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Implementation of the Regional Hospital Management Information System to Improve the Quality of Operational Services

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Abstract

The increasing demand for fast, accurate, and efficient healthcare services has encouraged hospitals to integrate technology into their operations. This study aims to analyze the impact of implementing the Hospital Management Information System on the quality of operational services in the registration department of Aek Kanopan Regional General Hospital. A descriptive quantitative approach with a one-group pretest–posttest design was used to measure changes in employees' perceptions before and after system implementation. Data were collected from 60 employees selected from a total of 150 using Slovin's formula with a 10% margin of error, and analyzed using the Wilcoxon Signed Rank Test. The results showed an increase in the mean score of the Hospital Management Information System from 19.9 to 20.6 and in service quality from 20.3 to 20.9, with significance values of 0.007 and 0.029 ($p < 0.05$), indicating significant improvement. The system enhanced work efficiency, service speed, data accuracy, and inter-unit coordination, although issues such as limited training and network instability remain challenges. Strengthening infrastructure, providing continuous training, and regular evaluations are recommended to optimize the system's effectiveness and improve hospital service quality.

Keywords

Healthcare Technology, Hospital Efficiency, Service Quality, Registration Department.

1. Introduction

Health services are an essential part of basic community needs that demand speed, accuracy, and precision in their implementation. Along with the progress of time, the demand for quality health services continues to increase. Hospitals, as advanced healthcare institutions, are required to keep up with the development of information technology to improve the quality of services provided. One of the significant innovations in hospital service systems is the implementation of the hospital management information system (Pane et al., 2023).

A hospital management information system is an integrated information technology-based system designed to support all hospital operational and managerial activities, ranging from patient registration and electronic medical records to coordination between units such as outpatient services, laboratories, and pharmacies (Rifarsih et al., 2022; Laila et al., 2024). The implementation of a hospital management information system has proven to accelerate service processes, reduce administrative errors, and enhance staff satisfaction. The use of information technology has been shown to improve the effectiveness of various processes. For example, mobile learning enables more interactive and efficient learning, demonstrating that technology can serve as a means of improving service quality, including in healthcare services through the hospital management information system (Nasution, 2016; Ardaani & Sholahuddin, 2025).

Aek Kanopan Regional General Hospital has implemented a hospital management information system since 2020. This system is primarily focused on supporting services across various units, including the patient registration department, which serves as the starting point of the healthcare service process. Efficient and integrated registration is a key factor in shaping patients' initial perceptions of the overall quality of the hospital. Therefore, the implementation of a hospital management information system in the registration unit becomes a crucial focus in evaluating the quality of hospital services (Sagala & Marbun, 2022).

Gultom et al. (2023) emphasized that implementing a hospital management information system can improve healthcare service performance. However, the effectiveness of its implementation still faces challenges, such as limited employee training, difficulties in using the system, and technical constraints, such as network disruptions. These factors have the potential to hinder smooth hospital operations and shape employee perceptions of the quality of the hospital management information system (Nugroho et al., 2023; Handayani et al., 2025).

Laila et al. (2024) explained that previous research has focused largely on the technical benefits of hospital management information systems, such as data integration and accelerated service processes, but has not focused in-depth on the experience of internal users, particularly employees. Employee perceptions play a strategic role in determining system effectiveness, as they interact directly with the hospital management information system during every service process.

Marzuq and Andriani (2022) and Gonzales (2024) emphasized the importance of service quality in building user satisfaction, while Parasuraman et al. (1988) demonstrated, using the SERVQUAL model, that service quality is influenced by the dimensions of compassion, responsiveness, and assurance. However, research specifically linking employee perceptions of hospital management information system implementation to operational quality, particularly in the patient registration unit, is still rare (Ilham & Yuniarti, 2022). Therefore, there is a significant research gap to examine how employee perceptions of hospital management information systemaffect the quality of operational services, so that it can be the basis for optimizing hospital services in the future (Ichsan & Karim, 2021; Irawan et al., 2023; Pane et al., 2023).

This study is expected to contribute both practically and academically. Practically, the findings may serve as a reference for Aek Kanopan Regional General Hospital in optimizing the implementation of hospital management information system to improve the efficiency of registration services and inter-unit coordination. Academically, this research enriches empirical studies on the effectiveness of hospital management information systems in regional hospitals and can serve as a reference for future studies in the field of healthcare service management.

This study aims to analyze differences in employees' perceptions of hospital management information system implementation before and after its adoption, as well as its impact on the quality of operational services. By comparing questionnaire results before and after the implementation of the hospital management information system, this research is expected to provide empirical insights into the impact of management information system implementation on service quality at Aek Kanopan Regional General Hospital.

