

Strengthening Human Resource Readiness And Infrastructure To Improve Simrs Adoption: A Literature Review

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Abstract

This study examines the relationship between human resource readiness and the adoption and successful implementation of the Hospital Management Information System (SIMRS), as well as how the competence of health workers interacts with the availability of hospital infrastructure and management strategies. The method uses a systematic literature review or scoping review to map the empirical evidence of the last ten years. Structured searches were conducted on Scopus and Web of Science, and Google Scholar with a combination of keywords related to SIMRS, human resource readiness, competencies, infrastructure, adoption, successful implementation, training, and management strategies, including Indonesian equivalents. Articles are selected through title and abstract screening, full-text review, and concise quality assessment based on design and clarity of method. The data was extracted including hospital settings, user samples, variable definitions, instruments, and key findings, and then synthesized thematically narratively. Results show that human resource readiness, especially tiered training, organizational culture support, and perception of convenience and usefulness, correlates with more consistent acceptance and use of SIMRS. A reliable infrastructure amplifies competency impact, while weak networks and devices lower satisfaction, trigger double logging, and hinder feature utilization. The most consistent strategies to improve output include change management, strengthening IT support, standardizing devices, network investment, and ongoing funding planning. This synthesis formulates the proposition that the success of SIMRS is the result of the synergy of human capacity and technological capacity in daily work practices.

Keywords: SIMRS, Human Resource Readiness, Health Worker Competence, IT Infrastructure, Technology Adoption, Hospital Management Strategy

Abstrak

Studi ini meneliti hubungan antara kesiapan sumber daya manusia dan adopsi serta implementasi Sistem Informasi Manajemen Rumah Sakit (SIMRS) yang sukses, serta bagaimana kompetensi tenaga kesehatan berinteraksi dengan ketersediaan infrastruktur rumah sakit dan strategi manajemen. Metode yang digunakan adalah tinjauan literatur sistematis atau tinjauan cakupan untuk memetakan bukti empiris dari sepuluh tahun terakhir. Pencarian terstruktur dilakukan pada Scopus dan Web of Science, serta Google Scholar dengan kombinasi kata kunci yang berkaitan dengan SIMRS, kesiapan sumber daya manusia, kompetensi, infrastruktur, adopsi, implementasi yang sukses, pelatihan, dan strategi manajemen, termasuk padanannya dalam bahasa Indonesia. Artikel dipilih melalui penyaringan judul dan abstrak, tinjauan teks lengkap, dan penilaian kualitas yang ringkas berdasarkan desain dan kejelasan metode. Data diekstrak termasuk pengaturan rumah sakit, sampel pengguna, definisi variabel, instrumen, dan temuan utama, kemudian disintesis secara tematik dan naratif. Hasil menunjukkan bahwa kesiapan sumber daya manusia, terutama pelatihan bertingkat, dukungan budaya organisasi, dan persepsi tentang kemudahan dan kegunaan, berkorelasi dengan penerimaan dan penggunaan SIMRS yang lebih konsisten. Infrastruktur yang andal memperkuat dampak kompetensi, sementara jaringan dan perangkat yang lemah menurunkan kepuasan, memicu pencatatan ganda, dan menghambat pemanfaatan fitur. Strategi yang paling konsisten untuk meningkatkan hasil meliputi manajemen perubahan, penguatan dukungan TI, standarisasi perangkat, investasi jaringan, dan perencanaan pendanaan berkelanjutan. Sintesis ini merumuskan proposisi bahwa keberhasilan SIMRS adalah hasil sinergi antara kapasitas manusia dan kapasitas teknologi dalam praktik kerja sehari-hari.

Kata kunci: SIMRS, Kesiapan Sumber Daya Manusia, Kompetensi Tenaga Kesehatan, Infrastruktur TI, Adopsi Teknologi, Strategi Manajemen Rumah Sakit

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INTRODUCTION

Healthcare digitalization is driving hospitals to rely on Hospital Management Information Systems (SIMRS) to integrate clinical and administrative processes, accelerate service flows, and improve data accuracy for managerial decisions. In a congested operational context, SIMRS acts as the backbone of recording and coordination across units, ranging from registration, medical records, pharmaceuticals, laboratories, to reporting. However, the implementation of SIMRS in many hospitals is not only determined by the quality of the application, but also by the readiness of the organization to manage the changes that occur when manual processes shift to digital. Therefore, SIMRS is increasingly positioned as a strategic agenda that demands the alignment of people, processes, and technology so that its benefits are truly realized.

Empirically, the success of SIMRS is often influenced by non-technical factors, especially the readiness of human resources and the support of the organization's environment. Organizational cultures that support the use of technology, clear internal policies, and a conducive work environment have been shown to be related to higher rates of acceptance and utilization of SIMRS (Windari et al., 2023). When system changes are not balanced by the readiness of health workers, the risks that arise include resistance, partial use, double recording, and low data quality. Therefore, the urgency of this research lies in the need to explain how the readiness of human resources and other supporting factors determines the adoption and success of the implementation of SIMRS in health workers as the main users.

