Acceptance, Performance and Challenge Development Hospital Information System at 2 Public Hospitals in Jambi Province

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Abstract

Evaluation of the Hospital Information System (HIS) performance is important considering that it is one of the important aspects in realizing fast service, minimal medical errors, and providing information disclosure to transparent operational cost control. The study aims to determine user acceptance, HIS performance, and challenges in its development in 2 Jambi Provincial Government Hospitals. This quantitative study included hospital staff who were selected purposively and in-and-out patients were selected by simple randomness according to Lemeshow's number. The concept of Technology Acceptance Models (TAM) is used to determine the acceptance of hospital information system technology by officers. The quality of the information system according to the D&M Success Model is to determine the performance of the HIS used. The Service Quality (Servqual) dimension uses Important-Performance Analysis (IPA) analysis to determine the priority attributes of HIS development. The results showed Hospital Information System at 2 (two) public hospitals in Jambi Province has user acceptance. Based on HIS performance, Raden Mattaher Hospital's excellence on system speed but low relevance, however H. Hanafie Hospital's was good at completeness but lacks accuracy. HIS development priority attributes were based on the patient's hope related to knowledge, attitude, and practice (behavior) from health workers in giving information applied to Raden Mattaher Hospital while providing infrastructure expected at the H. Hanafie Hospital. It is important to address the challenge of HIS development by strengthening practice effort and the accelerated speed system in Raden Mattaher Hospital while increasing HIS physical proof and accuracy in H. Hanafie Hospital.

Keywords

Hospital Information System (HIS), Technology Acceptance Models (TAM), Important-Performance Analysis (IPA), AtributPrioritas, Jambi Province

1. Introduction

The complexity of services in hospitals, including government hospitals, is a challenge in realizing fast services, minimal medical errors, providing open and timely access to information, and transparent operational cost control. These challenges can be answered through an Information and Communication Technology (ICT) approach, where the use of ICT has become an important aspect in the development of the global health world, including in hospitals (Hack et al. 2011; Alipour et al. 2016; Setyohadi and Purnamawati 2018).

A Hospital Information System (HIS) is a form of implementing an ICT approach by managing information related to patient data and reporting hospital activities so that health workers can work effectively and efficiently (WHO/USAID 2014). The use of a Hospital Information System (HIS) can affect the speed of service which will determine the performance of services at the hospital (Meutia et al. 2016). The ease of making the right decisions by the management can certainly be realized with the availability of accurate, reliable, current and relevant information both clinically and administratively so that it becomes a potentially competitive and strategic advantage for hospitals (Buntin et al. 2011).

HIS software developed in hospitals must be able to integrate and accommodate all types of service needs. Hardware must be able to adjust the need for the system being built, and the user (brainware) is a determinant of the running of the system that has been built which requires high commitment and consistency (Buntin et al. 2011; Harsono 2015; Maya 2018). Buntin et al. (2011) analyzed many factors that will determine the success of HIS as a system built from software, hardware, and brainware,Several research results show that high-quality medical services can be realized from the implementation of HIS, with good documentation of medical history, health status, current medical conditions, and treatment plans and financing from patients (Buntin et al. 2011; Rao et al. 2011).

The success of an information system in a hospital will of course be determined by the user (hospital officer), but the success of its development will also be determined by the perception of service users in the hospital. Alipour et al. (2016) and Setyohadi and Purnawaty(2018) developed the perception of service providers on the benefits and convenience of the system put forward in the Technology Acceptance Model (TAM) concept will be very decisive, especially the readiness to change data in an integrated manner. In addition, development considerations by taking into account the elements of service quality according to service users have been proven to increase the success of HIS used (Sayekti and Putarta 2016; Kurnaedi et al. 2017; Supriyati and Cholil 2017; Astria 2018; Maya 2018).

Jambi Province has 2 type B hospitals with the highest government-owned referrals, Raden Mattaher Hospital (RM) and H. HanafieHospital (HH). With different locations and characteristics, of course, it requires different support in developing HIS in these two hospitals. It is undeniable that the complaints submitted by hospital service users stem from information problems. The system is too convoluted, the information is considered ineffective and incomplete, the use of media that is not attractive, and the hours of service that are considered in favor of the patient are some of the things that the two hospitals complain about. In addition, the use of HIS in both hospitals is more dominant at the financial interest billing system level.