2. Literature Review

2.1. Hospital Management Information System

The hospital management information system is a computer-based information system that manages all hospital service processes in an integrated manner, ranging from administration and medical services to managerial support systems. This concept aligns with the dynamics of the industrial revolution 4.0, which emphasizes digitalization, automation, and the use of the Internet of Things (IoT) to enhance operational effectiveness. Purba et al. (2021) state that the application of digital technology is capable of transforming manual systems into faster, more accurate, and more efficient processes, thereby supporting competitiveness and organizational sustainability, including in healthcare services. Gultom et al. (2023) state that a hospital management information system supports electronic data recording, speeds up service flows, reduces errors, and enhances hospital unit coordination. Nasution and Aslami (2022) define an information system as a computer-based system providing information for users with similar needs, covering organizational and external environments.

The optimal implementation of a hospital management information system can improve employee work efficiency, accelerate patient services, and increase transparency in managing medical data (Santosa et al., 2024). In terms of improving user satisfaction, the hospital management information system is not only an administrative tool but also contributes to reducing registration service time by up to 30% while simultaneously improving the job satisfaction of administrative staff.

As the latest innovation in information system development, the integration of Artificial Intelligence (AI) within hospital management information system can accelerate data access, support in-depth analysis, and enhance the efficiency and security of strategic decision-making, although it still requires careful data management (Takain & Katmini, 2021; Fadli et al., 2024). Gultom et al. (2023) emphasize the hospital management information system's role in hospital efficiency, but lack evidence on service quality. Purba et al. (2021) and Santosa et al. (2024) note digitalization and performance benefits. This study examines hospital management information system impact on perceived service quality.

2.2. Quality of Operational Services

The quality of hospital operational services can be measured from several aspects, such as service speed, accuracy of information, work efficiency, and staff responsiveness (Prasetyo et al., 2024). Service is an activity provided by companies, individuals, or clients as an intangible offering. It is one of several activities designed for those who require it (Ichsan & Karim, 2021; Zebua et al., 2024). If a company is perceived as unable to satisfy customer needs through its products and services, then

the service is considered to be of low quality. Business location refers to the place where a business is physically located or operates to produce goods and services while considering financial aspects (Irawan et al., 2023). In this study, variable Y is operational service quality, which is influenced by employees' perceptions of the ease and effectiveness of the system used.

Service quality is an important indicator in assessing the success of hospital management systems. One widely used approach to measure service quality is the Servqual theory developed by Parasuraman et al. (1988). This theory states that service quality can be measured through five main dimensions: reliability, responsiveness, assurance, empathy, and tangibles (Aghazadeh et al., 2013; Marzuq & Andriani, 2022). When hospital management information system is used to strengthen these five dimensions, the quality of services at the initial stage in hospitals will significantly improve (Sagala & Marbun, 2022).

Meanwhile, in operational management theory, registration services are considered part of the input process within the healthcare service chain. Operational management emphasizes the importance of time efficiency, workforce optimization, and the use of technology to accelerate service processes. In this context, hospital management information system acts as an automation solution that can reduce manual administrative burdens, minimize queues, and facilitate inter-unit coordination (Pane et al., 2023; Arora & Ikbal, 2023). Studies show that the use of hospital management information system-based digital registration systems can reduce service time by up to 40% and increase patient satisfaction in terms of speed and clarity of procedures. Therefore, the implementation of information systems in operational aspects such as registration should be viewed as a long-term investment in hospital quality management (Chang et al., 2012; Rizqulloh & Putra, 2024).

3. Methods

This study employs a descriptive quantitative approach with a one-group pretest-posttest (before–and–after) design. The population in this study consists of all employees working at the hospital who use the hospital management information system in their operations, totaling 150 individuals. The sample was determined using the Slovin formula with a margin of error of 10%, as follows:

$$n = \frac{N}{1+N\,(e)^2} = \frac{150}{1+150\ (0{,}10)^2} = \frac{150}{2{,}5} = 60$$

The data, which are ordinal in scale and collected from the same respondents under two different conditions (before–after), were analyzed using the Wilcoxon Signed Rank Test to examine the differences. The data were collected through a closed-ended questionnaire using a 5-point Likert scale. The questionnaires were distributed from July 17–24, 2025, to 60 respondents.

