Development of a Research and Service Information System to Optimize Monitoring of Research and Service Activities at Semarang State University

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Article Info	Abstract
	The aim of this research is to build a module that contains monitoring features for the stages of research implementation and community service at SIPP to realize effectiveness and efficiency in the process of monitoring the stages of activity implementation by utilizing information system-based technology to support orderly administration and service improvement at LPPM UNNES. This type of research is research and development. Research and development is a process or steps to develop a new product or improve an existing product that can be accounted for. The results of the research show that with the development of the Research and Community Service Information System (SIPP), deficiencies in the previous piecemeal system which was carried out manually or electronically but not in the application of databases can be overcome properly, thereby making the data management process easier. effective and efficient. The SIPP being developed already has data storage media in the form of a database so it is hoped that it can minimize the possibility of data loss. With the development of SIPP, it is hoped that the process of incoming mutations, outgoing mutations, majors, can run well so that data errors do not occur and make it easier for researchers and staff to organize data.

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INTRODUCTION

The Institute for Research and Community Service (LPPM) Semarang State University (UNNES) is an academic implementing element that has main duties and functions in the field of Research and Community Service. LPPM UNNES's vision is "To become an independent research and community service institution with a conservation perspective and an international reputation." Meanwhile, the mission of LPPM UNNES is: "To carry out research and community service oriented towards the development of human resources, science and technology, arts and culture, sports with a conservation perspective and an international reputation." Article 87 of the Minister of Research, Technology and Higher Education Regulation Number 23 of 2015 concerning the Organization and Work Procedures of Semarang State University states that the Research and Community Service Institute (LPPM) has the task of coordinating, implementing, monitoring and evaluating research and community service activities . In terms of carrying out institutional administrative affairs, research and service management must also meet the standards as stated in.

Minister of Research, Technology and Higher Education Regulation Number 44 of 2015 concerning National Higher Education Standards related to the scope and explanation of National Research Standards, including standards for content, results, processes, assessment, infrastructure and research management. In carrying out daily operational tasks, LPPM UNNES is led by an Institution Chair and assisted by the Institution Secretary, Heads of Centers and Academic Staff, and assisted by the Administrative Section Coordinator and Heads of Sub-Coordinators. Since 2015 LPPM UNNES together with UPT ICT have initiated an information system that functions to help manage research and community service, starting from reviewer selection, proposing research proposals and community service, assessment, monitoring and evaluation, reporting research activities and community service , the system is known as the Community Service Research Information System (SIPP). This system encourages very significant

changes, especially in the administration of research and community service documents from manual documents to digital documents. From this system, LPPM UNNES can carry out research management and community service in an efficient and documented manner. Over a period of 7 years, SIPP has transformed into a system with an extraordinarily large database and has become a database that can be used to see the performance of each lecturer in the fields of research and community service.

Over the past 7 years, SIPP has become a very important information system at LPPM UNNES for carrying out research management and community service. SIPP has also been implemented for managing research and community service from DIPA Faculty funding sources in each unit. During this time, SIPP has increasingly developed with features aimed at facilitating management, but obstacles are still found in monitoring research activities and community service through this SIPP. In terms of the management system, which in this case is SIPP, the system is not yet able to display information regarding the achievements of an activity stage, because there is no special menu available to monitor the stages of research implementation and community service.

The urgency of this research is that the implementation of research and community service does not simply abort the obligations of a lecturer in implementing the tridharma of higher education as their main task. Research and community service can be directed towards one of the priority goals, either in the context of scientific development, improving a system, or developing policies and models. Regardless of the goals to be achieved, the implementation of research and community service must be controlled and evaluated, both regarding substantive and administrative aspects. In this way, the implementation of research and community service can be accounted for theoretically and methodologically, as well as the resulting outcomes. Apart from that, the implementation of research and community service must be administratively accountable.

Based on the background of the problem that has been explained, the aim of this research is to build a module that contains monitoring features

for the stages of research implementation and community service in SIPP to realize effectiveness and efficiency in the process of monitoring the stages of activity implementation by utilizing information system-based technology to support orderly administration and improving services at LPPM UNNES.

