



Article

Evaluation of Hospital Management Information System (HMIS) Implementation in the Registration Unit from the Perspectives of Technology, Human, and Organization

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Abstract: Hospital X is currently undergoing a system transition from an old Hospital Management Information System (HMIS) to a new and more advanced version. This study aims to evaluate the implementation of HMIS in the registration section by examining three key aspects: technological, human, and organizational, using the HOT-Fit (Human, Organization, and Technology-Fit) framework. This research employs a qualitative analysis approach, with data collected through interviews, observations, and documentation. The findings from the technological aspect indicate that system development has been adapted to meet user needs; however, user manuals or clear operational guidelines are still lacking. HMIS is capable of providing information that aligns with both user and organizational requirements. From the human aspect, HMIS supports staff in completing tasks more efficiently, and users generally accept the transition to the new system, although training has not been distributed evenly among all personnel. The organizational aspect reveals that HMIS delivers relevant information to support both internal and external organizational functions. The use of HMIS in the registration unit contributes positively to the overall quality of hospital services, and optimal system performance benefits both users and the organization. Based on the results, it is recommended to schedule regular training sessions, increase staffing in the IT unit, establish specific policies governing HMIS usage, and conduct routine system maintenance to support sustainable implementation.

Keywords: Evaluation, Registration, HOT-fit, HMIS, SIMRS

1. Introduction

SIMRS (Hospital Management Information System/HMIS) is an information system that can be used to integrate all patient service data, which is collected, processed, and presented to produce accurate and relevant information for decision-making purposes [1]. The legal foundation for the development of SIMRS is based on the Regulation of the Minister of Health of the Republic of Indonesia No. 24 of 2022 on Medical Records, Article 45, which states that all healthcare facilities must implement electronic medical records (EMR) no later than December 31, 2023 [2].

Based on field studies, Hospital X in Lumajang Regency has implemented SIMRS since 2014. In 2023, Hospital X transitioned to a newer SIMRS version that includes EMR features. This transformation is part of the hospital's effort to innovate in EMR implementation in order to improve patient services. However, the study findings show that the new SIMRS implementation is not yet optimal, as the system currently only

Citation: R. F. Anggraeni, B. H. Prakoso, G. Alfiansyah, and D. R. P. Mudiono, "Evaluation of Hospital Management Information System (HMIS) Implementation in the Registration Unit from the Perspectives of Technology, Human, and Organization", *ijhitech*, vol. 2, no. 1, pp. 31–39, Jul. 2024.

Received: 15-04-2024

Accepted: 20-06-2024

Published: 28-07-2024



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supports the registration unit. Several problems were identified in the aspects of technology, human resources, and management. From the technological aspect, the study found that the SIMRS lacks a help icon or guide to assist users in learning how to operate the system. The availability of user instructions can influence users' perception of their ability to operate the system and increase their interest in using it [3].

The information produced by the system is not entirely accurate, as there are still some inconsistencies. For instance, during patient registration, staff input patient data based on their identity cards; however, observations revealed instances of duplicate patient data such as medical record numbers and patient names. If registration staff are not careful, input errors may occur, leading to patient misidentification. In the human aspect, the registration staff reported that the new SIMRS interface is too complicated due to the large number of fields that must be filled in. Although there are many input fields, the new SIMRS allows patient data entry and the printing of the SEP (Patient Eligibility Letter) to be completed on a single page, which facilitates access and workflow.

Staff need time to understand the system flow and to adapt accordingly. Training has not been evenly provided—some staff have received formal training, while others learn the system informally from colleagues. In the organizational aspect, the management had previously evaluated the old SIMRS when it was first implemented in 2014 and provided standard operating procedures (SOPs) as a guide for system use. SIMRS is considered helpful in enabling staff to deliver faster services to patients. Therefore, the organization supports the adoption of the new SIMRS with more comprehensive features that include EMR. SIMRS is expected to generate useful information for both internal and external reporting. However, because some of the generated data is still inaccurate, further verification is needed to ensure the information supports effective decision-making.

