Evaluation of Hospital Information System Using HOT-FIT Method in Hospital in Indonesia

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Abstract. Hospital Information System (HIS) has an important role in clinical and administrative services to achieve quality services. However, monitoring and evaluation are necessary to find out how the benefits of HIS in the hospital work unit.This study aimed to evaluate the Hospital Information System using the HOT-Fit method in a hospital in Central Sulawesi Province.This type of research was descriptive quantitative. The sample in this study were all officers who used HIS in Undata Hospital, Central Sulawesi Province, amounting to 171 people. Sampling using a total sampling method. The data was collected using a questionnaire with a Guttman scale. The evaluation data obtained were analyzed statistically by showing the frequency distribution of each variable.The perceptions of HIS officers were as follows: respondents who had good perceptions based on human factors were 64.9%, respondents who had good perceptions based on organizational factors were 88.3%, and respondents who had good perceptions based on technological factors were 86.0%. The human, organizational, and technological factors in the SIRS of Undata Hospital, Central Sulawesi Province, were already good but there were still shortcomings for old users, and the SIRS application suddenly got errors.

Keywords: *Hospital Information System (HIS), HOT-Fit method, evaluation, hospital in Indonesia*

Introduction

The Hospital Information System (HIS) is an effort to provide accurate, punctual, and sufficient information to support the process of management functions and decision making in providing health services in hospitals(1). Information system evaluation is an effort to understand the actual conditions of an information system implementation. With this kind of evaluation, the achievement of information system implementation can be understood so that further action can be planned and taken to improve its performance. Information system evaluation methods that can be used are the Technology Acceptance Model (TAM) method, the HOT-Fit method, the DeLone and McLean method, and the PIECES method(2).

HIS has been developed for various clinical functions such as Electronic Health Record (EHR), Computerized Physician Order Entry (CPOE), and Clinical Decision Support System (CDSS) to support medical services and improve patient safety. A survey in 2008 showed that only about 10% of public hospitals in the US had utilized an EHR system, either basic or comprehensive. These adoption rates are very similar to European countries. The 2007 survey showed that only about 11.9% of general hospitals in Austria and 7.0% of hospitals in Germany used the comprehensive EHR. Furthermore, still in 2007, only about 10.1% of hospitals in Japan had adopted the EHR. In South Korea, only 9% of hospitals had ever used EHR comprehensively(3),(4).

Data collected by the Indonesian Ministry of Health through the Hospital Information System (HIS), hospital guidelines for recording and reporting on a routine basis, until the end of November 2016, it was reported that 1,257 out of 2,588 (or about 48%) hospitals in Indonesia have utilized HIS functionally. There were 128 hospitals (5%) that reported having HIS but it was not implemented functionally, and there were also 425 hospitals (16%) that did not have HIS, and 745 hospitals (28%)

that did not report HIS ownership. The number of hospitals in Central Sulawesi Province is 32 hospitals(5),(6).

One of the hospitals in Central Sulawesi Province is Undata Hospital, which is the largest state-owned hospital as well as a referral hospital for various hospitals, including district hospitals and surrounding health centers. In providing services to patients, Undata Hospital has used HIS since 2003 that has undergone two changes from SIRUS *(SistemInformasiRumahSakit)* to SIMUDA *(SistemInformasiManajemenUndata)* in 2016. Because SIMUDA has been implemented at Undata Hospital, one of the factors currently playing an important role in the successful application and use of information technology is the user factor. The level of readiness of users in accepting information technology has a great influence in determining the success or failure of the application of this technology. This study aims to evaluate the Hospital Information System (HIS) using the HOT-Fit method at Undata Hospital, Central Sulawesi Province.

Material and Methods

This type of research was quantitative with a descriptive approach. The research sample was all officers who used the Hospital Information System at Undata Hospital, Central Sulawesi Province. The study was conducted in August 2018. The sample size in this study was 171 officers who used HIS with the total sampling method. Data collection in this study was obtained by filling out a questionnaire provided by the researchers related to the questions about HIS human, organizational and technological variables at Undata Hospital, Central Sulawesi Province.

The data obtained would be processed by computer. Meanwhile, the data analysis used was univariate analysis, namely the analysis of the frequency distribution and single percentage of the general characteristics of the respondents (age, years of service, and education), as well as the frequency distribution and percentage of human factors in HIS, organizational factors in HIS, and technological factor in HIS.

Results

One of the evaluation methods was the HOT-Fit Model, by looking at the whole system by placing three important components in the information system, namely humans, organizations, and technology, as well as the suitability of the relationship between them as a determinant of the successful application of an information system.

Table 1. Distribution of Respondents' Perceptions Based on Human Factors in HIS at Undata Hospital, Central Sulawesi Province

Human	**Frequency**	**Percentage**
Poor	60	35.1
Good	111	64.9
Total	171	100.0

The distribution of respondents' perceptions based on human factors in HIS can be seen in [Table 1], which shows that 111 respondents (64.9%) had good perceptions because those who previously had to manually input data were now using applications so that it was very helpful in processing information and simplifying their work. As many as 60 respondents (35.1%) had a poor perception. This happened because most SIMUDA users were old and found it difficult to use the SIMUDA application, thus slowing down the completion of their work.