RESEARCH METHODS

This type of research is research and development. Research and development is a process or steps to develop a new product or improve an existing product that can be accounted for [5] [6]. In this research, researchers will conduct research and development related to the development of SIPP UNNES features in improving the management and supervision of research activities and community service.

The implementation of steps in research and development is adjusted to the needs of researchers. The steps in this research methodology are explained in Figure 3 as follows:

This research stage is divided into three stages as follows:

Stage I – Preparation Stage

a) Conduct a literature review on system development, artificial intelligence: collaborative filtering

b) Conduct analysis of potential and actual problems.

c) Conduct field surveys, observations, interviews and discussions to discuss alternative solutions to existing problems.

d) SIPP development pilot plan.

Stage II – Modeling Stage

a) Design and develop SIPP features that are appropriate and in accordance with needs, especially in the agricultural sector.

b) Designing a user interface (UI) to communicate the available system features so that users understand and can use the system, and have satisfaction and comfort values in using the system.

c) Determine the system requirements specifications, these specifications also include what elements or components are needed for the system to be built until the system is implemented.

d) Determine the description of existing problems and the relationships between components, variables and system parameters.

Phase III – Construction Phase

a) Implementing the results of logical and physical modeling, and is an effort to build a physical database that is placed in secondary memory (disk) with the help of a predetermined DBMS (Database Management System).

b) Write a series of programs using a predetermined programming language so that the computer carries out commands as specified.

c) Product testing (SIPP) in the field and ensuring that there are no errors and that it complies with the design specified in the plans and designs that have been made and approved previously.

d) Make system improvements based on the results at the evaluation stage.

e) Evaluate SIPP with the aim of increasing its effectiveness, feature errors, decision considerations, and minimizing errors in the system.

Furthermore, in system development using the Software Development Life Cycle (SDLC) method with a prototype model. A prototype model is defined as a tool that provides creators and potential users with ideas about how a system functions in its complete form, and the process of producing a prototype is called prototyping..

RESULTS AND DISCUSSION

System design aims to provide a general overview to users of the system to be developed and is also the preparation of a detailed design by identifying the components of the information system. This design stage has the main objective, namely to meet the needs of users, in this case researchers and staff at Semarang State University. Meanwhile, another aim of this design is to provide a clear picture of the development of the information system that the author will create. In this way, it is hoped that the creation of this program can help overcome existing deficiencies and produce information and reports quickly and accurately.

An overview of the academic information system developed at LPPM UNNES is web-based.

With this Information System, all research and service reporting processes will be integrated between one section and another using centralized storage media. The design of the proposed procedures is a stage to improve or increase work efficiency in processing research and service activities.

In the design stage of the proposed procedure, context diagrams, DFDs and data dictionaries will be created. The following is the procedure proposed by the author where this information system can be accessed by several users including.

1. Exit mutation procedure

a. Researchers and Servants who are prospective transfers fill out the mutation form on the Researcher and Servant page.

b. Researchers and staff are waiting for validation from the system management whether the mutation has been approved or not.

c. If the mutation is approved, the researchers and staff print proof of the mutation.

2. Incoming mutation procedures

a. Candidates for mutation researchers and service providers fill out the transfer registration form.

b. Candidates for mutation researchers and service providers complete the entry mutation form and print the entry mutation form.

c. Researcher and Community Service candidates bring proof of entry transfer and submit other requirements to the SIPP management department.

d. The management section puts researchers and service workers into classes according to the classes at the previous school.

3. Majoring procedures

a. Researchers and Servants fill out the form according to the fields of Researcher and Servant

b. after all researchers and servants have registered according to their fields. Selection is carried out based on topic and research field.

4. Value procedure

a. Reviewers log in and enter the assessment menu.

b. Reviewers review research and service documents that have been uploaded.

c. The SIPP management section provides access to print review results.

