DESIGN AND DEVELOPMENT OF AN INTERNAL QUALITY AUDIT INFORMATION SYSTEM BASED PPEPP CYCLE

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Abstract—The Mataram University of Technology Quality Assurance Institute already has and has established national education standards plus the standards set by universities following Permendikbud number 3 of 2020. However, there are problems with the implementation of Internal Quality Audits, where the implementation of internal quality audits is very less effective and efficient, good in terms of time, cost, and energy. This is because the Mataram University of Technology Quality Assurance Institute only has 3 auditors to audit 12 study programs in one year and even spends two months in a row. This is an important concern for researchers to build and produce an internal quality audit information system application program that can help implement the internal quality audit process carried out by the Mataram University of Technology Quality Assurance Institute. The design of the internal quality audit information system was carried out using the prototyping method. The application of the prototyping method in system design will make information system builders better and more structured. The internal quality audit information system was built using the PHP programming language with the CodeIgniter framework and MySQL as the database and implementing Code-View-Controller (MVC). The main objective of this research is to produce an internal quality audit information system so that it can assist the Mataram University of Technology Quality Assurance Institute in documenting and optimizing higher education quality management in a planned and sustainable manner following the PPEPP cycle.

Keywords: information systems, internal quality audit, PPEPP cycle, quality.


Kata Kunci: sistem informasi, audit mutu internal, siklus PPEPP, mutu.
INTRODUCTION

Quality higher education is a big task that has been mandated by the Government through Law Number 12 of 2012 concerning Higher Education, where all universities in Indonesia must implement a Quality Assurance System to produce and create quality education. Quality higher education is higher education that produces graduates who are able to actively develop their potential and produce science and/or technology that is useful for society, nation, and state (Kebudayaan, 2020).

To produce quality education, universities must implement a Quality Assurance System in a planned and sustainable manner in accordance with the Cycle of Determining, Implementing, Evaluating, Controlling, and Improving Higher Education Standards. The evaluation as intended in the PPEPP cycle is carried out through an Internal Quality Audit (Direktorat Penjaminan Mutu, 2018).

Internal Quality Audit is a systematic, independent, and documented testing process to ensure the implementation of activities in higher education in accordance with established procedures and standards to achieve institutional goals. Thus, AMI is a very strategic stage in developing the quality of higher education, especially to improve quality on an ongoing basis (Direktorat Penjaminan Mutu, 2018).

The quality of higher education is the level of conformity between the implementation of higher education and Higher Education Standards consisting of National Higher Education Standards and Standards set by Higher Education Institutions (Kebudayaan, 2020). To achieve this suitability, evaluation must be carried out.

Evaluation is a comparison activity between the output of activities that have been implemented by institutions and study programs with the fulfillment of national higher education standards and established higher education standards (Kementerian Riset, Teknologi, 2018). Without a good and planned evaluation, universities will not be able to carry out control and improve their quality standards.

The Mataram University of Technology Quality Assurance Institute has so far established and implemented standards, both national higher education standards and standards set by universities in accordance with Permendikbud No. 3 of 2020 (Kebudayaan, 2020). However, there are weaknesses in the Internal Quality Audit process carried out, where the Internal Quality Audit is still carried out manually and has not been systemized. Implementing an Internal Quality Audit which is carried out manually will take a very long time, even months, and require a lot of energy and costs, as well as other facilities, so, to overcome these problems, an application system is needed that able to help and provide information quickly and efficiently, appropriate, related to the data and information needed in the process of implementing the Internal Quality Audit (Muslim et al., 2021).

An information system is a technique that has the task of forming, processing, storing, analyzing, and disseminating information to achieve agreed goals (Komalasari et al., 2023).

Internal Quality Audit is a routine activity carried out by the Quality Assurance Agency repeatedly to ensure the implementation of the standards that have been set so that the quality of education can be achieved very well (Febriyanti & Irawan, 2020).

An internal quality audit information system is the application of information technology to help processes or activities carried out by a group of people become better and easier to produce the required information (Agus et al., 2023).

The Prototype method is a software development method that allows interaction between system developers and system users, so as to overcome incompatibility between developers and user (Hasanah & Untari, 2020). By applying this prototype method, system development becomes better because it suits user needs (Erkamim et al., 2022).

Meaning, that when internal auditors are efficient, they will be able to extend the scope of their tasks and carry them out effectively. Ultimately, when internal auditors become more effective and efficient, it is expected that stakeholders will be more likely to be persuaded and trust the work of the electronic internal audit (Alqudah et al., 2023).

There have been several previous studies related to the research that will be carried out, including The results of research by Suryo Widiantoro and Yodi with the title "Design and Build an Internal Quality Audit Information System Based on IAPS 4.0" in 2020. Where the research only produced a design and framework from the Internal Quality Audit information system which cannot yet be implemented (Widiantoro & Yodi, 2020), while in this research we will design and build an Internal Quality Audit information system application that can immediately be implemented to help the performance of the Mataram University of Technology Quality Assurance Institute in improving the quality of education.

