Improving The Management Quality of Research And Community Service Institute using SIMPEMAS

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Abstract

Research and Community Service is an implementation of the tri dharma component of higher education which is the main task of the lecturer. For lecturers, research and community service cannot be avoided because it is a necessity that must be carried out as well as teaching. Research and community service have enormous benefits for students, lecturers, institutions, as well as the nation and state. Pakuan University Institute for Research and Community Service, hereinafter known as LPPM Pakuan University, is present as the frontline in facilitating and mediating lecturers and students to actively carry out research and service in accordance with their scientific disciplines so that they are beneficial to society and the nation. The Information System for Research and Community Service at Pakuan University was made with several methods, namely by computerized data management with a special application that is needed to support a fast and accurate information system, so that the problem of time and the level of validity of research and community service data can be suppressed the minimum possible. A software development process, also known as a software development life cycle (SDLC), is a structure imposed on the development of a software product. The final result of software quality according to respondents is Very Good with a percentage of respondents' responses of 88.04%. so that currently the software is suitable for use in the LPPM Pakuan University Environment to improve the quality of management services of the Pakuan University LPPM towards research activities and internal community service.

Keywords:
Simpemas,SDLC,Management, Manajemen Information System Research and Community Service.

1. Introduction

Research and Community Service Institute is an implementation of the tri dharma component of higher education which is the main task of the lecturer. For lecturers, research and community service cannot be avoided because it is a necessity that must be carried out as well as teaching. Research and community service have enormous benefits for students, lecturers, institutions, as well as the nation and state. The benefit obtained by students is knowledge that is always up to date(Sadia et al., 2016). For research lecturers, community service is one of the elements for the promotion of lecturers' academic positions, up-to-date knowledge and learning materials that are always up to date according to the times. Another benefit for the institution is to increase accreditation, improve the quality of Lecturer, Student Resources so that pensioners and students can produce students who can be immediately accepted in the community. Meanwhile, the benefits for the nation and state are that the results of research are expected to become a reference for determining the direction and policy of national and state development, as well as the benefits of community service, one of which is to find out the public response regarding policy making (Healey, 2005).

Pakuan University Research and Community Service Institute, hereinafter known as LPPM Pakuan University, is present as the frontline in facilitating and mediating lecturers and students to actively carry out research and service in accordance with their scientific disciplines so that they are beneficial to society and the nation. It is an effort of Pakuan University in developing research and community service atmosphere and opening opportunities for

the academic community to play an active role in the community by taking advantage of opportunities to get national and international competitive grants (Pavlin, 2006). Activities in LPPM Pakuan University, such as research data and community service, have not all been through the system or are still managed manually so that they are not integrated with other files. Data logging can be performed on many different files which can be stored in different places. This resulted in taking a long time when manipulating the data to compile the report. In addition, the management of research and service data can result in data integrity and security that is not guaranteed as well as delays in information so that the problem of time and level of research data validation and community service can be minimized. Therefore the authors are interested in developing a web-based information system application that can make it easier to manage the activities of LPPM Pakuan University itself. Starting from making it easier to compile reports, search data, and data processing in research and community service.

Information Systems (IS) is a combination of information technology and the activities of people who use that technology to support operations and management. In a very broad sense, the term information systems is often used to refer to the interactions between people, algorithmic processes, data, and technology(Hevner & Chatterjee, 2010; Stair et al., 2012; Wieringa, 2014). In this sense, this term is used to refer not only to the organizational use of information and communication technology (ICT), but also to the way in which people interact with these technologies in support of business processes. The purpose of an information system is to produce information. Information systems always involve important data where the data is processed into a form that is useful for its users (Tosida et al. 2019). Processed data alone is not sufficient to be said as information. To be useful, information must be supported by the following three pillars: right to the person or relevant (relevance), on time (timeliness), and right in value or accurate (accurate). The output that is not supported by these three pillars cannot be said to be useful information, but is garbage(van der Aalst, 2013).

