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The Influence of Digital Transformation and Information Management on the Efficiency of Hospital Services

Pengaruh Transformasi Digital dan Manajemen Informasi terhadap Efisiensi Layanan Rumah Sakit B

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ABSTRACT

Background: Digital transformation in the health sector aims to improve the quality and efficiency of services. However, the implementation of SIMRS, RME, and SATUSEHAT still faces various obstacles, such as infrastructure limitations, low digital literacy among health workers, and data security issues. Evaluating the effectiveness of digitization and the factors that influence it is important.

Objective: This study aims to analyze the influence of digital transformation and information management on the efficiency of healthcare services at Hospital B.

Methods: This study uses a quantitative correlational approach with a Likert scale questionnaire. A total of 57 respondents from healthcare workers and management were selected using purposive sampling. Data were analyzed using multiple linear regression after undergoing validity, reliability, and classical assumption tests.

Results: The majority of respondents were female (63%), had more than 10 years of work experience (58%), and held functional positions (62%). Digital transformation did not significantly affect service efficiency ($p = 0.432$), while information management had a significant effect ($p = 0.012$). Both variables explained 19.8% of the variation in service efficiency ($R^2 = 0.198$).

Conclusion: Hospitals are advised to prioritize strengthening information management through enhancing human resource capacity, integrating information systems, and developing digital infrastructure. Further research is recommended to explore other variables such as organizational culture and digital leadership.

Keywords: Digital Transformation, Information Management, Service Efficiency, Hospitals, SIMRS

ABSTRAK

Latar Belakang: *Transformasi digital di sektor kesehatan bertujuan untuk meningkatkan mutu dan efisiensi layanan. Namun, implementasi SIMRS, RME, dan SATUSEHAT masih menghadapi berbagai hambatan, seperti keterbatasan infrastruktur, rendahnya literasi digital tenaga kesehatan, serta isu keamanan data. Evaluasi terhadap efektivitas digitalisasi dan faktor-faktor yang memengaruhinya menjadi penting.*

Tujuan*: Penelitian ini bertujuan menganalisis pengaruh transformasi digital dan manajemen informasi terhadap efisiensi layanan kesehatan di Rumah Sakit B.*

Metode: *Penelitian ini menggunakan pendekatan kuantitatif korelasional dengan kuesioner skala Likert. Sebanyak 57 responden dari tenaga kesehatan dan manajemen dipilih secara purposive sampling. Data dianalisis menggunakan regresi linier berganda setelah melalui uji validitas, reliabilitas, dan asumsi klasik.*

Hasil *Mayoritas responden adalah perempuan (63%), memiliki masa kerja >10 tahun (58%), dan menduduki posisi fungsional (62%). Transformasi digital tidak berpengaruh signifikan terhadap efisiensi layanan ($p = 0,432$), sedangkan manajemen informasi berpengaruh signifikan ($p = 0,012$). Kedua variabel menjelaskan 19,8% variasi efisiensi layanan ($R^2 = 0,198$).*

Kesimpulan: *Rumah sakit disarankan memprioritaskan penguatan manajemen informasi melalui peningkatan kapasitas SDM, integrasi sistem informasi, dan pengembangan infrastruktur digital. Penelitian lanjutan disarankan mengeksplorasi variabel lain seperti budaya organisasi dan kepemimpinan digital.*

Kata Kunci: *Transformasi Digital, Manajemen Informasi, Efisiensi Layanan, Rumah Sakit, SIMRS*

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INTRODUCTION

Digital transformation in healthcare is a strategic effort to increase the efficiency of hospital services through the application of information technology and management systems that improve the accessibility, accuracy, and speed of health services (Santoso et al., 2025). In its implementation, challenges such as infrastructure readiness, competence of medical personnel in the use of technology, and regulations related to the security and privacy of patient data are still an obstacle (Pesqueira et al., 2025).