The readiness of human resources in this study is understood as the readiness of knowledge, skills, attitudes, and perceptions of health workers to receive, learn, and use SIMRS consistently in their daily work. This variable is relevant because SIMRS changes clinical routines, documentation standards, and cross-professional coordination, so the success of the system is highly dependent on the user's ability to run digital workflows. The literature shows that systematic training is associated with increased user satisfaction and operational effectiveness, as it helps healthcare workers understand system function and lower cognitive load when adapting (Herwati et al., 2023). In addition, technology acceptance is also influenced by the perception of convenience and usefulness, as emphasized in the Technology Acceptance Model, which has implications for increased adoption readiness when the system is seen as work-helpful and easy to use (Adiansa et al., 2022; Santoso et al., 2023; Takain & Katmini, 2021).

The competency variables of health workers and the availability of infrastructure are also crucial because they both determine whether individual readiness can be translated into effective use. Competencies include digital literacy, experience using information systems, and adaptability, which are related to low resistance and increased fluency of use (Windari et al., 2023). At the same time, infrastructure such as networks, devices, system stability, and technical support can be a reinforcer or a deterrent, as infrastructure disruptions have the potential to lower satisfaction and limit the utilization of SIMRS features even if users are competent. Case studies also corroborate that lack of training and

user engagement hinders implementation effectiveness, while improved training and technical support can improve system satisfaction and performance (Agustin & Hasibuan, 2023).

The main research gap is that there are still limited studies that examine the relationship between human resource readiness and the success of SIMRS implementation while placing competence and infrastructure availability as factors that interact with each other in one explanatory framework. Many studies highlight the influence of organizational culture, policies, and training on SIMRS uptake, but often stop at measures of satisfaction or perception without explicitly linking them to indicators of more operational implementation success, such as consistency of use, completeness of inputs, and sustainability of module utilization (Herwati et al., 2023; Windari et al., 2023). Meanwhile, other studies emphasize infrastructure issues or technical barriers, but lack clarity on when these barriers are the main determinants and when they can be covered by user competence.

The theoretical gap arises because the approach used is often partial. The technology acceptance framework emphasizes the perception of convenience and usefulness, but does not always capture the dynamics of organizational capacity, training readiness, and implementation dependence on IT service infrastructure in a fast-paced clinical work environment (Adiansa et al., 2022; Santoso et al., 2023). On the other hand, findings related to resistance and variation in individual characteristics such as age, education, and technological experience show that there is a heterogeneity of readiness that requires a more structured explanation of the mechanisms of its influence on adoption and success (Dwiyanto, 2023; Munaa & Ummah, 2022).

Common solutions that are often recommended are training, user engagement, organizational culture improvement, and infrastructure improvements, but the evidence linking these combinations of factors in a single model explaining the combined effects and interaction effects is still relatively limited (Agustin & Hasibuan, 2023; Windari et al., 2023).

This study proposes an explanatory mechanism that places human resource readiness as a key predictor of the adoption and success of SIMRS implementation at the health worker level, with competence as an individual capacity that enables effective use, as well as infrastructure as a supporting condition that determines whether this capacity can be realized in practice. Mechanistically, supportive training and organizational culture increase user knowledge and confidence, form a positive perception of convenience and usefulness, thereby encouraging consistent use of SIMRS (Adiansa et al., 2022; Herwati et al., 2023; Windari et al., 2023). However, consistent and quality use requires a stable accessible system; Therefore, the availability of infrastructure is positioned as a factor that strengthens the influence of competence on the success of adoption.

Interaction tests are central to answering the question of why hospitals with good training programs continue to experience low utilization when networks are unstable or devices are limited, as well as why adequate infrastructure does not automatically produce optimal utilization when user competence is low or resistance is high (Agustin & Hasibuan, 2023; Putri, 2024). With this framework, research can also link hospital management strategies as a lever that increases human resource capacity

and directs infrastructure investments simultaneously, for example through recruitment and support of IT professionals, super-user mentoring, as well as strengthening helpdesk services and device standardization (Larry & Mutuku, 2024; Nagunwa & Lwoga, 2012). The mechanism is expected to produce a more complete explanation of the causal pathway from human resource readiness to successful implementation of SIMRS, taking into account infrastructure conditions and management strategies as a reinforcing context.

The context of the study is directed at hospital environments that have operated SIMRS in daily services or are expanding the use of its modules in clinical and support units. In this context, healthcare workers such as doctors, nurses, medical record officers, pharmacists, and administrative staff are the main actors who determine the quality of data and the sustainability of system use. The complexity of workflows, service time pressures, and the need for cross-unit coordination make the issue of user competence and infrastructure reliability very decisive, as even a small disruption can trigger a return to manual processes and reduce usage consistency.