The Information System for Research and Community Service at Pakuan University was made with several methods, namely by computerized data management with a special application that is needed to support a fast and accurate information system, so that the problem of time and the level of validity of research and community service data can be suppressed the minimum possible. Another problem that often arises apart from delays is misinformation related to the identity of the researcher, the number of studies that have been done. So that the system built is able to monitor the implementation of research and community service.

2. Methodology

A software development process, also known as a software development life cycle (SDLC), is a structure imposed on the development of a software product. It is often considered as a subset of system development life cycle. There are several models for such processes, each describing approaches to a variety of activities that take place during the process. Software Engineering (SE) is the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software, and the study of these approaches; that is, the application of engineering to software because it integrates significant mathematics, computer science and practices whose origins are in Engineering (Cunningham & Kempling, 2009). Various processes and methodologies have been developed over the last few decades to improve software quality, with varying degrees of success. However, it is widely agreed that no single approach that will prevent project overruns and failures in all cases. Software projects that are large, complicated, poorly-specified, and involve unfamiliar aspects, are still particularly vulnerable to large, unanticipated problems (Fitriati & Mulyani, 2015).
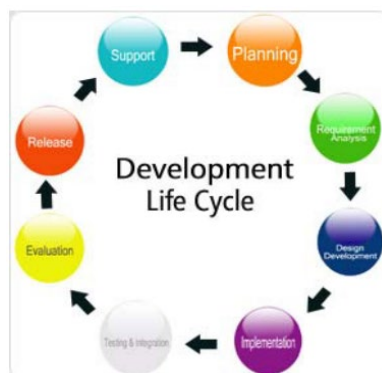

Figure 1 . SDLC Source : (Larasati, 2017)

2.1 Planning

The planning stage can be said to be the stage of data collection or seeking information on data needs, related to the

system to be created or to be developed. This system planning resulted in the initial identification of the system in the form of problems which were then solved through solutions by making applications. This stage is divided into several stages.

2.2 Requirement Analysis

Requirement analysis is the most important and fundamental stage in SDLC. this is done to find out information in the process of planning a survey of LPPM, Pakuan University System requirements. This method is divided into two techniques, (Tooptompong & Piromsopa, 2018) namely:

a. Observation (Observation)

In the observation method, research and direct observation are carried out at LPPM Pakuan University to collect and obtain the required data.

b. Interview

In the interview method, question and answer and discussion were conducted directly with the Chairperson of the LPPM, Pakuan University to obtain the data needed in making the system to be built.

2.3 Design Development

SIM design uses UML design which is a graph/image based language to visualize, specify, build, and document an OO (Object-Oriented) software development system. UML, short for Unified Modeling Language, is a standardized modeling language consisting of an integrated set of diagrams, developed to help system and software developers for specifying, visualizing, constructing, and documenting the artifacts of software systems, as well as for business modeling and other non-software systems (Land et al., 2012). In the development of this simpemas using two UML approach models, namely usecase diagrams, activity diagrams and Class Diagrams.

2.4 Implementation

Implementation stage is the final of making the system acceptable or not by the user. in this system in accordance with the design of the UML system used. therefore, on a system created because there are only one user, only one user in this system, namely admin. The admin can do everything on the system. but in this simpemas the admin cannot create another user(Ardiansyah et al., 2020).

2.5 Testing & Integration

Testing activities are carried out before the simemas is used so that at the time of system integration it can be used properly in accordance with the needs that have been previously analyzed. at this testing stage, testing is done using structural and functional testing methods that refer to ISO 9126. After testing, system integration is carried out on the existing system, because this financial system is the first system to be made in simpemas, then the system integration is carried out directly(Ardiansyah et al., 2020; De-Marcos et al., 2014; Djouab & Bari, 2016).