Health information management systems have an important role in supporting data-based decision making. If this system is not managed optimally, it can cause operational inefficiencies, such as delays in service and medical recording errors that have the potential to reduce the quality of hospital services (Oloyede, et al., 2023).

Patients as service recipients benefit from digitization, such as easy access to electronic medical records and telemedicine services (Izza et al., 2024). In the regulatory aspect, the government plays a role in formulating policies, providing infrastructure, and ensuring compliance with security standards and data protection of health information systems. The success of the digital transformation of the health sector is highly dependent on the synergy and readiness of all relevant parties (Pesqueira et al., 2025).

Hospital health services, digital transformation and information management include various stakeholders, ranging from medical personnel, hospital management, patients, to the government as a policy regulator (Santoso et al., 2025).

Globally, digital transformation of the healthcare sector is a priority, especially after the COVID-19 pandemic, which accelerated the adoption of medical technology. Developed countries such as the United States and the United Kingdom have widely implemented electronic medical records (*EHR*) and developed artificial intelligence (*AI*) to support diagnosis and patient data management. Telemedicine services are also growing rapidly, facilitating online medical consultations in areas with limited access (Saputra Mokoagow et al., 2024).

The digitization of health services in Indonesia according to the Blueprint for Digital Health Transformation 2024 focuses on the implementation of SIMRS and the SatuSehat platform for data integration between facilities. However, major obstacles such as limited infrastructure, low digital literacy of medical personnel, and data security issues still hamper the process (Kemenkes, 2021).

In planning, hospitals often lack infrastructure and local strategic planning (Erwin et al., 2023). During implementation, medical personnel resistance, system complexity, and software incompatibilities pose challenges (Naurah et al., 2024) , while evaluation is hampered by weak monitoring and the absence of consistent success indicators (Malahayati & Syamsuar, 2022).

The research site was chosen because RS B is a new hospital that started operations in early 2024, is undergoing digitization of services, and has an evolving information management structure. This condition is an ideal context for analyzing the relationship between digital transformation, information management, and service efficiency. This research aims to provide an empirical basis for policy makers in formulating information technology-based service improvement strategies.

The study of Santosa et al. (2023) shows that SIMRS can reduce patient waiting time and improve the accuracy of medical records. Rambe et al. (2025) highlighted the contribution of information systems to the achievement of the quadruple aim, namely improving service

quality, cost efficiency, health worker welfare, and patient satisfaction.

1. Digital transformation

Digital transformation is a systematic change in an organization through the use of digital technology to improve operational efficiency, service effectiveness, and competitiveness (Santoso et al., 2025). In the health sector, digital transformation expands access to medical services, accelerates patient data management, and improves the quality of accurate and efficient data-based decision making (Syahwali et al., 2023).

In its application, organizational digital transformation includes several main dimensions, one of which is the technological dimension which includes the adoption of software and digital infrastructure such as hospital information systems and artificial intelligence for patient data analysis (Dameria & Jane, 2025). The organizational dimension focuses on the readiness of organizational structures, digital leadership, and change strategies in the face of technological innovation (Santoso et al., 2025). The human resources dimension focuses on increasing the competence of the workforce in adapting to new technologies and changing organizational culture that is more supportive of digitalization (Mubarokah & Pribadi, 2025). Finally, the policy and regulation dimension plays a role in ensuring compliance with legal standards and data protection in the implementation of digital systems (Pesqueira et al., 2025).

2. Information Management

Information management is a systematic process of collecting, storing, processing, and distributing information to support more effective and efficient decision making in an organization (Maha et al., 2025). In the health sector, for example, the implementation of hospital management information systems (SIMRS) has helped in the management of electronic medical records, patient administration, and optimization of digital-based health services (Fladyan Grace Wulur et al., 2023).

The concept of information management in organizations is supported by Management Information Systems Theory, which emphasizes the important role of technology in improving the efficiency and effectiveness of information management (Westerhof et al., 2025) . This theory explains that organizations need to develop integrated information systems in order to manage data more systematically and support data-based decision making (Ennajeh et al., 2025) . In addition, the Knowledge-Based View reveals that information is a strategic asset that must be managed properly to create a sustainable competitive advantage (Syahwali et al., 2023).