1.1 Objectives

This study aims to investigate user acceptance, Hospital Information System (HIS) performance, and challenges in its development in 2 public hospitals type B of Jambi Province in 2019. Technology Acceptance Models (TAM) concept to (know) user acceptance toward information systems and technology and developed to determine HIS performance, while Important-Performance Analysis (IPA) of dimension Service Quality (Servqual) was used to determine HIS development priority attributes.

2. Literature Review

HIS Concept

A Hospital Information System is a communication information technology system processing and integrating all hospital service processes in the form of a network of coordination, reporting and administrative procedures to obtain precise and accurate information and become part of the Health Information System (SIK) (Ministry of Health 2013). The success of implementation is not only determined by information technology but also by other factors, such as business processes, management changes, governance, and others, so the HIS problem is not only a technology issue (Aziz 2017).

Information System Quality.

The approach used for the development of information systems states that the indicators of the success of information are categorized into six main dimensions, namely system quality, information quality, service quality, usage, user satisfaction, and net benefits. This is defined in the 2003 ID Success Model which was introduced by DeLone and McLean in early 1992. In the concept, it is said that system quality is the expected characteristics of an information system, consisting of ease, relevance (usability), accuracy, completeness,andspeed (Advistasari et al. 2015).

Technology Acceptance Model (TAM)
Davis (1989) developed a measure of ease and relevance (usability) in the development of information systems can be done using the concept of readiness to use a technology called the Technology Acceptance Model (TAM). TAM focuses on the factors that determine users behavioral intention in accepting new technologies, which are operationalized in perceived usefulness as the extent to which a person believes that a particular system will improve work or performance(Gajayanake et al. 2014; Holden and Karsh 2010).

While the perception of ease of use extent to which a person believes that using a particular system will be regardless of effort. TAM is a hypothesis that the intention to use dating is influenced by attitudes and perceptions of benefits. This will affect behavioral intention directly. Perceived ease of use may have an impact on perceived usefulness (Priyanka and Kumar 2014; Supriyati and Cholil 2017).

Service Quality
Parasuraman et al. (1985) developed the service quality can be measured by a multi-item scale designed to measure customer expectations and perceptions, as well as the gap between the two on the five main dimensions of service quality (reliability, responsiveness, assurance, empathy, and physical evidence). The five main dimensions are translated into detailed attributes for the variables of expectations and perceptions, arranged in questions based on a Likert scale (Parasuraman et al. 1985; Mardjiono and Eko 2009).

3. Methods

3.1 Research Design

This study uses a quantitative descriptive approach in two hospitals, namely RSUD Raden Mattaher (RM) and RSUD H. Hanafi (HH). Raden Mattaher became the referral centre for the Eastern region and the City in Jambi Province, while H. Hanafi Hospital became the referral centre for the Western region in Jambi Province.

3.2 Population and Sample

The population for measuring system quality is all employees in both hospitals. The sample was determined by purposive sampling with the criteria of officers having a service period of > 1 year and being responsible for the operation of SIMRS, the head of the room and the health officer in the service room. The number of samples found was 57 people for Raden MattaherHospital and 55 people for H. Hanafi Hospital.

The population for measuring of performance a hospital in service quality is all patients who come to visit both inpatient and outpatient. The sample was chosen at simple randomness with the minimum number calculated according to the Lemeshow formula, namely 203 people in Raden Mattaher (RM) Hospital and 102 people in H. Hanafi (HH) Hospital the sample inclusion criteria for the outpatient unit were repeat patients, and the inpatients were patients who had been treated for 1x24 hours.

3.3 Operational and Measurement Definition

System Quality
The system quality of HIS in this study was measured based on the concept of the ID success model by DeLoneand McLean through 5 variables with operational definitions as shown in table 1.

