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Improving The Effectiveness of Research and Community Service Management System

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Abstract

In recent years, technological developments and paradigm shifts in the world of education and research demand a transformation in the management system of research and community service. The Institute for Research and Community Service (LPPM) of Universitas Negeri Semarang (UNNES) in its role of realising the responsibility of the Tri Dharma of Higher Education, has made a breakthrough in the field of research and community service through an application called SIPP (Research and Community Service Management Information System) which can be accessed on the website. However, there are still five obstacles that need to be improved. This research intends to identify concrete problems faced by Universitas Negeri Semarang in this regard, and design solutions that can increase the effectiveness of the research and community service management system. The results showed that the development of an Artificial Intelligence (AI)-based Recommendation System has become one of the most effective strategies in enhancing user experience in improving the effectiveness of the research and community service management system at Semarang State University. By utilising AI technology, the SIPP application can optimise the data management process, identify research trends, and facilitate collaboration between researchers.

Keywords: artificial intelligence, effectiveness, management system

INTRODUCTION

The background of the research on improving the effectiveness of the research and community service management system at Semarang State University is a reflection of the important role of higher education institutions in producing knowledge and contributing to society. Semarang State University, as one of the universities in Indonesia, has a mission to become not only a centre of higher education but also a centre of research and community service. Although many efforts have been made in the management of research and community service, there are still challenges and obstacles that can hinder the achievement of these goals.

In recent years, technological developments and paradigm shifts in the world of education and research have demanded a transformation in the research and community service management system [1] [2] [3]. This research intends to identify concrete problems faced by Universitas Negeri Semarang in this regard, and design solutions that can improve the effectiveness of the research and community service management system. Increased effectiveness in this case is expected to have a positive impact not only on academic and knowledge development, but also in providing concrete solutions to problems faced by the community [4] [5] [6]. Thus, this research is expected to make a real contribution in improving the quality and relevance of research and community service at Semarang State University.

The problem-solving approach in the research on improving the effectiveness of the research and community service management system at Semarang State University can be done through several strategic steps. First, there is a need for a thorough evaluation of existing infrastructure and policies, identification of obstacles that may arise, and analysis of the needs of relevant stakeholders. Next, designing an integrated information system that supports collaboration between units in the university can be a solution to improve the efficiency and effectiveness of research management. In addition, the active involvement of lecturers and researchers in decision-making regarding research priorities and community service projects can also strengthen the relevance of research results to community needs. The implementation of digital technology and training for relevant staff can be key steps in ensuring the sustainability and success of this system improvement. Through this approach, it is hoped that Semarang State University can achieve maximum achievements in the management of research and community service, in line with its mission and strategic role in the development of science and positive contributions to society. The objectives of this research are analyse the existing condition of the research and community service management system at Universitas

Negeri Semarang and develop a design to improve the effectiveness of research and community service system management at Semarang State University.

Some previous studies related to the development of research and community service management systems still produce varied concepts so that further research needs to be done. Some previous studies that examined the development of research and community service management systems still produced varied findings [7] [8] [9] [10]. This research carries significant innovations in order to improve the effectiveness of the research and community service management system at Semarang State University. One of the most important breakthrough aspects is the application of artificial intelligence technology that can optimise the data management process, identify research trends, and facilitate collaboration between researchers [11] [12]. This system not only provides support in research management but also stimulates the creation of networks between researchers and industry or society. In addition, this research proposes an evaluation method that is more holistic and responsive to the needs of local communities. The application of this approach is expected to bring novelty in empowering universities as agents of change that are adaptive and responsive to the dynamics of social and technological change. By aligning policy, technology, and stakeholder needs, this research illustrates innovative steps in improving the effectiveness of the research and community service management system at Universitas Negeri Semarang.