Information management in an organization can be categorized into several key dimensions. The technology dimension includes hardware and software used to support data management as well as information security systems (Senthilrajah & Ahangama, 2025). The organizational dimension involves policies, management structures, and strategies for managing information effectively (Silitonga, 2019) . The human resources dimension focuses on the competence of the workforce in utilizing information systems as well as the organizational culture that supports information digitization (Chang et al., 2012). Finally, the regulatory and policy dimension relates to compliance with legal and ethical standards in data management and protection, especially in sectors that rely heavily on sensitive information such as health (Pesqueira et al., 2025).

Effective information management contributes significantly to operational efficiency, accelerated decision-making, and increased organizational transparency (Westerhof & Bos, 2025) . In the healthcare sector, structured information systems

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enable real-time access to patient data, reduce redundancy, and strengthen coordination between units, resulting in improved quality of care and patient safety (Pesqueira et al., 2025; Putri et al., 2025).

3. Efficiency of Health Services in Hospitals

Healthcare efficiency in hospitals refers to the optimization of resources, time, and manpower to provide quality medical services at minimal cost (Santosa et al., 2023) . This concept aims to ensure that every aspect of health services runs effectively without reducing the quality of care provided to patients (Mubarokah & Pribadi, 2025). The efficiency of hospital services can be measured from various aspects, including the duration of patient waiting time, utilization of medical facilities, as well as the ratio of health workers to the number of patients served (Biantara & Dety Mulyanti, 2023).

The concept of efficiency in healthcare in the theory of production efficiency, explained that hospitals must allocate their resources optimally to achieve maximum service output at controlled costs (Pesqueira et al., 2025). Another theory of *Lean Healthcare* emphasizes the elimination of waste in the healthcare system, such as the reduction of patient waiting times and simplification of administrative processes, in order to improve operational efficiency (Westerhof et al.,2025). Meanwhile, integrated health system theory is also relevant in this context, as it highlights the importance of information technology integration and coordination between service units to improve the efficiency and effectiveness of hospital services (Ahmad Juan Syahwali et al., 2023).

Good information management ensures accurate and real-time data management, so that medical personnel can make quick and appropriate decisions (Ponggele et al., 2025). Effective information systems also improve service efficiency by reducing patient waiting times, speeding up administration, and optimizing medical facilities (Naurah et al., 2024). Thus, optimal implementation of digital transformation improves information management and service efficiency operationally, technologically, and financially (Vissers et al., 2022).

Based on this background, this study aims to analyze the effect of digital transformation and information management on healthcare efficiency in hospitals, focusing on the role of digital technology in improving information management and operational efficiency. The results are expected to provide recommendations for hospital managers for effective and sustainable digitalization strategies.

MATERIALS AND METHODS

This study uses a quantitative method with a survey approach to analyze the effect of digital transformation and information management on the efficiency of health services in hospitals. Data were collected through questionnaires distributed to health workers and hospital management, in accordance with the approach used in previous studies by Zhang et al., (2025) and Syahwali et al., (2023).

A. Research Design

This study uses a correlational quantitative design with multiple linear regression analysis methods to measure the effect of digital transformation and information management on health service efficiency in hospitals (Pandey et al., 2024) . Before conducting regression analysis, the research instrument was tested for validity and reliability to ensure the accuracy of data measurement (Hardani, et. al., 2020). Furthermore, classical assumption tests were conducted including tests of normality, multicollinearity, and heteroscedasticity to ensure that the

regression model meets the necessary statistical requirements (Muin, 2023).