Table 1. Operational Definition of System Quality

Variable	Operational definition	Measuring instrument	Measurement Results (Performance/Importance)	Scale
Ease of HIS	Ease of use of HIS by hospital staff, including ease of learning and operating	Questionnaire, questions 1-3	1. Good, if average value ≥ median, 3.67 (RM) and 4.00 (HH) 2. Not Good, if average value < median, 3.67 (RM) and 4 (HH)	Ordinal
Relevance	The importance of HIS and helpfully in completing the work of officers	Questionnaire, questions 7-8	1. Good, if average value ≥ median 4.00 (RM&HH)	Ordinal

			Not Good, if average value < median 4.00 (RM & HH)	
Accuracy	The use of HIS increases the effectiveness, productivity, and output of the work performed by officers	Questionnaire, questions 4-6	1. Good, if average value ≥median 4.00 (RM) and 3.83 (HH) 2. Not Good, if average value < median 4.00 (RM) and 3.83 (H)	Ordinal
Completeness	The completeness of the HIS application, including the output,was a product to make the officers' enthusiasm for making reports and work better	Questionnaire, questions 9-11	1. Good, if average value ≥median 3.66 (RM & HH) 2. Not Good, if average value< median 3.66 (RM & HH)	Ordinal
Speed	The use of HIS is reliable so that it can speed up the completion of work	Questionnaire, questions 19-23	1. Good, if average value median = 3.00 (RM) & 4.00 (HH) 2. Not good, if average value < median=3.00 (RM) & 4.00 (HH)	Ordinal

Service Quality

Service quality in the context of information system services in hospitals in this study was measured using the Parasuraman concept with variables and operational definition in table 2.

Table 2. Operational Definition of Service Quality

Variable	Operational definition	Measuring instrument	Measurement Results (Performance/Importance)	Scale
Hospital Information System Service Quality	Assessment of the quality of information system services provided by service providers based on service quality according to the dimensions of Servqual (Service Quality); tangibles, reliability, responsiveness, assurance, empathy	Questionnaire (All number of questionnaires)	1. Good, if average value ≥ median = 2.80 (RM) and mean = 4.01 (HH) 2. Not good, ifaverage value < median = 2.80 (RM) and the mean = 4.01 (HH)	Ordinal
Tangibles Dimensions	Physical evidence is shown by the hospital in information to patients, both infrastructure and implementation of providing information. (1) availability of technology equipment, (2) information services. (3) doctor's schedule information, (4) interesting information display, (5) displayed information	Questionnaire 1-5	1. Good, if average value ≥ median= 4,00 (RM) & 3.60 (HH) 2. Not Good, if average value < median= 4.00 (RM)& 3.60 (HH)	Ordinal
Reliability Dimension	Reliability of officers and the realization of hospital staff in; (6) providing information to patientsrealization of information, (7) attitude of officers in providing information, (8) reliability of officers, (9) appropriateness of service time, (10) accurate recording	Questionnaire 6-10	1. Good, if average value ≥ median = 2.40 (RM) & 4.00 (HH) 2. Not Good, if average value < median = 2.40 (RM) & 4.00 (HH)	Ordinal
Responsiveness Dimension	Responsiveness of hospital staff in providing information to patients, including the timely delivery of services as promised; (11) officers provide information on service times, (12) officers provide information services quickly, and (13) the readiness of officers to help provide information to patients	Questionnaire 11-13	1. Good, if average value ≥ median = 2.33 (RM) & 4.00 (HH) 2. Not Good, if average value < median=2.33 (RM) & 4.00 (HH)	Ordinal

Dimension Assurance	The ability of hospital staff in providing information to patients so that patients trust it; (14) information makes customers trust, (15) patients feel safe in communicating with officers, (16) officers are always ready to provide the information needed, (17) officers have good knowledge good in answering patient questions, (18) suitability of services with those Informed	Questionnaire 14-18	1. Good, if average value ≥ median = 2.40 (RM) & 4.00 (HH) 2. Not Good, if average value < median = 2.40 (RM) & 4.00 (HH)	Ordinal
Dimension of Empathy	The attention given by the hospital in providing information to patients (19) personal information is strongly supported by the hospital, (20) convenience in receiving information, (21) officers are always friendly when asked by patients, (22) officers are always ready to provide information to patients, (23) employees understand the information needs of patients	Questionnaire 19-23	1. Good, if average value ≥ median = 2.40 (RM) & 3.4 (HH) 2. Not Good, if average value < median = 2.40 (RM) & 3.4 (HH)	Ordinal

3.4 Data Analysis

Univariate Analysis

Univariate data analysis was used to determine the frequency distribution of each dimension of system quality and service quality *(servqual)* using an ordinal scale, with good and not good categories. The quality of the system is measured through 5 dimensions, that is ease of HIS, accuracy, relevance, completeness, and speed of the system with an ordinal scale. Meanwhile, service quality is measured through 5 dimensions of service quality related to information services including tangibles, reliability, responsiveness, assurance, and empathy. Measurements on each dimension use a Likert scale with the lowest value of 1 and the highest 5 using a questionnaire that has been tested for its validity and reliability.