METHODS

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

The application of the steps in this research and development is adjusted to the needs of the researcher. The steps in this research methodology are described in Figure 1 as follows:
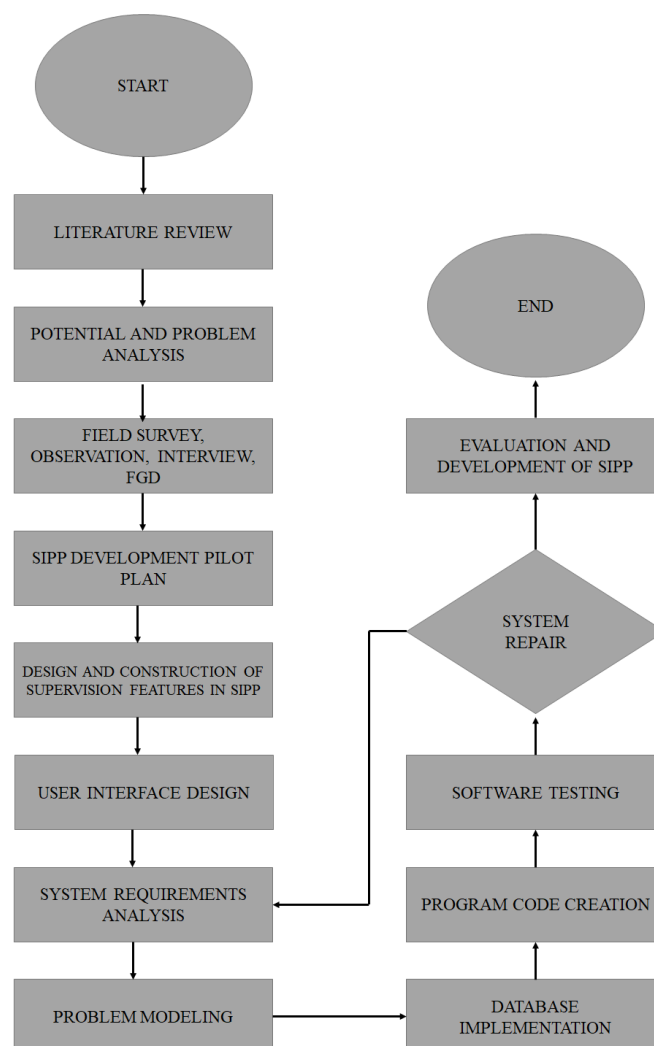

Figure 1. Flowchart Methods

The flowchart above details the flow in the research which is divided into three stages as follows:

Stage I - Preparation Stage

a) Conduct a literature review on system development, artificial intelligence: collaborative filtering
b) Analyse the potential and actual problems.
c) Conduct field surveys, observations, interviews, and discussions to discuss alternative solutions to existing problems.
d) Pilot plan for SIPP development.

Phase II - Modelling Phase

a) Design the development of SIPP features that are appropriate and in accordance with the needs, especially in agriculture.
b) Designing a user interface (UI) to communicate the available system features so that users understand and can use the system, and have a value of satisfaction and comfort in using the system.
c) Determining the specifications of system requirements, this specification also includes 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 relationship between components, variables and system parameters.

Phase III - Construction Phase

a) Implementing the results of logical and physical modelling, and is an effort to build a physical database placed in secondary memory (disk) with the help of a predetermined DBMS (Database Management System).
b) Writing a series of programmes with a predetermined programming language so that the computer executes the commands as specified.
c) Testing the product (SIPP) in the field and ensuring there are no errors and in accordance with the design that has been determined in the plan and design that has been made and approved previously.
d) Making improvements to the system from the results in the evaluation stage.
e) Evaluating SIPP with the aim of increasing its effectiveness, feature errors, decision considerations, and minimising errors in the system.

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

RESULT AND DISCUSSIONS

The world today has developed very rapidly. Life that used to be manual has now been transformed into an instant life. The conveniences in life are created by technology that is always undergoing renewal. Information and Communication Technology (ICT) has an important role in the world because we are now in the information age.

Technology has helped humans in various fields such as research and community service. The Institute for Research and Community Service (LPPM) of Semarang State University (UNNES) in its role of realising the responsibility of the Tri Dharma of Higher Education, has changed the procedure of instrument evaluation activities from manual to more effective and efficient through an application called SIPP (Research and Service Management Information System) which can be accessed on the website.

In supporting the digitalisation of higher education, the SIPP application is present to provide convenience in research and service. According to [1] interactive applications are used as a tool to develop the skills and conveniences needed to assimilate and transform large amounts of information into solutions for today's fast-moving society. So as not to let the campus have difficulty in capturing the many new opportunities offered by technological tools [3].

