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The Effect of Application of Hospital Management Information Systems on Operational Performance Through User Satisfaction

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Abstract
This study aims to determine and analyze the effect of the implementation of the Hospital Management Information System (HMIS) on Operational Performance through User Satisfaction. The study was conducted at the Hermina Group Hospital with respondents from the Hermina Hospital employees. Sampling uses a purpose sampling technique. The sample used was 207 respondents. According to the level of exploration, this research is a causal associative type using a questionnaire that is measured with a semantic differential scale and analyzed using AMOS 24 Structural Equation Modeling (SEM). The results of the study show that HMIS has a positive effect on user satisfaction. User Satisfaction has a positive effect on operational performance. HMIS influences Operational Performance indirectly through User Satisfaction. The implications in this research are the main thing and useful in increasing knowledge, suggested indicators and providing a conceptual framework for improving HMIS features, implementing HMIS training, continuously improving the system flow. Suggestions for further research by adding variables, dimensions, and indicators to the model, thus providing results that are more focused on theoretical concepts. Limitations in this study are the use of three variables, namely HMIS, User Satisfaction and Operational Performance, while there are many other factors that affect Operational Performance
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1. Introduction

In a company or organization in the form of services or production of goods in the era of globalization, there are generally demands to improve professionalism and transparency, improve service quality, coordination, efficiency, responsibility, supervision, and provide information quickly, precisely and accurately for all levels of home management sick and community so that it becomes a responsive, innovative, effective and efficient organization. When viewed specifically, in the field of health advances in information technology and telecommunications such as electronic medical records, electronic prescriptions, digital archives, online payments, integrated with BPJS health insurance and the Ministry of Health, other insurance (Multi Insurance) is expected to support health services to the wider community. Previous studies have explained that HMIS can affect employee performance (Fitriyanti Lestari, 2017), the level of system user satisfaction directly affects the use of the system, if HMIS is satisfying then the level of use will be more frequent. (Gursel, 2014). The advantages of companies that use HMIS can provide three categories of benefits, namely reducing operating costs (reducing operating costs), increasing revenue (increased revenue) and reducing capital expenditure (reduction in Capital Expenditure) (Garrido et al, 2004). In addition, there are many benefits that cannot be quantified, such as quality improvement, patient safety, continuity of care, and patient centeredness. With this research a theory can be built that can function to explain, predict, and control a symptom, which then respondent results are analyzed using AMOS software.

2. Literatur Review

According to Putu Wuri Handayani, et al (2018), HMIS is a communication information system that processes and integrates the entire flow of hospital services in the form of a network of coordination, reporting and administrative procedures to obtain information precisely and accurately, and is part of the Health Information System. User Satisfaction is the response and feedback that the user raises after using the information system. The user's attitude to information systems is a subjective criterion of how much the user likes the system used, quoted (Sumarno; DeLone, W.H., and McLean.2003). Understanding operational performance according to Daft (2010, p216), is a field of management that specializes in the production of goods and services, and uses special tools and techniques to solve production problems.

In this study, based on the background, theoretical basis and previous studies that are relevant and supportive, the authors compile a framework of thinking referring to the schema in Figure 1 below. The model of thinking consists of 3 (three) variables consisting of HMIS (Hospital Information System - HIS), user satisfaction and operational performance.

