

Analysis and Design of Production Monitoring Information Systems on Label Shoe Manufacturing Companies

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Abstract

Digital technology can be used to solve problems that arise from business activity. One company that has not optimally used digital technology is PT Tiga Tapak Mutiara, which is engaged in manufacturing shoe labels. In its business process, each related division collects data, and the data collection results will be reported to the manager to unify work activities. The production data collection process has not been carried out optimally by the relevant divisions because the conventional recording is still carried out using a spreadsheet application which can slow down the reporting process to be monitored by the leadership. As a result, a slow process can impact not completing production on time. In addition to the problem of data collection, another problem is that the completion of orders received earlier is not compared to the orders received last. The aim and contribution of this research are to integrate business processes to overcome these problems in data collection, monitoring, and order completion activities. It is necessary to design a web-based monitoring information system with the Rapid Application Development (RAD) method and the application of the First In, First Out (FIFO) method so that the ordering process can run according to the time of order. The result of this research is a web-based information system that is useful for integrating business processes to monitor and optimize production activities to be completed on time. This web-based information system has also passed the functionality test using black box testing and is following the company's needs.

Keywords: *Black-box testing; Information System; RAD; Web-based*

1. Introduction

One of the companies engaged in manufacturing shoe labels is PT Tiga Tapak Mutiara. In its business process, data collection and reporting of production results are still carried out conventionally using a spreadsheet application, the data collection process includes material arrival activities to sending back materials that have been completed in the processing stage then each relevant division collects data, and the results of the data collection will be reported to the manager for monitor work activities. The production data collection process by the relevant divisions has not been able to run optimally because it is still carried out by conventional recording using a

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spreadsheet application which can allow for the accumulation and duplication of report documents. This condition can slow down the reporting process to be monitored by the leadership and result in production not running on time. On the other hand, in the problem of the completion process, the order of the order that was entered earlier did not match the order that was entered last.

This research was conducted based on previous research focusing on the Analysis and Design of web-based information systems using the WDLC model, which has been successfully implemented and implemented in a website content management system (CMS) to manage websites. The results can be used to manage congregational data collection at the BNKP Pewarta church [1]. The following research describes the results of the analysis and design of a web-based system for the Research and Community Service Institute called the LPPM department at Multimedia Nusantara University in a limited time using the Rapid Application Development (RAD) design method. The results contribute to the management of research activities and community service [2], [9]. Subsequent research is focused on developing an inventory information system and applying the FIFO method, which can simplify and speed up the performance of warehouse staff in accommodating stock inventory data calculations. In addition, with this inventory information system, companies can see the inventory of goods in a certain period as well as minimum and maximum stock information so that they can be more organized in the inventory transaction process so that processing time becomes faster. Relatively faster and can improve the performance of the warehouse in recording goods [3]. The results of the following research are an analysis of inventory information systems that have been carried out for copier rentals which can facilitate the recording of incoming and outgoing goods, data processing, and reporting. The inventory recording method is FIFO, where goods are entered first and issued first. Based on the literature review that has been done, the RAD method is suitable for use in this study. In addition, several aspects of previous research are used for the system's features [4].

2. Methods

In this study, researchers used the most appropriate method to solve the problems studied using the Rapid Application Development (RAD) system development method. The RAD method is used because this method can reduce cycle times and increase productivity with the users concerned. RAD generally reduces costs and minimizes risk, achieving complete customer satisfaction and business needs. However, this risk arises because researchers must provide a fast response to users who update the system, and the next drawback is that researchers cannot use the system. RAD itself must engage the developer with the appropriate users of this system and require fast results. The resulting implementation also reduces the awkward aspect of what the user wants. Initiatives to improve software processes begin with a traditional light assessment of the current software process, based on the understanding of action researchers that improvement should start with evaluation [5], [8]. In Figure 1 below, it will be shown the cycles/stages in implementing the RAD method:

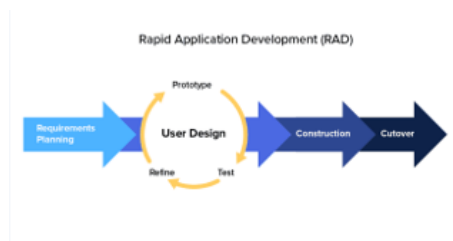


Figure 1. . Rapid Application Development Method

Based on Figure 1 above, we can see the steps to implement the RAD method, starting with requirements planning, user design, construction, and cutover. The following is a brief explanation of each stage:

- a) Requirements Planning:
At the requirement gathering stage, interviews will be conducted to seek information from users, design system preparations, and determine what features will be used in the application. Users and analysts will discuss to identify system objectives and be oriented towards solving business problems.
- b) User Design:
A face-to-face description of all the requirements described in the analysis stage will be carried out at this stage. From the conditions obtained, it will be converted into Unified Modelling Language (UML) form in the form of use case diagrams that can describe the main functions of the system to be created and explain the relationship between system users later [6], [7].
- c) Construction:
At this stage, the main focus is system development. In the RAD method, users must continue to participate and can suggest changes or improvements as the report progresses. The developer's job is to do system development, coding, and system testing. At this stage, implementing the FIFO method in coding is also carried out so that the objectives of the system logic can match the problems described previously.
- d) This is the last stage in the implementation of RAD. The data to be tested using the user acceptance with the black-box testing model and will be transferred to the new system and continued with user training. In addition, a comparison will be made between RAD and traditional methods, and as a result, the new system should be able to be delivered and operate fast.

3. Result

A. Requirement Analysis

The planning requirements process is the first phase in the RAD method. At this stage, requirements gathering is done by looking for information from the user, designing the system preparation, conducting interviews, and determining what kind of features will be used in the system. Users and analysts discuss to identify the purpose of the system and oriented toward solving business problems [8]. To make the requirements analysis phase can be understood more clearly, the explanation of the analysis between the current system versus the proposed system will be shown in the form of a comparison table which can be seen in Table 1.

Table 1. Analysis of the current system vs the proposed system

No	Type of Analysis	Weakness of current System	Proposed System
1	Performance	Searching the production report data requires a long time, so the operation will be delayed and not run optimally.	Searching production report data does not take long because it already uses the system, and there are features for searching data.
2	Information	Information on production report data is late to be submitted to the head of production.	Processing of production report data is using the system so that the head of production can get the information about the production report data quickly by using the feature on production head user, so on the dashboard, there is information on the production report data
3	Economics	Requires cost to print a production report using a paper.	Does not use a lot of cost because it uses an online system and displayed on the monitor, the production report data is stored in the database.
4	Control	System security is not optimal because it still uses spreadsheet application to process data and no authentication to access the data, so that the production report data can be seen by unauthorized user.	The security of the proposed online system becomes more optimal due to the authentication and limitation of system user access rights so that the production report data can be stored properly in the database.
5	Efficiency	It still takes a long time in the process of making a production report data report.	The proposed system is more efficient because it can directly report production results according to the specified date and period.
6	Service	Production employees must provide reports on production results directly in the physical form of paper.	The online system proposed by the head of production is to view production reports without needing printouts or physical reports on paper so that production employees do not need to meet directly with the head of production.

Based on table 1 above, we can see that the proposed system has advantages compared to the six aspects of the analysis.

B. User Design

The diagram will be created using the Unified Modeling Language (UML) in this phase. UML is now starting to be in demand by software developers. Object-oriented characters s very supportive of flexibility and speed in producing a program or system. Making UML aims to describe the process of running information and relationships between existing entities in the system being developed. The diagrams that will be made are Use Case Diagrams, Activity Diagrams, and Class Diagrams. UML diagrams can describe the system being created and what will happen at the design stage [7]. Figure 2 below will show the proposed Use Case Diagram on the system development, which can make it easier to design the system:

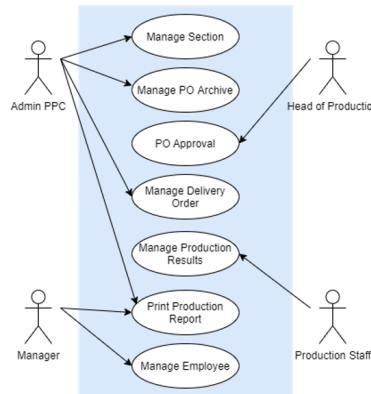


Figure 2. Proposed Use Case Diagram

Use case diagrams are used to describe the main functions of a system. In Figure 2, it is seen that four actors are involved in the use of the system to be designed. All actors involved in the system can use it by logging in, and after finishing it, they can log out. The primary function of the Production Planning Control (PPC) Admin actor is shown to be able to access the dashboard menu, manage sections, manage purchase order copies, manage travel documents, manage employees, and print production reports. The following actor is the manager actor, and the primary function is to access the menu manage employees, and print production reports. Furthermore, the production head actor is shown that he can only perform the function for approval of purchase order copies. The last actor is the production employee actor who can manage production results. Based on the proposed use case diagram above, it will be derived into Activity Diagram in Figure 3. The Activity