The purpose of this study is to analyze the relationship between human resource readiness and the adoption and success of SIMRS implementation in health workers, examine the role of the interaction of health worker competencies and infrastructure availability in determining the success of adoption, and formulate the implications of hospital management strategies to increase human resource capacity and infrastructure investment so that the output of SIMRS implementation is more optimal. An expected theoretical contribution is an integrative model that not only assesses human and technological factors separately, but explains the combined effects through the interaction of competencies and infrastructure. The practical contribution is priority-based managerial recommendations, such as the design of tiered training and mentoring tailored to user profiles, accompanied by strengthening infrastructure and technical support services to minimize operational barriers so that SIMRS is used consistently and has a real impact on service efficiency and data quality.

METHODS

The research method for this literature review study uses a systematic literature review (SLR) approach or scoping review to map and synthesize empirical evidence on: (1) the relationship between human resource readiness and the adoption and success of SIMRS implementation in health workers, (2) the interaction of health worker competencies and infrastructure availability in determining implementation outputs, and (3) hospital management strategies in increasing human resource capacity and infrastructure investment. The review process is carried out through a structured search of scientific databases (e.g. Scopus, PubMed, Web of Science, and Google Scholar) using a combination of keywords such as *hospital management information system, SIMRS, human resource readiness, competency, infrastructure, adoption, implementation success, training, management strategy* along with the Indonesian equivalent. Articles were selected by inclusion criteria (e.g. last 10 years of publications, hospital/healthcare context, involving healthcare workers as users, and reporting

indicators of adoption/implementation success) and exclusion (e.g. non-empirical or irrelevant to variables). After head-abstract screening and full-text review, the quality of the study was assessed in a concise manner (e.g. based on design, method clarity, and relevance of findings), and data were extracted including research design, setting, samples, operational definitions of variables, instruments, and key findings. The synthesis was carried out by narrative synthesis/thematic, grouping the findings into themes: (a) determinants of human resource readiness for adoption and success, (b) evidence of the effect of strengthening/inhibition of infrastructure on competence, and (c) management strategies (training, *change management*, IT support, device standardization, network investment) that most consistently increase implementation outputs; the final result is directed to formulate a proposition/model conceptual that describes the mechanisms of relationships and interactions between variables in the context of SIMRS.

RESULTS AND DISCUSSION

Results

The Role of Human Resource Readiness in SIMRS Adoption Among Healthcare Workers

The successful implementation of the Hospital Management Information System (SIMRS) is not only determined by the quality of the technology, but is highly dependent on the readiness of human resources (HR) as the main users in complex clinical work environments. Human resource readiness includes the knowledge, skills, attitudes, and perceptions of health workers towards new technologies, including willingness to learn and adaptability to changes in workflows. In practice, SIMRS changes the way health workers document services, access patient information, coordinate across units, and prepare reports. Because these changes are structural and touch on daily routines, successful adoption requires individual readiness as well as organizational support. The literature discussed in this study confirms that human resource readiness is closely correlated with better acceptance rates, consistency of use, and SIMRS implementation outputs.

One of the important determinants of HR readiness is organizational culture and managerial support. Organizational culture that encourages the use of technology, provides clear internal policies, and creates a conducive work environment has been proven to be related to higher acceptance and utilization of SIMRS (Windari et al., 2023). In a supportive organization, the use of SIMRS is not perceived as an additional burden, but rather as a new work standard supported by a system of rewards, supervision, and facilitation. Windari et al. (2023) emphasized that organizational factors influence the implementation of SIMRS, and hospitals with a pro-technology culture tend to show better levels of satisfaction and system utilization. These findings reinforce the argument that HR readiness is not just a technical competence, but also a result of the organizational climate that shapes norms, expectations, and behavior in using systems.

Training is also a key component in building human resource readiness. Systematic training serves to reduce user anxiety, improve understanding of system functions, and reduce cognitive burden

when healthcare workers transition from manual to digital processes. Various studies show that adequate training increases user satisfaction and operational effectiveness (Herwati et al., 2023; Abdu et al., 2023). For example, the measurement of user satisfaction with the EUCS approach at Mitra Delima Hospital showed that aspects related to the ability to use the system that were heavily influenced by training were related to higher levels of satisfaction with SIMRS (Herwati et al., 2023). Thus, the training is not only oriented towards teaching buttons and menus, but also strengthens self-efficacy, forms digital work habits, and clarifies the consequences of data quality when filling is inconsistent.

