Evaluation of the Implementation of Hospital Management Information Systems (SIMRS) Using the Hot–Fit Method at Al Fuadi General Hospital, Binjai

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Abstract. This research aims to investigate the factors that provide the maximum net benefit from the implementation of SIMRS. Based on the patient satisfaction survey conducted, there were still complaints related to poor service performance of the agency and the low increase in inpatients every year. This type of research is qualitative by conducting surveys and collecting primary data through interviews with a questionnaire to information system users as respondents. The sampling was taken from 76 employees consisting of upper management, middle management, and bottom management. This research used the HOT-Fit method, consisting of human, organization, technology with variable system cauldrons, information quality, service quality, user satisfaction, system users, and organization. Based on the results of the t-test using SMARTPLS, the user and user satisfaction variables of the system directly affect the value of benefits provided by SIMRS, system quality and organization indirectly affect the value of benefits provided SIMRS.

Keywords: evaluation · SIMRS · hot-fit · service performance

1 Introduction

Hospital Management Information Systems (SIMRS) is a system that can integrate and communicate the flow of information both inside and outside the hospital. SIMR implementation can improve and support the process of health services organized by the hospital, including: (a) speed, accuracy, integration, service improvement, efficiency improvement, and ease of reporting in operational implementation; (b) speed of decision making, accuracy and speed of problem identification, and ease of strategy preparation in managerial implementation; and (c) work culture, transparency, coordination between units, system understanding and reduction of administrative costs in the implementation of the organization [1].

Al Fuadi General Hospital (RSU) is in Ahmad Yani Street No. 22, Binjai city. On March 2, 2015, the hospital was designated a Class-C General Hospital. It has the vision to improve the hospital services plenary. At the beginning of 2018, RSU Al Fuadi began implementing the Hospital Management Information Systems (SIMRS) to improve its services. SIMRS application used in RSU Al Fuadi named E-Med.

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A customer satisfaction survey of services at RSU Al-Fuadi Binjai conducted on 20 inpatients shows that related to the tangible aspect (building), 10% answered not satisfied, 85% answered satisfied, and 5% answered very satisfied. Related to the empathy of medical personnel aspect, 10% answered dissatisfied, 80% answered satisfied, and 10% very satisfied. Related to the service reliability aspect, 40% answered not satisfied, 55% answered satisfied, and 5% answered very satisfied. Related to the response aspect, 30 medical personnel answered dissatisfied, 60% answered satisfied, and 10% answered very satisfied.

RSU Al Fuadi began to cooperate with Social Security Administrator for Employment (BPJS) in June 2018. Since then, patient visits for general patients increased by 5% in 2018–2019 and 51% for BPJS patients in 2019–2020. In the 2020–2021 period, an increase in general patients by 1%, BPJS patients by 4%, and an increase in patients by 2% for general patients and BPJS patients by 10% occurred. Based on these data, there is no significant increase in the number of general patients, which contrasts with the increase in BPJS patients.

From the number of BPJS patients in 2020 and 2021, patient visits to Al Fuadi hospital were the lowest among 7 other hospitals, with 5,047 people in 2020 and 6,147 people in 2021.

In terms of annual income, Al Fuadi hospital has an income of Rp15,500,843,600 ranked fifth among 7 other hospitals. In 2021, Al Fuadi RSU remained ranked 5th in terms of revenue of Rp18,826,996,700, signifying no improvement in ranking compared to competing hospitals.

Low patient growth and out-of-competition incomes with competing hospitals are a concern. The implementation of SIMRS did not positively impact improving service performance, which can be seen from the low growth of general patients and BPJS.

Therefore, it is necessary to evaluate whether the application of SIMRS at RSU Al Fuadi Binjai only improves the efficiency of administrative functions and not the performance of the hospital's services.

Evaluation of the Hospital Information System was done to determine the actual situation of the implementation of SIMRS. Evaluation of Information Systems is an activity to measure or explore all the attributes of a system in planning, development, implementation, or operation. SIMRS evaluation defines how well the SIMRS system can operate in organizations that implement it to improve the performance of hospital service quality.