The positive response from researchers and servants regarding the SIPP application does not necessarily make the SIPP application have no shortcomings in supporting research and service activities. The SIPP application that can help research and service also has a handful of problems. There were 91.7% of respondents who said that the SIPP application was not an obstacle in research and service performance. However, the remaining 8.3% said that there were several obstacles in accessing the SIPP application. One respondent said the obstacle in the SIPP application was because this application was too complicated. Several researchers stated the same thing. The complexity in the SIPP application that the respondents felt was because in the SIPP application to fill in daily notes and budget utilisation, they had to input one by one. The second obstacle is that the SIPP application has too many menus that must be opened. This makes the

SIPP application impractical. This impracticality creates obstacles in the continuity of research. The third obstacle is that the output validation in the SIPP application is often not updated. Another obstacle is that the SIPP application is not well integrated enough to input files repeatedly. The last obstacle is that the SIPP application is not integrated with Simlitabmas so that DRPM fund recipients have to fill in the data twice.

The obstacles in the SIPP application require development efforts so that this application becomes even better so that the performance of researchers and servants will also increase in quality. This study revealed some efforts that need to be made based on the opinions of researcher and service respondents at Semarang State University. A total of 89.72% of respondents stated that the SIPP application needs some development efforts, while the remaining 10.28% stated that the SIPP application does not need development.

The development of an Artificial Intelligence (AI)-based Recommendation System has become one of the most effective strategies in enhancing user experience in improving the effectiveness of the research and community service management system at Semarang State University. By utilising AI technology, the SIPP application can optimise the data management process, identify research trends, and facilitate collaboration between researchers. One of the main reasons why the development of an AI-based research and community service management system at Semarang State University is important is its ability to understand user preferences and behaviour more accurately.

In addition, the development of an AI-based recommendation system can also help in improving user retention of the SIPP application. By presenting the ease of use of application features according to user interests and preferences, the SIPP application can make the research and service management experience more enjoyable and efficient for users. This can create stronger bonds between researchers, thereby increasing the likelihood of researchers to conduct better research.

In developing a research and community service information system, various equipment and needs are needed which include tool needs and data needs. Tool needs in the development of research and community service information systems are divided into Hardware needs and Software needs. While the data and information needs used in the development of the system include account data for lecturers, employees, and staff.
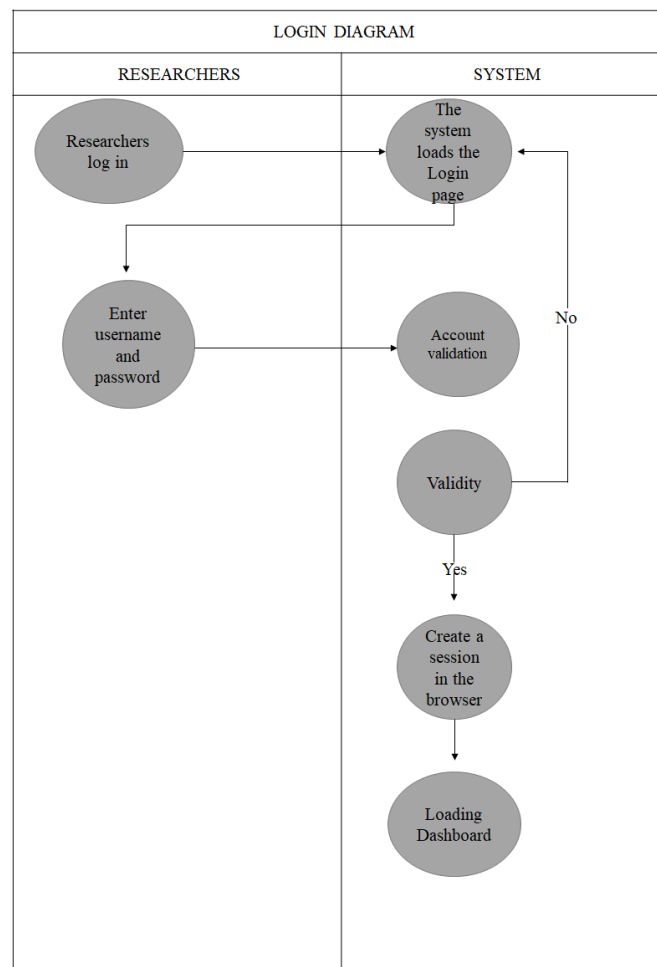

