

# DESIGN AND BUILD INVENTORY MANAGEMENT INFORMATION SYSTEM USING THE SCRUM METHOD

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## Abstract

PT Telkom Akses (PTTA) is a subsidiary of PT Telekomunikasi Indonesia, Tbk (Telkom) which share owned entirely by Telkom. PT Telkom Akses is engaged in the business of providing construction services and network infrastructure management. Data collection manually can result in slow data management and will have an impact on the workflow of PT. Telkom Akses 3 Ilir Palembang. There will be a lot of damaged or duplicated data and finding data will be difficult. Therefore, it is necessary to develop a system that can collect data on incoming and outgoing goods, namely a Web-based Inventory System. The development of this inventory system uses the CodeIgniter3 Framework and Scrum methodology. Scrum is one of the methods that uses the Agile principal, which refers to team collaboration, product incremental, and iterative processes to achieve goals. The results of the evaluation of system testing using the black-box testing method show that the developed system can run well and as expected. Hopefully with the present of this system, it can help PT Telkom Akses 3 Ilir Palembang in performing incoming and outgoing goods data collection.

**Keyword:** Inventroy System, Web, Codeigniter 3, Scrum, BlackBox Testing

## I. INTRODUCTION

Technological developments encourage humans to do most of the use of computers so that the results needed can be processed quickly, one of which is managing inventory using an information system. [1][2].

Inventory management is an activity carried out by a company that is needed in making decisions so that the need for materials or goods for the purposes of company activities both production and sales can be fulfilled optimally with the smallest possible risk [3]. All organizations keep inventories, where inventory can be in the form of company-owned raw materials, goods in process, supplies used in operations, and finished goods. Inventory can be something as simple as a glass bottle or something as complex as a mix of raw materials used in the manufacturing process [4].

Humans as technology users must be able to take advantage of the current technology, as well as the subsequent development of the technology. Human

adaptation to new technologies that have developed must be done through education. This is done so that the next generation is not left behind in terms of new technology. With technology and education, it is able to develop together along with the new generation as the successor to the old generation. Some of these adaptations can be realized in the form of an Inventory Information System [5].

Technological developments must produce benefits for the organization in obtaining the information needed quickly so as to assist organizational managers in making decisions. Changes in the form of business processes used with the development of technology and communication are expected to encourage organizations to have better management [6] In addition, by utilizing information technology not only as a supporting facility for the company's business processes, but also can be an advantage and a necessity for companies in facing competition and supporting company performance [7] As some sectors of the economy rely heavily on the proper

use of information, organizations have tried to raise awareness of how to use technology. Organizations have found that information systems are the key to success in several sectors [8]

Basically the company that was founded has a purpose, and the main goal of the company is how the company can maintain its survival and keep its business in order to survive and develop. A company or agency on a large or small scale certainly has an inventory of goods for all transaction processes, with a good inventory system it can affect the development and progress of an agency. A poor inventory system will affect other aspects, such as the lack of consumer or customer trust in the company.

PT Telkom Access is a subsidiary of PT Telekomunikasi Indonesia, Tbk (Telkom) whose shares are wholly owned by Telkom. PTTA is engaged in the business of providing network infrastructure construction and management services. manual data collection can result in slow data management and will have an impact on the workflow of pt telkom access 3 ilir. Many of the data that is owned will be damaged or duplicated and searching for item data will be difficult. digitalization is deemed necessary in carrying out data collection of goods to be more effective and efficient. so that data items are not easily damaged or duplicated, easy to find and well documented. Therefore, practical work students will develop a website-based inventory system. With the development of this system, it is hoped that it will make it easier for users to collect data on incoming and outgoing goods at pt telkom access 3 ilir palembang.

II. RESEARCH METHODOLOGY

The method used in developing the inventory system is the Scrum SDLC (System Development Life Cycle) Methodology. Scrum is a framework of agile methodology, where scrum focuses on managing projects on a day-to-day basis and adopts many of the agile methods [9]. Scrum is a method that uses agile principles, which refers to team collaboration, product increments and process interactions to achieve goals. In the scrum method, the project will be divided into several stages, where each stage will produce the product used. The Scrum workflow consists of close collaboration between the development team and stakeholders with the product owner through continuous iteration of the system being developed. [10]. The steps involved in developing an inventory system using the scrum methodology are as follows:

A. Product Backlog

The product backlog is the first step in the Scrum methodology. The product backlog consists of the tasks (tasks) of the system to be developed. These tasks can be in the form of functional, non-functional, enhancements, fixes, patches, ideas, or other requirements needed by the system. This stage produces the following activities.