Research carried out by Dwi Rani Febriyanti and Hendri Irawan with the title "Implementation of a Web-Based Internal Quality Audit Information System to Increase Work Efficiency Case Study: Budi Luhur University Quality Assurance Institute" in 2020. In this research, the quality management implemented or used still uses the old management,
MATERIALS AND METHODS

The prototyping method is a software development method that can be applied to the development of small and large systems with the hope that the development process can run well. This prototyping aims to collect information and design and build a system based on the needs of users (Kustanto & Chernovita, 2021), namely the Mataram University of Technology Quality Assurance Institute following the Determination (Penetapan), Implementation (Penerapan), Evaluation (Evaluasi), Control (Pengendalian), and Improvement (Peningkatan) or abbreviated as (PPEPP) cycle as shown in Figure 1.

![PPEPP Cycle](Figure 1)

Source: (Directorate of Quality Assurance, 2018)

In the internal quality audit information system program, the determination menu will contain an input menu for documents and instruments created based on the quality standards held by the Mataram University of Technology Quality Assurance Institute. For the implementation menu, each unit will upload all files or evidence of standard implementation that have been implemented in the current year, while at the evaluation stage, the auditor will provide responses or comments on files or evidence of standard implementation that have been uploaded by each unit or study program. At the control stage, all study programs or units within the Mataram University of Technology will provide feedback on the responses or comments given by the auditor, while in the improvement menu, new indicators will be entered into each standard document in accordance with the results that have been achieved which will then be determined and implemented in the following year, so that the cycle can continue to be implemented in a planned and sustainable manner. The stages in creating this internal quality audit information system are as follows:

1. **Determination (Penetapan)**: This stage involves the determination of the standards needed in the internal quality audit information system.
2. **Implementation (Penerapan)**: This stage involves the implementation of the determined standards.
3. **Evaluation (Evaluasi)**: This stage involves the evaluation of the implemented standards.
4. **Control (Pengendalian)**: This stage involves the control of the evaluated standards.
5. **Improvement (Peningkatan)**: This stage involves the improvement of the controlled standards.

Based on the research that has been carried out, several differences or updates can be drawn from the research, including those related to cycles, software development methods, and outputs produced by information systems. The aim of this research is to produce an internal quality audit information system application that is able to assist universities in improving the quality of education based on the Determination, Implementation, Evaluation, Control, and Improvement (PPEPP) cycle which can be implemented every year continuously and sustainably in order to create a culture of higher education.
Requirements Collection

In gathering the design requirements for an internal quality audit information system based on the PPEPP cycle, of course, researchers must involve application system users, namely the Mataram University of Technology Quality Assurance Institute team, in order to find out the problems and obstacles that have occurred so far. So by knowing these constraints, the need for data and information to design and build an internal quality audit information system can be easily determined. The data that can be collected include:

a. Study Program Data

The Mataram University of Technology has 12 study programs consisting of 7 academic education programs and 5 vocational education programs, as shown in Table 1.

<table>
<thead>
<tr>
<th>No.</th>
<th>Study Program</th>
<th>Education Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Informatics Engineering</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Information Systems</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Information Technology</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Computer Systems Engineering</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Software Engineering</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Management</td>
<td>Academic (Undergraduate Program)</td>
</tr>
<tr>
<td>7</td>
<td>Law</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Computer Engineering</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Informatics Management</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Computerized Accounting</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Administrative Management</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Secretary</td>
<td></td>
</tr>
</tbody>
</table>

Source: (Universitas Teknologi Mataram, 2022)

b. Auditor Data

The Mataram University of Technology Quality Assurance Institute has 3 internal auditors who have carried out internal quality audits, including Lalu Delsi Samsumar, M.Eng, Ahmad Yani, M.Kom and Karina Nurwijayanti, M.Pd.

c. Instrument Data along with Internal Quality Audit Report

Internal Quality Audit instrument data and output are used as samples in creating an internal quality audit information system as shown in Table 2.

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Question</th>
<th>Audit Notes</th>
<th>Findings</th>
<th>Documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cooperation</td>
<td>Has the institution implemented collaboration in the 3 fields, namely Education, Research, and Community Service?</td>
<td>Yes</td>
<td>Achieved</td>
<td>Cooperation Agreement Letter (MoU) Proof of Collaboration</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Has the number of local/regional level collaborations reached 4 per year?</td>
<td>Yes</td>
<td>Achieved</td>
<td>Cooperation Agreement Letter (MoU) Proof of Collaboration Monitoring and Evaluation Report</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>There is no international cooperation yet.</td>
<td>Major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Has the number of collaborations in the education sector reached 2 per year?</td>
<td>Yes</td>
<td>Achieved</td>
<td>Cooperation Agreement Letter (MoU) Proof of Collaboration</td>
</tr>
</tbody>
</table>
Design Process