After the implementation of the hospital management information system at Aek Kanopan Regional General Hospital, notable improvements were observed in both information management and operational service quality within the registration department. In terms of management information, the availability of computer and network infrastructure at the registration counter became more adequate and supportive of digital-based operations. Data security and privacy also improved significantly, as patient information entered during registration is now protected and accessible only to authorized personnel, unlike the previous manual system where data could be accessed freely. The integration between service units has become more efficient, with patient data entered at the registration counter now directly connected to the outpatient clinic, laboratory, and pharmacy. The system is also more user-friendly, allowing staff to easily understand and operate it for both new and returning patients. Moreover, hospital management now provides regular

training and technical support for system use, which was previously unavailable under the manual process.

Regarding operational service quality, the registration process has become faster and more efficient, supported by digital data input and automated queue number printing. Data accuracy has also increased, as errors in recording and loss of physical documents have been minimized. Coordination between service units is now smoother and more immediate, enabling better workflow continuity. The system has positively impacted employees' task performance by simplifying procedures and supporting daily work execution. The hospital management information system has enhanced work efficiency, service speed, data reliability, and inter-unit coordination, marking a significant improvement compared to manual operations prior to its implementation.

4. Results

This section explains the characteristics of respondents involved in the study. The respondent profile provides a general overview of their background, which helps strengthen the interpretation of research findings. The following table presents the respondent profile:

Table 1. Respondent Characteristics

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Male	32	53.3
	Female	28	46.7
Age	20–30 years	26	43.3
	30–40 years	30	50
	40–60 years	4	6.7
Educational Background	High School/Vocational	5	8.3
	Diploma (D3)	14	23.3
	Bachelor's Degree (S1)	40	66.7
	Master's Degree (S2)	1	1.7
Work Division	Registration Counter	11	17.57
	Outpatient Unit	7	11.71
	Medical Records	11	17.57
	Inpatient Unit	11	17.57
	Emergency Unit (ER)	9	15.58
	Others	1	1.7
Years of Service	< 1 year	3	5
	1–3 years	23	38.3
	3–5 years	27	45
	5–7 years	7	11.7

Table 1 presents the characteristics of the respondents in the Aek Kanopan Regional General Hospital. Based on gender, the majority of respondents were male (53.3%) compared to female (46.7%). In terms of age, the largest group was in the 30–40-year range (50%), followed by 20–30-year-olds (43.3%), and the remaining 40–60-year-olds (6.7%). Educational background was dominated by bachelor's degree graduates (66.7%), followed by diploma (23.3%), high school/vocational school (8.3%), and only a few had master's degrees (1.7%). In terms of work units, respondents were distributed relatively evenly across the registration counter (17.57%), medical records (17.57%), inpatient (17.57%), emergency department (15.58%), outpatient (11.71%), and other categories (1.7%). Based on length of service, the majority had worked for 3–5 years (45%) or 1–3 years (38.3%), while only 5% had worked for <1 year and 11.7% had worked for 5–7 years. These data indicate that respondents were generally of productive age, highly educated, and had considerable work experience in various service units.

Based on Table 1, a total of 60 respondents participated in this study. The majority were aged 30–40 years (50%), male (53.3%), and held a Bachelor's degree (66.7%). Most respondents had 3–5 years of work experience (45%), indicating that they had sufficient experience in operational services and were relatively adaptive to the implementation of hospital management information system.

Table 2. Descriptive Analysis of Pretest and Posttest Scores

	Pretest X	Posttest X	Pretest Y	Posttest Y
N	60	60	60	60
Mean	19.90	20.60	20.37	20.97
Median	20	21	21	22
Mode	21	21	21	21
Minimum	13	16	15	15
Maximum	23	23	23	24

Table 2 presents the pretest and posttest results, indicating an improvement in scores. For the hospital management information system variable (X), the mean increased from 19.90 to 20.60, the median from 20 to 21, and the minimum score from 13 to 16. For the service quality variable (Y), the mean increased from 20.37 to 20.97, the median from 21 to 22, and the maximum score from 23 to 24. These changes reflect an improvement in average values, an increase in the lowest score for variable X, and an increase in the highest score for variable Y after the posttest.

