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DESIGN OF INFORMATION SYSTEM TO CONTROL CHEMICALS INVENTORY IN MATERIALS LABORATORY

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ABSTRACT

The material laboratory stores chemicals used for material testing. The storage of chemicals needs to be maintained as chemicals have a shelf life, and if stored for too long, they can be hazardous to both the environment and the individuals working in the material laboratory area. The current manual inventory management leads to overstocking or understocking, increasing storage costs. Therefore, this study aims to design an information system that shifts from manual to real-time, enhancing the effectiveness of inventory management and reducing storage costs. The PIECES method is used in this study because this method can analyze the current system's condition and the proposed system before implementation. System design is also employed in this study, such as use case diagrams, activity diagrams, and class diagrams, to clarify the communication flow within the material laboratory. The use of system design can demonstrate a structured communication flow in the material laboratory, enabling real-time information systems. The PIECES method helps researchers analyze the current manual system and the real-time system that will be used.

KEYWORDS *inventory management, information systems, pieces method*

INTRODUCTION

Inventory management is an important activity in the manufacturing industry. Inventory management includes the process of monitoring incoming and outgoing goods as well as maintenance activities of stored products (Emar et al., 2021). Good inventory management can reduce the risk of oversupply or understocking, which is closely related to customer satisfaction (Hersyaputra et al., 2021; Pradana et al., 2024). In the heavy equipment manufacturing industry, inventory management includes monitoring of production raw materials, semi-finished goods, finished goods including consumables used to produce products from the heavy equipment manufacturing industry (Firdaus & Hadining, 2023; Visakha & Pradesan, 2023). In addition to producing heavy equipment products, the heavy equipment

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manufacturing industry also has material laboratory facilities that function to monitor the quality of the materials produced in production (Setiyanto et al., 2019).

Materials laboratories have chemical needs to carry out the material testing process. Chemicals are stored in storage rooms in materials laboratories (Nistrina & Sahidah, 2022). Inventory management of chemicals is necessary to be able to reduce storage costs, improve storage space efficiency, and safety because chemicals are hazardous materials if not stored properly (Ammar et al., 2021; Payne et al., 2020). The materials laboratory has 3 storage rooms with a manual inventory monitoring system. Inventory monitoring uses check sheets that are filled out manually and periodically (Kehinde Busola et al., 2020). This causes inefficient use of storage space due to excess inventory and lack of inventory, difficulty in finding chemicals when needed, increasing waste due to uncontrolled chemicals so that they are stored until the end of their useful life, as well as waste from using paper for check sheets (Setiyani & Setiawan, 2021).

Seeing these conditions, the author is interested in designing a real-time information system on material laboratory supplies (Hendharsetiawan & Suryani, 2022). This can facilitate communication between the inventory control team and the admin who orders the inventory, reduce costs due to excess inventory, increase the effectiveness of the testing process because there is no shortage of inventory. The analysis method used in this study is PIECES analysis because it can be used to analyze the current system and the system to be proposed (Ramadona et al., 2020).

RESEARCH METHOD

This study was carried out using a qualitative method. According to (Ernawati, 2020), the qualitative method is a method that in the process of making direct observations in this study using the object of chemical supplies in the material laboratory, to strengthen and clarify the observation results, an interview process is carried out on the inventory flow actors.

In the research method section, the stages of research carried out by the researcher from the beginning to the end of the research will be explained (Kumar, 2018). The detailed research method in this study can be seen in Figure 1.