Based on the identified issues in the registration unit, a review is necessary to evaluate the implementation of SIMRS from human, technological, and organizational aspects. The results of this research can serve as input for improving SIMRS to enhance the effectiveness and efficiency of hospital services, particularly in the registration unit. This is in line with Riana (2006), who stated that system changes must go through an evaluation process to ensure the new system is implemented optimally [4]. The method used in this research is the HOT-Fit method. The HOT-Fit model is adapted from the DeLone and McLean Information System Success Model (2003) and the IT-Organization Fit Model. It is used to classify evaluation factors, dimensions, and indicators. The IT-Organization Fit model integrates the suitability of evaluation factors—users, organizations, and technology.

The HOT-Fit model incorporates organizational aspects to ensure that technology supports organizational goals. This method is appropriate given the nature of the problems being addressed, as it is designed to evaluate hospitals from the perspectives of technology, human resources, and organizational management [5]. The objective of this research is to evaluate the implementation of SIMRS in the registration unit based on technological, human, and organizational aspects.

2. Materials and Methods

This research is a qualitative analysis study. Data collection was conducted through interviews, observations, and documentation. The research subjects in this study consisted of SIMRS users, including one Head of the IT Unit, one Medical Record Coordinator, and three registration officers. Prior to participation, all research subjects were provided with information regarding the study. Each subject received an informed consent form that included a summary of the study, its objectives, assurance of data confidentiality, and potential risks. If the subject agreed to participate, they were asked to voluntarily complete and sign the informed consent form without including their name.

Data validity was ensured through source triangulation and method triangulation. Source triangulation was conducted by interviewing multiple research subjects, while method triangulation was performed through a combination of observation, interviews,

and documentation. The data collected were then subjected to data reduction, data presentation, and conclusion drawing.

HOT-Fit is an evaluation method that emphasizes key components in assessing information systems, namely technology, human, and organization [5]. This method is used to determine the success of an information system by evaluating the alignment and interaction among the core components: Human, Organization, Technology, and Net Benefit (the value resulting from the synergy among these elements). The HOT-Fit model framework is illustrated in Figure 1.

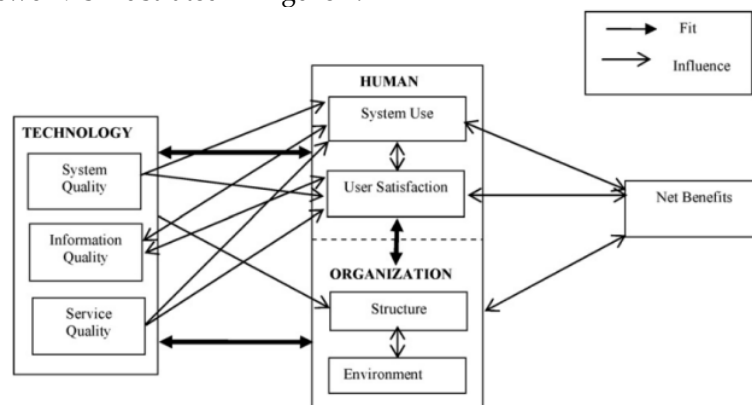


Figure 1. HOT-Fit Model Framework

Source: Yusof et al., 2008

The HOT-Fit model consists of eight variables used in this study, including: system quality, which refers to the system's ability or performance in supporting service activities in the registration section; information quality, which evaluates the output of the system in producing the required information; and service quality, which assesses user satisfaction with system-related services. In addition, the model includes system use, referring to the frequency of SIMRS usage in the registration unit; user satisfaction, indicating the success of system implementation based on user experience; and organization, which reflects managerial support for the successful implementation of SIMRS. Lastly, the net benefit variable considers the perceived impact—both positive and negative—of SIMRS use, particularly how it helps registration staff perform their tasks more effectively. This comprehensive framework evaluates the interplay between human, organizational, and technological factors to assess the overall success of SIMRS implementation.

3. Results

3.1. Technological Aspect

Technology refers to the information system implemented to support service activities in the registration section, which in this case is the Hospital Management Information System (SIMRS). The technological aspect is reviewed from three variables: system quality, information quality, and service quality.