Importance of Performance Analysts (IPA)

Importance Performance Analysis (IPA) is used to determine the priority attributes of service quality *(servqual)* development of information systems. The fit/gap analysis was conducted to analyze the service quality attributes *(servqual)* preceded by determining the comparison of the average value of perceived service quality for Performance And the average service quality considered important for importance. The average score of each attribute measuring service quality dimensions will be positioned into the importance-performance matrix in the form of a Cartesian diagram, where the flat axis (X) is filled with the perceived service quality score and the vertical axis (Y) is filled with the expectation score.

3. Results and Discussion

System Quality

The quality of the information system in this study was measured based on indicators of ease of HIS, relevance, accuracy, completeness, and speed of HIS applications according to hospital staff as HIS users. The results of the study at Raden Mattaher Hospital showed that 38 of 57 people (66.7%) respondents stated that the quality of the information system was in a good category, while at H. Hanafie Hospital only half of the respondents, that is 26 of 52 people (50%).

Based on the dimensions of the quality of the information system, at Raden Mattaher Hospital, it can be seen that speed is the dimension with the highest percentage of good categories, with 39 out of 57 people (68.4%), followed by completeness and ease of HIS with 31 out of 57 people (54.4%), while the accuracy and relevance of the system only 30 out of 57 respondents (52.6%). Different results were obtained at H. Hanafie Hospital, where the completeness of the system was the dimension that got the highest percentage of good categories from the respondents, with 37 out of 52 respondents (71.2%), followed by the relevance dimension with 35 out of 52 respondents (67.3%). The dimensions of the ease of HIS and speed of the system got the same percentage value, which is 34 out of 52 respondents (65.4%), while accuracy is the dimension with the smallest percentage, which is 26 out of 52 respondents (50%). More details can be seen in the following table 3:

Table 3. Dimensions of Information System Quality at Government Hospitals in Jambi Province

RS System Quality Dimensions	Raden Mattaher		H. Hanafie	
	n	%	n	%
Information System Quality				
Good	38	66.7	26	50
Not good	19	33.3	26	50
System Quality Dimension				
Ease of HIS				
Good	31	54.4	34	65.4
Not good	26	45.6	18	34.6
Relevance				
Good	30	52.6	35	67.3
Not good	27	47.4	17	32.7
Accuracy				
Good	30	52.6	26	50
Not good	27	47.4	26	50
Completeness				
Good	31	54.4	37	71.2
Not good	26	45.6	15	28.8
Speed				
Good	39	68.4	34	65.4
Not good	18	31.6	18	34.6
Amount	57	100	52	100

Service Quality

The quality of services related to information services showed that 52 out of 101 patients (51.5%) stated that the quality of information services at Raden Mattaher Hospital was categorized as good, while at H. Hanafi Hospital, 55 of 102 people (53.9%). Based on the dimensions of service quality related to information services at Raden Mattaher Hospital, it appears tangible (physical evidence) is a dimension that according to the patient is good, with a total of 64 people (63.4%), followed by empathy dimension with a good category according to respondents, namely 58 people (57.4%). For the next service quality dimension, namely, reliability, which received a good rating from 57 people (56.4%), the responsiveness dimension was 55 people (54.4%). And the last dimension that received the lowest good rating was assurance with a total of 53 people (52.5%).

Meanwhile, in H. Hanafie Hospital, empathy is a dimension of service quality with the highest percentage for good information services with a total of 82 respondents (80.4%), followed by the responsiveness dimension with a good category of as many as 79 people (77.4%). The next dimension is an assurance with the number of people stated being 78 people (76.5%), followed by the reliability dimension assay as 67 people (65.7%). Meanwhile, in the tangible dimension, it was found that more respondents stated that they were not good, as many as 58 out of 102 people (80.4%), (see table 4).