Figure 2. Login Activity Diagram

In the login activity diagram, the researcher logs in then the SIPP system will load the login page. After that, the researcher is asked to enter a username and password. If the username and password do not match, the system will return the researcher to the login page again to enter the username and password again. However, if the username and password match, the system will load the session on the browser and direct the researcher to the dashboard page.
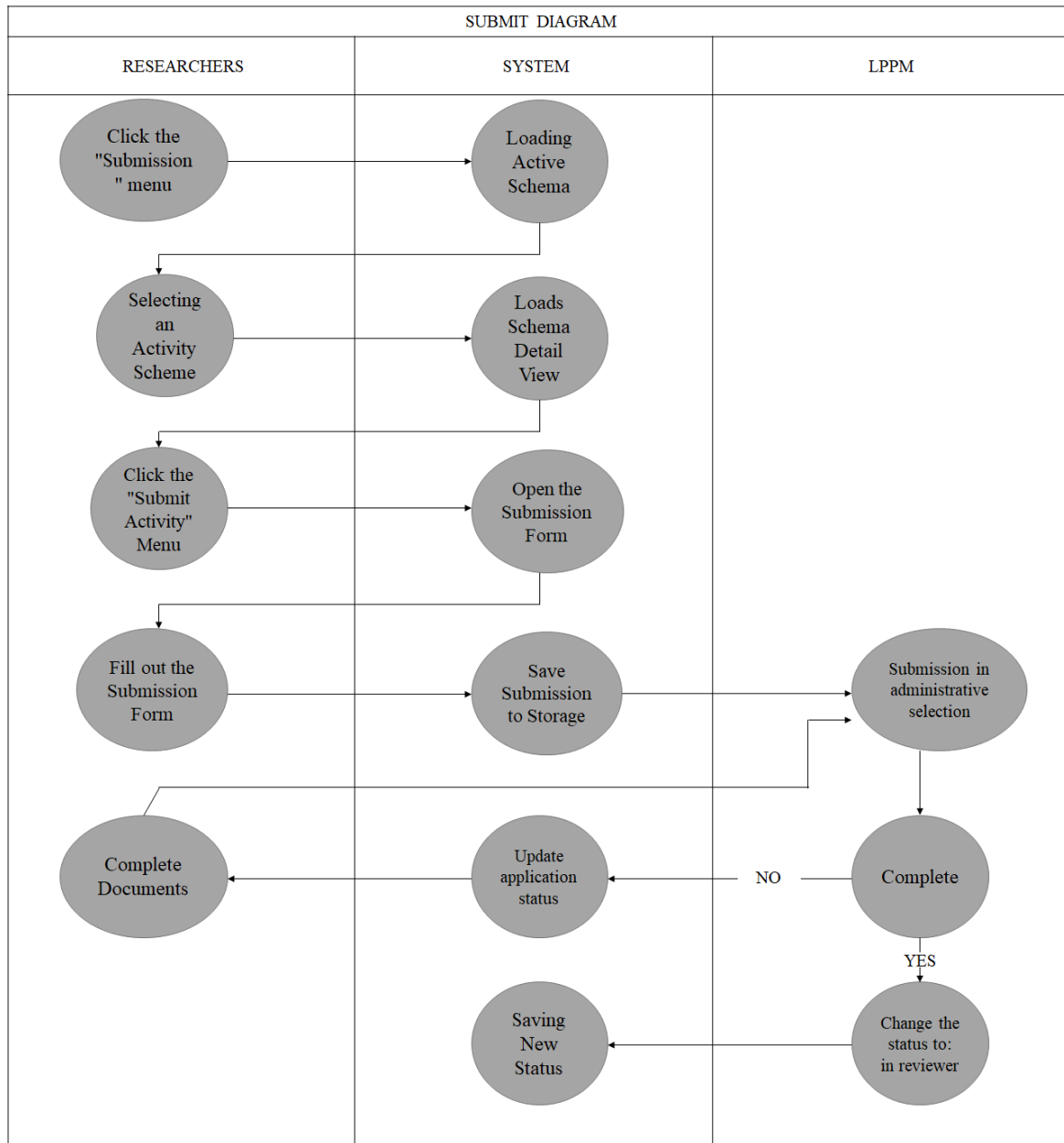

