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Analysis of the Success of Outpatient Electronic Medical Records Implementation at Simpangan Hospital, Depok, in 2024

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Abstract

Digital transformation in healthcare promotes the adoption of *Electronic Medical Records* (EMR) to enhance efficiency and data accuracy. This research [A1] aims to analyze the success of EMR implementation in the outpatient unit of *Simpangan Depok Hospital*, focusing on technical, organizational, and user dimensions based on the DeLone & McLean model. A quantitative descriptive method was applied to 78 healthcare professionals. The results indicate that technological readiness, effective training, internal policy support, and user perception of benefits significantly contributed to EMR success. The system was considered optimally functional and positively impacted workflow efficiency and service quality. These findings confirm that EMR success stems from the synergy of system readiness, organizational support, and user acceptance. The research also reaffirms the applicability of information system evaluation models in regional hospital settings in Indonesia.

Keywords: Electronic Medical Record, Health Information Systems, Hospital, Implementation success, System Evaluation

INTRODUCTION

Digital transformation in healthcare service systems has become a global strategy to improve efficiency, accuracy, and the quality of medical services. [A1] *Electronic Medical Records* (EMR) are an essential part of this strategy, enabling patient data to be recorded, stored, and managed digitally to support evidence-based services. In the United States, over 90% of hospitals and clinics had fully adopted EMRs by 2023 (Daniels et al., 2025), and similar trends have been observed in many European countries. This system is considered effective in accelerating service processes, reducing medical errors, and improving coordination between service units (Nguyen et al., 2022).

However, the implementation of EMRs in developing countries still faces significant challenges. Common issues include limited digital infrastructure, resistance from healthcare workers, and inadequate training (Issac et al., 2025). Research by Kampman et al. (2025) indicated that non-technical factors, such as organizational policies and user motivation, also play a role in the success of digital health systems.

From a theoretical perspective, Rogers' *Diffusion of Innovation* approach explains that the success of technology adoption strongly depends on perceived benefits, social support, and organizational readiness. Furthermore, the *DeLone & McLean Information System Success Model* provides a framework for evaluating system quality, information quality, and service quality as determinants of organizational impact.

In Indonesia, the implementation of EMRs is a regulatory mandate based on Ministry of Health Regulation No. 24 of 2022. The national target requires all hospitals to implement EMRs by no later than December 31, 2023 (MoH RI, 2022). However, a 2022 PERSI survey revealed that only 50% of hospitals had implemented EMRs, and only 16% were able to optimize them (Surahman & Setiatin, 2024).

Research by Setiatin & Dewi (2025) at an outpatient hospital showed that EMRs do improve service quality through data accuracy and time efficiency. However, the implementation was not ideal due to issues such as system downtime and the need for technical staff to handle network disruptions.[A2]

In practice, *Simpangan Hospital* in Depok, a mid-level hospital in West Java, began its transition to EMRs in early 2024. [A3] Various issues with the previous manual system hampered service effectiveness, including difficulties in reading doctors' handwriting, lengthy processes in searching for medical records, and misplaced or missing documents. These situations led to delayed patient examinations and increased the risk of medical errors[A4].

Moreover, based on initial observations, there has not yet been systematic research assessing how effectively the EMR implementation at *Simpangan Hospital* has progressed, nor what factors support or hinder its success. This creates a significant research gap, particularly in regional hospitals that have not received much attention from evaluative academic studies.

Digital transformation in the global healthcare sector has accelerated the adoption of *Electronic Medical Records* (EMR) as a strategic tool to enhance service efficiency, accuracy, and interoperability. By 2023, over 90% of hospitals and clinics in the United States had fully integrated EMR systems, significantly reducing medical errors and improving care coordination (Daniels et al., 2025). Similar trends are observed across Europe, where EMRs support data-driven clinical decisions and streamline patient management. This shift underscores the critical role of digital health infrastructures in advancing universal health coverage and operational excellence in modern medical practice.