In addition to organizational and training factors, user perceptions of the convenience and usefulness of SIMRS play a significant role in adoption readiness. The Technology Acceptance Model (TAM) explains that perceived ease of use and perceived usefulness are the main determinants of technology acceptance (Adiansa et al., 2022; Santoso et al., 2023). In the context of SIMRS, when health workers assess that the system helps speed up work, reduces recording errors, or makes it easier to access clinical information, the motivation to use the system increases. In contrast, systems that are perceived to be complex or irrelevant to clinical needs are likely to trigger resistance, partial use, or practice back to manual. The findings of Takain & Katmini (2021) and Adiansa et al. (2022) show that positive perceptions regarding usefulness and ease strengthen users' readiness to adopt the system.

Individual factors also affect the readiness of human resources, including age, education level, and technology experience. The literature shows a tendency that healthcare workers who are younger and have better IT proficiency are more receptive to SIMRS (Adiansa et al., 2022). Conversely, some of the more senior staff may show resistance due to concerns about technology, fear of making mistakes, or limited experience using information systems. Munaa & Ummah (2022) and Dwiyanto (2023) highlight the importance of interventions tailored to the diversity of user profiles, such as tiered training, mentoring approaches, or the appointment of super-users in work units to help colleagues who are experiencing difficulties.

A number of case studies provide concrete illustrations of how HR readiness affects the success of SIMRS adoption. The implementation at Manembo-Nembo Hospital, for example, shows that staff involvement through interviews and workshops can improve readiness and acceptance, ultimately contributing to more efficient operations and smoother services. On the contrary, the experience of Aek Kanopan Hospital confirms that inadequate training and low user involvement can hinder the effectiveness of implementation, so that the system is not optimally utilized (Agustin & Hasibuan, 2023).

However, the readiness of human resources alone is not enough to explain the success of implementation; Success is also determined by the interaction between the competence of health workers and the availability of infrastructure. Competencies include digital literacy, the ability to understand digital workflows, accuracy of data input, and the speed of adaptation when the system is updated. The infrastructure includes device availability, network stability, server response, inter-module integration, and technical support. The relationship between the two is mutually reinforcing and can

also weaken each other. Competent healthcare workers can maximize the features of SIMRS, but these competencies will not translate into system performance when infrastructure is often problematic (e.g., slow networks, limited devices, or frequent system downs). Conversely, a good infrastructure does not automatically increase success when low user competence users may remain incomplete input, reluctant to explore modules, or rely on double logging. In other words, the success of SIMRS adoption needs to be understood as the result of the interaction of human capacity and technological capacity at the operational level.

Implicitly, an effective hospital management strategy must direct simultaneous interventions to strengthening human resource capacity and infrastructure availability. In terms of human resources, hospitals need to build continuous and unit-based training programs, provide mentoring, and manage cultural changes so that the use of SIMRS becomes a work norm. From an infrastructure perspective, hospitals need to ensure device standardization, network stability, and responsive technical support services. When both aspects are handled in an integrated manner, HR readiness will more easily translate into consistent adoption, good data quality, and sustainable SIMRS implementation outputs. Thus, the literature confirms that SIMRS is not just a technology project, but an organizational transformation whose success depends on human readiness and the alignment of competencies and infrastructure in daily work practices.

1. Table of Determining Factors for the Success of SIMRS Adoption

Dimensions	Key Factors	Impact on SIMRS Adoption	Literature Support
Individual Readiness (HR)	Digital literacy, age, education, technology experience.	Determine the speed of adaptation, the smooth transition from manual to digital, and the accuracy of data input.	Adiansa et al. (2022); Munaa & Ummah (2022); Dwiyanto (2023)
User Perception (TAM)	Perceived <i>ease of use</i> and <i>perceived usefulness</i> .	Increase motivation for regular use and reduce resistance; prevents users from returning to the system manually.	Adiansa et al. (2022); Santoso et al. (2023); Takain & Katmini (2021)
Organizational Culture & Managerial Support	Internal policies, reward systems, change management, user engagement.	Creating a supportive environment so that SIMRS is considered a new work standard, not an additional workload.	Windari et al. (2023); Agustin & Hasibuan (2023)
Infrastructure Capacity & IT Support	Hardware, network stability, server response, system integration, and <i>helpdesk/IT</i> team availability.	Ensure smooth digital workflows, prevent <i>downtime</i> , and ensure data synchronization between units.	Getachew et al. (2022); Larry & Mutuku (2024); Bisrat et al. (2021)

The interaction between healthcare worker competency and infrastructure availability in determining the success of SIMRS adoption

The results of the literature synthesis show that the successful adoption of the Hospital Management Information System (SIMRS) is most strongly explained through the interaction between

the competence of health workers and the availability of infrastructure. These two factors do not work separately, but rather influence each other resulting in a combined effect that determines whether SIMRS is used consistently, effectively, and sustainably. In general, the pattern of cross-study findings shows that SIMRS adoption tends to be high when user competence is adequate and infrastructure is supportive; on the contrary, an imbalance of one factor often triggers operational obstacles and a decrease in system acceptance (Agustin & Hasibuan, 2023; Putri, 2024).