Figure 3. Submit Activity Diagram

When submitting, researchers can click the 'submission' menu, then the system will load the active scheme. Then the researcher can select the submission scheme and the system will load the scheme detail display. The researcher can then select the 'submit activities' menu and the system will open the submission form. Researchers can fill in the form, the system will save the submission to storage. The LPPM will save the submission in the administrative selection. If it is complete, the LPPM will change the status to 'in review' then the system will save the new status. If incomplete, the system will update the submission status and the researcher is asked to complete the documents. After that the LPPM will submit the administrative selection again.
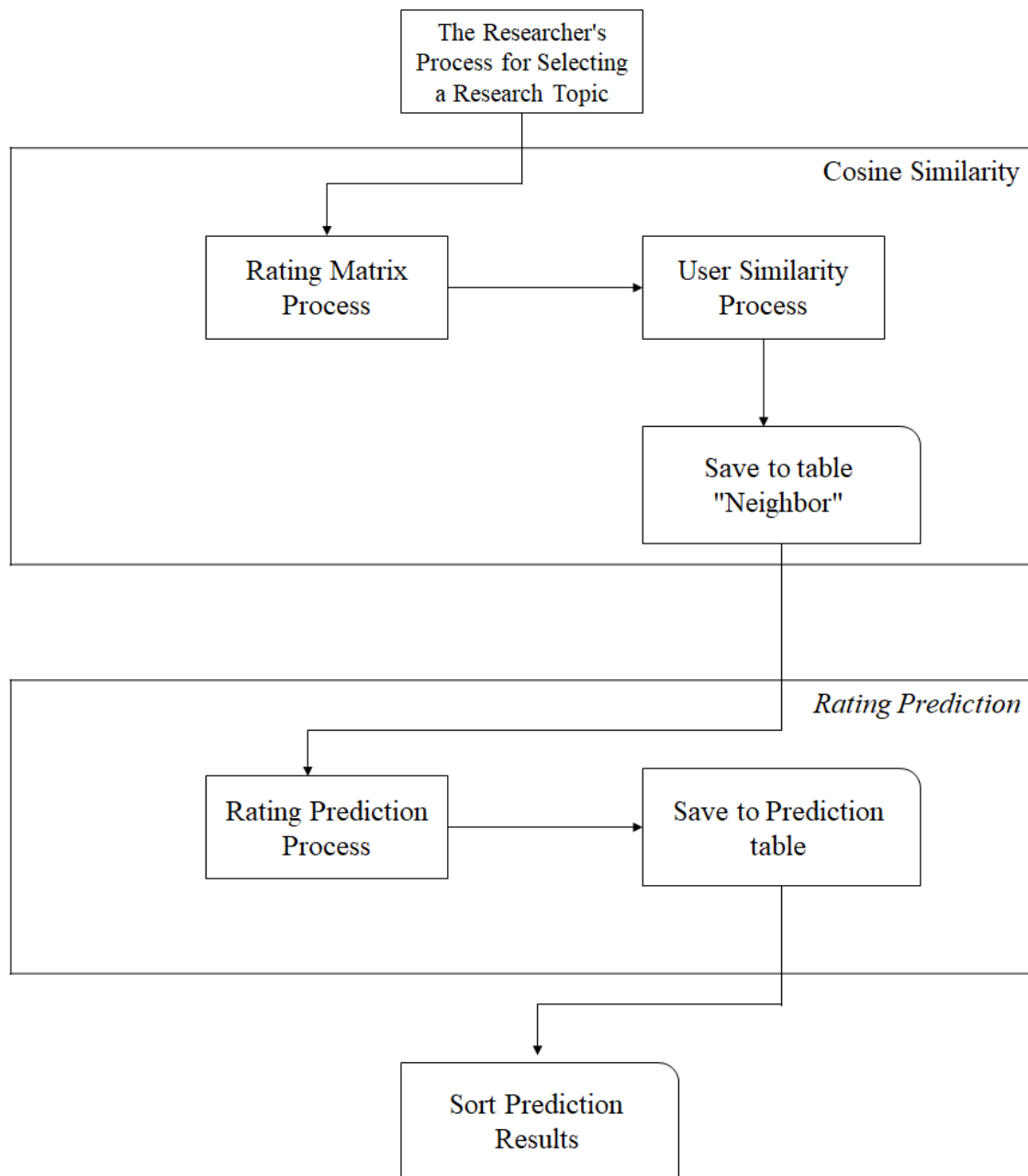
Figure 4. User Collaborative Filtering Diagram

