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2017 International Conference on Soft Computing, Intelligent System and Information Technology

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Identification of Factors Influencing the Success of Hospital Information System (SIRS) by Hot-Fit Model 2006

A Case Study of RSUD Dr Samratulangi Tondano, Minahasa Regency, North Sulawesi

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Abstract—Hospital Information System (SIRS) is an integrated information system prepared to handle all hospital management processes, from diagnosis, patient treatment, medical record, pharmacy, pharmacy warehouse, billing, personnel database, payroll, and management control. Indonesian Constitution No. 44/52/1/2009 and the Decision of the Minister of Health No. 1171/1/1/2011 state that "Hospitals in Indonesia must record, report and perform SIRS". Therefore, RSUD Dr. Tondano Minahasa Regency, North Sulawesi, uses SIRS to support employee performance in providing health services for the public. The purpose of this study was identifying factors influencing the success of SIRS using Human Organization Technology Fit Model. The researchers randomly collected questionnaires from 150 respondents who used SIRS. Questionnaire data was collected and analyzed by SPSS and AMOS software. The result showed that from 16 proposed hypothesis, 14 hypotheses were accepted and 2 hypotheses were rejected. In conclusion, most SIRS users only focused on registration and administration functions instead of clinical function. Availability of IT unit and IT staff strongly influenced SIRS usage.

Keywords—Hospital Information System; SEM; DeLone & McLean's IS Success Model; HOT-Fit Model.

I. INTRODUCTION

Information technology (IT) has spread to the health sector. Technology gives positive impacts to health service for the public in the forms of examination, diagnosis, treatment to medical decision making [1]. The influence of IT comes from knowledge, experience, skill, computerization, and positive or negative belief on SIRS. These factors will impact the success of the usage of the system [2]–[3].

Based on the survey, RSUD Dr Samratulangi Tondano, Minahasa Regency, North Sulawesi, uses SIRS to improve the quality and performance of the employees in providing health services [4]–[5]. However, in services, SIRS users often face problem when operating it. The common problems are the information of patient data is sometimes inaccurate, SIRS function not running properly, and users preferring

manual method when SIRS is experiencing error. These strongly affect the future success of SIRS. Due to these problems, the researcher used this case to identify factors which influence the success of SIRS.

The usage of Information Technology (IT) and Informatics Engineering (TIK) expert in hospital (RS) can be the main component of reducing misinformation, improving communication of health service providers [6]–[7] and improving SIRS quality to achieve certain objective [8]–[9].

The purpose of this study was identifying factors influencing the success of a SIRS in RSUD Dr Samratulangi Tondano, Minahasa Regency, North Sulawesi [10]–[11]. The researcher used Human Organization Technology Fit Model (HOT-Fit) 2006 which is a success model beside DeLone & McLean's IS Success Model. According to previous studies, HOT-Fit Model is suitable for this case because the framework of SIRS evaluation should consider "Human", "Organization" and "Technology" components. These components focus on the success of SIRS. This model produces eight variables to measure the success of Information System (SI), which are; System Quality, Information Quality, Service Quality, System Use, User Satisfaction, Structure, Environment and Net Benefit [12].

A. Hospital Information System

Law No.46 article 1 of 2014 states that Health Information System (SIK) is a structure which covers interrelated data, information, indicator, procedure, tool, technology, and human resources to support health development [13]. The Department of Health of RI has released policy of implementation of health development to improve the quality of health services in Hospitals. MENKES/1171 /PER/VI/2011 article 1 clause 1 states that "Every hospital must implement Hospital Information System".

B. DeLone&McLean Is Succes Model

Information System (SI) has an active role in supporting the success of an organization [13]. The success of a SI can be seen in various past researches [14]. DeLone&McLean's

IS Success Model 2003 is the latest updated model which is complete and has scope and impact of the success of an information system [15]–[16]. The model is presented in Fig. 1.