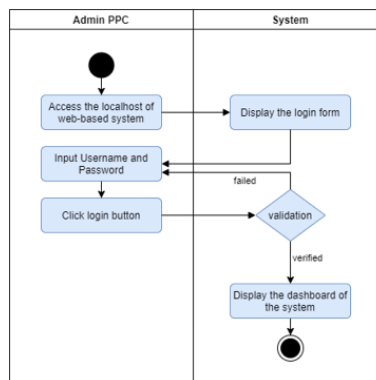


Figure 3. Login Activity Diagram

diagram in Figure 3 will describe the Activity when the user accesses the systems—starting with the Admin PPC through the login form by inputting the username and password created previously. If data validation fails, the system will return to the login screen to re-enter the correct username

and password. If the data validation is successful, the system will display a dashboard. After the login activity process is successfully carried out, then the Admin PPC can carry out activities to manage the Section, which will be shown in Figure 4.

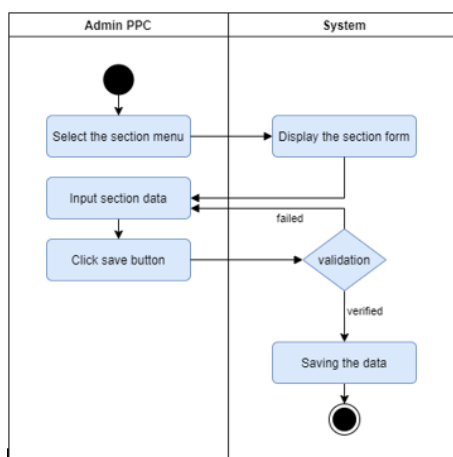


Figure 4. "Section's" Activity Diagram

On figure 4 above, the Admin PPC selects the "Sections" menu on the system, and the system will display the "Sections" form for the Admin PPC to input data. After the input process is complete, the Admin PPC will save the data from getting the data validation results. If it fails or does not match the data, the Admin PPC must re-enter it until it is correct, and if it is successful, the data will be saved to the database. Aside from the Section menu, after the login activity process is successfully carried out, then the Admin PPC can carry out activities to manage the Purchase Order (PO), which will be shown in Figure 5.

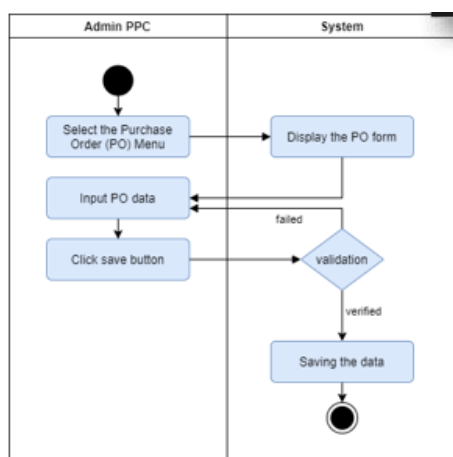


Figure 5. Purchase Order (PO) Activity Diagram

On Figure 5 above, the Admin PPC selects the Purchase Order (PO) menu on the system to display the PO form so that the Admin PPC can input the PO data. When finished, the Admin PPC can save the data by clicking the save button on the system display. If data validation fails, the Admin PPC is required to re-enter the PO data until it is successful in saving the data. Aside from the Purchase Order menu, after the login activity process is successfully carried out, then the Admin PPC can carry out activities to manage Delivery Order, which will be shown in Figure 6

In Figure 6 above, to input Delivery Order, Admin PPC can select the Delivery Order menu on the system to display the Delivery Order form. After inputting, the Admin PPC can click the