The Collaborative Filtering stage is intended to enable fellow researchers to collaborate by selecting similar research topics. When selecting research topics, there is a Cosine Similarity stage where there is a rating matrix process then continued by the user similarity process and then stored in the 'Neighbor' table. The next stage is Rating prediction where in the process there will be a rating prediction process and will save to the prediction table. Then it will bring up a sequence of research topic prediction results that researchers will likely receive.

Attractive visuals in an application are also very important to support user comfort in operating it. There are many elements in the visual design of an application. These elements include design and typography, design and symbolism, and design and illustration. These elements are important in an application because they all collaborate to display visually appealing facilities to users [9]. Attractive visuals on an app will give positive judgement to subsequent users [2]. Facilities in applications that are less attractive will certainly be a problem in user discomfort. Especially in SIPP application users, most researchers and servants are researchers and servants who are elderly. However, based on the respondents' answers 41.78% of respondents stated that the facilities in the SIPP application were very visually appealing. The remaining 58.22% of respondents stated that the facilities in the SIPP application were visually attractive. This shows that the facilities in the SIPP application are visually good. The features in the SIPP application were considered by 28.76% of respondents to be very interesting, 55.47% of respondents stated that the features in the SIPP application were interesting, and 15.77% of respondents stated that the features

in the SIPP application were quite interesting.

User Experience or user experience is a person's perception and response resulting from using a product [3]. UX design professionals have provided a simple definition that can be interpreted as the user's feelings towards every interaction that is being faced with what is in front when using it. To get a good User Experience, a product must have a match between product features and user needs [6]. Based on the respondents' answers, 52.05% of respondents stated that the SIPP application was very user friendly. As many as 42.46% of respondents stated that the SIPP application was user friendly. As many as 5.49% of respondents stated that the SIPP application was quite user friendly. This shows that the SIPP application has provided a good experience for its users.

The convenience that exists in the SIPP application is accompanied by the convenience it offers. As many as 58.9% of respondents stated that the SIPP application was very easy to use and 51.36% of respondents said they had no difficulties while using the SIPP application. This convenience in the SIPP application is very helpful and supports the performance of research and service carried out by researchers and servants. As many as 54.10% of respondents stated that the SIPP application greatly supported research and service performance and as many as 65.75% of respondents stated that the SIPP application was very helpful for research and service performance. Not only that, the presence of the SIPP application makes research and service performance improve. As many as 47.26% of respondents said that the application made their performance improve in conducting research and service. So that the presence of this SIPP application makes researchers and servants very satisfied.

CONCLUSIONS

The positive response from researchers and servants regarding the SIPP application does not necessarily mean that the SIPP application has no shortcomings in supporting research and service activities. The SIPP application that can help research and service also has a handful of problems. The obstacles in the SIPP application are because this application is too complicated. Several researchers stated the same thing. The complexity in the SIPP application that the respondents feel is because in the SIPP application to fill in daily notes and budget usage must be input one by one. The second obstacle is that the SIPP application has too many menus that must be opened. This makes the SIPP application impractical. The third obstacle is that the output validation in the SIPP application is often not updated. Another obstacle is that the SIPP application is not well integrated enough to input files repeatedly. The last obstacle is that the SIPP application is not integrated with Simlitabmas so that DRPM fund recipients have to fill in data twice. The development of an Artificial Intelligence (AI)-based Recommendation System has become one of the most effective strategies in enhancing user experience in improving the effectiveness of the research and community service management system at Semarang State University. By utilising AI technology, the SIPP application can optimise the data management process, identify research trends, and facilitate collaboration between researchers. One of the main reasons why the development of an AI-based research and community service management system at Semarang State University is important is its ability to understand user preferences and behaviour more accurately. The suggestion in this study is that the features in the SIPP application be integrated with each other, as well as integrated with several Unnes applications based on AI technology. The appearance of the SIPP application should be attractive. Additional features should be added to the SIPP application, such as upload, download, and chat features with LPPM.

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