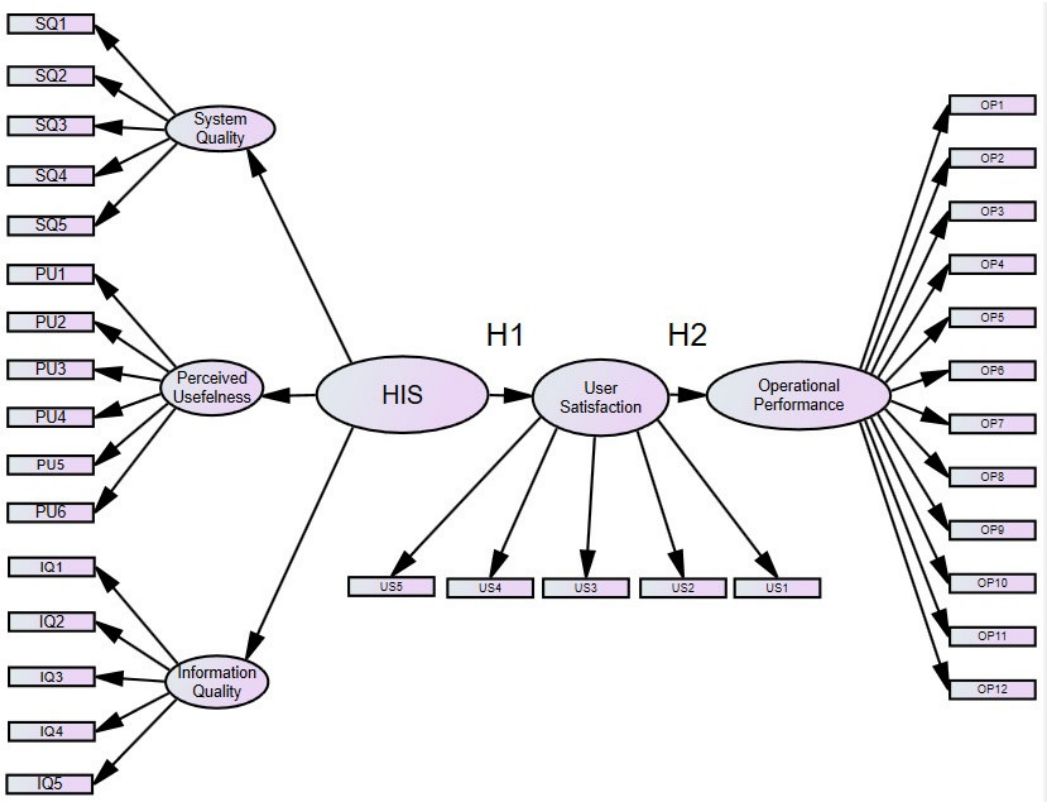

Figure 1. Research Framework

Source: Putu Wulandari et al (2018), DeLone and McLean (2003), Venkatesh and Davis (2003), Regulation of the Minister of Health of the Republic of Indonesia Number 2416 / Menkes / Per / XII / 2011, Darmawan and Fauzi (2013).

Figure 1 explains that the HMIS / HIS variable has 3 dimensions, namely system quality, perception of benefit use, information quality. The system quality dimension consists of five indicators (SQ1, SQ2, SQ3, SQ4, SQ5), the perception of benefits has six indicators (PU1, PU2, PU3, PU4, PU5, PU6) and the information quality dimension consists of five indicators (IQ1, IQ2 , IQ3, IQ4, IQ5). HMIS / HIS is expected to have a positive effect on user satisfaction. User satisfaction consists of five indicators (US1, US2, US3, US4, US5), user satisfaction is expected to have a positive effect on operational performance. Operational performance has twelve indicators (OP1, OP2, OP3, OP4, OP5, OP6, OP7, OP8, OP9, OP10, OP11, OP12). HMIS and user satisfaction are expected to directly affect operational performance.

Table 1 Operationalization of X1 HMIS Variables

Variable	Dimension	Indicator	Kode
HMIS (X1)	System Quality	HIMS quality system is easy to use and user friendly	SQ1
		HMIS display is simple and does not confuse	SQ2
		HMIS has access rights so that data confidentiality is guaranteed	SQ3
		HMIS is easy to access	SQ4
		HMIS rarely encountered error	SQ5
	Perception	HMIS provides accurate results	PU1
	Usefelnesss	HMIS answers the needs	PU2
		HMIS control for work	PU3
		HMIS makes work easier	PU4
		HMIS increases user productivity	PU5
		HMIS is important for work	PU6
	Information Qua	The information generated by HMIS is in accordance with reality	IQ1
		Informasi yang dihasilkan HMIS sesuai dengan kenyataan	IQ2
		The information generated by HMIS is precise and accurate	IQ3
		The information generated by HMIS is very complete and detailed	IQ4
		The Information generated by HMIS is easy to read	IQ6

Source : Darmawan & Fauzi (2013:13) , DeLone & McLeon (2003),Venkatesh & Davis (2003), Yusof et al (2006) Putu Wulandari Dkk (2018)

Table 2. Operationalization of Y1 User Satisfaction Variables

Variable	Indicator	Kode
User Satisfaction (Y1)	HMIS facilities and features	US1
	Features & functions as needed	US2
	Satisfied with usage	US3
	Helping with employee assignments	US4
	HMIS Easy to use	US5

Source : DeLone & McLeon (2003) ,Yusof et al (2006)