Human, Organization, and Technology (HOT) method proposed by Yusof et al. [2] reveals that the success of Information Systems is seen from 3 factors, namely human factors, organizations, and technology. The first is the human factor. Humans are a significant factor because they are users of the system. A good information system must meet the users' needs and ease of use.

The second is the organizational factor. The organization is divided into 2 consisting organizational structures and environment. Organizational structure relates to management, commitment, work culture, training, and leadership.

While the environment is related to competence, financing, and policy. Technological factors relate to collecting, cleaning, and processing data from various sources making and distributing all health information. Technological factors are divided into 3: system quality, information, and service quality.

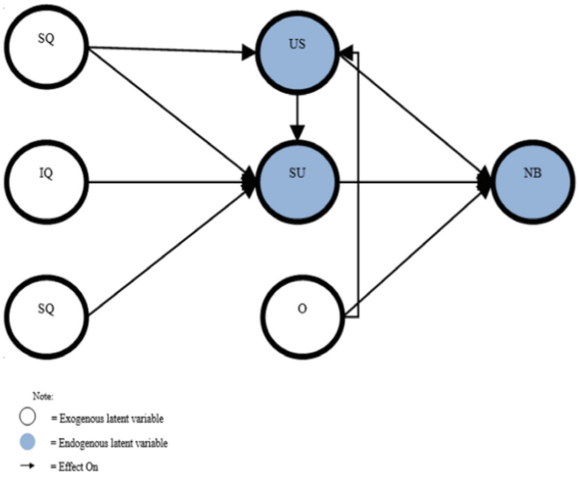

Fig. 1. Conceptual Chart

2 Research Method

This study used a qualitative research method by conducting surveys and collecting primary data through interviews with a questionnaire dissemination guide to Information System users as respondents. In this study, the object and material of research were the Hospital Management Information System (SIMRS) users at RSU Al Fuadi. Variables in the study were system quality, information quality, service quality, user satisfaction, system use, organization, and net benefit. The sampling technique was done with probability sampling using disproportionate stratified random sampling. A disproportionate stratified random sampling technique was used to determine the sample of the stratified population but with less proportional division. The number of samples in this study was 76 respondents. The conceptual chart in this study shows in Fig. 1.

3 Results and Discussion

3.1 Results

3.1.1 Validity Test

Convergent validity is the correlation between the indicator score and its construct score. The PLS-SEM model meets convergent validity and can be said to be valid if the Loading Factor value >0.7 and the AVE value >0.5 [3]. Nevertheless, in developing new models or indicators, LF values between 0.5–0.6 are still acceptable [4]. SQ2 was removed because it had a Loading Factor value below 0.5. The validity test result shows in Table 1 and Table 2.

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Table 2 shows the AVE (Average Variance Extracted) of each variable, from this table the construct used in this study can be categorized as valid since it all surpasses 0.5.

Table 1. Validity Test Result

Variable	Variable Indicators	Loading Factor	Remarks
System Quality	SQ 1	0.88	Valid
	SQ 3	0.75	Valid
	SQ 4	0.89	Valid
	SQ 5	0.87	Valid
	SQ 6	0.84	Valid
	SQ 7	0.83	Valid
	SQ 8	0.77	Valid
	SQ 9	0.84	Valid
	SQ 10	0.84	Valid
	SQ 11	0.79	Valid
	SQ 12	0.82	Valid
	SQ 13	0,88	Valid
	SQ 14	0,81	Valid
Information Quality	IQ 1	0.77	Valid
	IQ 2	0.8	Valid
	IQ 3	0.77	Valid
	IQ 4	0.84	Valid
	IQ 5	0.75	Valid
	IQ 6	0.73	Valid
	IQ 7	0.66	Valid
	IQ 8	0.73	Valid
	IQ 9	0.85	Valid
	IQ 10	0.81	Valid
Service Quality	SQ 1	0.7	Valid
	SQ 2	0.75	Valid
	SQ 3	0.75	Valid
	SQ 4	0.83	Valid
	SQ 5	0.73	Valid
	SQ 6	0.84	Valid
	SQ 7	0.84	Valid
	SQ 8	0.86	Valid

