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RESEARCH ARTICLE Open Access

Evaluation of the Usability of the SIMRS Application in the Registration Department at Raden Mattaher Jambi Hospital

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Abstract: The use of the SIMRS application is necessary because it is related to information management. A good information system results in good information. Nevertheless, from a practical standpoint, medical recorders who serve as outpatient registration officers have challenges while attempting to use the SIMRS application. The level of enjoyment that medical recorders have as users of the SIMRS application is impacted because of these challenges. Therefore, it is very important to conduct usability testing procedures to assess the extent to which the SIMRS application is user friendly. This study's objectives are to measure the usability of the SIMRS application and identify any issues with it by evaluating three usability factors: effectiveness, efficiency, and errors. The researchers employed a combination of research methods for this investigation. Because of this study, six issues were discovered throughout the usability testing process. The findings of the measurement of usability aspects were as follows: 87% for effectiveness aspects, 0.0005 goals per second for efficiency aspects, and 13% for error aspects. The need for adding barcodes for new patient identity data, recommended SIMRS application to do Bridging System and the need for adding fingerprint features to the SIMRS application.

Keywords: Usability; SIMRS; Registration.

1. Introduction

The development of science and technology to meet the needs of information technology in the era of globalization is important. According to Megawati and Firnandi (2017) information system technology encourages and impacts the provision of health services needed to meet the needs of the community for the accuracy and speed of hospitals in providing their services [1]. Because it is related to data and information management, the use of electronic information systems is a must. Another factor that contributes to the quality of health services is the level of information available in health care institutions. According to Rika Andriani *et al*. (2022) a quality information system is responsible for producing quality information [2].

The Hospital Management Information System (SIMRS) is an information technology communication system that runs and combines all service processes in the hospital. This is done by creating good management procedures, coordination networks and reports [3]. SIMRS is designed to help manage hospital operational information and data to be more structured, integrated and accurate. According to the Indonesian Minister of Health Regulation No. 82 of 2013 concerning SIMRS, it is mandated that all hospitals are required to implement SIMRS. On the other hand, based on the findings of the Ministry of Health's research, as of July 2020, out of 2,650 hospitals spread throughout Indonesia, there were 1,479 hospitals that had implemented SIMRS from the front office to the back office. Meanwhile, there were 567 hospitals that only implemented SIMRS in the front office, 75 hospitals that already had SIMRS but were not functioning, and 294 hospitals that did not have SIMRS [4].

Some of the problems found by users in the SIMRS application, such as features that did not work on the application, and inconsistencies in the information displayed on the application. This happened because of user delays when entering data so that the data displayed was not appropriate. In addition, the length of the process in accessing the system was also found. The slow process in accessing this system is due to the large number of users who are accessing the system [5]. The system that often errors and slow internet networks are also problems for users in using the SIMRS application [6]. The ease of use of an application is the most important factor in determining the quality of information and how well it is used. According to Mudiono and Roziqin (2019) user trust in utilizing information obtained through the SIMRS application is directly proportional to the quality of information provided by the application [7].

One of the hospitals that has used SIMRS in its services is Raden Mattaher Jambi Regional Hospital. In accessing the SIMRS application, each officer has a username and password. The SIMRS application is used by the Outpatient Registration Section to call patient queues, enter new patient data, register new and old patients, and display patient treatment history. In a previous study entitled Evaluation of the Hospital Management Information System for the Outpatient Registration Section with the HOT FIT Method, it was found that the evaluation of SIMRS based on the Technology component requires software (SIMRS application) and hardware improvements. When entering patient data, errors often occur in the next menu feature and there is a mismatch in the input data for new patients between patients who have used the online registration application and the SIMRS application used by officers. Patient data that has been entered in the online registration application is not stored in the SIMRS application so that officers enter data twice for one patient. In addition, network monitoring is also needed because network instability often occurs [8].

Seeing these problems, it is necessary to conduct research on the SIMRS application to assess the usability of the SIMRS application through the Usability Testing (UT) method. According to Rizma *et al*. (2023), the method for measuring the effectiveness of user experience and ease of use of the user interface is called usability testing [9]. In the implementation of usability testing, researchers conduct direct testing on users by measuring the usability aspects consisting of five aspects. In this study, the evaluation focuses on three aspects: Effectiveness, Efficiency, and Error. Effectiveness is related to the ease of users in using the application, efficiency is related to the total time needed by users to achieve goals, and error is related to the number of errors made by users when using a program. The findings of this study are expected to be a source of reference material to improve the capabilities of the SIMRS application at Raden Mattaher Jambi Regional Hospital.