Table 4. Dimensions of Service Quality at Government Hospitals in Jambi Province

System Quality Dimension	Raden Mattaher		H. Hanafi	
	n	%	n	%
Service quality				
Good	52	51.5	55	53.9
Not Good	49	48.5	47	46.1
Dimensions of Service Quality				
Tangible				
Good	64	63.4	44	43.1

Not good	37	36.6	58	56.9
Reliability				
Good	57	56.4	67	65.7
Not good	44	43.6	35	34.3
Responsiveness				
Good	55	54.5	79	77.4
Not good	46	45.5	23	22.6
Assurance				
Good	53	52.5	78	76.5
Not good	48	47.5	24	23.5
Empathy				
Good	58	57.4	82	80.4
Not good	43	42.6	20	19.6
Amount	101	100	102	100

HIS Development Priority Attributes

Based on the average value of the performance-importance of the attributes that make up the dimensions of service quality, it can be mapped according to the Cartesian Quadrant to determine the priority of the attributes that must be followed up first.

a. Mapping of attributes forming dimensions of service quality at Raden Mattaher Hospital

Respondents assessments of the attributes that form the dimensions of the quality of information system services to patients at Raden Mattaher Hospital, is a *Servqual*dimension attribute included in quadrant A, where improvement must be a priority for the hospital. These attributes are: (6)realizing what is informed, (7) hospital staff showing a sympathetic attitude in providing information, (8) hospitals can be relied on in providing information, (10) accurate records, (11) officers provide information services quickly, (12) employees are alert to help patients who are confused about finding information, (13) the information presented makes customers trust it, (15) patients feel safe in conducting transactions with hospitals, (16) employees are always ready to provide the information needed, (17) officers have the knowledge to answer customer questions.

*Servqual*dimension attribute is included in quadrant B, where the hospital should maintain the quality that has been achieved. The service attributes in this quadrant are considered important and have been implemented properly. These attributes are: (1) the availability of modern equipment and technology in providing information, (2) the availability of hospital information services, (3) the ease of information on doctor's schedules at the hospital, and (5) the information displayed is complete, (9) The hospital provides services according to the time informed.

*Servqual*dimension attribute which is included in quadrant C can be used as a low priority where improvement must be a priority for the hospital. These attributes are: (19) The provision of personal information is strongly supported by the hospital, (20) Patients feel comfortable receiving information from the hospital (21) Officers are friendly when asked by patients, and (22) Officers are always ready to provide information to patients, (23) Employees understand the information needs of patients.

Attributes or service elements are included in quadrant D, namely elements that are considered less important but whose implementation is considered good. Namely attributes on the dimensions of physical evidence (tangible), namely: (4) Display of information for patients looks attractive. More details can be seen in the following figure 1.