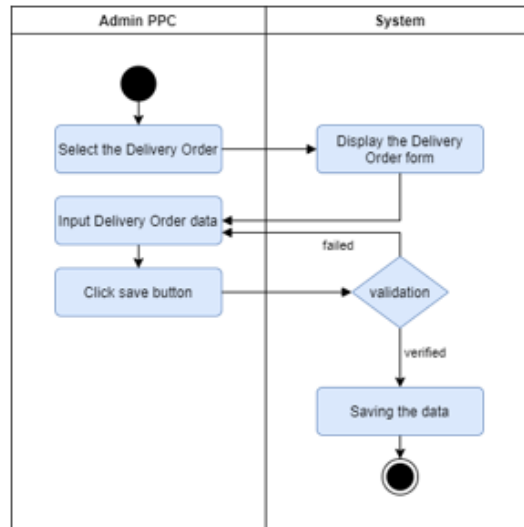


Figure 6. Delivery Order Activity Diagram

save button on the system view to process the data. If the data validation stage fails, the Admin PPC must re-enter the Delivery Order until it is appropriate and correct to save the data. Aside from the Delivery order menu from the Admin PPC user, the other user (Manager) can access the system through the login activity. After the login process is successfully carried out, the Manager can carry out activities to manage the Employee, which will be shown in Figure 7.

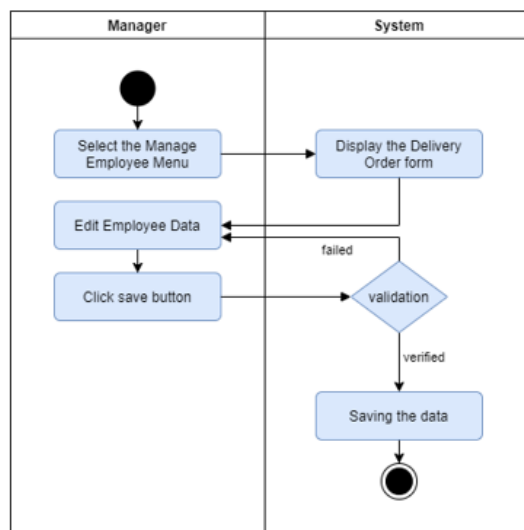


Figure 7. Manage Employee Activity Diagram

On Figure 7 above, the manager can select the employee menu and input data for employees who work in the company PT Tiga Tapak Mutiara. After inputting employee data, the manager can click the save button on the system display so that the data will be validated and saved. Aside from the Manage Employee menu from the Manager user, the other user (Head of Production) can access the system through the login activity. After the login process is successfully carried out, then the Head of Production can carry out activities to Manage and Approve Purchase Order (PO), which will be shown in Figure 8.

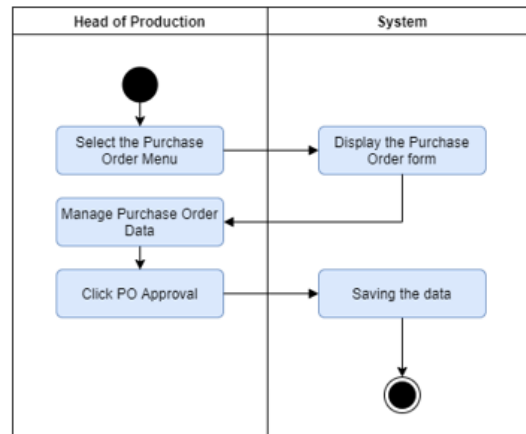


Figure 8. Purchase Order Activity Diagram on Head of Production

On Figure 8 above, to display the Purchase Order form, the Head of Production can select the PO copy menu on the system and choose the desired PO data. If the PO copy data has been found, the head of production can recheck the PO copy data before immediately proving it. Aside from the Purchase Order menu on the Head of Production user, the other user (Production Staff) can access the system through the login activity process. When the login is successfully carried out; then, Production staff can carry out activities to Manage the Production results and input the daily production, which will be shown in Figure 9