2. Research Method

Researchers use mixed research methods. According to Indrawan and Jalilah (2021) this method is a combination of quantitative and qualitative research [10]. According to Subagyo (2020) this research can be called a type of research that involves data analysis, then expressed in the form of results, and finally a conclusion is drawn [11]. Nielsen in an article entitled Usability Testing explains that research on Usability

Testing can be quantitative and qualitative [12]. Qualitative usability testing focuses on collecting problems and incidents found by participants or users when using the system. While quantitative usability testing focuses on measuring the level of user experience, usually the data collected is data on the success of participants in completing tasks and the time required to complete the task. Because the purpose of this study is to determine the level of usability of the SIMRS application and identify problems related to the application. So the researcher chose a mixed research method [12]. The study was conducted at Raden Mattaher Jambi Hospital, namely in the Outpatient Registration section. All Medical Recorders working in the Outpatient Registration section represent the population used for this study. There are a total of six Medical Recorders. To conduct this study, the researcher used the total sampling method, namely the number of samples taken is the same as the population. As a result, a total of six medical recorders participated in this study as samples.

The researcher collected data through tasks or assignments on the SIMRS application, the researcher observed and recorded the process of completing the task by the medical recorder. The researcher continued to the stage of testing the usability aspects of the application until all data was collected and completed. There are three usability aspects used in this study. These aspects are the Effectiveness aspect which measures the success of the Medical Recorder in carrying out the task, the Efficiency aspect which measures the length of time needed by the Medical Recorder to complete the task, and the Error aspect which measures how many errors the Medical Recorder found when working on the task. After the test was completed, the researcher held a discussion to find out the challenges faced by medical record officers in utilizing the SIMRS application.

2.1 Usability Testing Tasks

Testing that provides a number of tasks for users to complete when interacting with an application where the tasks have been previously designed. This type of testing is known as Task Usability Testing. This testing is the first step in the usability testing process. This task was given to six people who were medical recorders in the outpatient registration section. The creation of this task was based on the characteristics of the SIMRS application related to outpatient registration and utilized by medical recorders. The following is a list of stages in the implementation of Task Usability Testing and task design. Stages of implementing Task Usability Testing:

1) The researcher observes the respondents while performing the task
2) The researcher records the number of tasks successfully completed by the respondents
3) The researcher records the amount of time it takes for each task to be completed by the respondents.
4) The researcher determines the number of errors made by the respondents

Table 1. Task Usability Testing

No	Task
1	Login using the username and password owned by each respondent
2	Click queue
3	Input the patient's name or medical record number. If the patient is a new patient, the respondent will first input the patient's identity data.
4	Select the type of installation (Outpatient Installation)
5	Select the patient's destination polyclinic
6	Select the doctor on duty
7	Select the type of patient referral
8	Click on the type of health insurance, if the patient uses BPJS then select the patient's health facility
9	Click on the guarantee or reference number then click on the SEP (Participant Eligibility Letter) icon
10	Click save

2.2 Usability Aspects

1) Effectiveness

In using an application, effectiveness is a factor that determines how successful the user is in achieving his/her goals. Effectiveness can be calculated using the completion rate which measures the user's completion in completing a task. Here is equation 1 to calculate effectiveness [13].

$$Effectiveness = \frac{Total\ Task\ Sukses}{Total\ Task} \times 100\% \quad (1)$$

According to Sabandar and Santoso (2018) researchers utilize the R&D Reference Standards provided by the Ministry of Home Affairs to obtain the level of effectiveness [14]. These standards are presented in the following table.

Table 2. Standard Measures of Effectiveness

No	Effectiveness Ratio	Achievement Level
1	<40%	Very Ineffective
2	40% - 59,99%	Ineffective
3	60% - 79,99%	Quite Effective
4	⩾80%	Very Effective

2) Efficiency

The aspect that assesses the amount of time a user can complete a task after the user has learned how to use the program is called efficiency. The time-based efficiency equation (also called Time Based Efficiency) can be used to calculate efficiency. According to Krueger (2016) Equation 2 for calculating time-based efficiency is presented below [13].

$$Efficiency = \frac{\sum_{j=i}^{R} \sum_{i=1}^{N} \frac{n_{ij}}{t_{ij}}}{NR} \quad (2)$$

Information:
N = Total tasks
R = Total participants
nij = The results of the i-th task by the j-th participant
tij = The time required by participant j to complete task i in seconds.