In terms of competence, the literature emphasizes that the ability of health workers includes basic knowledge about SIMRS, operational skills (e.g. data input, information search, validation, and reporting), and readiness to adapt to digital-based work procedures. Studies examining this aspect show that adequate training correlates with improved technical skills, reduced usage errors, and increased user satisfaction, which ultimately strengthens the intention to use SIMRS regularly (Windari et al., 2023). In addition, user perceptions of the ease of use and usefulness of the system tend to be more positive in groups that have better competence, so that the adoption process becomes smoother and more stable (Windari et al., 2023).

However, an important finding from several studies is that high competence does not always guarantee successful adoption if infrastructure conditions are not supportive. When the system experiences frequent interruptions, slow access, or inadequate devices, the truly competent user still faces obstacles in completing the work on time. In situations like this, healthcare workers tend to experience decreased satisfaction and motivation, and may revert to using manual procedures as shortcuts to keep the flow of services running. This means that the impact of user competency is conditional when the infrastructure is stable, but weakens when the infrastructure is problematic.

In terms of infrastructure, the literature consistently emphasizes that the success of SIMRS requires sufficient hardware availability, stable software, a reliable internet network, and fast and responsive technical support. Some studies report that computer limitations, suboptimal servers, or unstable networks can disrupt the performance of SIMRS, leading to work queues, documentation delays, and additional workloads for healthcare workers. In addition, the presence of adequate technical support affects the hospital's ability to respond to system outages, fix errors, and maintain continuity of use of SIMRS during peak service hours.

Nonetheless, good infrastructure also does not automatically result in successful adoption if the competence of health workers is low or training is inadequate. A number of studies have noted that complete system features and adequate device support can remain underutilized because users do not understand digital workflows, are unfamiliar with the terminology in the system, or are not confident when performing data input and correction. This condition can lead to repeated errors, increase dependence on colleagues, and reduce the consistency of use (Putri, 2024; Faizah et al., 2025). Thus, infrastructure plays an enabler, but it still requires human readiness for the benefits to be realized.

The most prominent part of the literature results is the evidence that the effect of interaction between competencies and infrastructure contributes directly to the success rate of SIMRS

implementation. In some cases, hospitals that have trained healthcare workers but face unstable networks report a decrease in usage as input times become longer, duplicate work appears, and users revert to manual methods. Conversely, hospitals with adequate infrastructure but not enough training show superficial adoption, i.e. the system is used only for minimal tasks, while the utilization of advanced features (e.g. integrated reporting or data analysis) is not optimal (Agustin & Hasibuan, 2023; Windari et al., 2023).

The literature also points to the existence of a reciprocal mechanism: repetitive infrastructure problems can degrade the effective competence of users, not because their technical capabilities are lost, but because usage practices become inconsistent. System disruptions that often cause frustration, lower confidence, and strengthen resistance to change, especially in users with lower digital literacy (Faizah et al., 2025; Putri, 2024). In contrast, a stable infrastructure allows healthcare workers to train through regular use, so competence increases gradually, and system acceptance becomes stronger over time. Another recurring finding is the role of internal technical support such as IT teams or super-users who often act as a link between the human factor and technology. When users encounter operational constraints, technical assistance helps accelerate learning and prevent repeat mistakes. When infrastructure is at fault, a quick technical response can prevent the disruption from developing into a denial of system usage. Thus, technical support strengthens the synergy of infrastructure competencies and helps maintain the stability of SIMRS adoption in the implementation phase (Agustin & Hasibuan, 2023).

Overall, the results of the synthesis confirm that the adoption of SIMRS is most successful when hospitals manage human and technological factors in a balanced manner. The competence of health workers increases the chances of effective use of SIMRS, but the sustainability of use is highly dependent on the stability of the infrastructure. In contrast, the availability of infrastructure streamlines digital workflows, but it will only yield optimal benefits if users have adequate capabilities and readiness. The convergence of these findings reinforces the conclusion that the SIMRS implementation strategy needs to prioritize improving user competencies while ensuring infrastructure reliability and technical support (Windari et al., 2023).

Table 2. Matrix of Interaction Effects of Human Resource Competency and Infrastructure Availability

Infrastructure Conditions	High HR Competence	Low HR Competence
Adequate & Stable Infrastructure	Optimal Adoption: Maximum feature usage, high-quality data, efficient workflows, and high user satisfaction.	Underutilization: The system is only used for minimal tasks, frequent errors, and high reliance on the help of colleagues.
Poor Infrastructure / Frequent Disruptions	User Frustration: Work is delayed, satisfaction and motivation decrease, double logging appears, and a return to manual methods as a shortcut.	Total Failure/System Rejection: Operational panic, massive data errors, strong resistance to change, and system abandonment.