Tabel 3. Operasionalisasi Y2 Variabel Kinerja Operasional

Variable	Indicator	Kode
Operational Performance (Y2)	New & Old Patients	OP1
	Rata-Rata Pasien Per Hari	OP2
	Average Patients Per Day	OP3
	Ratio of Outpatient Workers Per Day	OP4
	Number of Visits	OP5
	Outpatient Workforce	OP6
	Number of Treatment Days	OP7
	BOR, LOS, TOI, BTO	OP8
	Death, NDR, GDR	OP9
	Baber Johnson's Chart	OP10
	Number of Life and Death Patients	OP11
	Average Number of Patients Treated	OP12

Source: Regulation of the Minister of Health of the Republic of Indonesia No. 2416 / Menkes / Per / XII / 2011

Based on the above frame of mind by looking at the relationship between the HMIS variables with the dimensions of system quality, perception of benefit, information quality as well as user satisfaction and operational performance variables and theories that support the research hypothesis can be taken as follows:

H1: HMIS / HIS has a positive effect on user satisfaction

The repeated use of HMIS can be interpreted that the use made is beneficial for the user, so that the high degree of benefits obtained will result in users being more satisfied with DeLone and McLean (2003).

H2: User satisfaction has a positive effect on operational performance

Livari (2005) in Radityo and Zulaikha (2007) noted that the application of the new information system will have an impact on the reactions shown by individual behavior in the organization, the reaction is in the form of new motivations to compete and improve performance. Of the two hypotheses above is hypothesis 1 (H1), hypothesis 0 (H0) is the opposite, building a model developed based on relevant theories will be further tested, testing the model will be carried out using Structural Equation Modeling.

3. Research Method

The research method used in this study is a quantitative statistical method using a survey approach. The survey approach method is research that takes a sample from one population and uses questionnaires as a primary data collection tool. The questionnaire is measured by a semantic differential scale where this scale measures the attitude of respondents consisting of a continuum line from the lowest point 1 to the highest point 10 (Ferdinand, 2014). The study population included employees from the Hermina Hospital who used Hospital Information Systems. The data analysis technique used in this study is Structural Equation Modeling (SEM) with AMOS 24 applications. The stages of analysis are through the Confirmatory Factor Analysis, Average Variance Extracted, Construct Reliability, Normality Test, Goodness of Fit Test and Hypothesis Test.

4. Result And Discussion

Characteristics of Respondents

The number of respondents in this study were 207 respondents. Data on the characteristics of respondents can be seen in the table below:

Table 4. Characteristics of Respondents

Characteristics of Respondents	Frekuensi	Percentage
Gender		
Man	56	27,1 %
Woman	151	72,9 %
Usia		
20 s.d < 25 years	54	26,1 %
25 s.d < 30 years	68	32,9 %
30 s.d < 35 years	34	16,4 %
≥ 35 years	52	25,1 %
Work unit		
Nursing	65	31 %
Marketing	50	24 %
Medical Support & Services	52	25 %
Finance	18	9 %
Human Resources	4	2 %
General Support	18	9 %

Source: Results of data processing (2019)

Test Validity and Reliability

Confirmatory Factor Analysis Test

Confirmatory Factor Analysis (CFA) test results show that all indicators of the dimensions and dimensions of the construct obtained probability values at the level of 0.001 and loading estimated values above 0.5 (Haryono, 2017; Ghozali, 2017). HMIS indicator values for PU1 (0.868), PU2 (0.879), PU3 (0.933), PU4 (0.889), PU5 (0.922), PU6 (0.862) on the dimensions of perception usefelness (PU) and SQ1 indicators (0.868), SQ2 (0.858)), SQ3 (0,882), SQ4 (0,885), SQ5 (0,720) against system quality (SQ) dimensions and IQ1 indicators (0.914), IQ2 (0.938), IQ3 (0.905), IQ4 (0.904), IQ5 (0.912) against Information Quality (SQ) dimensions. Dimensions of System Quality (0.932), Information Quality (0.958), Perception Usefelness (0.976) on the HMIS variable (HIS). Indicators US1 (0.928), US2 (0.951), US3 (0.961), US4 (0.947), US5 (0.914) on user satisfaction variables. Indicators OP1 (0.844), OP2 (0.863), OP3 (0.871), OP4 (0.914), OP5 (0.923), OP6 (0.932), OP7 (0.913), OP8 (0.9886), OP9 (0.926), OP10 (0.926) , OP11 (0.888), OP12 (0.930) on the operational performance variable.