Based on data and information from the LPM TEAM, the researcher then carried out a system design process which included:

a. System Flowchart

This system flowchart describes how the flow of the internal quality audit information system works, both by the Audite (Study Program) as the auditee, the Auditor (Evaluation TEAM) as the assessor of the data that has been uploaded or attached by the auditee to the system, and the Admin as the manager full of the information system created. The system flowchart image looks like in Figure 2.

b. Use Case Diagrams

The Use Case Diagram will describe the activities that can be carried out by each actor when accessing the internal quality audit information system. The use case diagram that was built is shown in Figure 3.

c. Activity Diagrams

The activity diagram depicts the activities that will be carried out by the auditor, where the auditor will examine the files that have been attached or uploaded by the auditee to the internal quality audit information system, to ensure that the attached documents comply with the instrument items. The following is an example of an activity diagram carried out by an auditor after logging in to the internal quality audit information system as shown in Figure 4.
d. Entity Relationship Diagram (ERD)

This entity relationship diagram depicts the relationships formed between one table and another table in the internal quality audit information system database. The design of the ERD internal quality audit information system can be seen in Figure 5.

Source: (Research Result, 2023)
Figure 5. Entity Relationship Diagram (ERD)

e. Program Architecture

The program architecture will describe how the menus are arranged in the quality audit information system that will be built. The architecture of the internal quality audit information system program is shown in Figure 6.

Source: (Research Result, 2023)
Figure 6. Program Architecture

RESULTS AND DISCUSSION

This research produces an internal quality audit information system that can help the Mataram University of Technology Quality Assurance Institute overcome the problems faced when carrying out the internal quality audit process. Apart from that, this research also has the latest results from previous research, both in terms of software development methods, interface design, and resulting output. The results of the implementation of the internal quality audit information system can be explained as follows:

1. System Login Page

The login page is used for users to enter the internal quality audit information system, where the user must enter their user and password to be able to enter the dashboard page. The login page menu looks like Figure 7

Source: (Research Result, 2023)
Figure 7. Login page

2. Dashboard page

The dashboard page is used to view all the information in the internal quality audit information system. The appearance of the dashboard page is shown in Figure 8.

Source: (Research Result, 2023)
Figure 8. Dashboard page

3. Instrument Input Form

The instrument data input page is used to enter questions that are used when conducting internal...
quality audits, where the questions are taken from the standard documents of the Mataram University of Technology Quality Assurance Institute. The display of the instrument data input form is shown in Figure 9.

![Figure 9. Instrument Input Page](image)

Source: (Research Result, 2023)

Figure 9. Instrument Input Page

4. **Study Program Implementation Page**

The standard implementation page is a page used by each study program to upload standard implementation files based on questions that have been entered into the internal quality audit information system. The display of the standard implementation document upload page is shown in Figure 10.

![Figure 10. Implementation of the Study Program](image)

Source: (Research Result, 2023)

Figure 10. Implementation of the Study Program

5. **Evaluation Page**

The evaluation page is used by auditors to provide notes on the results found. The appearance of the evaluation page looks like Figure 11.

![Figure 11. Evaluation page](image)

Source: (Research Result, 2023)

Figure 11. Evaluation page

6. **Report Page**

The report page is used to print the results of internal quality audit reports that have been carried out or filled in by the auditee (study program) or by the auditor. The appearance of the Internal Quality Audit Report is shown in Figure 12.

![Figure 12. Internal Quality Audit Report](image)

Source: (Research Result, 2023)

Figure 12. Internal Quality Audit Report

Based on the results of information system testing using the black box testing method, it can be ensured that all processes in the system can run well and smoothly without any errors. The results of the trial results on this internal quality audit information system can be seen in Table 3.

<table>
<thead>
<tr>
<th>No</th>
<th>Module</th>
<th>Scenario</th>
<th>Result</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Instrument Data Set Menu</td>
<td>Instrument Data Input</td>
<td>Instrument data sets can be added</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>Study Program Implementation Menu</td>
<td>Input Document Name</td>
<td>Document Name can be input</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>View implement</td>
<td>Displays implement</td>
<td></td>
<td>Valid</td>
</tr>
</tbody>
</table>
Based on the results of the trial implementation of the internal quality audit information system using the black box testing method, all menus and data input have been confirmed to run well following what the user expects, and are free from errors.

**CONCLUSION**

With the internal quality audit information system produced in this research, the Mataram University of Technology Quality Assurance Institute can overcome and resolve every problem and obstacle that has been encountered when carrying out internal quality audits, because all the activities carried out are structured and programmed appropriately well in a system. Apart from that, this internal quality audit information system can provide convenience for quality assurance institutions in making reports and documentation as well as improving quality periodically and continuously.

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