2.6 Evaluation

This stage is the evaluation of the system that is built, the whole process, is evaluated. Some questions that need to be answered include whether the newly implemented system meets the requirements and initial business objectives, whether the system is reliable and fault-tolerant, and if it functions in accordance with agreed functional requirements. In addition to evaluating released software, it is important to assess the effectiveness of the development process. If there are aspects of the whole process (or certain stages) that management is not satisfied, it's time to improve.(Ardiansyah et al., 2020)

Effectiveness and efficiency of the system must be continuously evaluated to determine when the product has met its maximum effective lifecycle (Herath & Herath, 2014). Considerations include: Continued existence of operational need, matching between operational requirements and system performance, feasibility of system phase-out versus maintenance, and availability of alternative systems.

2.7 Release

Release is the application stage can be used by everyone in this case the application that has been released is an application that is ready to use.

2.8 Support

Support is a stage that provides support for applications that have been released. so that when an application experiences an interruption or technical problem the team support provides direction to correct the problem

3. Result & Discussion
3.1. Simpemas Model

Simpemas Unpak is a web-based research and community service application which aims to facilitate the management of research data and community service in the LPPM Pakuan University environment. Simpemas which consists of several menus such as the home menu, admin login, lecturer login and reviewer login. Each menu has its own function, the admin login menu is a menu to enter as admin, the lecturer login menu which functions as the initial entry window for lecturers who have been given a password by the admin so that lecturers can submit research and community service, and can see the process being proposed. While the reviewer login menu is the first window to enter the Simpemas system as a reviewer who can assess proposals submitted by lecturers.The prototype model can be seen in 2.

Figure 2. Main Parts of the Soil Moisture Control Model

3.2. Testing and Evaluation Result

The results of this quality test consist of two parts, namely: the quality level of each aspect based on the four characteristics of ISO 9126, and the overall quality level of the four characteristics of ISO 9126. Of the 20 respondents who filled out a questionnaire for testing the quality of personnel management information system software, all Providing valid answers to the questionnaire. Respondents 'responses to the level of quality of the personnel management information system based on respondents' answers to software quality indicators according to ISO 9126 can be measured using the following formula:

% Actual Score   = (Actual Score/Ideal Score)x 100%

Furthermore, these results are processed and calculated using the criteria set in the research design, namely:

Table 1. Score and Criteria

% Score	Criteria
20,00% – 36,00%	Bad
36,01% – 52,00%	Not Good
52,01% – 68,00%	Good
68,01% – 84,00%	Very Good
84,01% – 100%	Excelent

3.2.1. Software Quality Level per Quality Aspect
Functionality

Aspect of functionality is the ability of the software to provide functions according to user needs, when used under certain conditions. The results of the response in table 2 above can be seen that the majority of respondents strongly agree that the application of research management information system and service to the community has excellent functionality in accordance with the functions it has. The percentage of respondents' response score of 90.22% is in the Very Good criteria. So based on the table above it can be concluded that the level of functionality of the application of personnel management information system in the Excelent criteria, with a percentage of 90.22.

$$\% \text{ Skor Aktual} = \frac{Skor\ Aktual}{Skor\ Ideal} \times 100\%$$
$$= \frac{812}{900} \times 100\%$$
$$= \textbf{90,22\%}\ (Excelent)$$

Table 2. Quality Aspect Functionality

Criteria	Bobot	Functionality									Total
		Suitability		Accuracy		Security		Interoperability		Compliance	
		1	2	3	4	5	6	7	8	9	
Strongly Agree	5	19	17		13		15	11	13	15	515
Agree	4	1	3	18	5	13	5	9	7	5	264
Hesitant	3			2	2	7					33
Not Agree	2										
Strongly disagree	1										
Responden		20	20	20	20	20	20	20	20	20	
Actual Score		99	97	78	91	73	75	91	93	95	812
Ideal Score		100	100	100	100	100	100	100	100	100	900

Reliability

The Reliability aspect is the software's ability to maintain a certain level of performance, when used under certain conditions. Based on table 3 and the calculation above it can be concluded that the Reliability level of application of personnel management information system in Good criteria, with a percentage of 83.2%.