Graph of Average Pretest and Posttest Scores

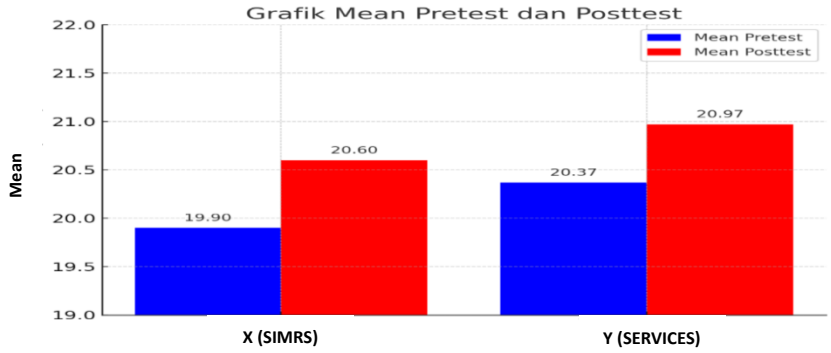

Figure 1. Comparison Diagram Before and After SIMRS

The comparison graph of scores in Figure 1 shows an average pattern of increase in both variables. The average hospital management information system score rose from 19.90 to 20.60, while service quality increased from 20.37 to 20.97. This improvement indicates that the use of a hospital management information system contributed to better scores in both variables, and the Wilcoxon test results confirmed that the difference was statistically significant.

Table 3. Distribution of Scale Scores *Pretest and Posttest (X) and (Y)*

Test	Variable	Pretest (n)	Pretest (%)	Posttest (n)	Posttest (%)
Pretest and Posttest (X)	STS	1	1.7	0	0.0
	TS	5	8.3	1	1.7
	N	13	21.7	14	23.3
	S	22	36.6	24	40.0
	SS	19	31.7	21	35.0
Pretest and Posttest (Y)	STS	1	1.7	0	0.00
	TS	3	5.0	1	1.7
	N	11	18.3	12	20.0

Test	Variable	Pretest (n)	Pretest (%)	Posttest (n)	Posttest (%)
	S	25	41.7	25	41.7
	SS	20	33.3	22	36.6

Based on the pretest results in tables 4 and 5, most respondents were on scales 3 and 4. This indicates that even before the implementation of the hospital management information system, the majority of respondents already tended to agree that hospital services were still difficult to manage. After the posttest was conducted, the number of respondents at scales 4 and 5 increased further. This condition illustrates that after the implementation of the hospital management information system, respondents perceived an improvement, making hospital services easier and more accessible compared to before.

Table 4. Wilcoxon Test Variable X and Y

Variable	Test Statistics	After - Before
X	Z	-2.696[b]
	Asymp. Sig. (2-tailed)	0.007
Y	Z	-2.186[b]
	Asymp. Sig. (2-tailed)	0.029

Based on the analysis using the Wilcoxon Signed Ranks Test, the Z statistic value was -2.696 with a significance value (Asymp. Sig. 2-tailed) of 0.007. It can be concluded that there was a difference in respondents' perceptions before and after the implementation of the management information system at Aek Kanopan Regional General Hospital.

The significance value of 0.007 is smaller than the critical threshold of 0.05 (α = 5%), which indicates that there is a statistically significant difference between the scores before and after the treatment. Thus, it can be concluded that the treatment or intervention had a real effect on the observed variable.

Based on the analysis using the Wilcoxon Signed Ranks Test for the After-Before data, the Z statistic value was -2.186 with a significance value (Asymp. Sig. 2-tailed) of 0.029. The significance value of 0.029, which is smaller than the significance level of 0.05, shows that there was a statistically significant difference between the conditions before and after the treatment or intervention. This result indicates that the treatment had a real impact on the change in the observed variable. In other words, the difference that appeared was not coincidental but rather a direct effect of the intervention implemented. These findings also support the research hypothesis that the implementation of a hospital management information system resulted in a significant change in service quality.

Table 5. Descriptive Analysis of Variable Before and After

Variable	Statistics	N	Mean	Median	SD	SE
X	Before	60	19.9	20	1.475	0.190
	After	60	20.6	21	1.937	0.250
Y	Before	60	20.3	21	1.756	0.227
	After	60	20.9	22	1.948	0.252

From the Descriptive Analysis Table (X) in Table 5, the mean score increased from 19.9 before to 20.6 after the implementation of the hospital management information system. The median also rose from 20 to 21. The Standard Deviation (SD) slightly increased from 1.475 to 1.937, while the Standard Error (SE) rose from 0.190 to 0.250. These results support the Wilcoxon test findings, which showed a significant difference between the scores before and after.

From the Descriptive Analysis Table (Y) on Table 5, the mean score increased from 20.3 before to 20.9 after the implementation of the hospital management information system. The median remained at 21. The Standard Deviation (SD) slightly rose from 1.756 to 1.948, while the Standard Error (SE) increased from 0.227 to 0.252. These results support the Wilcoxon test findings, which indicated a significant difference in service quality before and after the implementation of the hospital management information system.