However, the implementation of EMR systems in developing countries, including Indonesia, continues to face substantial challenges. Limited technological infrastructure, insufficient training, and resistance among healthcare workers often hinder successful adoption (Issac et al., 2025). According to a national survey conducted by PERSI in 2022, only 50% of hospitals in Indonesia had implemented EMRs, with a mere 16% achieving optimal utilization (Surahman & Setiatin, 2024). This gap highlights persistent structural and human resource barriers that complicate digital transition in resource-constrained settings.

Previous studies have explored various dimensions of EMR implementation, often employing established models such as DeLone & McLean's Information System Success Model or Rogers' *Diffusion of Innovation* theory. For instance, research by Nguyen et al. (2022) emphasized the importance of system integration and user training, while Setiatin & Dewi (2025) identified technical support and

policy alignment as key enablers in outpatient settings. Nevertheless, most existing studies focus on large or national referral hospitals, leaving a significant gap in context-specific evaluations of mid-sized regional hospitals, which serve a large proportion of the population in countries like Indonesia.

This research addresses that gap by examining the implementation of EMR in the outpatient unit of *Simpangan Hospital*, a mid-level healthcare facility in Depok, Indonesia. The study is urgent due to the national mandate from the Indonesian Ministry of Health (Regulation No. 24 of 2022), which requires all hospitals to adopt EMR by the end of 2023. Evaluating the success factors and challenges in a real-world, regional context provides timely insights for policymakers and hospital administrators striving to meet regulatory deadlines and improve service quality.

The novelty of this research lies in its application of the DeLone & McLean model within an understudied hospital setting—a regional public hospital in Indonesia—incorporating technical, organizational, and user-perceptual dimensions into a unified evaluative framework. Furthermore, it combines quantitative survey methods with local policy analysis to offer a comprehensive understanding of EMR success determinants, which has not been extensively documented in similar contexts.

The aim of this research is to analyze the success factors in implementing outpatient EMRs at *Simpangan Hospital*, Depok, by examining technical, organizational, and user-related aspects. This research is expected to contribute theoretically to the literature on health information system evaluation and practically to hospitals in developing appropriate digitalization strategies.

By integrating information system theory, empirical findings, and local context, this research seeks to address the need for a more applicable and contextual evaluative model to support the improvement of EMR-based healthcare service quality in Indonesia.

RESEARCH METHODS

This research employs a quantitative approach with a descriptive-analytic design to analyze the success of *Electronic Medical Record* (EMR) implementation in the outpatient unit of *Simpangan Hospital*, Depok. This approach was chosen because it enables the identification of relationships between technical, organizational, and individual user variables in the health technology adoption process, while also statistically measuring the influence of these factors (Aldosari et al., 2020; Ibrahim et al., 2022).

The method used is a survey utilizing a structured questionnaire as the primary data collection instrument. The questionnaire was developed based on the *Information System Success Model* by DeLone and McLean (2016), which includes six dimensions: system quality, information quality, service quality, use, user satisfaction, and net benefits. This instrument has been widely adopted in hospital information system evaluation studies due to its reliability in assessing the effectiveness of digital systems in clinical environments (Nguyen et al., 2022; Barter & Cooper, 2021).

The research subjects consist of 78 healthcare workers directly involved in using the EMR in the outpatient unit of *Simpangan Hospital*. The population includes doctors, nurses, midwives, medical record staff, laboratory personnel, radiology staff,

pharmacists, and registration officers. The sampling technique used is purposive sampling, with inclusion criteria being staff who have used the EMR system for at least six months. This technique was chosen to ensure that respondents have sufficient experience interacting with the system (Pamuji et al., 2024).

Primary data sources come from the questionnaire distributed directly to respondents in May 2025. In addition, secondary data sources include hospital documents related to EMR implementation policies, internal evaluation reports, and academic references concerning the adoption of health information systems in healthcare facilities (Setiatin & Dewi, 2025; Surahman & Setiatin, 2024).