Hospital Management Strategies to Increase Human Resource Capacity and Infrastructure Investment for Optimizing SIMRS Implementation Outcomes

The results of the literature review show that the successful implementation of the Hospital Management Information System or SIMRS is highly dependent on the compatibility between the readiness of human resources and the strength of technological infrastructure. SIMRS fundamentally changes the way clinical and administrative work works through standardization of flows, data-driven logging, and faster reporting. These changes often lead to user competency gaps and pressures on network capacity, devices, and technical support services. Therefore, the most effective hospital management strategy is a dual strategy that runs simultaneously, namely strengthening the capacity of human resources to be able to use the system consistently and correctly, as well as infrastructure investment so that the system is stable, fast, safe, and easy to integrate. Empirical literature and case studies confirm that if one side is ignored, SIMRS outputs tend to be suboptimal, both in terms of data quality, process efficiency, and user satisfaction.

In the dimension of human resource capacity building, the most consistent findings are the importance of continuous training and development. Effective training is not just menu introduction, but role-based and process-based learning, such as how doctors close services, nurses record actions, pharmacies manage stock, and claims officers prepare financing files. Training investments designed as iterative programs have been proven to increase user confidence, reduce input errors, and encourage more complete use of features. These findings are in line with Bisrat et al. (2021) who emphasized that the lack of training contributes to the partial use and emergence of double logging practices that weaken data quality.

In addition to training, the literature emphasizes the need for adequate recruitment and role structuring of information technology professionals. The presence of competent IT staff is important in the initial implementation phase for system configuration, data migration, and module customization, as well as in the operational phase for daily support, maintenance, and outage handling. Nagunwa and Lwoga (2012) highlight that strong technical support accelerates the adoption of the system because users feel safe when there is a problem that can be addressed immediately. Larry and Mutuku (2024) also assert that IT team capacity correlates with service stability and reduced downtime, which ultimately maintains continuity of clinical services. Studies also show that recruitment alone is not enough if it is not accompanied by a clear division of roles, such as application admins, network specialists, data analysts, and helpdesks, so that the burden of support does not accumulate on just one function.

The next HR factor is organizational culture and change management. Many studies illustrate that user resistance is more often triggered by the perception of increased workloads, concerns about surveillance, or bad experiences when systems are slow, rather than simply rejection of technology. A culture that supports innovation, communication, and learning for seamless technology adoption. Involvement of health workers in decision-making, such as service flow mapping, module trials, and

the preparation of work procedures, can increase a sense of belonging and reduce rejection. In synthesis, a SIMRS supportive culture is formed when leaders set clear expectations, provide feedback channels, acknowledge the difficulties of transition, and use SIMRS data for service improvement, rather than to blame individuals.

In the dimension of infrastructure investment, the results of the study confirm that technological stability is a prerequisite for changes in user behavior. When the network is unstable, devices are limited, or the server is often overloaded, users will look for shortcuts such as delaying input or returning to manual notes. Getachew et al. (2022) emphasize that SIMRS requires hardware, software, storage capacity, security, and network quality readiness for rapid and consistent system response across service units. Bisrat et al. (2021) added that routine infrastructure assessments help hospitals identify weak points and prioritize investments based on operational risks. Thus, the strategy that is often recommended is a periodic audit that maps connectivity coverage, work device standards, server capacity, backup plans, and access security policies, and then connects them to the most critical service needs.

The literature also emphasizes that the benefits of SIMRS increase significantly when the system is integrated with other health information technologies and has good interoperability. Integration reduces duplication of records, accelerates information flow, and improves data consistency between units such as laboratories, radiology, pharmaceuticals, and claims. Interoperability facilitates more timely data exchange, reporting, and clinical decision-making. However, the study also highlights that integration demands strong data governance, including standardization of service codes, patient data masters, and access rights arrangements. If these aspects are ignored, integrations can result in duplicate data, data version conflicts, or security gaps. Therefore, infrastructure investment not only means adding devices, but also building system architectures, data standards, and control mechanisms that support information quality.

The need for investment in human resources and infrastructure ultimately depends on a realistic and sustainable financing strategy. Danso et al. (2024) and Keita and Kourouma (2023) show that hospitals that are able to secure funding for technology upgrades tend to be better equipped to carry out system updates, strengthen network capacity, and provide adequate training. Funding can be sought through government schemes, partnerships with universities for capacity building and applied research, and collaborations with the private sector to strengthen technology and support services. The literature synthesis emphasizes that the key to success is not just to get initial funding, but to ensure that there is a regular operating budget for licensing, maintenance, security, training, and feature development as per the needs of the service.