3) Errors

The term Error refers to the aspect that calculates the number of errors made by users when using a program. The level of Error rate can be known by determining the number of respondents who are unable to complete the task given to them [15].

3. Result and Discussion

3.1 Results

Six medical recorders participated in this study. They were selected through a total sampling process, which is a type of sampling where the number of samples is the same as the population being sampled. The initial step of usability testing was carried out by giving tasks to medical recorders who were observed by the researcher. The findings of this test were used to evaluate aspects of effectiveness, efficiency and errors. The results of the usability test findings are displayed in the form of a percentage that shows the level of usability and errors found in the SIMRS application.

1) Effectiveness

Table 3. Results of Usability Testing of Medical Record Effectiveness

Medical Record Code	Total Task	Number of Tasks Completed	Effectiveness Performance
PM1	10 Task	9 Task	90%
PM2	10 Task	8 Task	80%
PM3	10 Task	9 Task	90%
PM4	10 Task	8 Task	80%
PM5	10 Task	9 Task	90%
PM6	10 Task	9 Task	90%
Average			87%

PM = Medical Recorder

The Effectiveness aspect is used to find out how many tasks have been successfully completed by medical recorders. The average effectiveness value of the SIMRS application is 87%, which can be seen in table 3..

2) Efficiency

Table 4. Total Time of Medical Record Work

Medical Record Code	Total Time (Seconds)	Time Based Efficiency
PM1	294	0,0005
PM2	126	
PM3	140	
PM4	230	
PM5	174	
PM6	211	

The data in table 4 is the total time of the medical recorder when completing 10 tasks. To calculate time-based efficiency, Equation 2 is used. According to the calculation results of equation 2, 0.0005 goals/sec are obtained.

3) Errors

Time Based Efficiency

Task	Number of Medical Recorders	Errors	Percentage Error Rate (%)
Task1	6	0	0%
Task2	6	2	33,30%
Task3	6	0	0%
Task4	6	0	0%
Task5	6	0	0%
Task6	6	0	0%
Task7	6	0	0%
Task8	6	0	0%
Task9	6	6	100%
Task10	6	0	0%
Average			13%

The data in table 5 shows that there are 2 tasks that have an error rate, namely task 2 has an error rate of 33.3% and task 9 has an error rate of 100%. Therefore, the average error rate is 13%.

3.2 Discussion

Six medical recorders participated in this study. They were selected through a total sampling process, which is a type of sampling where the number of samples is the same as the population being sampled. The initial step of usability testing was carried out by giving tasks to medical recorders who were observed by researchers. The findings of this test were used to evaluate the effectiveness, efficiency and errors aspects. The results of the usability test findings are displayed in the form of a percentage that shows the level of usability and errors found in the SIMRS application. The effectiveness aspect is used to find out how many tasks were successfully completed by medical recorders. The average value of the effectiveness of the SIMRS application is 87%, which can be seen in table 3. Based on the effectiveness reference criteria, if the effectiveness variable value is equal to or less than 80%, it can be concluded that the SIMRS application has a very effective effectiveness [14]. On the other hand, there are still tasks that cannot be completed by medical record officers. One of these tasks is task 9, which is clicking on the guarantee or referral number and then pressing the SEP icon. The reason medical recorders cannot complete the task is because the No Guarantee or Referral feature and the SEP Icon are not functioning properly. After calculating effectiveness, the next step is to find time-based efficiency. The efficiency aspect is used to calculate how long it takes for a medical recorder to complete a task. The data in table 4 is the total time for a medical recorder to complete 10 tasks. To calculate time-based efficiency, Equation 2 is used. According to the calculation results of equation 2, 0.0005 goals/sec are obtained. This result is used to determine the extent to which a medical recorder can find the information needed in the SIMRS application. This shows that a medical recorder can perform 0.0005 tasks in one second. After calculating effectiveness and efficiency, the last calculation is made on the error aspect. The error aspect is used to measure the number of medical recorders who make mistakes when running a task. The data in table 5 shows that there are 2 tasks that have an error rate, namely task 2 (clicking the queue) has an error rate of 33.3% and task 9 (clicking the guarantee or referral number then pressing the SEP icon) has an error rate of 100%. Therefore, the average error rate is 13%. In task 9 of 6 medical recorders, there were 6 errors, meaning that all medical recorders could not perform task 9. This was because the No Guarantee or Referral feature

and the SEP Icon were not functioning properly. In fact, these features function as a BPJS patient verification process. Another application used by medical recorders for outpatient registration is Claim Virtual (Vclaim), which was developed by BPJS Kesehatan. As a result, medical recorders input data twice for one patient. The reason for using the two applications was because the SIMRS application had not implemented a Bridging System. According to Kurniawan *et al* (2017) Bridging System is a service that could connect web-based software in the health service system into one to increase the quality of services provided in the hospital [16].