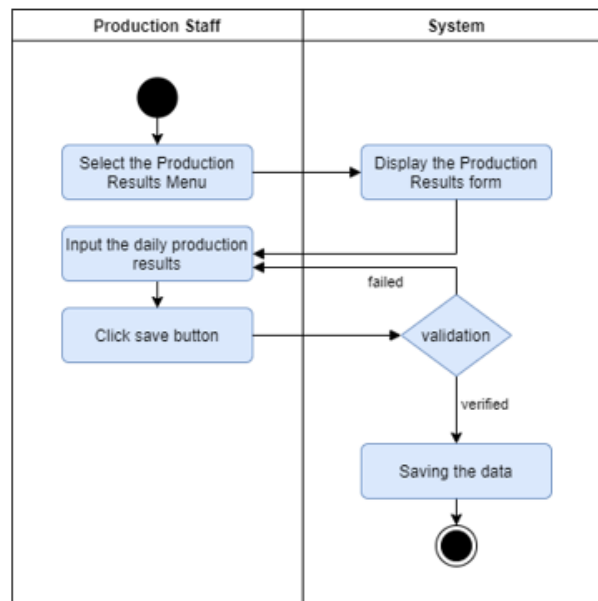


Figure 9. Production Result's Activity Diagram

Figure 9 above will show the process of inputting the Production results. To input daily production data, production employees will select the production menu on the system, and the production results form will be displayed. When the input is finished, the production employee can click the save button on the system view to save the data. Aside from the Production Results menu on the Production Staff user, the other user (Manager) can access the system through the login activity process. When the login is successfully carried out; then, the Manager can carry out activities to Manage the Production results Reports, which will be shown in Figure 10.

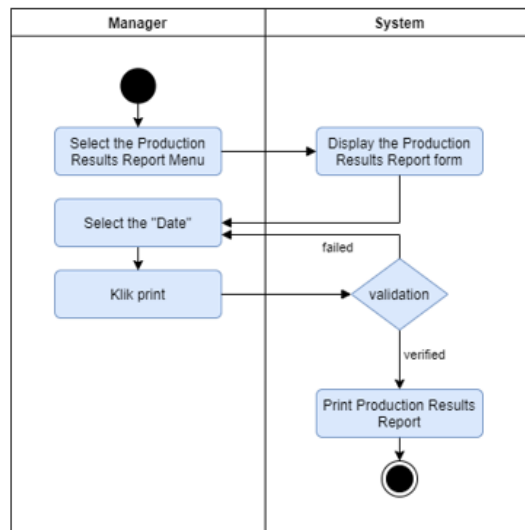


Figure 10. Production Results Report Activity Diagram

Figure 10 above will show the process of printing a production report. The manager can select the production report menu on the system. In addition, the manager can choose the production date you want to print by clicking the select print date button on the system. After seeing the use case and activity diagram exposure, the class diagram in Figure 10 will be explained to clarify the entities and attributes contained in the system design, along with the relationships between these entities.

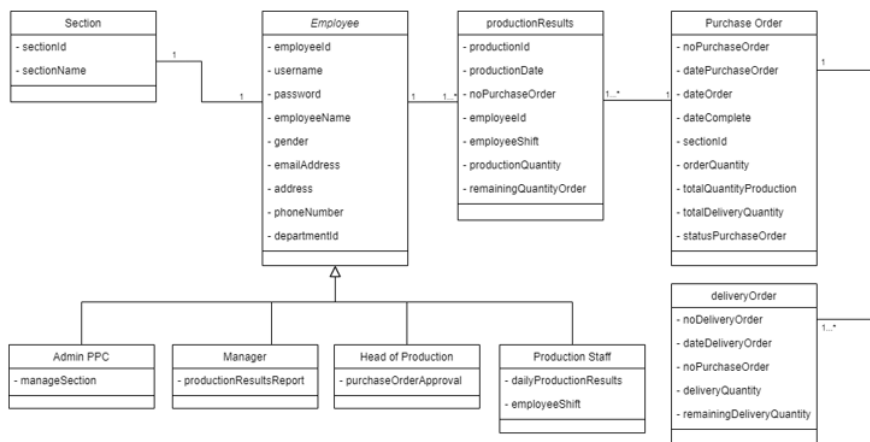


Figure 11. Class Diagram

Based on Figure 10, the proposed Class Diagram has five entities, and there are attributes in them. In addition, the same process has four associations as relations between attribute tables in the class, and there is a generalization on the employee entity

4. Discussion

a. Construction

At this stage, the research will be focused on system development. In the RAD method, the user must continue to participate and could suggest changes or improvements as the development of the report. The developer’s task here is to design, code, and test the system

[10]. From the Figure 12 to Figure 17 below, there will be shown the user interface of the system:

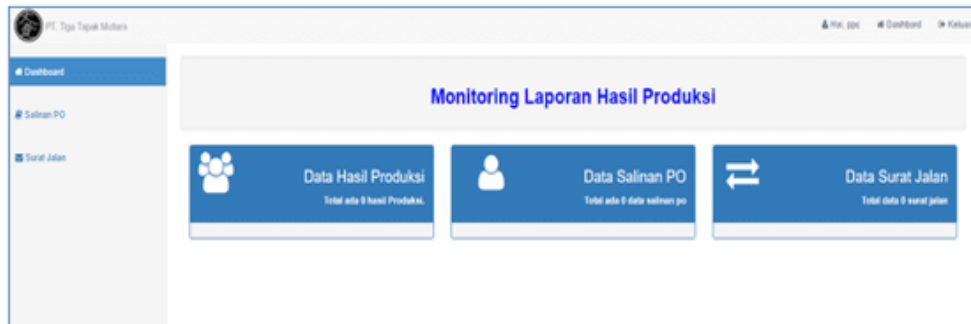


Figure 12. Dashboard of web-based information system

Figure 12 describes the interface of the dashboard system, there are some menus, and the user can use them to carry out some activities based on their needs.

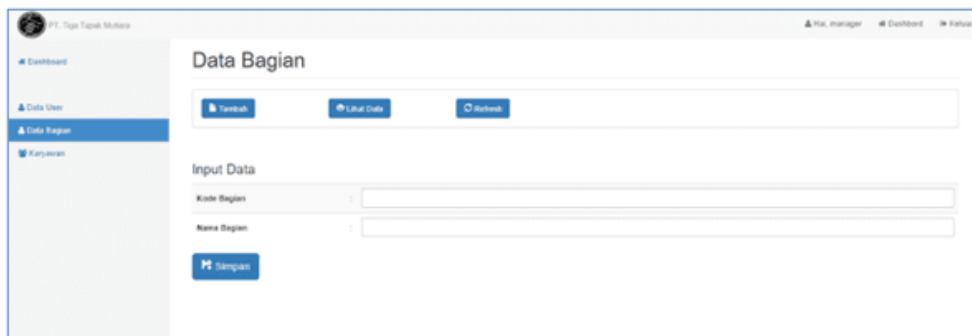


Figure 13. Input form on “Section” Data

Figure 13 describes the interface of the input form on “Section” Data; two input forms and some buttons can be used for inputting the user section. After completing their activities, users can go back to the dashboard menu or log out.

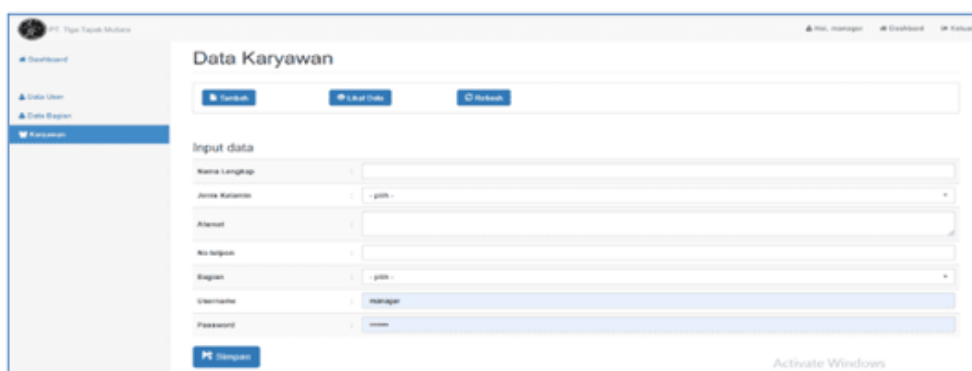


Figure 14. Input Employee’s Data Form

Figure 14 describes the interface of the input form on Employee Data; some input forms and some buttons can be used for inputting the user section, and there are required fields that

need to be filled to add new employees. After completing their activities, users can go back to the dashboard menu or log out.

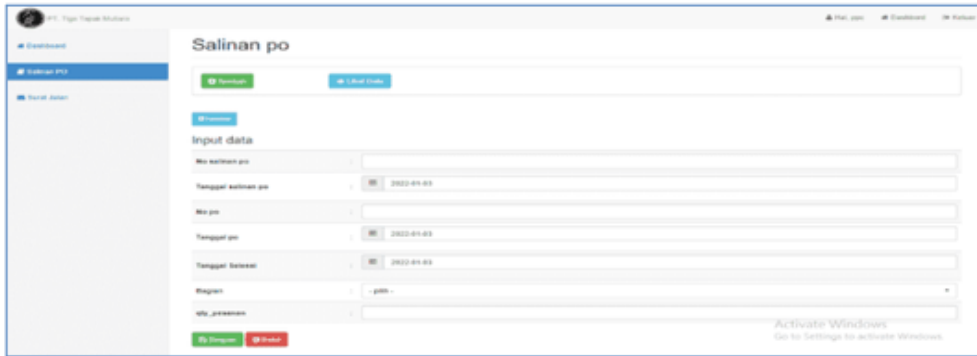


Figure 15. Input Copy of Purchase Oder form

Figure 15 describes the interface of the input form on Purchase Order; some input forms and some buttons can be used for inputting the user section, and there are required fields that need to be filled to add new purchase order