A. System Quality

System quality refers to the capability or performance of the system in supporting service activities in the registration unit. Each unit is equipped with several computers with good specifications for operating SIMRS. The network used is a LAN (Local Area Network), meaning that SIMRS can only be accessed within the hospital area. Each user is provided with a username and password according to their respective access rights to prevent unauthorized access. The new SIMRS is also equipped with antivirus software to

protect the system from malware attacks. The following is an excerpt from an interview with an informant:

"Each officer is given a username and password according to their respective access rights. Moreover, the system itself is also equipped with antivirus protection to prevent data leakage." (Informant 1)

The new SIMRS features functions that align with the registration unit's needs. The registration module includes menus for patient admission, identity verification, and BPJS (national health insurance) bridging. Based on field observations, patient registration activities have met the hospital's standard time: 5 minutes for existing patients and 10 minutes for new patients.

"SIMRS helps the registration process become more efficient. The available features already match the needs of the registration unit." (Informant 3)

Patient data recording in the registration unit at Hospital X is carried out by officers inputting patients' personal and insurance data into the system. This data is recorded and printed as proof of service. When patients arrive to register, officers request identification cards to input patient data into the system. This data will then be compiled into reports regarding patient visits. Based on interviews, it was found that there are still duplicate patient medical record numbers and patient names in the system, which cause data inconsistencies in service reports. These duplications may result from previous SIMRS versions, thus requiring verification by officers before patient identity is confirmed and entered into the system [6]. The information produced by the system should reflect accurate and timely data so that the information can be useful for supporting decision-making.

The benefits of implementing SIMRS in terms of system quality include the integration (bridging) with BPJS, which facilitates staff in quickly providing the required documents for patients. Additionally, patient registration services have been carried out in accordance with the standard service time, and the system security is well-maintained by limiting excessive user access.

B. Information Quality

Information quality refers to the assessment of system outputs in generating information. SIMRS features a lightweight and user-friendly interface. It includes several modules that support user tasks. The data within SIMRS can be utilized as reporting material and as a basis for decision-making within the organization. Before generating internal or external reports, data in SIMRS is processed through a well-structured reporting system.

Medical record staff can retrieve data recorded in SIMRS according to the information needs. After data retrieval, the staff perform data validation to ensure the generated information is accurate. Based on interview results, it is known that the information from the new SIMRS is not yet fully accurate due to errors still being found, such as incomplete or inconsistent patient data. This includes mismatches in medical record numbers, guarantor names, or addresses. An excerpt from an interview illustrates this:

"The reporting from SIMRS is not yet 100% accurate; there are still some discrepancies in patient data such as medical record numbers that sometimes double, guarantor names, and addresses, so cross-checking is still necessary." (Informant 2)

The inconsistent items mentioned require further improvement. These items must be revalidated to avoid duplication and to help healthcare personnel in recording patient data correctly. A system that can generate timely, accurate, and reliable information will reduce reporting errors that are not desirable. The implementation of SIMRS allows users to access information directly from the database, thereby minimizing duplicate data.

Information generated by SIMRS can be used as a reliable basis for internal and external reports. Reliable information improves user trust in the system and supports sustainable use within organizations. Thus, the accuracy of the information produced remains a key aspect that delivers significant benefits for both users and the organization.

C. Service Quality

Service quality refers to the support provided by SIMRS administrators in ensuring the successful implementation of the system. A specific unit, namely the IT Unit, is responsible for managing SIMRS. This unit consists of two staff members with clearly defined roles to handle user complaints and system issues. One staff member manages SIMRS administration, while the other handles hardware maintenance.

The IT Unit at Hospital X is relatively small, but it is able to provide quick responses to user-reported issues. Each user has a contact person from the IT Unit to facilitate communication if problems arise. In addition to being the SIMRS administrator, the IT staff also act as user liaisons to the system developers. Since the new SIMRS implementation is still in the early phases, the IT Unit plays a crucial role in system planning and development. Adequate human resources are essential to optimize system control [8]. The staff are responsive to user complaints, but limited personnel in the IT Unit have led to feelings of being overwhelmed. This is reflected in the following interview quote:

“For instance, if the IT staff receive a report about an error, they respond quickly and the issue is resolved the same day, so patient services can continue uninterrupted.” (Informant 4)

The quality of support from the IT Unit significantly contributes to the successful implementation of SIMRS. This can be seen in how easily users are able to operate the system, including accessing the system for registration. The new SIMRS interface is perceived as complex due to numerous data entry fields, which makes it difficult for users to learn the system independently. Technical assistance from the IT Unit helps users better understand the system. Continuous support from the IT team encourages user confidence in using SIMRS [9]. Therefore, the hospital's management is expected to further support the IT Unit by providing adequate personnel, facilities, and a clear division of tasks so that system implementation can proceed optimally. Well-managed SIMRS implementation contributes to better service quality, as users can complete patient data entry quickly and accurately, which in turn enhances patient satisfaction.