Construction Reliability Test

Construct Reliability (CR) and Average Variance Extracted (VE) The test results show that all CR values are ≥ 0.7 and CE ≥ 0.5. Value (CR & VE) Dimensions of system quality (0.84 & 0.71); information quality (0.91 & 0.83); perception use factors (0.89 & 0.79). CFA variable user satisfaction (0.70 & 0.56); operation performance (0.88 & 0.78).The results of the Construction Reliability Test and Extracted Average Variance indicate that the values of all CR ≥ 0.7 and CE ≥ 0.5 mean that the questionnaire is reliable and valid.

Test for Assumption of Normality and Outliers

Multivariate normality analysis on AMOS 24 was performed using the criterion ratio criterion (c.r) of multivariate in kurtosi. If the value of cr is in the range between ± 2.58 it indicates that the data is normally distributed multivariately (Haryono, 2017). Normality test results show that there are some c.r values greater than ± 2.58. To meet the assumption of normality it is necessary to do an outlier test by removing outlier data. Outlier data is obtained by comparing the mahalanobis distance value with the Chi-square table at a significance of 0.001. (Tabachnick and Fidell, 2007). In this study the Chi-square table was 63.870 (obtained from the formula excel = chiinv (0.001.33). Then the calculated chi-square value was 104.611> chi-square table 63.870, so the mahalanobis d-square value of more than 63.870 was stated outlier data, 25 outlier data obtained that must be deleted After the outliers are removed, the normality test is returned with the normality test output showing normal results, because the value of cr is in the range between ± 2.58 with a multivariate of 61.903.

Goodness of Fit Test

The complete model of the structural test results and model modification is obtained by Goodness from Fit data as shown in Table 2 below.

Table 5. Goodness of Fit Data

Goodness of Fit	Required acceptance limits *	Results after modification of the Decision model	Decision
X^2 CHI-SQUARE	$X^{2\ Calculate} < X^{2\ Table}$	61,903	Good Fit
CMIN/DF	≤ 2,00	1.928	Good Fit
GFI	≥ 0,90	0,803	Marginal Fit
AGFI	≥ 0,90	0,737	Marginal Fit
NFI	≥ 0,90	0,931	Good Fit
RFI	≥ 0,90	0,914	Good Fit
IFI	≥ 0,90	0,966	Good Fit
TLI	≥ 0,90	0,957	Good Fit
CFI	≥ 0,90	0,965	Good Fit
RMSEA	≤ 0,08	0,072	Good Fit

*) Source: Ferdinand, 2014; Widarjono, 2015; Haryono, 2017; Ghozali 2017; Santoso, 2018

Absolute Fit Indices test that compares directly the sample covariance matrix with estimates. One of them is the chi-square test (x^2). After modifying the model, the calculated chi-square value of 61.903 <chi-square table 63.870. This shows that the model is valid because the sample covariance matrix is the same as the estimation matrix. By looking at the significance level of 0,000 < 0.05 it means that the model becomes fit.

Hypothesis testing

In the complete structural model that has been modified and declared fit, then the hypothesis test is then performed. The results of the hypothesis test are summarized in the table below.

Table 6. Hypothesis Test Output Results

			Standardized	S.E.	C.R.	P	Label	Unstandardized
US	<---	HIS	.981	.108	13.041	***	.108	1.409
OP	<---	US	.931	.042	23.169	***	.042	.983

Source: Results of data processing (2019)