B. Actor Identification

At this stage, identification of actors aims to identify users involved in the inventory system. The actors who have been identified can be seen in Figure 1. Use Case Diagram.

C. Identification of System Requirements

Identification of system requirements is a stage that is carried out to analyse what needs will be used in the system. Identification of system requirements produces SKPL Documents that contain general information about the system and what requirements will be used in the system.

The list of requirements needed by the system on the front-end can be seen in Table 1. List of Requirements for the Front-End section.

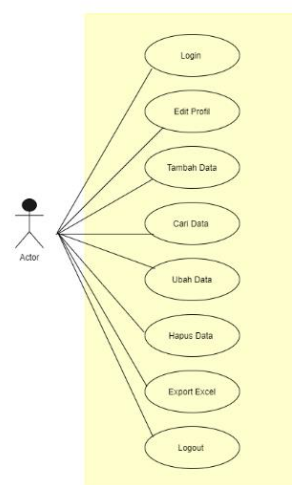


Figure 1. Use Case Diagram

Table 1. Front-End Requirements List

No	Backlog Item
1	User can see login page
2	User can see dashboard page
3	User can see incoming data page
4	User can see add incoming data page
5	User can see edit incoming data page
6	User can see outgoing data page
7	User can see add outgoing data page
8	User can see warehouse data page
9	User can see add warehouse data page
10	User can see edit warehouse data page
11	User can see profile page

The list of requirements needed by the system on the backend can be seen in Table 2. List of Requirements for the Back-End section.

**Table 2.** Back-End Requirements List

No	Backlog Item
1	User can login
2	User can edit profile
3	User can add incoming data
4	User can add outgoing data
5	User can change incoming data
6	User can delete incoming data
7	User can delete outgoing data
8	User can do export excel from incoming data
9	User can do export excel from outgoing data
10	User can logout
11	User can add warehouse data
12	User can edit warehouse data
13	User can delete warehouse data

**Table 4.** Back-End Sprint Planning

No	Interfaces	Estimated Works (Days)
1	Login	5
2	Profile setting	5
3	Add incoming data	5
4	Edit incoming data	5
5	Delete incoming data	5
6	Export excels from incoming data	5
7	Add outgoing data	5
8	Delete outgoing data	5
9	Export excels from outgoing data	5
10	Add warehouse data	5
11	Edit warehouse data	5
12	Delete warehouse data	5
13	Logout	5

**D. Sprint**

Sprint is the second stage after the product backlog. The sprint stage determines the time limit or estimated work with a product duration of one month or less, where there is a "Completed" increment process, which can be used and has the potential to be released. Sprints also have a consistent duration throughout the lifecycle during product development. The new sprint starts immediately after the previous sprint is finished. At this stage there are two activities, namely as follows:

**a. Sprint Planning**

Sprint planning is the stage that is carried out after determining the product backlog compiled by the scrum team, which will hold a meeting at the beginning of each sprint to evaluate the product backlog, discuss the goals and missions of each feature. At this stage of the next scrum process, the stakeholders involved determine the time needed to complete each feature that you want to develop, which can be seen in the table below. Sprint planning on the front-end can be seen in Table 3. Sprint Planning on the Front-End.

**Table 3.** Front-End Sprint Planning

No	Interfaces	Estimated Works (Days)
1	Login page	5
2	Dashboard	5
3	Incoming data page	5
4	Add incoming data page	5
5	Edit incoming data page	5
6	Outcoming data page	5
7	Add outgoing data page	5
8	Warehouse data page	5
9	Add warehouse data page	5
10	Edit warehouse data page	5
11	Profile page	5

*Sprint planning pada bagian back-end dapat dilihat pada Tabel 4. Sprint Planning bagian Back-End.*

**b. Sprint Backlog**

At the design stage, the sprint backlog makes a list of needs that are a priority with a working time that has been determined by the stakeholders involved. This stage also completes the features that have been defined in the product backlog and sprint planning. In system development, sprints are divided into 4 sprints which can be seen in the pictures below. Sprint 1 consists of 6 jobs with a total estimated time of 5 days. The work of sprint 1 is to develop login display, profile settings display, create database, create website connection with database, login function, and profile setting function. The sprint backlog for sprint 1 can be seen in figure 2. Sprint 1.