A quantitative correlational approach was applied with data collection carried out in one period of time, namely during October to December 2024, to measure the relationship between variables simultaneously (Nurfalah et al., 2023). The three-month period was specifically used for the data collection process and initial analysis; while the proposal design stage, further data processing, and writing of research results were carried out outside this time span to ensure adequate quality and depth of analysis

B. Population and Sample

The study population included all health workers and managerial staff directly involved in service delivery and information management at Hospital B, including doctors, nurses, medical record personnel, administrative officers, and IT unit managers. This population was selected because they have understanding and experience related to the implementation of digital transformation and management of information systems that affect the efficiency of health services. Based on the staffing data of Hospital B in 2024, the total number is about 135 people.

The research sample is part of the population taken by purposive sampling by considering direct involvement in the use of digital technology and information management systems at Bhayangkara Hospital. The sample size was determined based on the Slovin formula from 135 populations using a margin of error of 10% to a total of 57 respondent samples according to quantitative research (Duevel, 2020).

C. Data Retrieval Technique

This study uses data collection techniques through questionnaire surveys distributed online using google forms to health workers and hospital management to measure the effect of digital transformation and information management on healthcare efficiency (Creswell, 2018).

The questionnaire used a Likert scale to measure respondents' perceptions of digital transformation, information management, and healthcare efficiency (Muin, 2023). The purposive sampling technique was applied with the criteria of hospitals that have implemented digitalization (Sugiyono, 2020) . Inclusion criteria include health workers and administrative staff who have worked for at least one year, are involved in the service or use of information systems, and are willing to fill out the questionnaire. Meanwhile, the exclusion criteria included respondents who were not actively working, not willing to participate, or filled out the questionnaire incompletely.

D. Research Instrumens

The research instrument used in this study was a closed questionnaire with a 5-point *Likert* scale to measure respondents' perceptions of digital transformation, information management, and healthcare efficiency, with a rating range from 1 (strongly disagree) to 5 (strongly agree). This scale was chosen because it is able to provide adequate response variation and facilitate quantitative analysis in socio-empirical research (Sugiyono, 2020).

The Likert scale is used because it is able to capture variations in the level of agreement of respondents and produce quantitative data suitable for inferential analysis (Sugiyono, 2020). The instrument is prepared based on theory and previous research in order to measure variables validly and reliably. The validity test results show that all items have r-count> r-table (0.261) and significance <0.05. The reliability test shows a Cronbach's Alpha value of 0.799 for digital transformation, 0.700 for information management, and 0.838 for service efficiency, all of which are above 0.7, so the instrument is declared reliable and suitable for use.

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E. Data Analysis Technique

This study uses multiple linear regression analysis method to measure the effect of digital transformation and information management on the efficiency of home health services (Pandey et al., 2024). Before regression analysis was conducted, the research instruments were tested for validity and reliability to ensure the accuracy of data measurement (Hardani et al., 2020).

Furthermore, the classical assumption test includes normality, multicollinearity, and heteroscedasticity tests to ensure that the regression model meets the necessary statistical requirements (Muin, 2023).

F. Research Ethics

This study applies the principles of research ethics to ensure that the process of data collection and analysis is carried out responsibly and in accordance with academic standards and obtains a letter of recommendation from the Education and Research Affairs under the Subdivision of Binfung hospital with Number: SRk/002/X/KES.23.2./2024/Rumkit.

All participants were given *informed consent*, which explained the purpose of the research, participant rights, and guaranteed the confidentiality of their personal data (Sugiyono, 2020). Participation in this research is voluntary without coercion, and does not cause consequences for those who refuse. All data is kept confidential and used solely for scientific purposes, in accordance with the principles of anonymity and confidentiality (Duevel, 2020).

RESULT AND DISCUSSION

This study analyzes the effect of digital transformation and information management on the efficiency of health services at Bhayangkara Hospital. The results of statistical analysis using Pearson correlation and multiple regression showed a significant relationship between the variables tested, illustrating how the application of digital technology in hospital information systems affects operational efficiency and patient service quality.