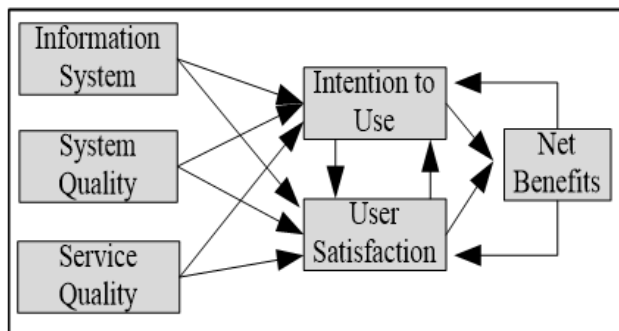


Figure 1. DeLone & McLean's IS Success Model

C. Human Organization Technology Fit Model (HOT-Fit)

Yusof et al. [12] provide a new framework to evaluate the success of an information system, called Human-Organization-Technology (HOT) Fit Model. This model puts important components in information system, i.e. Human, Organization and Technology and the suitability of the relations between them, as shown in Fig. 2.

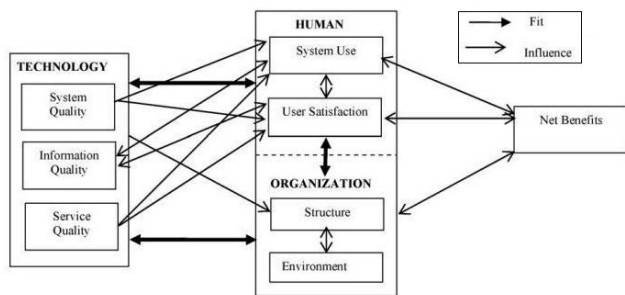


Figure 2. Components of Hot-Fit Model 2006

II. LITERATURE REVIEW

The present study is inseparable from previous studies for comparison and review which can be seen in Table I. The research results were used as basic references of the topic.

In previous researches, the researchers noticed that they all referred to the success of an Information System (SI). Therefore, the discussion of the present research focuses on identification of factors influencing the success of SIRS in RSUD Dr. Samratulangi Tondano, Minahasa Regency, North Sulawesi, by Human-Organization-Technology Fit Model 2006.

III. METHODOLOGY

A. Research Subject

The research objects in this study were all Hospital Information System (SIRS) users. Data were collected by

TABLE I. PREVIOUS RESEARCHES AND RESEARCH PURPOSES

Research	Purpose
Alam, Mansur, Bee, Hong (2016)[17]	Critical Factors Influencing Decision to Adopt Human Resource Information System (HRIS) in Hospitals (a)
Cahyaningrum (2016) [18]	Evaluation of the Implementation of Patient Registration Computerization System in Community Pulmonary Health Center (BBKPM) Surakarta (b)
Saputra (2016)[19]	The Identification of Success Factors Implementation Management Information of Hospital (c)
Murnita, Sedyono, Purnami (2016)[20]	Evaluation of the Performance of Pharmacy Management Information System At Roemani Muhammadiyah Hospital (d)
Pamugar, Winarno, Najib (2014)[21]	Evaluation Model of the Success and Acceptance of E-Learning Information System in Government Education and Training Agency (e)
Sari, Sanjaya, Meliala (2016)[22]	Evaluation of Hospital Management Information System (SIMRS) (f)
Alharbi, Atkins, Stanier (2016)[23]	Understanding the determinants of Cloud Computing adoption in Saudi healthcare organizations (g)
Thenun, Sedyono, Purnami (2016)[24]	Evaluation of Health Center Management Information System of Generic SIKDA (h)
Erimalata (2016)[25]	Hot-Fit Framework Approach in Generalized Structural Component Analysis in Regional Property Management Information System: An Examination of Reciprocal Effect (i)

direct interview with the chairman of RSUD Dr. Samratulangi Tondano, Minahasa Regency, North Sulawesi Utara, and all SIRS users. Questionnaire was then distributed to the respondents, who were all SIRS users. Sampling was performed on April 2017. The questionnaire used Likert scale format. The questionnaire was distributed by the researchers. Total distributed questionnaire was 150 copies and produced 100% response rate.

The tools for data analysis in this study were SPSS 19 and AMOS 18.0 in Windows 10. Data processing used descriptive statistic as analysis result which was supported to describe SIRS.

B. Research Flow

Research flow is a procedural chronology performed by researcher in the research or the order performed. In this case, research flow started from observation, interview, questionnaire distribution, data collection, literature study, and to drawing conclusion. The details are shown in Fig. 3.