SPRINT 1									
ID	Name	Duration (days)	Start Date	Finish Date	Juni 2021				
					14	15	16	17	18
					S	S	R	K	J
3.2.1.1	Develop tampilan login	5	14 Juni 2021	18 Juni 2021					
3.2.1.2	Develop tampilan pengaturan profil	5	14 Juni 2021	18 Juni 2021					
3.2.1.3	Create database	5	14 Juni 2021	18 Juni 2021					
3.2.1.4	Membuat koneksi website dengan database	5	14 Juni 2021	18 Juni 2021					
3.2.1.5	Develop fungsi login	5	14 Juni 2021	18 Juni 2021					
3.2.1.6	Develop fungsi pengaturan profil	5	14 Juni 2021	18 Juni 2021					

**Figure 2.** Sprint 1

Sprint 2 consists of 7 jobs with a total estimated time of 5 days. The work of sprint 2 is to develop the display of incoming goods, the display of adding incoming goods, the display of editing incoming goods, the function of adding incoming goods, the function of editing incoming goods, the function of removing incoming goods, and the export excel function of incoming goods. Sprint backlog for sprint 2 can be seen in Figure 3. Sprint 2

SPRINT 2									
ID	Name	Duration (days)	Start Date	Finish Date	Juni 2021				
					21	22	23	24	25
					S	S	R	K	J
3.2.1.7	Develop tampilan barang masuk	5	21 Juni 2021	25 Juni 2021					
3.2.1.8	Develop tampilan tambah barang masuk	5	21 Juni 2021	25 Juni 2021					
3.2.1.9	Develop tampilan edit barang masuk	5	21 Juni 2021	25 Juni 2021					
3.2.1.10	Develop fungsi tambah barang masuk	5	21 Juni 2021	25 Juni 2021					
3.2.1.11	Develop fungsi edit barang masuk	5	21 Juni 2021	25 Juni 2021					
3.2.1.12	Develop fungsi hapus barang masuk	5	21 Juni 2021	25 Juni 2021					
3.2.1.13	Develop fungsi export excel barang masuk	5	21 Juni 2021	25 Juni 2021					

**Figure 3.** Sprint 2

Sprint 3 consists of 7 jobs with a total estimated time of 5 days. The work of sprint 3 is to develop the display of outgoing goods, display of added goods out, display of destination WH data, function of adding goods out, function of deleting data of goods out, function of excel export of goods out, function of adding data of destination WH. The sprint backlog for sprint 3 can be seen in Figure 4. Sprint 3.

SPRINT 3													
ID	Name	Duration (days)	Start Date	Finish Date	Juni - Juli 2021								
					28	29	30	1	2	3	4		
					S	S	R	K	J				
3.2.1.14	Develop tampilan barang keluar	5	28 Juni 2021	2 Juli 2021									
3.2.1.15	Develop tampilan tambah barang keluar	5	28 Juni 2021	2 Juli 2021									
3.2.1.16	Develop tampilan data WH Tujuan	5	28 Juni 2021	2 Juli 2021									
3.2.1.17	Develop fungsi tambah barang keluar	5	28 Juni 2021	2 Juli 2021									
3.2.1.18	Develop fungsi hapus data barang keluar	5	28 Juni 2021	2 Juli 2021									
3.2.1.19	Develop fungsi export excel barang keluar	5	28 Juni 2021	2 Juli 2021									
3.2.1.20	Develop fungsi tambah data WH tujuan	5	28 Juni 2021	2 Juli 2021									

Figure 4. Sprint 3

Sprint 4 terdiri dari 7 pekerjaan dengan total estimasi waktu 5 hari. Pekerjaan dari *sprint 4* yaitu melakukan *develop* tampilan tambah data WH tujuan, tampilan *edit* data WH tujuan, tampilan *dashboard*, fungsi *edit* data WH tujuan, fungsi hapus data WH tujuan, fungsi *dashboard*, dan fungsi *logout*. *Sprint backlog* untuk *sprint 4* dapat dilihat pada Gambar 4. Sprint 4