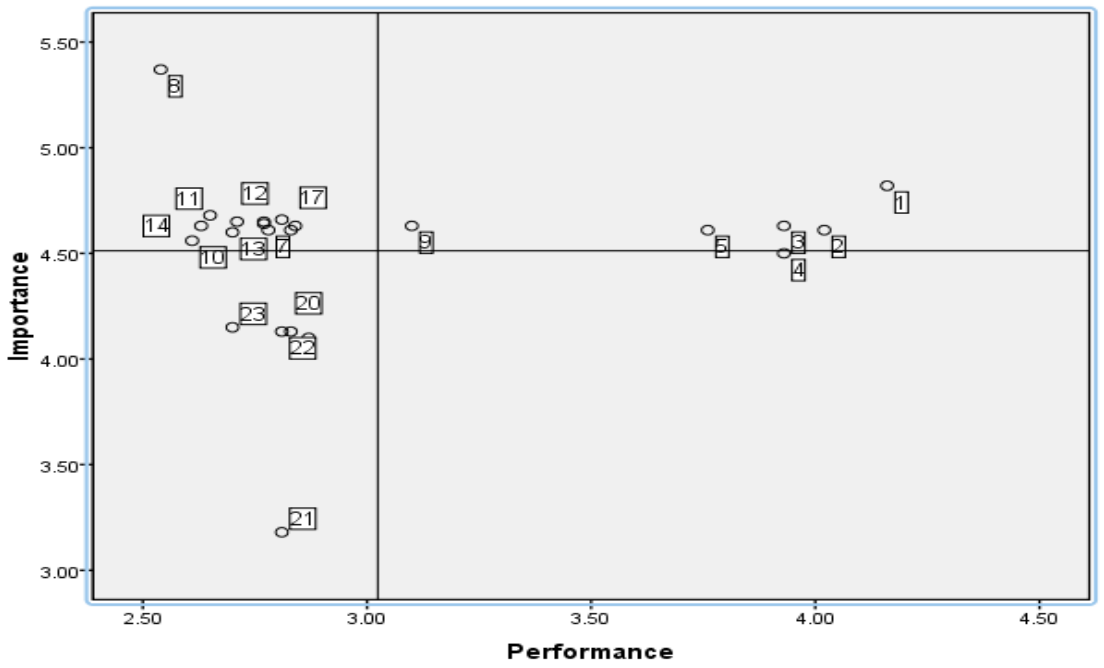

Figure 1 . *Matrix Importance-Performance Analysis* (Cartesian Diagram) Dimensions of *Service Quality* on Information Services at Raden Mattaher Hospital Jambi

b. Mapping of attributes forming dimensions of service quality at H. HanafieHospital

Respondents assessments of the attributes that form the dimensions of the quality of information system services to patients at H. Hanafie Hospital, is a *Servqual*dimension attribute included in quadrant A, where improvement must be a priority for the hospital. These attributes are: (1) Availability of modern equipment and technology in providing information, (3) Ease of information on doctor's schedule at the hospital, (4) Display of information for patients looks attractive, (5) Information displayed is complete, (19)The provision of personal information is strongly supported by the hospital.

*Servqual*dimension attribute belongs to quadrant B, where the hospital should maintain the quality that has been achieved. The service attributes in this quadrant are considered important and have been implemented properly. These attributes are: (2) Availability of hospital information services, (12) Officers provide information services quickly, (13) Employees are alert to help confused patients seek information, (20) Patients feel comfortable receiving information from the hospital, (21) The staff is friendly when asked by the patient.

*Servqual*dimension attribute which is included in quadrant C can be used as a low priority for which improvement should be a priority for the hospital. These attributes are: (9) Hospitals provide services according to the time informed, (10) Hospitals have accurate records, (15) Patients feel safe in conducting transactions with hospitals, (and 15) Hospital employees are always ready to provide the information needed, (18) Services by the information provided.

Attributes or service elements are included in quadrant D, namely elements that are considered less important but whose implementation is considered good. Namely attributes on the dimensions of physical evidence *(tangibles)*, namely: (6) Realizing what is informed, (7) Hospital staff showing a sympathetic attitude in providing information, (8) Hospitals can be relied on in providing information services appropriately, (11) Officers provide timely information service, (14) The information presented makes customers trust it, (17) Officers have the knowledge to answer customer questions, (22) Officers are always ready to provide information to patients, (23) Employees understand the information needs of patients, (see figure 2).