3.2. Human Aspect

The human aspect in this research refers to the human resources who use SIMRS, namely the head of IT, the medical records coordinator, and registration officers. The human aspect can be viewed from two variables, namely system usage and user satisfaction.

A. System Usage

System usage refers to the frequency with which users operate SIMRS. The use of SIMRS in the registration section has covered almost all activities related to patient services. Registration officers have attended new SIMRS training to enhance their understanding of how to use the system. The staff possesses operational knowledge of the system gained from experience during training sessions. Good knowledge among staff can increase the benefits of system use for the hospital [10]. The availability of SIMRS can support the work of users in the registration section.

The system is designed to assist users in their tasks. Officers can complete services with the help of SIMRS, starting from obtaining queue numbers, inputting patient data, searching for patient records, and editing data. SIMRS has been bridged with the BPJS system, allowing officers to print SEP (Eligibility Letters) for BPJS patients directly through SIMRS without needing to access the V-claim BPJS application. During the early stages of SIMRS implementation, users felt that the SIMRS interface was too complicated. This was due to users being unfamiliar with the system.

The implementation of a system is certainly not free from errors. Based on interview results, it was found that SIMRS experiences errors at certain times. SIMRS typically encounters errors in the afternoon during daily data backups, which causes the system to slow down for several minutes. The role of SIMRS is essential, particularly in the registration department for entering patient data. The work of staff relies heavily on the availability of SIMRS because several recording activities have been computerized to accelerate services. Therefore, when SIMRS experiences an error, the registration process is disrupted in serving patients. This is illustrated by the following interview excerpt:

"If SIMRS goes down, of course our work is hindered, especially in registration. Patient data must be entered into SIMRS. So, SIMRS plays an important role in registration."
(Informant 5)

When SIMRS used in the registration section experiences prolonged errors during service hours, patient services are temporarily shifted to manual processes, and the data can be re-entered once the system is back to normal. Officers can continue serving patients by printing the SEP (Eligibility Letter) via the BPJS V-claim application, and the data will be inputted into SIMRS afterward. This ensures that patients continue to receive proper service. The use of the system can help improve the efficiency and ease of patient services [11].

A system can support users in completing their tasks. Users who accept new technology can develop their knowledge of current technologies. The introduction of new technology should also be accompanied by training to enhance users' ability to adapt to the implemented system.

B. User Satisfaction

User satisfaction refers to the level of success in implementing a system, which depends on users' experiences while using it. SIMRS makes it easier for staff to search for patient data, take queue numbers, input patient data, and provide required services at the registration counter. The ease of accessing patient data via SIMRS is considered an added value of the system, helping users locate data more quickly, especially in the registration unit. The registration staff feel helped by the presence of SIMRS because the system meets their job needs. However, the medical records section states that SIMRS has not yet fully supported electronic medical records, particularly for reporting activities. This is evidenced by the following interview excerpt:

"SIMRS is very helpful for patient services, from taking queue numbers, inputting data, searching for medical records, and even printing the SEP. SIMRS is very helpful in the registration unit." (Informant 3)

Reports generated by SIMRS still need to be processed and checked again to ensure the accuracy of the information produced. The lack of statistics to support reporting from the old SIMRS system forces staff to reprocess the generated data using Microsoft Excel. This has become input for future SIMRS development, especially in adding menus required by users.

Staff feel assisted by SIMRS in completing several tasks that are part of their responsibilities. However, in the medical records section, further improvements are still

needed to optimize SIMRS use. Therefore, SIMRS must be improved to better support decision-making activities. The optimization of menus and features in SIMRS should be enhanced so that SIMRS can run better [12]. Users believe that the current SIMRS features are in accordance with their work needs. The availability of a well-functioning system can improve users' work performance in providing patient care.