SPRINT 4													
ID	Name	Duration (days)	Start Date	Finish Date	Juli 2021								
					5	6	7	8	9				
					S	S	R	K	J				
3.2.1.21	Develop tampilan tambah data WH Tujuan	5	5 Juli 2021	9 Juli 2021									
3.2.1.22	Develop tampilan edit data WH Tujuan	5	5 Juli 2021	9 Juli 2021									
3.2.1.23	Develop tampilan dashboard	5	5 Juli 2021	9 Juli 2021									
3.2.1.24	Develop fungsi edit data WH Tujuan	5	5 Juli 2021	9 Juli 2021									
3.2.1.25	Develop fungsi hapus data WH Tujuan	5	5 Juli 2021	9 Juli 2021									
3.2.1.26	Develop fungsi dashboard	5	5 Juli 2021	9 Juli 2021									
3.2.1.27	Develop fungsi logout	5	5 Juli 2021	9 Juli 2021									

Figure 5. Sprint 4

Sprint 5 and Sprint 6 consist of 3 jobs, 2 jobs are part of sprint 5 with an estimated processing time of 5 days and 1 job is part of sprint 6 with an estimated processing time of 5 days. The sprint backlog for sprint 5 and sprint 6 can be seen in Figure 5. Sprint 5 and Sprint 6

SPRINT 5		SPRINT 6												
ID	Name	Duration (days)	Start Date	Finish Date	Juli 2021									
					12	13	14	15	16	19	20	21	22	23
					S	S	R	K	J	S	S	R	K	J
4.1	Testing Website	5	12 Juli 2021	16 Juli 2021										
4.2	Pembuatan dokumen testing	5	12 Juli 2021	16 Juli 2021										
4.3	Perbaikan Bug	5	19 Juli 2021	23 Juli 2021										

Figure 6. Sprint 5 dan Sprint 6

Daily Scrum

Daily scrum is a stage that is carried out after each sprint has been completed, which at this stage results in meeting activities. At this stage the aim is to see the progress of the system and report the features that have been completed in the sprint. At the end of this meeting activity, updates must be made at each completion time to

find out the rest of the work carried out during the sprint process.

Sprint Review

Sprint review is carried out at the end of each sprint to evaluate the results of each sprint that has been done. Evaluation can be done to review what has been completed in each sprint. Based on the evaluation results, the stakeholders involved can determine the next work based on the product backlog and sprint backlog.

III. THE RESULT AND DISCUSSION

System implementation is a stage to build a system using a particular programming language. At this implementation stage, the development of the inventory system uses the CodeIgniter3 framework with the PHP programming language. The following is the result of the implementation of the database and inventory system features.

Database

This inventory system is equipped with a MySQL relational database that functions to manage data. The design of the relational database can be seen in Figure 7. Relational Database

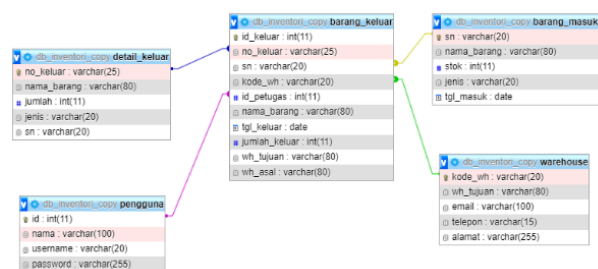


Figure 7. Relational Database

Login Page

The login page is the initial page that is displayed when the user enters the inventory system. On the login page there is a username and password field that the user can input. If the username and password entered by the user are correct and the login function is executed, it will display the dashboard page. If the username and password entered by the user are incorrect or incorrect and the login function is executed, a notification will appear to fill in the correct or appropriate username and or password fields. The results of the implementation of the login page can be seen in Figure 8. Login page.



Figure 8. Login Page

Figure 11. Incoming Data Page

**Dashboard Page**

The dashboard page is the main page that is displayed after the user has successfully logged in. This page contains information about the inventory of incoming goods and the number of outgoing goods. In this system there is a sidebar that directs the user to a certain page according to the chosen one. Dashboard page can be seen in Figure 9. Dashboard page.

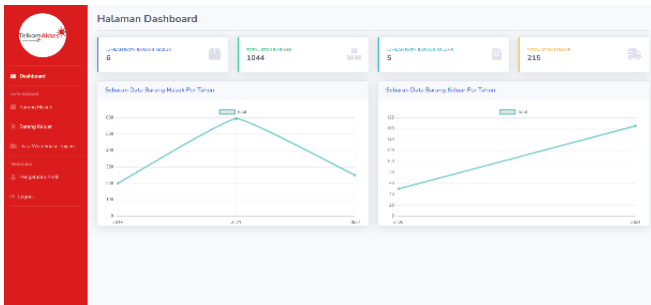


Figure 9. Dashboard Page

In addition, there is a logout button on the sidebar that the user can use to log out when finished using the system. This logout button can be accessed on every page. If the user selects the logout button, a confirmation popup will appear to log out and the logout function will be executed as shown in Figure 10.