IV. RESULT AND DISCUSSION

A. Research Tool

Steps in this research consisted of field study or survey to collect all information on Hospital Information System

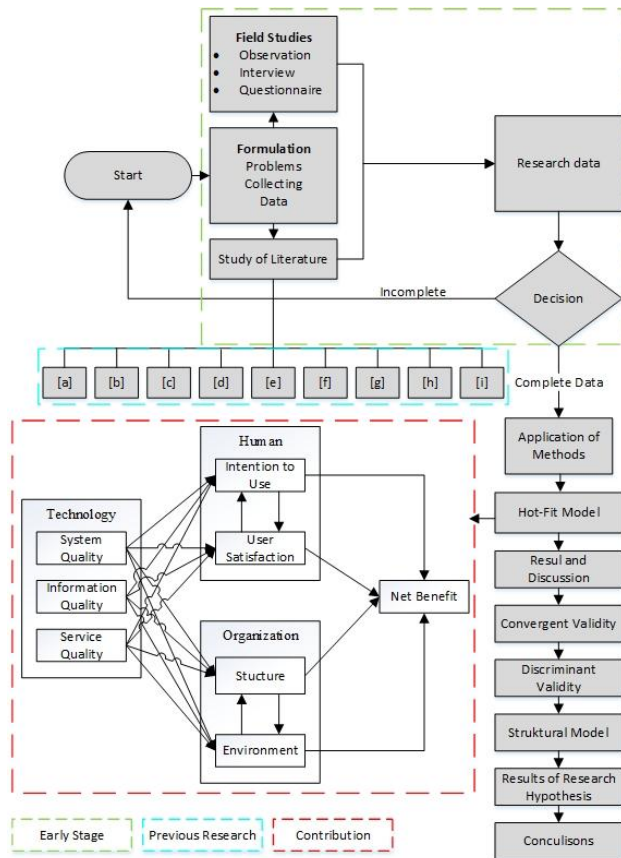


Figure 3. Research Flow Design

(SIRS), analysis of SIRS issue and study of literature relevant with SIRS. The researcher used questionnaire to collect data. The questionnaire used Likert scale format consisting of five points which were; “Strongly Disagree”, “Disagree”, “Slightly Disagree”, “Agree”, “Strongly Agree”.

The questionnaire consisted of five pages. The questions were based on eight indicators in HOT-Fit Model 2006 which were “System Quality” which contained five questions, “Information Quality” which contained five questions, “Service Quality” which contained three questions, “System Usage” which contained five questions, “User Satisfaction” which contained seven questions, “Organizational Structure” which contained five questions, “Organizational Environment” which contained three questions and “Net Benefit” which contained six questions.

V. RESULT AND DISCUSSION

A. Research Tool

Steps in this research consisted of field study or survey to collect all information on Hospital Information System (SIRS), analysis of SIRS issue and study of literature relevant with SIRS. The researcher used questionnaire to collect data. The questionnaire used Likert scale format

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B. Research Structure

Consistent with the research purpose, the structure was drawn in Fig. 4. To examine the success of a SIRS in RSUD Dr. Samratulangi Tondano, Minahasa Regency, North Sulawesi, eight main indicators were required, i.e. System Quality, Information Quality, Service Quality, Usage, User Satisfaction, Structure, Environment and Net Benefit. These indicators are shown in Fig. 4.

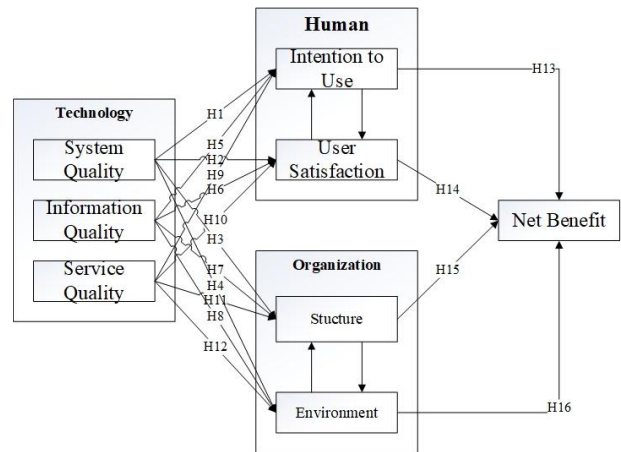


Figure 4. Hot-Fit Model Research Structure and Hypothesis

C. Research Hypothesis

Based on HOT-Fit Model hypotheses, there were eight indicators of the success of Information System (SI). The indicators affected the success of SIRS in RSUD Dr Samratulangi Tondano, Minahasa Regency, North Sulawesi.