5. Discussion

The results of this study indicate changes in scores after the implementation of the hospital management information system in both variables studied, namely the hospital management information system (X) and service quality (Y). Based on the descriptive analysis, the average score of variable X increased from 19.9 in the pretest to 20.6 in the posttest, with the median rising from 20 to 21. Meanwhile, for variable Y, the average score increased from 20.3 in the pretest to 20.9 in the posttest, with the median increasing from 21 to 22. Although the increase is relatively small, it shows a positive direction of change after the implementation of the hospital management information system.

The comparison of pretest and posttest mean scores also reinforces these findings. In variable X, the mean score increased from 19.90 to 20.60, while in variable Y, it rose from 20.37 to 20.97. Both results are consistent with the descriptive analysis, which indicates improvement in scores after hospital management information system implementation (Supartiningsih, 2017; Anfal, 2020). The Wilcoxon Signed-Rank Test further clarifies that these score changes are statistically significant. For variable X hospital management information system, $Z = -2.696$ with $p = 0.007$ ($p < 0.05$), indicating a significant difference before and after the implementation of hospital management information system. Most respondents experienced an increase in scores, suggesting that hospital management information system implementation positively affected the hospital information system. For variable Y (Service Quality), $Z = -2.186$ with $p = 0.029$ ($p < 0.05$). This also indicates a significant difference between pretest and posttest scores, confirming that hospital management information system contributed to improving hospital service quality.

According to Purba et al. (2021) and Sriyasak et al. (2024), indicator-based analysis shows that the most significant improvements in hospital management information system variables were in infrastructure and facilities, data security and privacy, ease of use, and management support. For service quality, the most significant improvements were in service speed, inter-unit coordination, and work efficiency. Based on pretest and posttest scale analysis, there was a clear shift in employee perceptions before and after hospital management information system implementation. Before implementation, most respondents agreed with statements reflecting the weaknesses of the manual system, such as delays, inaccuracies, and limited coordination. After hospital management information system implementation, the response pattern shifted positively, with the majority of respondents acknowledging improvements in aspects of ease of use, security, integration, and management support. According to Irawan et al. (2023), a similar trend occurred in service quality, where respondents perceived faster, more accurate, and more efficient services. This shift confirms that hospital management information system has successfully addressed the weaknesses of the manual system while improving the quality of hospital services.

The results of this study are consistent with previous findings that state hospital management information system implementation can improve work efficiency, accuracy of records, and patient satisfaction. Aisah and Maharani (2024) emphasized that hospital management information system can simplify decision-making processes and improve hospital performance. Similarly, Sagala and Marbun (2022)

found that hospital management information system proved effective in increasing service efficiency. Thus, the results of this study affirm that hospital management information system optimization must continue with the support of hospital management and adequate health resources to ensure that improvements in service quality become more significant and sustainable.

Practically, the contribution of this research provides important implications for hospital management. The increase in hospital management information system scores demonstrates that this system can support the smooth operation of healthcare workers and administrative staff, while the improvement in service quality scores shows that the benefits are also directly experienced by patients. Therefore, hospital management information system can be considered a key strategy in efforts to improve the quality of healthcare services, both from the perspective of internal management and from direct service delivery to patients.

6. Conclusion

This study demonstrates that the implementation of the hospital management information system at Aek Kanopan Regional General Hospital has a positive impact on improving the quality of operational services, particularly in the patient registration department. The descriptive analysis shows an increase in mean and median, and an improvement in the distribution of value categories across both variables studied. The Wilcoxon Signed Rank Test also confirmed that the differences before and after the implementation of hospital management information system are statistically significant, with $p = 0.007$ for hospital management information system and $p = 0.029$ for service quality. The indicators that showed the greatest improvement in hospital management information systems were infrastructure and facilities, data security and privacy, user convenience, and management support. Meanwhile, the most noticeable improvements in service quality were in service speed, inter-unit coordination, and work efficiency. Thus, the hospital management information system plays an important role in strengthening the quality of hospital services.

Based on the research findings, it is recommended that hospitals strengthen their technological infrastructure, particularly by ensuring stable internet connectivity and adequate computer facilities, to optimize the implementation of the hospital management information system. Hospital management should also provide regular training and technical assistance to staff to ensure more effective and consistent use of the hospital management information system across all service units. Furthermore, the results of this study can serve as a reference for other regional hospitals in developing management information systems to improve the quality of healthcare services. This study is limited by its small sample size and short observation period, which may not capture the long-term effects of hospital management information system implementation. Future research should involve larger samples, multiple hospitals, and longitudinal designs to assess sustained impacts and explore factors influencing successful hospital management information system adoption and service quality improvement.

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