3.3. Organizational Aspect

The organizational aspect refers to the influence of management in the success of SIMRS implementation. The SIMRS governance guidelines as stated in PMK No.82 of 2013 concerning the Hospital Information System clarify that one part of SIMRS governance is the front office, which includes the registration section [13]. The management team fulfills infrastructure and facilities requirements for the registration department, starting from network, hardware, to software. The management team also conducts socialization and user trials before SIMRS is officially implemented by involving all representatives from each unit involved in using the system. This is supported by the following interview excerpt:

"SIMRS development has already involved all units, even if only one representative per unit was present, it was enough to understand each unit's needs." (Informant 1)

The management fully supports the implementation of the new SIMRS. The implementation of a well-planned system supported by good coordination between related parties results in a system that runs effectively [14]. The management facilitates activities for developing the new SIMRS such as funding infrastructure facilities, conducting training and socialization, guiding SOP preparation, and formulating policies. SIMRS development involves all unit representatives to obtain well-integrated workflow information for the system. Each unit representative plays a role in analyzing user needs for the SIMRS program. In addition to IT coordinators from each unit, they are also involved in writing blueprints, SOP drafting, and other policy formulations. However, as the development of SIMRS is still ongoing, SIMRS user guides and operational policies have not been formally established and disseminated to registration staff.

The implementation of SIMRS is expected to provide optimal benefits to the organization through strong management support to enhance service activities at the hospital. SIMRS can help organizations in decision-making through the information generated by the system. The ease of managing data within the organization results in accurate information that can be used in decision-making. The management, which facilitates the implementation of SIMRS in terms of infrastructure, networking, software, training, and funding, is expected to optimize SIMRS implementation to improve the quality of hospital services.

3.4. Benefits of Using SIMRS in the Registration Department

The use of SIMRS based on assessment results shows a positive impact, both positive and negative, from the use of the system in helping the work of users in the registration department. The ease with which users carry out their work is one of the benefits gained from using SIMRS. The implementation of SIMRS has the value of increasing hospital service quality, one of which is in the registration department by improving the effectiveness of services. Additionally, SIMRS can shorten patient service time in the registration department.

The benefits based on technological aspects are obtained from research results, showing that SIMRS implementation can improve service delivery to patients. Minimizing manual administrative errors that are computerized can also reduce the occurrence of human error. Registration officers can easily check the accuracy of the data inputted into SIMRS, thereby reducing data processing errors. Managing large amounts of data is very important to be carried out accurately and thoroughly, where the use of

SIMRS is one of the right steps to achieve the efficiency of data processing. Easy access to information is an added value in implementing SIMRS. SIMRS can provide fast response time in registration services. Adequate service quality can support the optimal implementation of SIMRS.

SIMRS provides very good benefits based on human aspects because users feel assisted by the system in completing their work. The available features are in accordance with the needs of the registration department. Registration officers can register patients according to patient service standards. Investment in information systems that are useful for organizations depends on the support provided and user satisfaction, which increases the effectiveness of usage and is the most important factor in the success of system implementation. Fast and precise service will certainly increase patient satisfaction with the services obtained. Therefore, to maintain SIMRS performance, SIMRS must be managed properly so that it can provide great benefits for both users and the organization.

4. Conclusions

Based on the results of the study on the evaluation of SIMRS implementation in the registration unit, the new SIMRS has generally been implemented well, although improvements are still needed in several aspects. From the technological aspect, SIMRS has provided features that meet staff needs and assist them in completing their tasks. However, feature optimization is still necessary to ensure the system can generate accurate information to support decision-making. In terms of infrastructure such as software, hardware, and network availability, these have been well-provided and support the implementation of SIMRS. Although system errors still occur during use, these issues have been managed effectively by the SIMRS administrators. From the human aspect, it was found that staff have received training, and SIMRS has been very helpful for registration officers in carrying out their duties. However, its use has not yet significantly supported decision-making processes, highlighting the need to optimize features to enhance the benefits of SIMRS usage. The implementation of SIMRS has also provided benefits to the organization. The management has supported the system's implementation by facilitating all development and operational activities related to SIMRS. However, the absence of user manuals and specific policies regulating SIMRS usage has resulted in limited user understanding of the system. Recommendations for Hospital X include scheduling regular maintenance of the network, software, and hardware, as well as optimizing menus and features to improve overall system performance.

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