Data analysis tools include the latest version of IBM SPSS Statistics software. The analysis stages involve validity and reliability tests of the instrument using Pearson Product Moment and Cronbach's Alpha, as well as simple linear regression and coefficient of determination (R^2) tests to assess the influence between variables. These tests were selected as they are appropriate for modeling causal relationships among variables in a quantitative approach (Hamzah et al., 2021; Yoon et al., 2023).

Using this approach, the research is expected to produce a comprehensive overview of the success level of EMR implementation and its determining factors, based on a theoretical framework and empirically valid practices.

RESULTS AND DISCUSSION

The implementation of Electronic Medical Records (EMR) in the outpatient unit of Simpangan Hospital, Depok, has shown very positive results across various evaluative dimensions. In terms of technological readiness, most healthcare workers stated that hardware such as computers or laptops is adequately available, and the internet connection supports optimal system operations. The EMR system is also considered to be well-integrated across modules such as registration, medical records, and pharmacy. Additionally, the availability of responsive technical support is a significant added value in ensuring the continuous use of the system without major disruptions. These findings indicate that the *System Quality* dimension of the DeLone & McLean model has been fulfilled, serving as a strong foundation for the overall success of the system.

Furthermore, in terms of training and human resource competencies, approximately 82% of healthcare workers stated that the training provided was adequate in helping them understand how to use the EMR, and more than 84% found the training materials easy to understand and relevant to their duties. The user competency level is also relatively high, with the majority of respondents feeling confident in operating EMR features. The responsiveness of the IT team in providing technical assistance post-training further reinforced this positive perception. This indicates that the Service Quality and User Satisfaction aspects have been successfully achieved through a well-structured training process supported by ongoing assistance.

From a policy standpoint, most respondents stated that Simpangan Hospital has clear and supportive policies regarding EMR use. There are established procedures for addressing technical issues, and strong leadership support for system implementation is evident. This aspect reinforces the importance of organizational support, as theorized in Rogers' Diffusion of Innovation approach, which emphasizes the role of institutions and leadership in the successful adoption of technology.

Users' perceptions of EMR benefits also yielded very positive results. The majority of respondents stated that the system improves workflow efficiency and helps them provide more accurate and high-quality services. No respondents expressed disagreement with the benefits of the system, either in terms of improved record accuracy or its contribution to patient safety. These findings directly reflect the success of the Net Benefits dimension in the information systems evaluation framework, and demonstrate a high level of user acceptance of this digital innovation.

Finally, the overall assessment of EMR implementation success also shows encouraging results. Most healthcare workers stated that the implementation has been successful and has made a tangible impact on improving service quality. They also reported increased job satisfaction since using the EMR and actively recommended the continuation and development of the system. These overall findings confirm that the success of EMR implementation at Simpangan Hospital, Depok, is the result of synergy among technological infrastructure readiness, human resource competency, supportive organizational policies, and strong user acceptance. Thus, the evaluative approach based on the DeLone & McLean model has proven to be relevant and applicable in measuring the effectiveness of health information systems in the context of regional hospitals.

Discussion

The results of the research indicate that the implementation of Electronic Medical Records (EMR) in the outpatient unit of Simpangan Hospital, Depok, has been carried out very successfully, as assessed through various evaluative dimensions of information systems. Technological readiness, training effectiveness, internal policy support, user perceptions, and overall implementation outcomes received positive responses from the majority of respondents. With more than 80% of healthcare workers stating "Agree" or "Strongly Agree" to nearly all indicators, this suggests that the EMR system has been well accepted and functions as expected. These findings explicitly demonstrate that all elements of the Information System Success Model by DeLone & McLean (2016)—particularly System Quality, Service Quality, User Satisfaction, and Net Benefits—have been achieved.

Theoretically, this success can be explained through two main approaches. First, in the DeLone and McLean model, system, service, and information quality shape users' perceptions of usefulness and satisfaction, which ultimately influence the net benefits experienced by the organization and its users (DeLone & McLean, 2016). At Simpangan Hospital, the availability of devices, stable internet connectivity, and integrated EMR systems across service units contributed to a positive user experience. Second, Rogers' Diffusion of Innovation approach (2003) asserts that technology adoption is influenced by perceptions of relative advantage, social support, and organizational readiness. In this context, strong internal policy support and the active role of hospital leadership in promoting EMR use are key factors that accelerate comprehensive and sustainable system adoption.