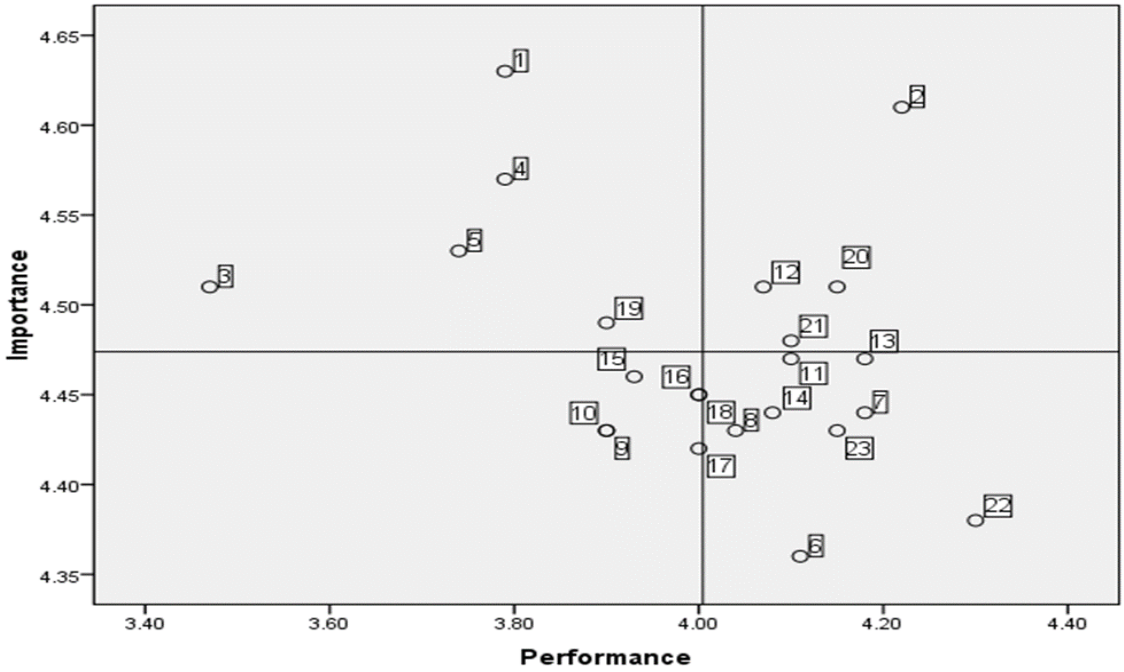

Figure 2. MatrixImportance-Performance Analysis (Cartesian Diagram) Dimensions of Service Quality on Information Services at H. HanafieHospital

Challenges of HIS Development at Raden Mattaher Hospital with H. Hanafie Hospital

Based on *the importance-performance matrix of the* attributes that composed the service quality dimension of the information system, a comparison of the priority attributes (quadrants A and B) between Raden Mattaher Jambi and H. Hanafi Hospital was obtained.The results of the analysis show that there are differences in the priority attributes of HIS development in the two hospitals. The priority attributes at RSUD Raden Mattaher emphasize more on improving the provision of services related to the information to patients, developing the attitude and culture of officers, accuracy, speed, and alertness, to the realization of what has been informed to provide a sense of security for patients. Meanwhile, at H. Hanafie Hospital, the priority attribute is more emphasized on the availability of modern equipment and technology in providing information, as well as the completeness of the information provided, as presented in table 5.

Table 5. Priority Attributes of SIMRS Development at Raden Mattaher Hospital and H. Hanafie Hospital

Raden Mattaher Hospital	H. HanafieHospital
Realize what is informed	Providing modern equipment and technology in providing information
Hospital staff show a sympathetic attitude in providing information	Doctor's schedule information
Hospitals can be relied on in providing appropriate information services	More interesting information display
Hospital has accurate records	Complete information displayed
Officers provide information services quickly	Hospitals pay more attention to the personal aspects of patients when obtaining information
The readiness of employees to help patients who are confused to find information	
Presenting information so that it creates a sense of trust in customers	

Creating a sense of security for patients in receiving information	
Improve employee readiness in providing information	
Improve the knowledge of officers in answering customer questions properly	

As a system built from hardware, software, and brainware, HIS will determine the quality of service and patient satisfaction, through increasing speed, accuracy, effectiveness, and minimal funding by patients. This is also seen in this study, where the quality of the information system in the good category in both hospitals, which only reached more or less 50-60 percent, was also with good service quality with almost the same percentage. These results indicate that improving the quality of service at the Jambi Provincial Government Hospital can be achieved by improving the quality of the information system in the two hospitals. The same result study by Advitasari, 2015 showed that the system quality has a positive impact on user satisfaction sig,0,000 (Advistasari et al 2015).

The quality of the information system refers to one of them how well the hardware, software, and policy procedures of the information system provide for the user's needs (Advistasari et al., 2015; Buntin et al., 2011; Protti et al., nd). The information system will make it easier for users to store data, search for data both patient data and drug data, and speed up waiting times so that the patient service process becomes shorter (Maya, 2018; Setiawan et al., 2015; Srinivasan, 2013). Improving service quality will certainly improve the performance of hospital staff, which will have an impact on improving organizational performance (Alipour et al., 2016; Blumenthal & Tavenner, nd; Bramble. JD et al., 2010).

6. Conclusion

The result showed Hospital Information System in District Hospital Government in Jambi Province has user acceptance. Based on HIS performance, Raden Mattaher District Hospital's excellence is on system speed but low to relevance, however, H Hanafie District Hospital was good at completeness but lacks accuracy. HIS development priority attributes were based on the patient's hope related to knowledge, attitude, and practice (behavior) from the health workers in giving information applied to Raden Mattaher District Hospital while providing infrastructure expected at the H Hanafie District Hospital. It is important to address the challenge of HIS development by strengthening practice effort and the accelerated speed system in Raden Mattaher District Hospital while increasing HIS physical proof and accuracy in H Hanafie District Hospital.

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