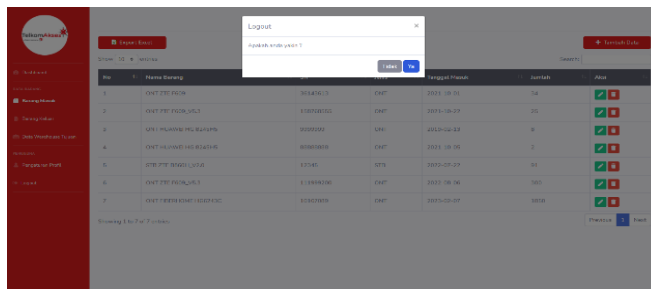


Figure 10. Popup Logout

**Incoming Data Page**

Login page contains a list of incoming goods. On this page the user can search for data, export incoming goods with the excel file extension, add data, change data, and delete data. Incoming goods page can be seen in Figure 11.

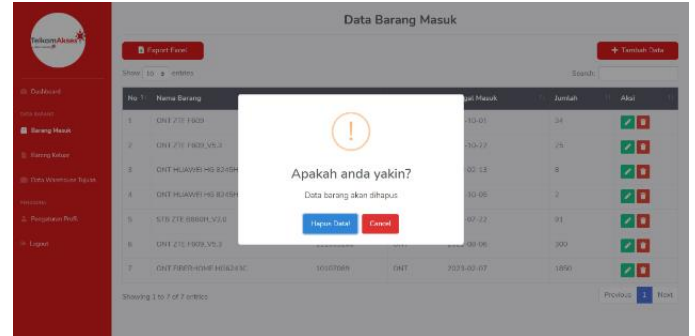
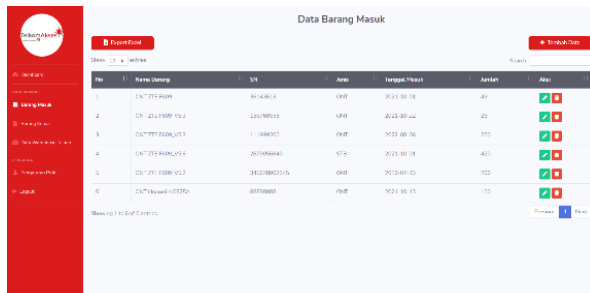


Figure 12. Popup Delete Incoming Data

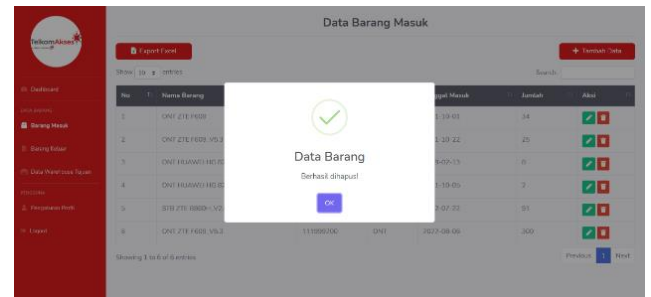


Figure 13. Popup Delete Incoming Data (2)

**Add Incoming Data Page**

Add incoming data page is the page used to add incoming goods data. On this page there is a form for adding goods, where the user is asked to input data in each field. If there is one and or all fields are empty, then the function of adding incoming goods data will not be executed and a notification will appear to fill the empty field. The page for adding incoming goods data can be seen in Figure 14.

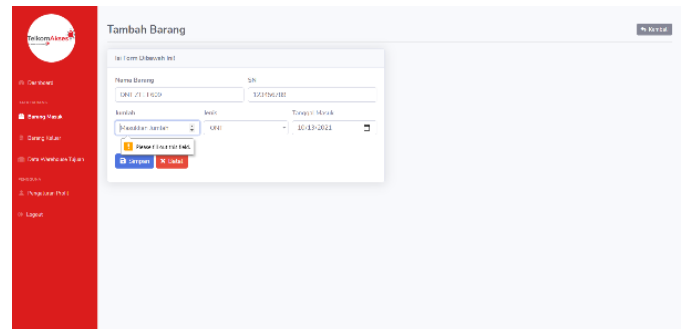


Figure 14. Add Incoming Data Page

On this page there is a function to save data. If the user selects the save button, the data save function will be executed then the data will be saved, and a popup notification will appear that the data is successful which can be seen in Figure 15.