These results reinforce findings from previous studies. Nguyen et al. (2022) noted that successful EMR implementation largely depends on training quality, user competence, and system integration. This is supported by Barter and Cooper (2021), who found that the success of hospital information systems is closely linked to organizational support and the quality of technical services. A research by Setiatin

and Dewi (2025) at an outpatient hospital also found that effective training and integrated systems enhance work efficiency and medical record accuracy—findings that align with this research. However, these results differ from those reported by Issac et al. (2025), who observed that hospitals in developing countries generally struggle with EMR implementation due to limited infrastructure and resistance from healthcare staff. This discrepancy can be explained by the comparatively higher level of internal readiness at Simpangan Hospital, in terms of technology, policy, and human resources. Moreover, systematic training strategies and responsive technical support have helped foster an ecosystem conducive to system success—an ecosystem that may not have existed in the context studied by Issac and colleagues.

The implications of these findings span theoretical, practical, and methodological dimensions. Theoretically, this research affirms that the DeLone & McLean model remains highly relevant for assessing the success of health information systems in hospital environments, including regional hospitals in developing countries. It also extends the application of the Diffusion of Innovation theory in evaluating readiness and success in technology adoption in public service sectors. Practically, these results serve as a valuable reference for other hospital management teams in Indonesia that are initiating or developing EMR systems. The emphasis on synergy between technological readiness, continuous training, and policy support offers applicable lessons. Methodologically, this research demonstrates that a quantitative descriptive approach using a theory-based questionnaire is effective in comprehensively measuring system effectiveness and can be further developed through longitudinal studies or mixed-method approaches to explore post-implementation dynamics.

Thus, the success of EMR implementation at Simpangan Hospital is not merely the result of technical readiness but reflects a systemic approach involving active managerial roles, user preparedness, and adaptive training design. This also proves that successful digitalization of healthcare services heavily depends on an organizational ecosystem that holistically supports technological innovation.

CONCLUSION

Based on the results of the research on the implementation of *Electronic Medical Records* (EMR) in the outpatient unit of *Simpangan Hospital*, Depok, it can be concluded that the system has been effectively implemented. All dimensions within the DeLone and McLean (2016) evaluation framework—namely system quality, service quality, user satisfaction, and net benefits—have been fulfilled. Technological readiness, including the availability of devices and networks, system integration across units, and adequate technical support, indicates that the infrastructure aspect has optimally supported EMR implementation. In terms of human resources, the training provided has proven effective in building user competence and increasing comfort in using the system. In addition, internal hospital policies, including leadership support and established procedures for handling issues, have created an organizational climate that supports technology adoption. User perceptions of the EMR system are also highly positive, especially regarding improved work efficiency, data recording accuracy, and service quality. These overall findings demonstrate that the success of EMR implementation is the result of synergy among technical readiness, organizational support, and user acceptance. This research also confirms

that the applied information system evaluation model is relevant for measuring the effectiveness of digital systems in the context of mid-level hospitals in Indonesia.

For future research, it is recommended that studies adopt a mixed-methods approach, combining quantitative surveys with qualitative in-depth interviews, to gain deeper insights into the contextual challenges and lived experiences of users. Longitudinal studies would also be valuable to assess the sustainability of EMR benefits and user satisfaction over time. Furthermore, applying integrated theoretical models, such as combining the DeLone & McLean model with the Technology Acceptance Model (TAM) or Unified Theory of Acceptance and Use of Technology (UTAUT), could provide a more comprehensive understanding of behavioral factors influencing system adoption. Finally, replicating this research in smaller or remote hospitals is crucial to identify unique barriers and develop tailored strategies for EMR implementation across diverse healthcare landscapes in Indonesia.

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