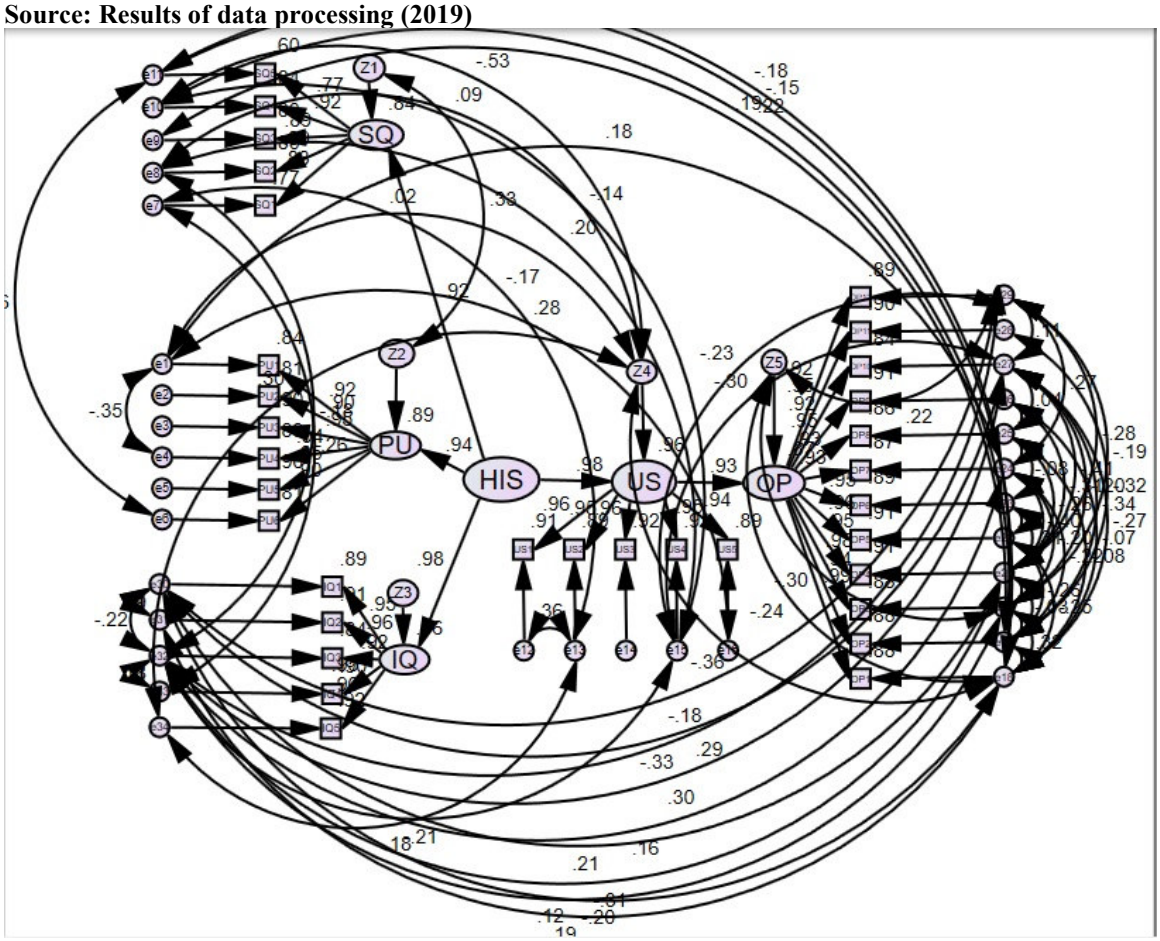

Figure 2. Hypothesis Test Output Results

Source: Data processing results (2019)

The picture above is the result of the hypothesis test output after the model modification is carried out.

Based on the proposed hypothesis, as follows:
1. First Hypothesis (H-1)
H0: HMIS / HIS has no positive effect on user satisfaction
H1: HMIS / HIS has a positive effect on user satisfaction
The results of the H1 hypothesis test are accepted, the results of the analysis in table 3 show that in the H1 hypothesis, HIS / HMIS has a positive effect on user satisfaction with a regression coefficient of 0.976 and a significant level of probability value <0.05 (0,000). The value of the standardize parameter is 0.976 that every increase of one unit of HIS / HMIS can increase user satisfaction by 0.976. .
2. Second Hypothesis (H-2)
H0: User satisfaction does not have a positive effect on operational performance (operational performance)
H2: User satisfaction has a positive effect on operational performance
H2 hypothesis test results are accepted, H2 hypothesis shows that, user satisfaction has a positive effect on operational performance with a regression coefficient of 0.930 with a significant level of probability value <0.05 (0,000) .. Parameter value of 0.930, that each increase of one unit of user satisfaction can increase operational performance of 0.930. In order to obtain the indirect effect of HIS / HMIS on operational performance of 0.907 (0.976 x 0.930). This explains that HIS / HMIS affects the operational performance through user satisfaction as mediation.
To be able to see the relationship between variables and dimensions and / or indicators, they are explained as follows.