(*continued*)

Table 1. (*continued*)

Variable	Variable Indicators	Loading Factor	Remarks
	SQ 9	0.7	Valid
	SQ 10	0.7	Valid
System Use	SU 1	0.63	Valid
	SU 2	0.67	Valid
	SU 3	0.81	Valid
	SU 4	0.74	Valid
	SU 5	0.79	Valid
	SU 6	0.86	Valid
	SU 7	0.72	Valid
	SU 8	0.82	Valid
User Satisfaction	US 1	0.77	Valid
	US 2	0.74	Valid
	US 3	0.81	Valid
	US 4	0.77	Valid
	US 5	0.79	Valid
	US 6	0.62	Valid
	US 7	0.71	Valid
	US 8	0.86	Valid
Organization	O 1	0.82	Valid
	O 2	0.83	Valid
	O 3	0.83	Valid
	O 4	0.83	Valid
	O 5	0.91	Valid
	O 6	0.84	Valid
	O 7	0.8	Valid
	O 8	0.9	Valid
	O 9	0.85	Valid
	O 10	0.85	Valid
	O 11	0.84	Valid
Net Benefit	NB 1	0.85	Valid
	NB 2	0.8	Valid

(*continued*)

Table 1. (*continued*)

Variable	Variable Indicators	Loading Factor	Remarks
	NB 3	0.78	Valid
	NB 4	0.76	Valid
	NB 5	0.81	Valid
	NB 6	0.83	Valid
	NB 7	0.8	Valid
	NB 8	0.8	Valid

Table 2. Value of AVE (Average Variance Extracted)

Variable	AVE
System Quality	0.69
Information Quality	0.6
Service Quality	0.6
System Use	0.58
User Satisfaction	0.58
Organization	0.72
Net Benefit	0.64

Table 3. Reliability Test Result

Variable	Cronbach's Alpha	Composite Reliability
System Quality	0.96	0.97
Information Quality	0.93	0.94
Service Quality	0.95	0.94
System Use	0.89	0.92
User Satisfaction	0.9	0.92
Organization	0.96	0.97
Net Benefit	0.92	0.94

3.1.2 Reliability Test

According to Table 3, Composite Reliability is worth more than 0.7 and Cronbach's Alpha value indicates a value above 0.6. Therefore, it can be concluded that the variables are reliable, so it can be continued to test structural models.

Table 4. Direct Effect Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistics (|O/STDEV|)
User Satisfaction → Net Benefit	0.45	0.45	0.11	**3.97**
User Satisfaction → System Use	0.5	0.49	0.1	**4.8**
System Quality → User Satisfaction	0.32	0.34	0.13	**2.56**
Organization → User Satisfaction	0.33	0.34	0.09	**3.86**
System Use → Net Benefit	0.49	0.49	0.12	**4.16**

3.1.3 Hypothesis Testing

Hypothesis testing was performed with a t-statistical test, to test the relationship of whether a partially independent variable has a real effect or not on a dependent variable. The hypothesis testing of the significance level used is 95% ($\alpha = 0.05$). The value of t a table with a significance level of 95% is 1.96 (See Table 4 and Table 5).