Table 1. Demographics of Respondents on the Effect of Digital Transformation and Information Management on Health Service Efficiency at Bhayangkara Blora Hospital

No	Variables	Category	n	%
1.	Gender	Male	21	37
		Female	36	63
2.	Length of Service	< 5 Years	12	21
		5-10 Years	12	21
		> 10 Years	33	58
3.	Position	Functional	35	62
		Structural	11	19
		Management	11	19

The majority of respondents in this study were female (63%) with >10 years of service (58%) and occupied functional positions (62%), reflecting direct involvement in the operation and implementation of hospital information systems.

Training programs and adaptation to digital systems need to be adjusted to be optimally accepted by female workers, especially in health information management and digital services that demand speed Pedro and Tahapary (2025) emphasize the importance of gender inclusiveness in technology development to avoid acceptance gaps. Several studies show that female workers tend to focus more on aspects of ease of use, clarity of instructions, and responsive technical support, while men emphasize system efficiency and data processing speed (Morisna & Hidayat 2025; Pamungkas et al., 2023).

Most of the hospital workforce is highly experienced, with 58% of respondents having worked for more than 10 years. Long tenure reflects a deep understanding of the hospital system. Sinubu et al., (2021) stated that tenure increases organizational knowledge, while

Kusumadewi et al. (2023) emphasized its role in decision making and information technology adaptation.

With long experience, they certainly have a good understanding of the procedures and challenges that exist in the workplace. According to Ahmad Juan Syahwali et al. (2023) , a workforce with a long tenure tends to have a deeper understanding of the systems and procedures that exist in the organization, and can play an important role in the experience-based decision-making process.

The use of information systems and digital services by hospital staff is strongly influenced by their level of experience and readiness to adopt new technologies. A study by Ahmed et al. (2025) shows that staff who are already familiar with digital work processes tend to accept and utilize SIMRS more quickly and effectively, thus improving operational efficiency.

Hospitals need to have long experience in handling health service operations, so they understand the systems and procedures deeply (Tilahun et al., 2025) This supports the successful implementation of service digitization in hospitals. The dominance of functional personnel indicates the hospital's focus on technical efficiency and direct services, while fewer managerial roles reflect limited strategic support and management of organizational change (Zhao et al., 2024).

The proportion of workers with more than 10 years of experience and the dominance of functional positions reflect the stability of the workforce, which is a strategic asset to support the effectiveness of digital transformation and information management. Stable and adaptive organizations are better equipped to deal with change, accelerating the transformation process (Fadaie et al., 2023).

The regression model shows a moderate positive correlation between the independent and dependent variables with a value of R = 0.445 (Costigliola, 2019). However, the R^2 value of 0.198 indicates that only about 19.8% of the data variability can be explained by the model, while 80.2% is influenced by other factors outside the model, indicating limitations in explaining variability thoroughly (Widgery, 1988).

The lower Adjusted R^2 value (0.166) and the large Standard Error of the Estimate (3.912) indicate that this model is still not accurate in predicting the value of the dependent variable (Widgery, 1988). To improve accuracy, it is recommended to add more relevant independent variables or use more complex regression techniques such as multivariate regression or *machine learning methods*. Thus, improving this model can improve the predictive and explanatory ability of existing data (Sugiyono, 2020).

Table 2. Regression Model Fit

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.445	0.198	0.166	3.912

Table 3. ANOVA Analysis

No.	Source	Sum of Squares	df	Mean Square	F	Sig.
1.	Regression	128.024	2	64.012	6.243	0.004
2.	Residuals	515.234	53	9.724		
3.	Total	643.258	55			

The *ANOVA* analysis results show that the regression model is statistically significant with p = 0.004. However, the *Sum of Squares Residual* value of 515,234 and *Mean Square Residual* of 9,724 indicate that there is variation in the data that is not explained by the model, so other factors need to be considered to improve prediction accuracy.

The F value of 6.243 indicates that this regression model explains data variability better than a model without independent variables. With a significant p value, this model is feasible to use because it statistically contributes to reducing data uncertainty (Sugiyono, 2020).