Table 7. HMIS / HIS parameter values for dimensions of PU, SQ, IQ

			Standardized	S.E.	C.R.	P	Label	Unstandardized
PU	<---	HIS	.942	.102	12.635	***	.102	1.291
SQ	<---	HIS	.915					1.000
IQ	<---	HIS	.977	.109	12.854	***	.109	1.395
PU6	<---	PU	.902	.049	20.703	***	.049	1.013
PU5	<---	PU	.946	.039	24.147	***	.039	.937
PU4	<---	PU	.941	.047	20.476	***	.047	.961
PU3	<---	PU	.947	.041	24.356	***	.041	1.004
PU2	<---	PU	.901	.048	20.645	***	.048	.981
PU1	<---	PU	.919					1.000
SQ5	<---	SQ	.773					1.000
SQ4	<---	SQ	.915	.086	14.155	***	.086	1.220
SQ3	<---	SQ	.895	.087	13.742	***	.087	1.199
SQ2	<---	SQ	.894	.083	13.662	***	.083	1.140
SQ1	<---	SQ	.880	.087	13.425	***	.087	1.169
IQ5	<---	IQ	.960	.034	29.171	***	.034	.982
IQ4	<---	IQ	.949	.035	27.523	***	.035	.955
IQ3	<---	IQ	.919	.045	22.258	***	.045	.998
IQ2	<---	IQ	.956	.031	32.032	***	.031	.982
IQ1	<---	IQ	.945					1.000

Source: Results of data processing (2019)

The HMIS / HIS parameter values table on the dimensions of PU, SQ, IQ above shows that the strongest relationship on the HMIS / HIS variable is supported by the IQ (Information Quality) dimension with a loading factor value of 0.979, followed by a dimension of PU (Perceived Usefelness) with a loading factor value of 0.951 and SQ (System Quality) with a loading factor value of 0.920 but all three represent in measuring the HMIS / HIS variable.

Table 8. Value of the parameters of User Satisfaction with indicators

			Standardized	S.E.	C.R.	P	Label	Unstandardized
US1	<---	US	.955					1.000
US2	<---	US	.945	.027	35.722	***	.027	.970
US3	<---	US	.959	.032	30.946	***	.032	.988
US4	<---	US	.952	.033	29.738	***	.033	.987
US5	<---	US	.942	.035	28.169	***	.035	.975

Source: Results of data processing (2019)

The Table Value of the User Satisfaction parameters to the indicator shows that the strongest relationship

on the user satisfaction variable is supported by the US3 indicator (Satisfied with usage) with a loading factor value of 0.959 then followed by the indicator US1 (Facilities and HMIS features) with a loading factor value of 0.955 and US4, US5, US2 with loading factor values above 0.5, but the five of them represent in measuring user satisfaction variables.

Table 9. Value of Operational Performance parameters for the indicator

			Standardized	S.E.	C.R.	P	Label	Unstandardized
OP1	<---	OP	.991					1.000
OP2	<---	OP	.938	.028	31.822	***	.028	.905
OP3	<---	OP	.977	.033	29.468	***	.033	.971
OP4	<---	OP	.951	.037	26.481	***	.037	.970
OP5	<---	OP	.955	.039	24.358	***	.039	.960
OP6	<---	OP	.945	.038	25.701	***	.038	.978
OP7	<---	OP	.934	.039	24.528	***	.039	.946
OP8	<---	OP	.930	.039	23.130	***	.039	.904
OP9	<---	OP	.952	.036	25.703	***	.036	.937
OP10	<---	OP	.916	.045	20.617	***	.045	.925
OP11	<---	OP	.949	.037	26.137	***	.037	.973
OP12	<---	OP	.918	.037	24.818	***	.037	.931

Source: Results of data processing (2019)

The Operational Performance parameter values table for the indicator shows that the strongest relationship in the operational performance variable is supported by the OP1 indicator (New & Old Patients) with a loading factor value of 0.991 then followed by the OP3 indicator (Ratio of new & old patients) with a loading factor of 0.977 and OP9, OP11, OP12, OP4, OP6, OP8, OP5, OP7, OP2, OP10 with loading factors above 0.5 and twelve indicators representing in measuring operational performance variables.

5. Conclusion

Based on the results of data analysis, the following conclusions can be drawn in this study:

1. HMIS / HIS has a significant and positive effect on user satisfaction. Every increase of one HMIS / HIS unit can increase user satisfaction. The strongest relationship of the HMIS / HIS variable is explained by the HMIS indicator of control for the job. This implies that in the future the company sets the priority scale for implementing HMIS / HIS as the main reference by optimizing and improving the management of quality data and information systems, so that it can support the implementation of HMIS / HIS in hospitals.
2. User satisfaction has a significant and positive effect on operational performance (Operational Performance). Every improvement of one quality management unit can improve operational performance. The strongest relationship of user satisfaction variables is explained by the indicator "satisfied with use". This implies that in the future the company facilitates the HMIS feature with the reports needed in order to support the achievement of operational performance to achieve optimal user satisfaction.

Suggestions for further research by adding variables, dimensions, and indicators to the model, so that results provide more focus on theoretical concepts and use other types of industry.

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