TESTING AND IMPLEMENTATION OUTPATIENT INFORMATION SYSTEM USING ISO 9126

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ABSTRACT

With the rapid development of the world is the indispensable information needs correctly and accurately. Competition in health services in the present and the future is needed by an institution or organization, especially regarding the quality and service of an institution or organization.Companies need to take advantage of information technology to improve business performance quality and information data to maximize efforts to improve the number of customers Therefore, this study aims to answer how to model an outpatient information system that can help provide optimal service In this study, the authors used the Object-Oriented Analysis and Design (OOAD) methodology for system development proposed and system testing using the ISO 9126 model using four characteristics of functionality, reliability, usability, and efficiency.

KEYWORDS: ISO 9126, Outpatient, Functionality, Reliability, Usability, Efficiency

INTRODUCTION

In the business world, competition between companies is increasing, therefore every company is required to make changes to achieve a success in doing. Competition in health services in the present and the future are indispensable to an institution or organization, especially with the presence of the computer as a tool to facilitate the work of man. This is a challenge and a need for every organization to be able to provide service services, especially administrative services, quickly, accurate and up-to-date information to the public. Computerization of the administration and patient services is one alternative to overcome the above problems, so that the entire process related to patient care and administration can be done quickly and precisely according to needs.

To meet the quality of an application, it is necessary to evaluate the software quality requirements. Evaluating the quality of an application is important to ascertain whether the application meets the expectations and goals of the end user.

2. PLATFORM THEORY
2.1 Basic Concepts of the Systems
The system can be interpreted as a collection or set of elements, components, or variables that are organized, interacting, interdependent with each other and integrated. The general model of a system consists of input, process, and output. This is a very simple concept of a system considering that a system can have multiple inputs and outputs at once. In addition, a system also has certain characteristics or properties, which characterize that this can be said as a system. The characteristics in question are: System components, System boundaries (Boundary), outside system environment (Environment), System liaison (Interface), system input (Input), System Output (output), system processor (Procces), and system targets (Objective).

2.2 Basic Concepts of Information Systems
Information systems can be interpreted as data that has been classified or processed or interpreted for use in the decision making process. Information processing systems will process data into information or process data from useless forms to be useful for those who receive them. Information system is a supporting thing that is very important for all levels of management in an organization in providing information and in decision making. Information systems can be interpreted as Information systems are defined as a collection of several interconnected parts that collect, process, store and provide as a result of the information needed to complete the business.

The purpose of the Information System is to provide information for all levels within the organization whenever needed. This system stores, retrieves, changes, manages and communicates information received using information systems. Based on the above theories, we can conclude that the information system is a collection of components, can be human, software, hardware, communication networks and interconnected data sources that collect and deliver data and

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information by providing media feedback to convey an aim.

2.3 Quality Testing

Software quality can be assessed through certain measures and methods, as well as through software testing. One of the software quality benchmarks is ISO 9126, made by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). ISO 9126 defines the quality of software products, models, quality characteristics, and related metrics used to evaluate and determine the quality of a software product. The ISO 9126 standard has been developed in an effort to identify key quality attributes for computer software. Quality factors according to ISO 9126 include the following six quality characteristics:

1. Functionality. The ability of software to provide functions according to user needs, when used under certain conditions.
2. Reliability (Reliability) The ability of software to maintain a certain level of performance, when used in certain conditions.
3. Usability. The ability of software to be understood, studied, used, and attractive to users, when used in certain conditions.
4. Efficiency. The ability of software to provide appropriate performance and relative to the amount of resources used at the time of the keadaant.
5. Maintainability. The ability of software to be modified. Modifications include corrections, improvements or adaptations to environmental changes, requirements, and functional specifications.
6. Portability. The ability of software to be transferred from one environment to another.

ISO 9126 is a standard for quality software that is internationally recognized. The fulfillment of items at ISO 9126 on a software does not necessarily give an ISO certificate to the software because the ISO standard must also be fulfilled from the management side of the software maker, in other words if the management does not meet the ISO standard, the work results cannot awarded ISO standard certificate.