$$\% \text{ Actual Score} = \frac{Actual\ Score}{Ideal\ Score} \text{x } 100\%$$
$$= \frac{416}{500} \text{x } 100\%$$
$$= \mathbf{83,2\%} \text{ (good)}$$

Table 3. Quality Aspect Reliability

Criteria	Bobot	Reliability					Total
		Maturity		Fault tolerance		Recoverability	
		10	11	12	13	14	
Strongly Agree	5	13			12		125
Agree	4	7	17	16	8	18	264
Hesitant	3		3	4		2	27
Not Agree	2						
Strongly disagree	1						
Responden		20	20	20	20	20	
Actual Score		93	77	76	92	78	416
Ideal Score		100	100	100	100	100	500

Usability

Usability aspect is the ability of software to be understood, learned, used, and engaging for users, when used under certain conditions. Based on the table 4 above it can be concluded that the Usability level of personnel management information system application in the criteria is Very Good, with a percentage of 91; 87%.

$$\% \text{ Actual Score} = \frac{Actual\ Score}{Ideal\ Score} \text{x } 100\%$$
$$= \frac{735}{800} \text{x } 100\%$$
$$= \mathbf{91,87\%} \text{ (Excelent)}$$

Tabel 4. Quality Aspect Usability

Criteria	Bobot	Usability								Total
		Understandibility		Learnability		Operability		Attractiveness		
		15	16	17	18	19	20	21	22	
Strongly Agree	5	17	16	7	3	16	6	16	18	495
Agree	4	3	4	13	14	4	13	4	2	228
Hesitant	3				3		1			12
Not Agree	2									
Strongly disagree	1									

Responden	20	20	20	20	20	20	20	20	
Actual Score	97	96	87	80	96	85	96	98	735
Ideal Score	100	100	100	100	100	100	100	100	800

Efficiency

The Efficiency aspect is the software's ability to provide appropriate performance and relative to the number of resources used at that time. Based on the table 5 above, it can be concluded that the level of efficiency of the personnel management information system application is in the Good criteria, with a percentage of 79.33%.

Table 5. Quality Aspect Efficiency

Criteria	Bobot	Efficiency			Total
		Time behaviour		Resourcebehaviour	
		23	24	25	
Strongly Agree	5	7	2	1	50
Agree	4	13	13	12	152
Hesitant	3		5	7	36
Not Agree	2				
Strongly disagree	1				
Responden		20	20	20	
Actual Score		87	77	74	238
Ideal Score		100	100	100	300

3.2.2. Overall Software Quality Level

Based on the data analysis obtained from the questionnaire, the following is a recapitulation of the quality test results based on four aspects of software quality according to ISO 9126:

Table 6. Quality Testing Results

Aspect	Actual Score	Ideal Score	% Skor Aktual	Criteri
Functionality	812	900	90,22%	Excelent
Reliability	416	500	83,2%	Very Good
Usability	735	800	91,87%	Excelent
Efficiency	238	300	79,33%	Very Good
Total	**2201**	**2500**	**88,04%**	**Very Good**

Based on the table above, it can be concluded that the overall quality level of personnel management information system software is in Very Good criteria, with a percentage of 88.04%. The highest quality aspect is based on the Usability aspect with a percentage of 91.87%, then the Functionality aspect with 90.22%. Reliability aspect with a percentage of 83.2%, while the lowest quality aspect is from the Efficiency aspect with a percentage of 79.33%.

4. Conclusion

Based on the test results, testing for the second hypothesis in this study proved that the quality of the personnel management information system software produced when measured based on the quality of the ISO 9126 model software exceeds the original expectation, namely Good. The final result of software quality according to respondents is Very Good with a percentage of respondents' responses of 88.04%. so that currently the software is suitable for use in the LPPM Pakuan University Environment to improve the quality of management services of the Pakuan University LPPM towards research activities and internal community service.

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Acknowledgements

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