Figure 15. Popup Add Incoming Data Page

In addition, there is a check if the user inputs the SN data that has been registered on the incoming goods, a popup confirmation of the data failed to add will appear which can be seen in Figure 16.

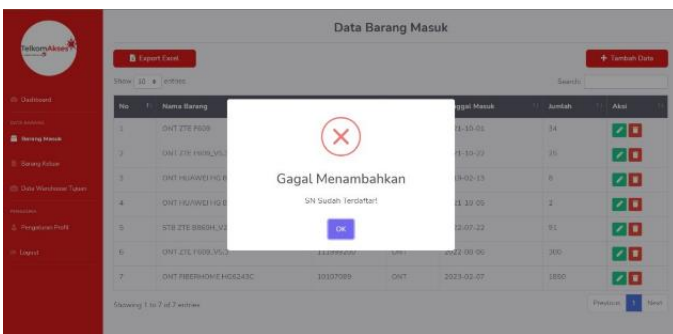


Figure 16. Popup Failed to Add Incoming Data

**Edit Outcoming Data Page**

Edit Outcoming data page is a page that is used to make changes to incoming goods data. On this page there is an item edit form, where the user can input the data, they want to edit in an existing field. If any and or all fields are deleted and not re-entered, then the edit function will not be executed, and a notification will appear to fill in the empty fields. The incoming goods edit page can be seen in Figure 17. The Incoming Goods Edit page.

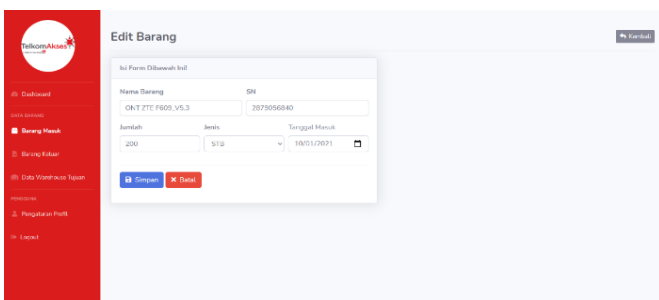


Figure 17. Edit Incoming Data Page

**Outcoming Data Page**

Outcoming data page contains a list of outgoing goods. On this page the user can search for data, export goods out with the excel file extension, add data, and delete data. Outgoing goods page can be seen in Figure 18. Outgoing Goods page.

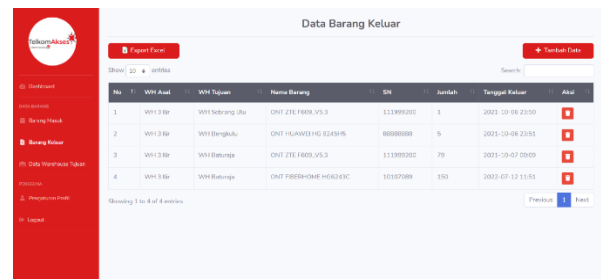


Figure 18. Outcoming data page

In addition, there is a function to delete data. If the user selects the delete button, a confirmation popup will appear to delete the data. If the user chooses to delete data, the delete data function will be executed then the data will be deleted, and a popup notification will appear that the data has been successfully deleted which can be seen in Figures 19 and 20.

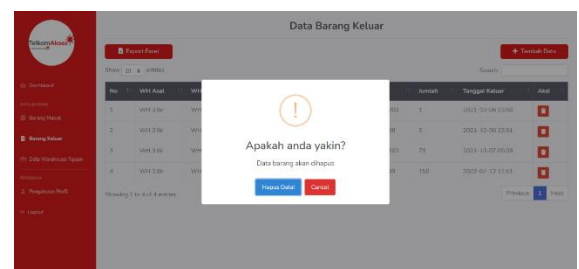


Figure 19. Popup Delete Outcoming Data

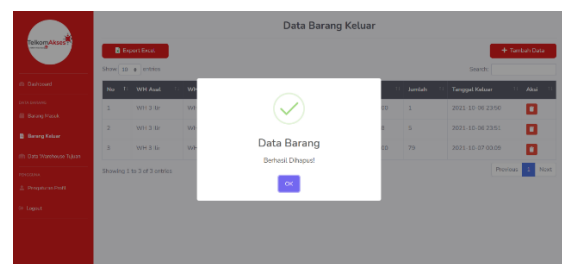


Figure 20. Popup Delete Outcoming Data (2)

**Add Outcoming Data Page**

Add outgoing data page is a page that is used to add outgoing goods data. On this page there is a form for adding goods, where the user is asked to input data in each field. If there is one and or all fields are empty, then the function of

adding outgoing goods data will not be executed and a notification will appear to fill the empty field. The page for adding out goods data can be seen in Figure 21.