3. RESEARCH METHODS AND STEPS RESEARCH

To answer and describe the problems that arise from the background and formulation of the problem, the methods in the research can be seen in the picture below:
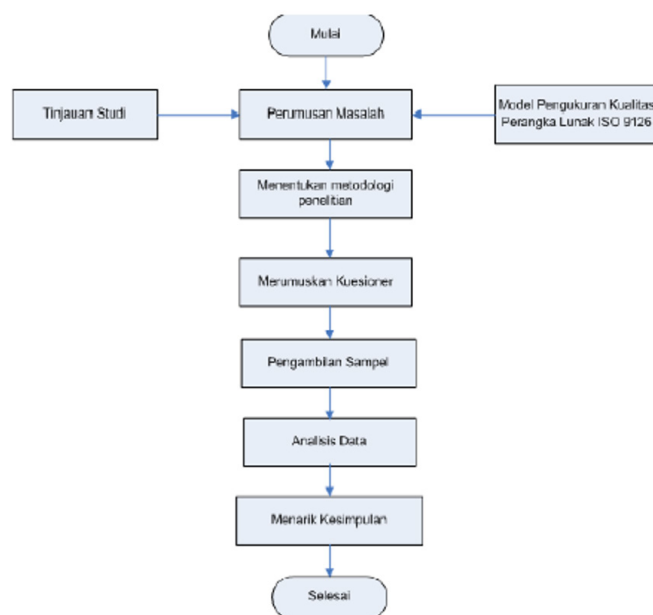

Figure 1: Steps Researh

Based on the picture of the method framework above, it can be explained as follows:

a. Formulation of the problem

The initial step of this research is to formulate the problems that exist in the administrative section which is the result of documentation activities, direct observation and interviews with several staff to get an overview of the state of the organization.

b. Review of the Study

The review of this study was conducted to obtain theories about hospital services and general theories related to the formulation of the problem. The method used by researchers is to read various references from books, journals and theses that have been published. The results of this step are literature related to the formulation of the problem.

c. International Organization for Standardization (ISO) Software Quality Measurement Model 9126

At this stage, researchers read references related to the International Organization for Standardization (ISO) 9126 software quality measurement model that will be used in system testing.

d. Determining Research Methodology

At this stage, the researcher determines the methodology that will be used in solving the research problem. The methodology used in this research is descriptive qualitative research methodology with a system development framework used in this study using the Object-Oriented Analysis and Design (OOAD) approach, programming languages using Microsoft Visual Basic.Net with databases using MySQL. The proposed system quality testing uses a questionnaire that contains questions based on the criteria contained in the ISO 9126 standard, and the scale of the questionnaire answer answers using the Linkert measurement scale.

e. Formulate a questionnaire

At this stage, the researcher identifies the questions and answers that will be used in the questionnaire to capture important information related to the problems and solutions that will be offered.

f. System Testing

The next step is to do testing on the system that has been obtained from the previous process. Testing is done by testing the system. The testing of the system prototype uses the ISO 9126 standard with the criteria to be assessed as follows: Functionality (testing system functionality), Reliability (testing system ease), Usability (testing the system's usability), Efficiency (testing system efficiency), Maintability (testing maintenance) system) and Portability (testing system portability). The scale used is to measure the level of answers to the questions in the questionnaire using the Likert measurement scale.

