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

Eri Wijaya  Niken Sulistyowati
Master of Management Study Program, Mercu Buana University, Jakarta Indonesia

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.

Keywords: HMIS, user satisfaction, operational performance, Structural Equation Modeling
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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. Literature 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 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 |
|            |             | HIMS display is simple and does not confuse | SQ2 |
|            |             | HIMS has access rights so that data confidentiality is guaranteed | SQ3 |
|            |             | HIMS is easy to access | SQ4 |
|            |             | HIMS rarely encountered error | SQ5 |
| Perception |             | HIMS provides accurate results | PU1 |
| Usefulness |             | HIMS answers the needs | PU2 |
|            |             | HIMS control for work | PU3 |
|            |             | HIMS makes work easier | PU4 |
|            |             | HIMS increases user productivity | PU5 |
|            |             | HIMS is important for work | PU6 |
| Information Quality | 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 & McLean (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)

Table 3. Operationalization Y2 Variabel Kinerja Operasional

| Variable                  | Indicator                                      | Kode |
|---------------------------|-----------------------------------------------|------|
| Operational Performance   | New & Old Patients                            | OP1  |
| (Y2)                      | 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 usefulness (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 Usefulness (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 kurtosis. If the value of cr is in the range between ± 2.58 it indicates that the data is normally distributed multivariate (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. 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         | $\leq 2.00$                  | 1.928                                            | Good Fit |
| GFI             | $\geq 0.90$                  | 0.803                                            | Marginal Fit |
| AGFI            | $\geq 0.90$                  | 0.737                                            | Marginal Fit |
| NFI             | $\geq 0.90$                  | 0.931                                            | Good Fit |
| RFI             | $\geq 0.90$                  | 0.914                                            | Good Fit |
| IFI             | $\geq 0.90$                  | 0.966                                            | Good Fit |
| TLI             | $\geq 0.90$                  | 0.957                                            | Good Fit |
| CFI             | $\geq 0.90$                  | 0.965                                            | Good Fit |
| RMSEA           | $\leq 0.08$                  | 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 $< X^2$ 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

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

Source: Results of data processing (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 coefficie nt 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 Useffulness) 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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