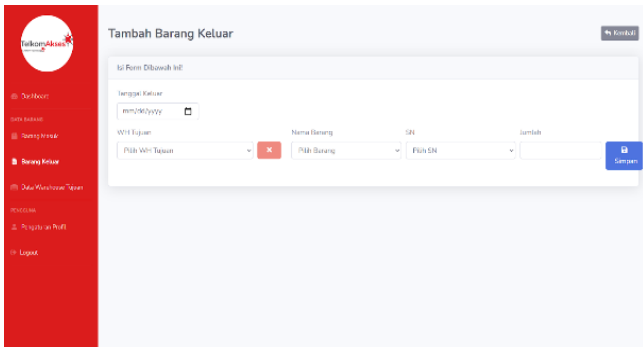


Figure 21. Add Outcoming Data Page

On this page there is a function to store outgoing goods data. If the user selects the save button, the function of adding outgoing goods data will be executed then the outgoing goods data will be stored and the current incoming goods data will be reduced according to the number of outgoing goods. Then a popup notification will appear that the data has been successfully added which can be seen in Figure 22.

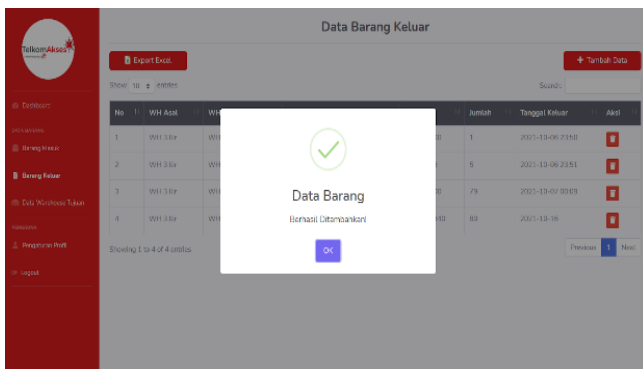


Figure 22. Popup Save Outcoming Data

**Warehouse Data Page**

The destination data warehouse page contains a list of destination warehouses. On this page the user can search for data, add data, modify data, and delete data. The destination data warehouse page can be seen in Figure 23. Data Warehouse page.

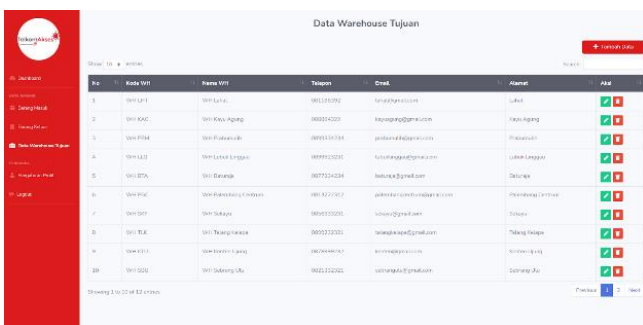


Figure 23. Warehouse Data Page

In addition, there is a function to delete data. If the user selects the delete button, a confirmation popup will appear to delete the data. If the user chooses to delete data, the delete data function will be executed then the data will be deleted, and a popup notification will appear that the data has been successfully deleted which can be seen in Figures 24 and 25.