4. RESULTS AND DISCUSSION

A. Use Case Diagram

Based on the specifications of functional requirements and actors involved in the system, it can be modeled with use case diagrams. The case case diagram describes the expected functionality of a system. The use case also describes the interactions that occur in the system, which gives a picture of the user or actor that is related to the system and the things that are related to the user in the system. Following are user interactions in Outpatient Information Systems.
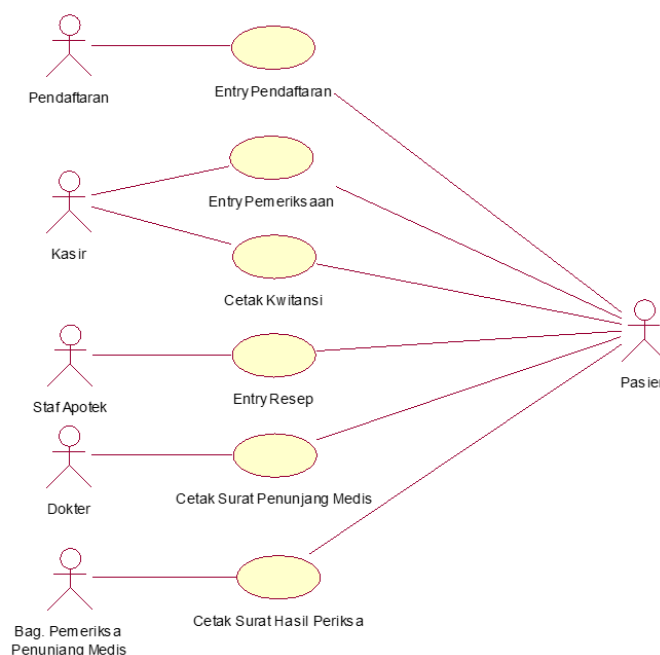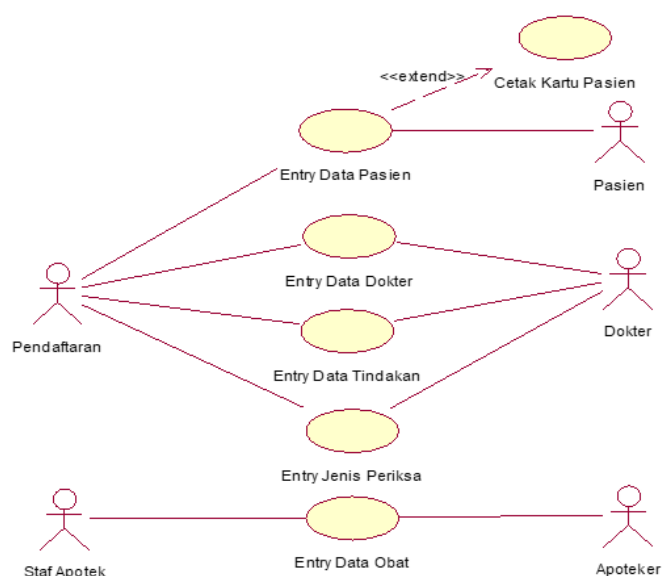

Figure 2: Use Case Diagram

B. Sequence Diagram

Sequence Diagram describes the flow of functionality in the use case. A sequence diagram shows the sequence of interactions of objects arranged in a time sequence. It describes the objects and classes that are seen in the scenario and the order of messages exchanged between objects needed to perform scenario functions. Its usefulness is to show a series of messages sent between objects as well as interactions between objects, something that happens at a certain point in the system execution. The following is an example of some outpatient information system sequence diagrams:
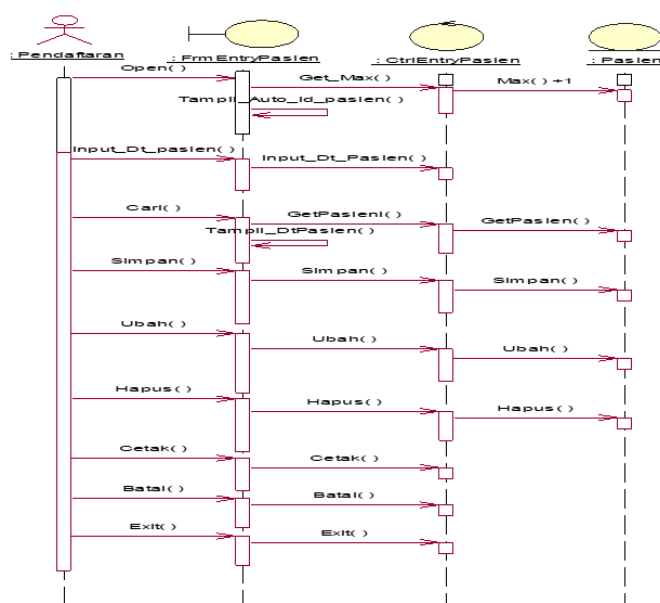