Network architecture is a system where the system consists of computers (can be PCs, laptops, cellphones), software (operating systems, applications) and other network devices that work together to achieve the same goal. This network will be interconnected to produce the information needed by the user. The network architecture used is an internet network, where this internet network is a computer network that can be categorized as a WAN, connecting millions of computers throughout the world, without national borders, where anyone who has a computer can join this network just by connecting to the service provider. internet (internet service provider / ISP).

System implementation is a stage of the system creation process from system design. System implementation can be categorized into two parts, namely implementation from system design to the coding stage (programming language) or software creation and implementation of the software that has been built to the agencies/institutions that will use the software.

Information System Optimization

According to the Language Dictionary Compilation Team (1994: 705) optimization is a process, method or act of optimizing. Optimizing means making it the best, highest or most profitable. In general, the problems faced by most organizations revolve around internal organizational factors as mentioned above, which include people, tools and systems. If improvements have been made in accordance with organizational needs, starting from people, tools, systems, or even comprehensive improvements.

According to Sutabri (2005: 8), the definition of a system is a collection or set of elements, components or variables that are organized, interact with each other, depend on each other, and are integrated. A system consists of parts or components that are integrated for a purpose. The basic model of this form is input, processing and output. However, this system can be developed to include storage media. Systems can be open and closed, but information systems are usually open systems, meaning that the system can receive some input from the external environment. The simple concept of a system is input, process, and output. Apart from that, a system has characteristics that

make it a system. The characteristics referred to are as follows: (1) System Components (Components), (2) System Boundaries (Boundaries), (3) External System Environment (Environment), (4) System Connectors (Interface), (5) Enter the System (Input), (6) System Output (Output), (7) System Processing (Process), (8) System Goals (Objective).

According to Sutabri (2005:23), information is data that is clarified, processed and interpreted for use in the decision-making process. Information processing systems process data into useful information for the recipient. The value of information is related to decisions. If there is no choice or decision, then information is unnecessary. Information plays an important role in making a decision. The information function does not direct decision makers about what to do, but reduces diversity and uncertainty so that good decisions can be made.

According to Ladjamudin (2005:13), the definition of an information system is a system created by humans to achieve a goal, namely conveying information and containing a set of organizational procedures which, when implemented, will provide information for decision makers and/or to control the organization. An information system can be a combination of several computer-based technology elements that interact and work together based on a predetermined work procedure, which processes and processes data into a form of information that can be used to support decisions..

Research Monitoring and Community Service

Monitoring is defined as a step to review the process of implementing activities in accordance with the plan and identify problems that arise so that they can be resolved effectively directly, assessing progress to achieve goals (Sutabri, 2012). Monitoring is a process in organizational activities that is important for determining progress in achieving goals and ensuring that the organization's main tasks run as planned (Aviana, 2012). Monitoring will provide information about status that measurements and evaluations are completed from time to time, generally monitoring is carried out for the purpose of a management

progress process (Hadi B., Narasing B. S., & Jcobus A., 2018).

In monitoring the stages of research implementation and community service through SIPP, problems that arise can be identified, including:

1. Monitoring of the research and community service stages at SIPP has not been effective.

2. There is no feature or menu in SIPP that provides a recap of the progress of each stage, both from the management and researchers and community service side.

Based on the description above, the analysis can be described as follows:

1. Monitoring of research and community service stages at SIPP has not been effective, this is because so far LPPM UNNES has only monitored uploads of complete administrative documents, matters relating to the completion of a stage are still often overlooked. Apart from that, researchers and staff think that at each stage of activity they are only asked to upload documents, even though at each stage of activity there is always a review process carried out by reviewers.

2. The features in SIPP which provide monitoring information for each stage from the LPPM UNNES side are not optimal, this is because there is no module for monitoring the implementation of the research and community service stages so that information which presents the progress of the stages is not yet visible in the system.

Based on the description of the problem above, the solution planned by the author is as follows:

1. The problem of ineffective monitoring of research and community service stages through SIPP, the solution steps are:

a. SIPP operators at the university level regularly monitor each stage of research and community service implementation through the features that already exist in SIPP. If service researchers are found who have not completed a stage (Figure 3.1), the SIPP operator is obliged to inform them through the Announcement feature (Figure 3.1). 3.2) which is available in SIPP so that it can be read by service researchers.