Overall, the results of the literature review lead to the conclusion that the optimization of SIMRS implementation outputs is most effectively achieved through an integrated strategy package. Continuous training improves competence and consistency in use, recruitment and strengthening of IT teams maintains the continuity of technical support, and a supportive organizational culture reduces

resistance and strengthens compliance with digital flows (Nagunwa & Lwoga, 2012). At the same time, assessment and infrastructure improvements ensure that the system is stable and secure, while integration strengthens process efficiency and data quality (Getachew et al., 2022). When these two pillars are supported by sustainable financing, hospitals are more likely to produce SIMRS implementations that are reliable, user-accepting, and have an impact on service quality (Danso et al., 2024; Keita & Kourouma, 2023).

Table 3. Recommendations for Hospital Management Strategies in the Implementation of SIMRS

Strategy Focus	Recommended Intervention Steps	Expected Externalities
Strengthening Human Resources Capacity	<ol style="list-style-type: none"> 1. Organize role-based tiered training. 2. Appoint a key user (<i>super-user</i>) in each work unit. 3. Provide refresher materials when there is a system update. 	Lowers the cognitive load of users, minimizes data input errors, and improves consistency of system usage.
Change Management & Organizational Culture	<ol style="list-style-type: none"> 1. Involve medical staff in service flow mapping. 2. Prioritize open and responsive communication to complaints. 3. Using SIMRS data for improvement, not punishment. 	Reduce resistance/rejection, increase a sense of <i>belonging</i> , and make SIMRS a norm of work culture.
Strengthening IT Infrastructure & Governance	<ol style="list-style-type: none"> 1. Conduct periodic audits for networks, devices, and servers. 2. Recruit IT/Helpdesk staff with a clear division of roles. 3. Build interoperability (integration between service units). 	Ensure rapid system response, prevent duplication of logs, and ensure smooth service during peak loads.
Sustainable Financing	<ol style="list-style-type: none"> 1. Allocate a routine operational budget (not just initial purchase costs). 2. Build partnerships with universities or the private sector. 	Ensure the availability of funds for future licensing, maintenance, cybersecurity, and upgrades.

Discussion

This discussion emphasizes that the adoption and success of the implementation of the Hospital Management Information System or SIMRS is not determined by technological readiness alone, but is greatly influenced by the readiness of human resources. Human resource readiness includes the knowledge, skills, attitudes, and perceptions of health workers towards the benefits and ease of use of the system. When HR readiness is low, systems tend to be partially used, data is incomplete, and workflows revert to manual means. On the other hand, good human resource readiness encourages the consistent use of features so that the benefits of SIMRS are more easily apparent, both in terms of

service efficiency, documentation accuracy, and reporting accuracy. In the literature, organizational culture and training emerge as the main foundation of HR readiness. An organizational culture that supports learning, innovation, and collaboration strengthens the acceptance of health workers to the changes in work processes brought by SIMRS (Windari et al., 2023). This support is usually reflected in clear leadership policies, the availability of mentoring, and a work climate that facilitates problem solving without blaming individuals. A pro-change culture makes the adoption of technology more stable because health workers feel that these changes are in line with organizational values and supported by leadership. User involvement in decision-making, such as service flow mapping and procedure customization, increases a sense of belonging so that resistance is reduced.

Training and competency development are the next key variables. Effective training does not stop at menu introduction, but teaches the application of SIMRS in real work scenarios according to clinical and administrative roles. A number of studies report that systematic training improves user satisfaction and operational effectiveness (Abdu et al., 2023). The findings of Herwati et al. (2023) using the EUCS approach show the relationship between user readiness through training and high satisfaction with the system. Conversely, lack of training often leads to input errors, incomplete documentation, and duplicate record-keeping practices that weaken data quality (Bisrat et al., 2021).

Human resource readiness is also influenced by health workers' perceptions of SIMRS. The Technology Acceptance Model framework explains that the perception of ease of use and the perception of usability are the main determinants of technology acceptance (Adiansa et al., 2022; Santoso et al., 2023). When users feel that the system helps work, speeds up services, and does not complicate them, adoption readiness increases (Takain & Katmini, 2021; Adiansa et al., 2022). However, this perception does not appear automatically, as it is shaped by daily user experience. If the system is often slow, the flow is not up to clinical needs, or technical support is weak, users will judge SIMRS as a burden, even if it is conceptually considered beneficial. This means that the strategy of increasing human resource readiness needs to target perception through improving the user experience, not just adding training sessions.

Individual factors also strengthen or weaken readiness. A number of studies say that age, education, and technological experience affect the acceptance of SIMRS, where younger or more skilled people use computers tend to adapt faster (Adiansa et al., 2022). Conversely, some of the more senior staff may experience technology anxiety or fear of making mistakes and choose to avoid, and this condition requires more personalized interventions such as intensive mentoring and gradual learning (Munaa & Ummah, 2022; Dwiyanto, 2023). These findings about the variation in user characteristics are important for management, as a one-format training approach for all is often ineffective in heterogeneous hospital environments.