Table 2. Distribution of Respondents' Perceptions Based on Organizational Factors in HIS atUndata Hospital, Central Sulawesi Province

Organization	**Frequency**	**Percentage**
Poor	20	11.7
Good	151	88.3
Total	171	100.0

The distribution of respondents' perceptions based on organizational factors in HIS can be seen in [Table 2], which shows that 151 respondents (88.3%) had good perceptions because hospital

management facilitated users such as preparing hardware. Management had good communication with SIMUDA users. This could be seen from the support provided by management and co-workers when facing problems in using the SIMUDA application. As many as 20 respondents (11.7%) had a poor perception because they often experienced problems (down) during busy service hours even though the hospital network was adequate, causing obstructed service activities.

Table 3. Distribution of Respondents' Perceptions Based on Technological Factors in HIS atUndataHospital, Central Sulawesi Province

Technology	Frequency	Percentage
Poor	24	14.0
Good	147	86.0
Total	171	100.0

The distribution of respondents' perceptions based on technological factors in HIS can be seen in [Table 3], which shows that 147 respondents (86.0%) had good perceptions because the SIMUDA application accelerated data presentation. The SIMUDA application also provided information that was relevant and accurate and easy to understand. As many as 24 respondents (14.0%) had poor perceptions because SIMUDA was difficult to learn and use since it did not have instructions for use. Besides, the SIMUDA application also often experienced errors, especially during busy service hours.

Discussion
The HOT-Fit model explains the interpretation of complexity in a comprehensive manner, and the linkages between human, organizations, and technology processes. This evaluation method describes all the components contained in the information system itself. The results of the evaluation in this study were compiled based on the HOT-Fit evaluation framework, starting from Humans, Organizations, and Technology(7), (8).

SIMUDA can speed up their works because those who previously had to input data manually now use the application so that it is very helpful in processing information and doing their work. Management does not pay attention to the educational background of potential SIMUDA users, so the management provides training to all SIMUDA users. This is because not all of them have an educational background in information systems so that they can assist users in using the SIMUDA application. SIMUDA application users can save time in presenting information and improve data communication. However, the SIMUDA application also often experiences errors, especially during busy service hours and results in slow information required to be obtained, thereby reducing user satisfaction and slowing down data presentation.

The human component evaluates information systems in terms of system use on the frequency and breadth of functions and investigations of information systems. The use of the system is also related to who is using it, level of users, training, knowledge, expectations and acceptance, or rejection of the system. This component also assesses the system in terms of user satisfaction. User satisfaction can be related to perceived usefulness and user attitudes towards information systems that are influenced by personal characteristics(9).

Human factors, namely user satisfaction, are positively and significantly related to system use and system benefits. The more precise and better the quality of technology applied to humans, the more useful a system is because of the satisfaction in its use so that the quality of hospital staff performance will increase, in accordance with the purpose of implementing SIMR(10).

Organizations must have the ability to prepare human resources to adapt to problems that may occur in the application of information systems to reduce barriers in managing transformation. This can be achieved through strategy and management such as leadership support, teamwork, and effective communication that is formed by involving the roles and abilities of employees. In addition, everything related to the organization and planning of information technology must be in line with each other to ensure that technological developments are supported by the goals of the organization itself(5), (11).

The organization has a significant effect on influencing the use and benefits of the system. The organizational environment shows a significant influence on the use of information systems. The regulations applying in the hospital industry will influence the HIS development plans and policies imposed by the organization in implementing HIS. The encouragement of the organization can significantly provide motivation to use the system as well as increase the perceived usefulness compared to technological factors(12).

There are three components in technology, namely System Quality, which is to measure the features contained in an information system, especially system capabilities and interface display; Information Quality, which relates to the process of information and information generated by the system; and Service Quality, which is the overall measure of the system support or technology service provider(13).

The conditions of technological factors in the utilization of library information systems can be seen from the conditions in each variable, including conditions that occur in the system quality that is considered good because of the relationship that occurs in several indicators producing finding that the information system is easy to operate because it has complete metadata so that the information generated is in line with expectations. Also, the condition of the information quality is well expressed and produce findings, namely that information can be found quickly because it has keywords that are easy to understand, and information is sufficient because it is appropriate and represents the original collection content. Furthermore, the condition of service quality is considered to be good, and produced findings that improved information systems and data back-up make work more comfortable. In addition, there is also a support menu such as reporting and feedback, which will immediately improve the good performance of the employees who serve in that section(14), (15).

The limitation of this study is that each variable is a perception, which is a subjective view and assessment so that the results of this study only apply to the study site and do not apply to other study sites.

Conclusion

Based on the results of the research above, it can be concluded that the human factor at Undata Hospital, Central Sulawesi Province, is good, it is just that there are still deficiencies in older users. The organizational factor of HIS at Undata Hospital, Central Sulawesi Province, is already good, it is just that there is still a lack of people who are responsible for handling HIS problems because they rarely attend when there are problems with the HIS application. The technological factor in the HIS Undata Hospital, Central Sulawesi Province, is good, it is just that there are still deficiencies in the HIS application which suddenly errors.

Acknowledgement

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