There are five usability problems found in the SIMRS application, which are based on the findings of observations and conversations of researchers with medical recorders regarding the application. These problems are explained in the problem mapping table below:

Table 6. Problems and Improvement Recommendations

Code	Problem	Code	Recommendation
M-1	The length of the process for entering new patient identity data	R-1	Add barcode for identity data
M-2	SEP feature is not working properly yet	R-2	Perform Bridging System with Vclaim application
M-3	No Guarantee/Reference feature is not working properly	R-3	Perform Bridging System with Vclaim application
M-4	The patient queue process is still manual	R-4	Perform Bridging System with Vclaim application
M-5	There is no fingerprint feature for BPJS patients yet	R-5	Adding fingerprint features to SIMRS

4. Related Work

Previous research on SIMRS Evaluation conducted by Maya Aprilianingsih *et al*. (2022) using the HOT-Fit method found that there are three components that play an important role in system evaluation [8]. First, the human component, it is known that SIMRS has not been able to increase user satisfaction because there has not been any special training on the use of the application, resulting in frequent errors. Second, the organizational component, support from hospital management is still lacking and regular monitoring, both monthly and annual monitoring, of application utilization has not been carried out. Third, the technology component, hardware improvements and system development need to be carried out. Meanwhile, research according to Supriyono *et al*. (2017) which also used the HOT FIT method, this study was conducted to determine the effect of independent variables (human, organization, technology, leadership and regulation) on the dependent variable (net benefit) and it was found that all independent variables directly have a significant effect on the dependent variable, namely human factors, organization, technology, leadership and regulation affect net benefit [17]. The R-squared value is 0.9582, which means that all independent variables can explain the dependent variable by 95.82%. Tutu Gondewa *et al*. (2020) using the McCALL method in evaluating the SIMRS application based on user perception, the evaluation process on the application is carried out with several stages of measurement using several quality factors in the McCALL method, namely correctness, reliability, efficiency, integrity and usability so that it is known that there are still shortcomings in terms of correctness and efficiency [5]. Some of these shortcomings were obtained from the results of the quality test of the application in displaying information that is still not appropriate and handling difficult access due to the server load being too heavy. However, the results of the evaluation regarding reliability, integrity and usability have shown conformity with what is expected by system users. The End User Computing Satisfaction (EUCS) method is a method for measuring the level of satisfaction of users of an application system by comparing the expectations and reality of an information system. This method is used by Effi Daniati *et al*. (2021) by looking at five dimensions, namely concentration, accuracy, format, ease of use and timeliness. This evaluation emphasizes more on end user satisfaction with the technological aspect [18]. Different from the Technology Acceptance Model (TAM) which includes psychological or behavioral factors. TAM is a behavioral model that is useful for answering the question of why many information technology systems fail to be implemented because users do not have behavioral intention to use them. This method is used by Adi Nugraha *et al*. (2022) by looking at four things, namely perceived usefulness, perceived ease of use, attitude toward using, and actual usage [19].

5. Conclusion

Based on the research that has been conducted, five problems were found in the SIMRS Application for outpatient registration. First, the length of the process of inputting new patient identity data, the outpatient registration medical recorder inputs new patient data starting from the name to the patient's BPJS Number. This process takes a lot of time, researchers recommend adding a barcode so that the process of inputting new patient identity data is more efficient. Second, the SEP feature is not functioning properly because the SIMRS application has not implemented a Bridging System so that the outpatient registration medical recorder must input it twice for one patient. This was also found in the No guarantee/referral feature. For this reason, it is recommended that the SIMRS application implement a Bridging System with the Vclaim application. Third, the patient queue process is still manual, the SIMRS application already has a queue feature but is not yet connected to the BPJS queue. For this reason, researchers recommend that the SIMRS application implement a Bridging System with the BPJS Queue application. Fourth, there is no fingerprint feature for BPJS patients, the outpatient registration medical recorder uses another application, namely the BPJS Kesehatan Fingerprint Application, the fingerprint feature is very necessary because all BPJS patients are required to do fingerprints except for underage patients. For that reason, researchers recommend adding fingerprint features to SIMRS. Therefore, system quality updates and improvements must be made to maximize the benefits of the SIMRS application for users, especially the outpatient registration section, so that it can increase the use of the SIMRS application.

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