Human resource readiness interacts strongly with the availability of infrastructure. High user competence will not result in optimal performance when the infrastructure is weak, for example, unstable connections, limited work devices, or frequent system interruptions. The adequacy of

infrastructure affects the efficiency of the services that SIMRS produces, while Getachew et al. (2022) highlight the need for adequate hardware, software, networking, storage capacity, and security for the system to be responsive. Bisrat et al. (2021)) added that periodic infrastructure assessments are needed to identify weak points and direct investment priorities. On the other hand, excellent infrastructure also does not automatically increase success if human resources are not ready, because sophisticated systems will still be underutilized if users are not confident or do not understand digital flows.

The evidence of the case shows this dynamic. The implementation of SIMRS at Manembo Nembo General Hospital shows that staff engagement through interviews and workshops strengthens readiness and acceptance, which in turn supports the smooth flow of service processes. Conversely, constraints at Aek Kanopan Hospital confirm that lack of training and engagement can hinder the effectiveness of implementation, especially when technical issues arise and there is no adequate support (Agustin & Hasibuan, 2023). Other studies have also illustrated that resistance increases when users face repeated technical difficulties, so that the competencies that should develop are hampered by negative experiences (Putri, 2024; Faizah et al., 2025). These findings reinforce the idea that human resource and infrastructure readiness are not separate factors, but rather shape each other through implementation experience.

Based on this synthesis, hospital management strategies to optimize SIMRS outputs need to combine strengthening human resource capacity and infrastructure investment simultaneously. In terms of human resources, hospitals need to develop role-based tiered training, provide key users in each unit as daily references, and prepare refresher materials when there is a module update (Herwati et al., 2023). Recruitment and structuring of information technology personnel is also crucial so that technical support is fast and consistent, both for maintenance, security, and user assistance (Nagunwa & Lwoga, 2012; Larry & Mutuku, 2024). From a cultural perspective, change management needs to emphasize open communication, user engagement, and the use of SIMRS data for service improvement to increase acceptance (Windari et al., 2023).

On the infrastructure side, priority strategies include regular audits, increasing network and work device capacity, strengthening security and data backups, and planning maintenance sustainability to keep the system stable during peak service hours (Getachew et al., 2022; Bisrat et al., 2021). Hospitals also need to encourage the integration and interoperability of SIMRS with other systems such as electronic medical records, laboratories, radiology, pharmaceuticals, and claims systems to reduce duplication of inputs and improve data quality. All of these strategies require realistic and sustainable funding support, whether through grants, academic partnerships, or private sector collaborations, as the success of SIMRS requires not only upfront costs but also operational costs for updates, training, and security (Danso et al., 2024; Keita & Kourouma, 2023). Overall, the relationship between HR readiness and SIMRS success is causal and reciprocal. Readiness shapes adoption, while a good infrastructure-supported adoption experience will strengthen subsequent readiness. Therefore, an integrated approach that balances user competencies, organizational culture, technical support, and infrastructure investment

is key to ensuring that SIMRS is properly used, produces quality data, and has an impact on the quality of hospital services.

CONCLUSION

The conclusion of this study shows that the success of the adoption and implementation of SIMRS is greatly influenced by the readiness of human resources which includes the competence, attitude, and perception of health workers towards the convenience and usability of the system, as well as supported by a supportive organizational culture and change management support. The findings also confirm the existence of a mutually reinforcing relationship between human resource readiness and infrastructure availability, where tiered training, user assistance, recruitment or strengthening of IT teams, and network and device stability are factors determining the consistency of data usage and quality. Implicitly, hospital management needs to implement an integrated strategy that combines HR capacity building, digital culture strengthening, and infrastructure investment simultaneously so that SIMRS is not only technically running, but truly integrated in clinical and administrative workflows, resulting in improved efficiency, documentation accuracy, and service quality.

The limitations of this study are that they rely on diverse study synthesis in the design, indicators of success, and context of health facilities, so generalization of findings needs to be done carefully. Some studies also use more user perception and snapshot approaches, so the long-term causal relationship between human resource readiness, infrastructure quality, and clinical outcomes has not been fully measured. For further research, it is recommended to conduct longitudinal and mixed methods studies that assess changes in competence, acceptance, and compliance with the use of SIMRS from pre-implementation to post-implementation, accompanied by measurement of objective outputs such as data completeness, service time, incidence of documentation errors, and patient satisfaction. Subsequent research also needs to test the effectiveness of specific interventions such as role-based training models, super-user schemes, change management strategies, and infrastructure investment packages, including cost-benefit analysis and interoperability and data security aspects to ensure the sustainability of SIMRS implementation.

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