Figure 3: Sequence Diagram
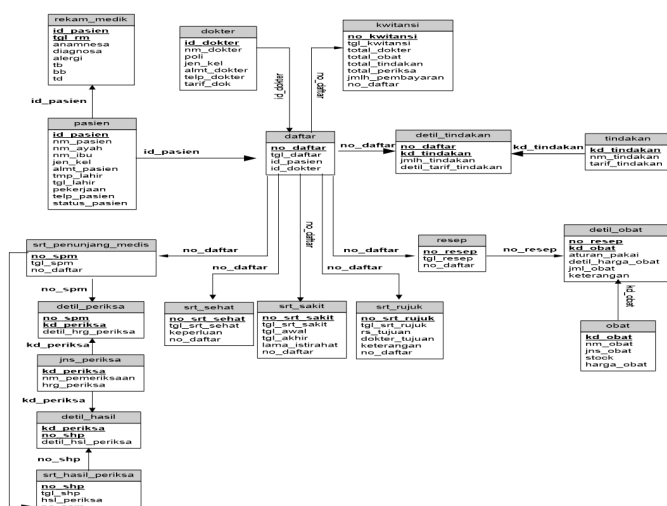
C. Class Diagram

Figure 4: Class Diagram

D. User Interface

Display of outpatient information system interface can be seen in the following picture:

Figure 5: Patient Data Page

The patient's data page serves to input patient data when registering. On this page, the actor in charge is the registration section.

Figure 6: Page Data Doctor

On the doctor's data page, handle the doctor's data input process. The actor who is carrying out this task is admin staff.

E. Testing With ISO 9126

ISO 9126 quality test consists of two parts, namely: the quality level of each aspect based on four characteristics of ISO 9126, and the overall quality level of the four characteristics of ISO 9126. Of the 20 respondents who filled out the questionnaire for testing outpatient information system quality. Respondents 'response to the level of quality of outpatient information systems based on respondents' answers to software quality

indicators according to ISO 9126, can be measured using the following formula:

% Score Actual = x 100% $\frac{Skor\ Aktual}{Skor\ Ideal}$

Information

a. Actual Score is the answer of all respondents to the questionnaire that has been submitted.

b. Ideal score is the highest value or all respondents are assumed to choose the answer with the highest score.

Furthermore, the results are processed and calculated with the criteria set out in the research design, namely:

% Total score	Criteria
20.00% - 36.00%	Very Not Good
36.01% - 52.00%	Not Good
52.01% - 68.00%	Enough
68.01% - 84.00%	Well
84.01% -100%	Very Good

Table 1: Percentage Criteria for Ideal Scores ([Narimawati, 2007], 84-85)

Note: 20% lower limit is obtained from 1/5 of the upper limit of 100%.

Following is the Calculation of Test Questionnaire Results with the ISO 9126 Model:

1. Responses of respondents to the Functionality of the KMS e-procurement prototype.

Criteria Answer	Weight	Functionality									Total
		Suitability		Accuracy		Security		Intero-perability		Comp-liance	
		1	2	3	4	5	6	7	8	9	
VG	5	14	18	15	16	12	12	20	15	12	220
W	4	6	2	5	4	8	8		5	8	184
E	3										
NG	2										
VNG	1										
Total Respondent		20	20	20	20	20	20	20	20	20	
Actual Score		94	98	95	96	92	92	100	95	92	854
Ideal Score		100	100	100	100	100	100	100	100	100	900

Table 2: Results of Functionality Testing

% Score Actual = x 100% $\frac{Skor\ Aktual}{Skor\ Ideal}$

$= \frac{854}{900}$ X 100% = 94.89% (Very Good criteria)

In the table above can be seen the majority of respondents strongly agreed that the outpatient information system has good functionality corresponding functions it has. The percentage of respondents score of 94.89% is in the Very Good criteria.