3.2 Discussion

3.2.1 Direct Effect

a. The effect of User Satisfaction (US) on net benefit (NB) obtained an estimated coefficient value of 0.45 and t-count 3.97 greater than t-table 1.96, it can be concluded that there is a positive relationship between User Satisfaction (US) on net benefit (NB); thus, this hypothesis is declared proven and accepted.
b. The effect of User Satisfaction (US) on system use (SU) obtained an estimated coefficient value of 0.5 and t-count of 4.8 greater than t-table 1.96, it can be concluded that there is a unidirectional relationship (positive) between User Satisfaction (US) to net benefit (NB); thus, this hypothesis is declared proven and accepted.
c. The effect of system quality (SQ) on user satisfaction (US) obtained an estimated coefficient value of 0.32 and a t-count of 2.56 greater than t-table 1.96, it can be concluded that there is a unidirectional relationship (positive) between system quality (SQ) and user satisfaction (US); thus, this hypothesis is declared proven and accepted.
d. The effect of the Organization (O) on user satisfaction (US) obtained an estimated coefficient value of 0.33 and a t-count of 3.86 greater than t-table 1.96, it can be concluded that there is a unidirectional relationship (positive) between the Organization (O) to user satisfaction (US); thus, this hypothesis is declared proven and accepted.

Table 5. Indirect Effect Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)
Organization → User Satisfaction → System Use →Net Benefit	0.08	0.08	0.04	2.22
Organization → User Satisfaction → System Use	0.16	0.17	0.06	2.77
User Satisfaction → System Use → Net Benefit	0.24	0.24	0.08	3.00
System Quality → User Satisfaction → Net Benefit	0.14	0.15	0.07	2.04
Organization → User Satisfaction → Net Benefit	0.15	0.15	0.06	2.57
System Quality → User Satisfaction → System Use	0.16	0.16	0.07	2.31

e. The effect of system use (SU) on net benefit (NB) obtained an estimated coefficient value of 0.49 and t calculates 4.16 greater than t table 1.96, it can be concluded that there is a unidirectional relationship (positive) between system use (SU) to net benefit (NB); thus, this hypothesis is declared proven and accepted.

3.2.2 Indirect Effect

a. The indirect effect of the organization (O) on net benefit (NB) through user satisfaction (US) and system use (SU) obtained an estimated coefficient value of 0.49 and t-count of 2.2 greater than t-table 1.96, it can be concluded that there is an indirect influence of the organization (O) on net benefits (NB) through user satisfaction (US) and system users (SU).
b. The indirect effect of the organization (O) on system use (SU) through user satisfaction (US) obtained an estimated coefficient value of 0.16 and a t-count of 2.27 greater than t-table 1.96, it can be concluded that there is an indirect influence of the organization (O) on system use (SU) through user satisfaction (US).
c. The indirect effect of user satisfaction (US) on net benefits (NB) through system use (SU) obtained an estimated coefficient value of 0.24 and t-count of 3, greater than t-table 1.96, then it can be concluded that there is an indirect influence of user satisfaction (US) on net benefit (NB) through system use (SU).

d. The indirect effect of system quality (SQ) on net benefit (NB) through user satisfaction (US) obtained an estimated coefficient value of 0.14 and a t-count of 2.04 greater than t-table 1.96, it can be concluded that there is an indirect influence of system quality (SQ) on net benefit (NB) through user satisfaction (US).
e. The indirect effect of the organization (O) on net benefit (NB) through user satisfaction (US) obtained an estimated coefficient value of 0.15 and a t-count of 2.57 greater than t-table 1.96, it can be concluded that there is an indirect influence of the organization (O) on net benefit (NB) through user satisfaction (US).
f. The indirect effect of system quality (SQ) on system use (SU) through user satisfaction (US) obtained an estimated coefficient value of 0.16 and a t-count of 2.31 greater than t-table 1.96, it can be concluded that there is an indirect influence of system quality (SQ) on system use (SU) through user satisfaction (US).

4 Conclusion

a. The implementation of SIMRS at Al Fuadi Binjai Hospital is still not optimal, as proven by the inadequate network that makes some computers challenging to connect, IT personnel are still lacking, and organizations have not been able to utilize the data produced by SIMRS as the basis for improving service performance.
b. The direct factor affecting the Net Benefit of SIMRS at RSU Al Fuadi Binjai is users' satisfaction and system users. The indirect factors affecting Net benefits are the system quality and organizations.
c. Factors that do not affect the Net Benefit of SIMRS at RSU Al Fuadi Binjai are information quality and service quality.

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