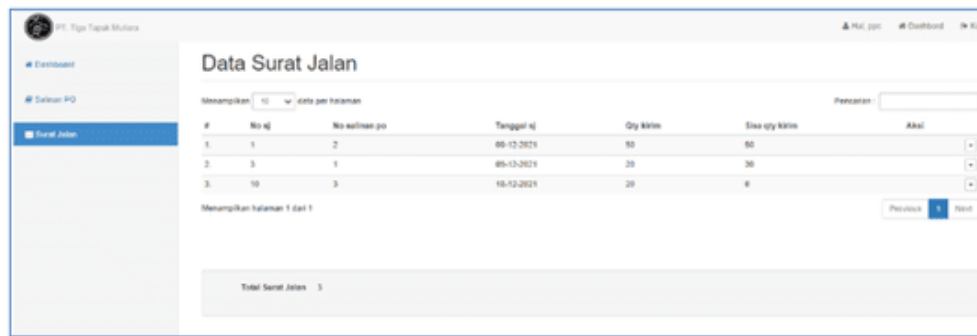


Figure 16. List's of Delivery Order

Figure 16 describes the interface of the Delivery Order data, and this list will be used to deliver the product to the customer. After completing their activities, users can go back to the dashboard menu or log out. Figure 17 describes the interface of the Production results

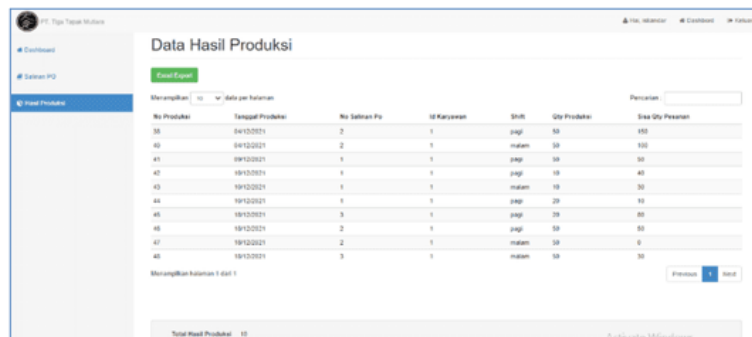


Figure 17. Production Results Data

data, and this list will be used to perform a report. After completing their activities, users can go back to the dashboard menu or log out.

b. Cutover

The cutover is the last stage in the implementation of the RAD method. In this step, we must conduct user acceptance testing of a system that has been developed. The user acceptance testing model will be used in black-box testing and carried out by the company (PT Tiga Tapak Mutiara), so the system has met the expectations. The black-box testing results will be shown on Table 2.

Table 2. Black-box testing results

Description	Case	Status
Log in	User's can input username and password	PASS
Dashboard	The home page of web-based information system to access menu	PASS
Section's menu	Data Can do input, save, edit and display "Section" data	PASS
First In-First Out method	The order process can run according to the time of order	PASS
Employee menu	The system will provide to add the new employee the user's to input their data	PASS
Copy of Purchase Order menu	The system will provide to input copy of purchase order and display the data	PASS
Document travel menu	The system will provide to input document travel for reporting	PASS
Production Results	The system will provide the head of production and manager to view the production results	PASS

Based on the results of black-box testing at the cutover stage, it can be seen that the system's functions can run according to the expectations of the company and users.

5. Conclusion

Based on the discussion in the previous section, the following conclusions can be drawn: The PO production process that is input first will be completed using the FIFO method so that the production results can be completed on time and monitored. Furthermore, on the proposed system's dashboard is information on the stock ordered, the amount of stock produced, and the rest of the production so that it can overcome the difference in the supply of goods in the running system. Record production data stored in the database, making it easier for the head of production to make production reports.

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