Figure 3.1. The SIPP screen displays showing service researchers who have not completed the monitoring and evaluation stages.

Figure 3.2. The Announcement feature in SIPP is to inform service researchers who have not completed a stage of research and community service activities

Adding a feature to the service researcher dashboard in the form of information that differentiates between document upload status and implementation status of a stage, an overview of the feature can be seen in Figure 3.3.

Figure 3.3. The SIPP screen displays information that differentiates between uploading documents and implementing activity stages

1. Problem: The feature or menu that provides information on monitoring the progress of activity stages from the LPPM UNNES management side is not optimal, the solution steps are:

a. Adding a monitoring module to SIPP, the module for monitoring this stage is in the form of

menus and features that will help LPPM UNNES in carrying out monitoring stages of research and community service activities, these menus can be added to the main menu which is located on the left of the screen. The Monitoring Activity Stages menu contains information regarding the progress of achievement of the activity stages, a recapitulation of service researchers who have completed the activity stages, as well as an export button to document form such as PDF or EXCELL. The Activity Stage Monitoring Menu display can be seen in Figure 3.5.

Figure 3.5. Initial display of the Activity Stage Monitoring menu

In this menu, if you click on the Scheme name, you will be directed to a more detailed display showing the name of the service researcher according to the selected scheme. In the detailed display you will see the names of service researchers who have completed an activity stage, as shown in Figure 3.6 below.

Figure 3.6. Detailed Display of the Monitoring Menu for Activity Stages

Work plan

In solving the problem of optimizing monitoring of research implementation and community service through SIPP at LPPM UNNES, a preparation, design and trial plan is needed and an action plan needs to be established as explained in the following description:

Preparation Plan

The preparation plan for solving the problem of optimizing monitoring of research implementation and community service is as follows:

a. Coordination meeting of the SIPP development team from UPT ICT with the research and community service management team of LPPM UNNES

b. Analysis of development needs

Design and Test Plan

The activity of designing and creating the monitoring menu module for the activity stages was carried out independently by the system developer, namely Anggyi Trisnawan Putra S.Si., M.Si.. Next, the system developer carried out trials of the modules that had been developed. Then the modules that have been tested are implemented into the SIPP and provide guidance and assistance to SIPP operators.

Work plan

So that the implementation of the development of the monitoring menu module for the activity stages to support the optimization of monitoring is carried out in accordance with expectations, an action plan is prepared as follows:

Table 3. 1 Work Plan for Development of monitoring module for activity stages

Numb	Work plan	Description
1	Coordination meetings	Coordination between the UPT ICT IT team and the LPPM UNNES research and community service management team
2	Needs analysis	Analysis of needs to support the creation of a monitoring module for activity stages
3	Planning	Design of monitoring modules for activity stages by the UPT ICT IT Team
4	Trials	Trial of the monitoring module for activity stages by the UP IT Team and Community Service Research Management Team
5	Evaluation	Melakukan evaluasi setelah ujicoba
6	Implementation	Proses menambahkan modul monitoring tahapan kegiatan kedalam SIPP setelah diuji dan di evaluasi
7	Create a Guide	Develop a guide to the monitoring module for activity stages

8	Socialization	Socialization of the monitoring module for activity stages to service researchers and SIPP operators in each work unit

CONCLUSION

The conclusions obtained from the research and analysis carried out are as follows: It is hoped that with the development of the Research and Service Information System (SIPP), deficiencies in the piecemeal system that was running previously which were carried out manually or electronically but not in the application of the database can be resolved. handled well, making the data management process easier and more effective and efficient. The SIPP being developed already has data storage media in the form of a database so it is hoped that it can minimize the possibility of data loss. With the development of SIPP, it is hoped that the process of incoming mutations, outgoing mutations, majors, can run well so that data errors do not occur and make it easier for researchers and staff to organize data.

The suggestions that the author can give are as follows: There needs to be better development of the system that has been created so that the LPPM UNNES environment will get used to using computers. It is hoped that the system that has been developed can continue to be developed and maintained to be better in the future.

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