Table 4. Regression Coefficients

No.	Variables	Coefficient B	Std. Error	*t* Count	Sig. (*p*)
1.	Constant	20.815	2.934	7.094	0
2.	Digital Transformation (X1)	0.061	0.077	0.792	0.432
3.	Information Management (X2)	0.354	0.135	2.611	0.012

Based on the regression results, Digital Transformation (X1) has no significant effect on the efficiency of health services at Bhayangkara Hospital, with a *p* value = *0.432*, which is greater than *0.05*. This may be due to the suboptimal implementation of digital transformation or the lack of adequate understanding and training for medical personnel and hospital staff.

Research by Popa et al., (2018) shows that although organizations invest heavily in digital technologies, their impact is only felt if they are applied according to practical needs and accompanied by adequate training.

In contrast, Information Management (X2) was shown to have a significant influence on healthcare efficiency with a *p* value = *0.012*, which is less than *0.05*. This suggests that effective information management plays an important role in improving hospital operations. Good information management accelerates decision-making, improves response and strengthens coordination, making it important for hospitals to focus on information management to improve service performance and efficiency (Santosa et al., 2023).

Previous research shows findings that are relevant to the results of this study related to Digital Transformation (X1) and Information Management (X2) at Bhayangkara Hospital. Majeed et al. (2024) found that a good information management system improves coordination and efficiency of decision making, in line with the results that Information Management (X2) has a significant effect *(p = 0.012)* on service efficiency. Similar findings were put forward by Sihole et al. (2024) , which states that efficient information management can reduce medical errors and speed up response, thereby improving hospital operational efficiency.

Previous research has also consistently shown that digital transformation and information management have an important role in improving the efficiency of healthcare services in hospitals (Santoso et al., 2025; Rambe et al., 2025) highlighted that good information systems contribute to achieving the quadruple aim, including improved service quality, cost efficiency, and patient satisfaction. Meanwhile, Putri et al., (2025) emphasized that the successful implementation of digital technology is highly dependent on the usability aspect and the availability of training for medical personnel, which are key factors in supporting hospital operational efficiency.

The results of this study on the contrary, for the Digital Transformation variable (X1) had no significant effect (*p = 0.432*), in line with the findings of Sariyildiz (2025) which shows that challenges such as unprepared infrastructure and lack of training often hinder the effectiveness of digitalization.

Zhang et al. (2025) also emphasized the importance of organizational readiness and training in the success of digital transformation. This suggests that without such support, the potential of digitalization is difficult to realize to its full potential.

The low influence of digital transformation in this study could also reflect the lack of integration between new technology and existing work processes. According to Aqil & Rumianti (2025), adjustments to work systems and organizational culture, digital technology is difficult to have a real impact on

performance. Therefore, hospitals must ensure the thorough integration of digital innovations in the service process.

Robust information management enables real-time response and flexibility in hospital operations. Accurate information makes it easier for medical personnel to make quick and appropriate decisions, so investment in integrated information systems is essential to maintain the quality of health services (Westerhof & Bos, 2025).

CONCLUSION

This research shows that information management plays a significant role in improving service efficiency at Bhayangkara Hospital, while digital transformation has not had a significant impact. The success of digitalization depends on organizational readiness, such as infrastructure and workforce competencies. Therefore, strengthening information management through SOPs, staff training, and data security policies should be prioritized. Digital transformation needs to be carried out in a targeted manner with an integrated system, adequate infrastructure, and management commitment. These findings provide a strategic basis for the development of health services in the digital era.

LIMITATIONS OF THE RESEARCH

This research has several limitations, which are the basis for further research to expand the sample population and use other broader methods.

1. The sample of respondents was limited to one hospital, so the results may not be generalizable to other hospitals with different characteristics.
2. The use of perception-based questionnaires may lead to subjective bias from respondents.
3. This study used a correlational quantitative design so that it could not identify cause-and-effect relationships definitively.

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