1. Response of respondents to the Reliability of outpatient information system.

Criteria Answer	Weight	Reliability					Total
		maturity		Fault tolerance		recoverability	
		10	11	12	13	14	
VG	5	14	17	7	6	18	310
W	4	6	3	10	14	2	140
E	3			3			9
NG	2						
VNG	1						
Total Respondent		20	20	20	20	20	
Actual Score		94	97	84	86	98	459
Ideal Score		100	100	100	100	100	500

Table 3: Reliability Testing Results

% Score Actual = x 100% $\frac{Skor\ Aktual}{Skor\ Ideal}$

$= \frac{459}{500}$X 100% = 91.80% (Very Good criteria)

In the table above can be seen the majority of respondents strongly agreed that outpatient information system has gooDd reliability corresponding functions that it has. The percentage score of 91.80% respondents are in Very Good criteia.

2. Response of respondents to the Usability of outpatient information system

Criteria Answer	Weight	Functionality								Total
		Underst-andibility		Learnability		Operability		Attractiveness		
		15	16	17	18	19	20	21	22	
VG	5	5	15	2	3	5	15	12	6	315
W	4	15	5	18	17	15	5	8	14	388
E	3									
NG	2									
VNG	1									
Total Respondent		20	20	20	20	20	20	20	20	
Actual Score		85	95	82	83	85	95	92	82	703
Ideal Score		100	100	100	100	100	100	100	100	800

% Score Actual = x 100% $\frac{Skor\ Aktual}{Skor\ Ideal}$

$= \frac{703}{800}$X 100% = 87.88% (Very Good criteria)

In the table above can be seen the majority of respondents strongly agreed that the outpatient information system has good usability suit its function. The percentage of respondents score of 87.88% is in Very Good criteria.

3. Response of respondents to the Efficiency of outpatient information system

Criteria Answer	Weight	Efficiency			Total
		Time behavior		Resource Behavior	
		23	24	25	
VG	5	8	11	5	120
W	4	12	9	15	144
E	3				
NG	2				
VNG	1				
Total Respondent		20	20	20	
Actual Score		88	91	85	264
Ideal Score		100	100	100	300

Table 5: Efficiency Testing Results

Actual Score% $= \frac{Skor\ Aktual}{Skor\ Ideal}$x 100%

$= \frac{264}{300}$X 100% = 88% (Very Good criteria)

In the table above can be seen the majority of respondents strongly agreed that outpatient information system has excellent efficiency suit its function. The percentage of respondents score of 88% is in Very Good criteria.

Based on the analysis of data obtained from questionnaires, the following recapitulation of quality testing based on four aspects of software quality according to ISO 9126, namely:

Aspect	SkorAktual	SkorIdeal	Actual Score%	Criteria
functionality	854	900	94.89%	Very good
Reliability	459	500	91.80%	Very good
Usability	703	800	87.88%	Very good
Efficiency	264	300	88.00%	Very good
Total	2280	2500	91.20%	Very good

Table 6: Test Results ISO 9126

Based on the above table it can be concluded that the level of quality outpatient information system as a whole in the Very Good criteria, with a percentage of 91.20%. Aspects of the highest quality is based on the aspect Functionality with a percentage of 94.89%, while the lowest quality aspect is the aspect of Usability with a percentage of 87.88%.

4. CONCLUSION

Based on the results of testing, testing for the second hypothesis in this study proved that the quality of outpatient information systems produced when measured based on the software quality of the ISO 9126 model achieved initial expectations of Very Good. The final result of software quality according to respondents is Very Good with the percentage of respondents' responses amounting to 91.20%. The final result of testing with black box testing is that there are no loopholes in the application and so it is safe to use by the user.

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