This study found that system quality, information quality, service quality, usage, user satisfaction, structure, environment and net benefit were factors which significantly supported and influenced the success of SIRS. Therefore, this study proposed several issues related with factors influencing the success of SIRS which were usage, acceptance and success of a SIRS in RSUD Dr. Samratulangi Tondano, Minahasa Regency, North Sulawesi.

D. Data Analysis

The tools used in this study were SPSS 19 and AMOS 18.0 software to display flowchart and analysis result shown in Fig. 5. These tools were run on Windows 10 for data

analysis. Data processing used descriptive statistic as supported analysis result to describe SIRS. The result of data analysis was used to see relations elated with the eight available indicators (System Quality, Information Quality, Service Quality, Usage, User Satisfaction, Structure, Environment and Net Benefit).

Information distribution by questionnaire was analyzed based on existing samples. 150 respondents consisted of 93 women and 57 men, so it's concluded that the collected samples were total SIRS user in RSUD Dr. Samratulangi Tondano, Minahasa Regency, North Sulawesi. Based on total respondents, the researchers conclude that there were differences in gender and educational background in total respondent which was collected randomly. These differences showed that most SIRS users in RSUD Dr. Samratulangi Tondano, Minahasa Regency, North Sulawesi were women with educational background from Associate's Degree education to Graduate education.

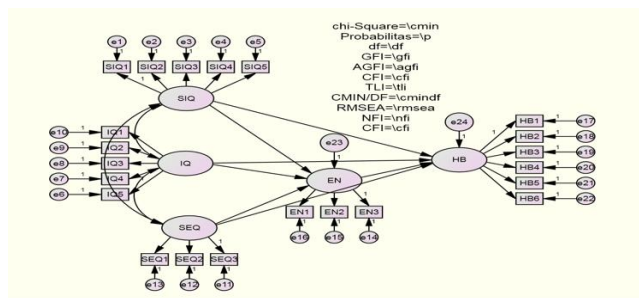


Figure 5. Diagram of AMOS Path Framework

E. Convergent Validity Test

Convergent validity is the level of correlation between different measurement instruments used to measure the same construct. In this case, Confirmatory factor analysis (CFA) could be performed to examine convergent validity, whether each item was effective and able to provide valid answer. List of standardized estimate with average variance extracted (AVE), reliability composite (CR). As shown in Table II, most items' standardized estimates are greater than 0.7. Therefore, the scale could support convergent validity [26].

F. Discriminant Validity Test

Discriminant validity is a measure of how far a measurement is different from another compared with it. This test was performed to measure whether two different statistical factors produced valid data [27] by comparing the square root of AVE and coefficient correlation factor [28]. Each indicator had unique value. The values of Net Benefit (N.B), Service Quality (Sv.Q), Information Quality (I.Q), System Quality (Sy.Q), System Use (S.U), User Satisfaction (U.S), Structure (S) and Environment (E) were shown in Table III.

G. Structural Model Analysis

After performing SEM assumption, analysis test (shown in Table IV) was performed using six indices to measure overall model suitable for quantification of error result of

approach (RMSEA), fit index (GFI), adjustment with three fit indices (AGFI), index comparison (CFI), comparison and suitability of expected index (PCFI).

TABLE II. RELIABILITY AND AVE CONSTRUCTED BY OBSERVABLE VARIABLE AND LATENT VARIABLE

Latent Variable	Observable Variable	Standardized Estimate	CR	AVE
Service Quality	SEQ1	0.875	0.920	0.794
	SEQ2	0.816		
	SEQ3	0.976		
Information Quality	IQ1	0.826	0.935	0.744
	IQ2	0.968		
	IQ3	0.899		
	IQ4	0.819		
	IQ5	0.781		
System Quality	SIQ1	0.939	0.959	0.826
	SIQ2	0.986		
	SIQ3	0.857		
	SIQ4	0.895		
	SIQ5	0.861		
System Use	SU1	0.942	0.963	0.839
	SU2	0.949		
	SU3	0.873		
	SU4	0.951		
	SU5	0.861		
User Satisfaction	US1	0.707	0.943	0.706
	US2	0.807		
	US3	0.785		
	US4	0.849		
	US5	0.842		
	US6	0.888		
	US7	0.981		
Structure	ST1	0.944	0.965	0.849
	ST2	0.825		
	ST3	0.935		
	ST4	0.895		
	ST5	0.999		
Environment	EN1	0.959	0.954	0.874
	EN2	0.993		
	EN3	0.847		
Net Benefit	HB1	0.871	0.959	0.824
	HB2	0.855		
	HB3	0.810		
	HB4	0.928		
	HB5	0.791		
	HB6	0.819		