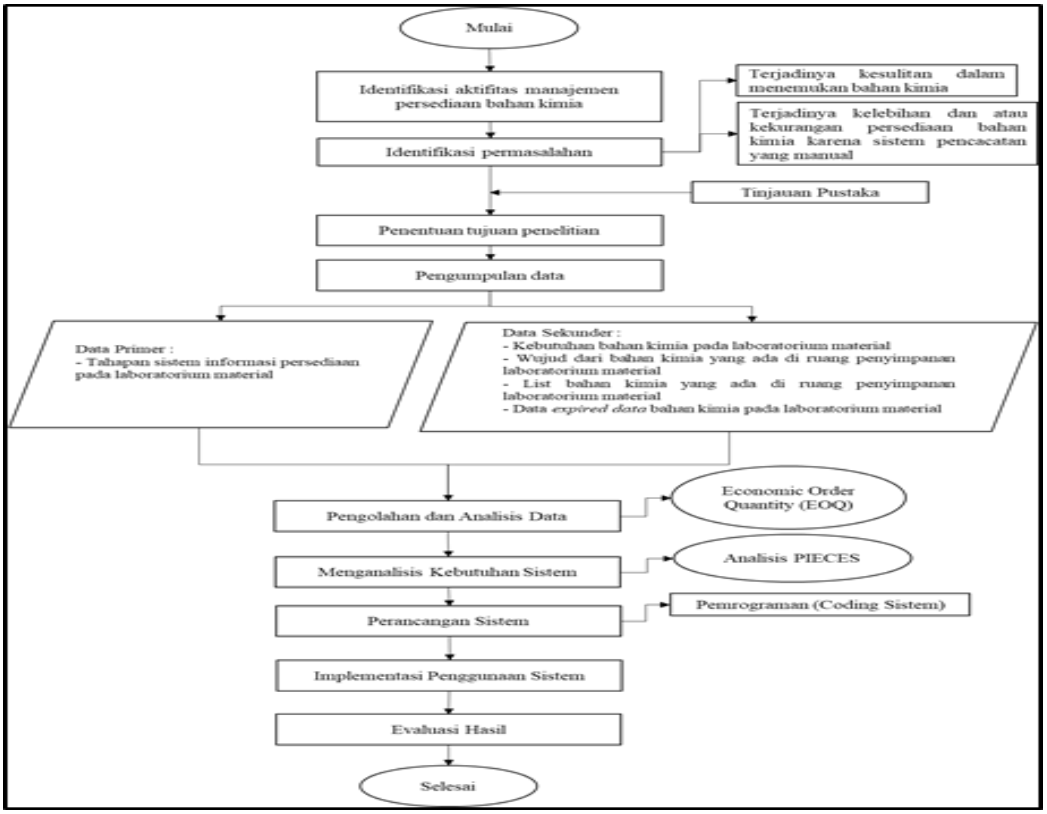


Figure 1. Research Methodology

Identification Stage

The identification stage is the initial stage of designing an information system used to control supplies in the materials laboratory. This stage is carried out by conducting a feasibility study on the systematic work of the materials laboratory. This stage needs to be done to understand the condition of the information system as real as possible that occurs in the materials laboratory.

Planning Stage

The planning stage is the stage to determine the steps of the research, determine the methods used to solve the problem.

Planning Stage

The design stage is the design stage of making an information system by conducting a PIECES analysis to find out the current and future condition of the system. Furthermore, at this stage, the proposed information system programming process is carried out. At this stage

Implementation Stage

The implementation stage is the stage of implementing the proposed information system.

Evaluation Stage

The evaluation stage is the final stage of this research where the researcher will see the changes in the effectiveness of the information system that occurs in the materials laboratory after implementing the proposed information system.

RESULT AND DISCUSSION

Conditions Before Repair

The materials laboratory currently uses a manual system by technicians using handwriting and paper in the process of controlling the supply of chemicals which includes materials entering and exiting the storage room and with the existence of 3 different storage rooms. This is considered less effective and there is a high possibility of errors in controlling inventory.

Communication flow systems that have not been standardized in the demand request process also often cause delays in purchasing which results in delays in the test analysis process.

Proposed Improvements

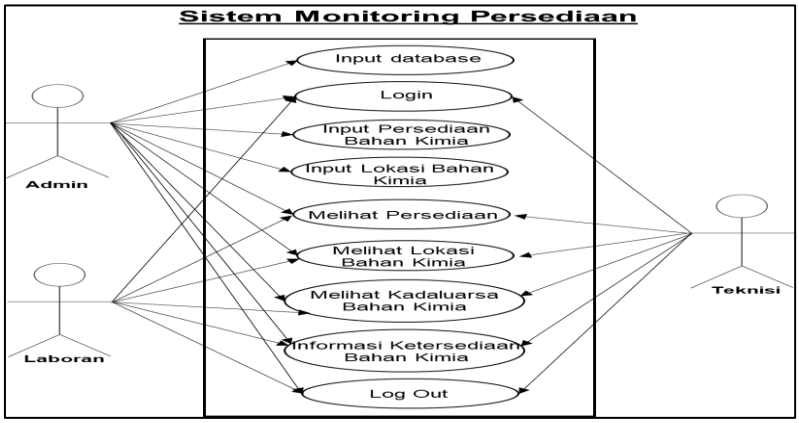
Based on the results of the analysis of the system that is currently applied in the materials laboratory, the author provides several proposals for the latest system that can improve and can also improve the existing system so that inventory management activities in the materials laboratory are more efficient.

The proposal submitted is an inventory management activity that uses UML (Unified Modelling Language) for application design. In this study, the author uses several design diagrams, including:

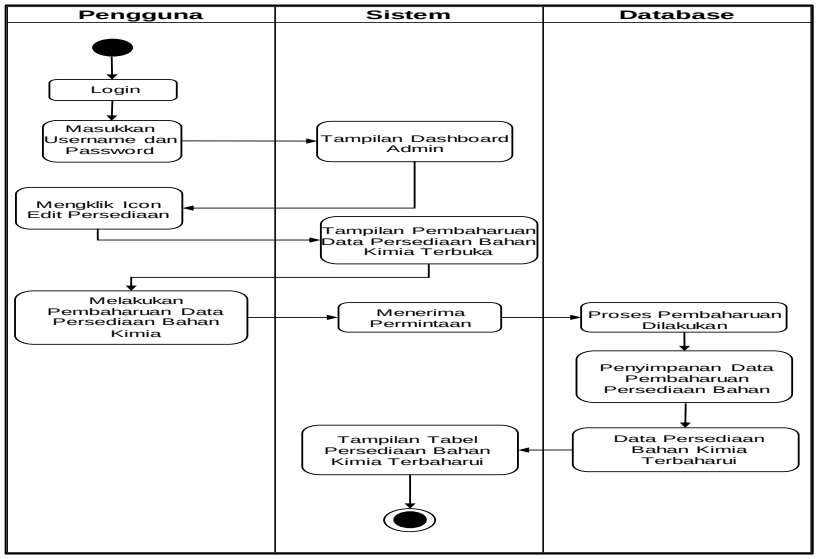
a. Use case diagram
b. Activity diagram
c. Class diagram

System Design Diagram

In this study, the author uses 3 visualized design diagrams in Figure 7, namely the use case diagram, Figure 2, which is the activity diagram, and Figure 3, which is a class diagram, which is the steps of the inventory management web design process in the materials laboratory.



Gambar 2. Use Case Diagram



Gambar 3. Activity Diagram

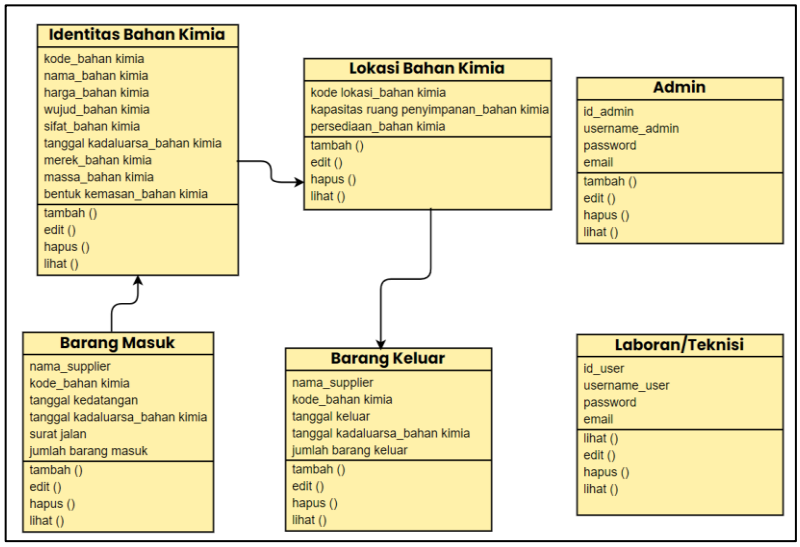


Figure 4. Class Diagram

Display System Design

The login menu shown in Figure 5 provides the email address and password fields that need to be filled in to be able to access the system.

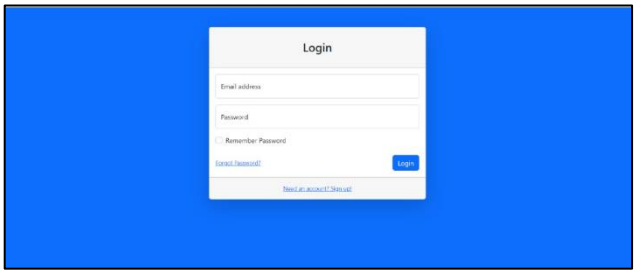


Figure 5. Log In Display

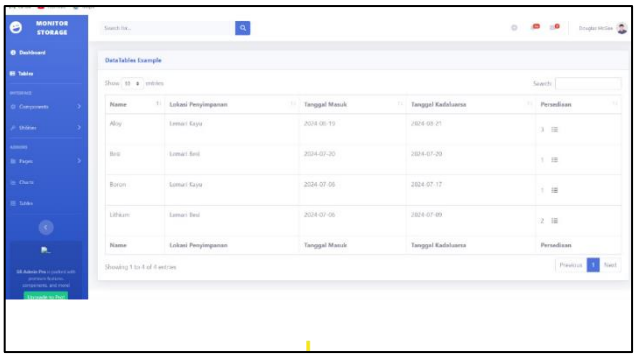


Figure 6. Dashboard Display

In Figure 6, a display dashboard is displayed that contains information on the overall items in the storage room. On this page, admins can edit data, both adding and subtracting items from stored chemicals and searching for the items needed.

CONCLUSION

After conducting research on the materials laboratory, the author concluded several things: The inventory management system applied in the materials laboratory still uses a manual system and the process of collecting data and presenting reports takes a long time, so real time monitoring cannot be carried out. An inconsistent manual system causes excess and shortcomings in the supply of chemicals and delays in the supply of chemicals. The author is building a system to monitor the inventory of chemicals in the storage room so that it can be done in real time so that an increase in efficiency will occur.

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