TABLE III. THE SQUARE ROOT OF AVE AND FACTOR CORRELATION COEFFICIENTS

	N.B	Sv.Q	I.Q	Sy.Q	S.U	U.S	S	E
HB	0.854							
SIQ	0.819	0.909						
IQ	0.756	0.820	0.862					
SEQ	0.769	0.563	0.788	0.891				
SU	0.823	0.678	0.806	0.776	0.915	0.840	0.921	0.935

TABLE IV. FIT ANALYSIS OF RESEARCH MODEL

Goodness of Fit Index	Cut-off Value	Model Research	Model
<i>Significant probability</i>	≥ 0.05	0.140	Good Fit
RMSEA	≤ 0.08	0.026	Good Fit
GFI	≥ 0.90	0.878	Good Fit
GFI	≥ 0.80	0.844	Good Fit
CMIN/DF	≤ 2.00	1.100	Good Fit
TLI	≥ 0.90	0.982	Good Fit
CFI	≥ 0.90	0.984	Good Fit

H. Test Results of Research Hypothesis

Of 16 proposed hypotheses, 14 hypotheses were accepted and 2 hypotheses were rejected. The rejected hypotheses were system quality on user satisfaction (H2) with significance value of 0.807 and Limit 0.05, so system quality didn't influence user satisfaction. System quality on organizational environment (H4) had significance value of 0.842 and Limit 0.05, showing that system quality didn't influence organizational environment. These were shown in Table V.

TABLE V. HYPOTHESIS RESULT

No	Hypothesis	SP	Limit	Remarks
H1	System Quality (+) → Intention to Use	0.046	0.05	Influence (+)
H2	System Quality (-) → User Satisfaction	0.807	0.05	Influence (-)
H3	System Quality (+) → Structure	0.440	0.05	Influence (+)
H4	System Quality (-) → Environment	0.842	0.05	Influence (-)
H5	Information Quality (+) → Intention to Use	0.024	0.05	Influence (+)
H6	Information Quality (+) → User Satisfaction	0.023	0.05	Influence (+)
H7	Information Quality (+) → Structure	0.039	0.05	Influence (+)
H8	Information Quality (+) → Environment	0.027	0.05	Influence (+)
H9	Service Quality (+) → Intention to Use	0.000	0.05	Influence (+)
H10	Service Quality (+) → User Satisfaction	0.000	0.05	Influence (+)
H11	Service Quality (+) → Structure	0.000	0.05	Influence (+)
H12	Service Quality (+) → Environment	0.000	0.05	Influence (+)
H13	Intention to Use (+) → Net Benefits	0.000	0.05	Influence (+)
H14	User Satisfaction (+) → Net Benefits	0.000	0.05	Influence (+)
H15	Structure (+) → Net Benefits	0.000	0.05	Influence (+)
H16	Environment (+) → Net Benefits	0.007	0.05	Influence (+)

VI. CONCLUSION

This study only identified factors which influenced SIRS and offered solution for future usage of SIRS. The research

objects and respondents were all SIRS users in RSUD Dr Samratulangi Tondano, Minahasa Regency, North Sulawesi.

Based on analysis and discussion results, it's concluded that of 16 proposed hypotheses, 14 hypotheses were accepted and 2 hypotheses were rejected, i.e.:

- A. Technological components which were system quality, information quality and service quality influenced usage, satisfaction and net benefit. However, system quality didn't influence user satisfaction.
- B. Organizational components which were organizational structure and environment had positive impacts on user intention, user satisfaction and net benefit. However, organizational environment didn't influence system quality.
- C. Most SIRS users only focused on registration and administration functions rather than clinical function. Factors which strongly influenced SIRS usage were availability of Information Technology (IT) and availability of Informatics Engineering (TIK) expert.

Availability of Information Technology (IT) and availability of Informatics Engineering (TIK) expert strongly influenced the success of SIRS. This study provided understanding on the importance of Information Technology (IT) and involvement of Informatics Engineering (TIK) expert in supporting health services for the public.

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