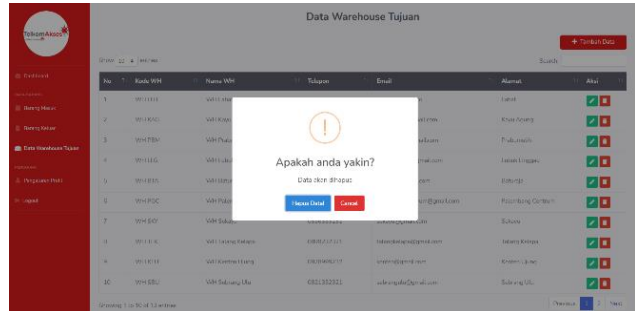


Figure 24. Popup delete Warehouse Data

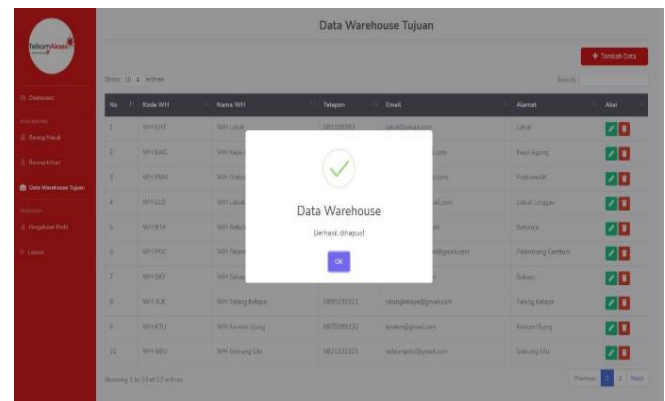


Figure 25. Popup Hapus Data Warehouse Tujuan (2)

**Add Warehouse Data Page**

Add warehouse data page is a page that is used to add a data warehouse destination. On this page there is a form for adding data, where the user is asked to input data in each field. If one and or all fields are empty, the added data warehouse function will not be executed, and a notification will appear to fill in the empty fields. The page for adding incoming goods data can be seen in Figure 26. The Add Data Warehouse page.

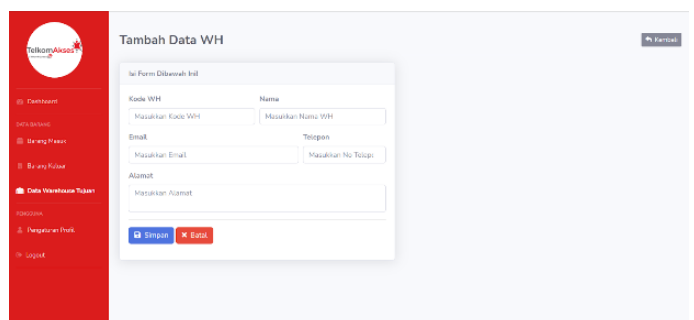


Figure 26. Add Warehouse data page

On this page there is a function to save data. If the user selects the save button, the data save function will be executed then the data will be saved, and a popup notification will appear that the data has been successfully added which can be seen in Figure 27.

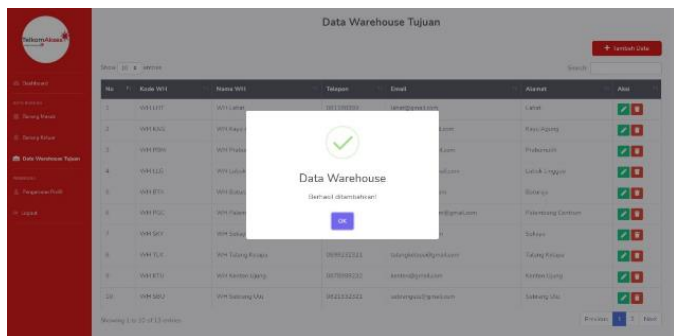


Figure 27. Popup Save Warehouse Data

**Edit Warehouse Data Page**

Edit Warehouse Data Page is a page that is used to modify the destination data warehouse data. On this page there is a data warehouse edit form, where users can input the data, they want to edit in the existing fields. If any and or all fields are deleted and not re-entered, then the edit function will not be executed, and a notification will appear to fill in the empty fields. The data warehouse edit page can be seen in Figure 28.

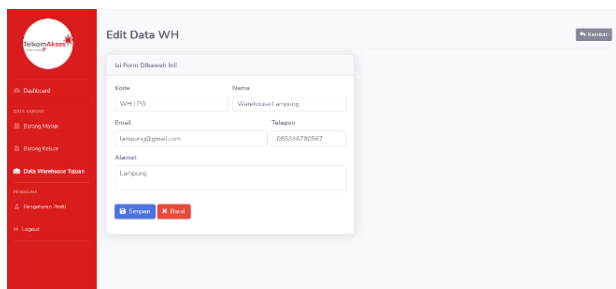


Figure 28. Edit Warehouse Data Page

On this page there is a function to save data. If the user selects the save button, then the data change function will be executed then the data will be saved, and a popup notification will appear that the data has been successfully changed which can be seen in Figure 29.

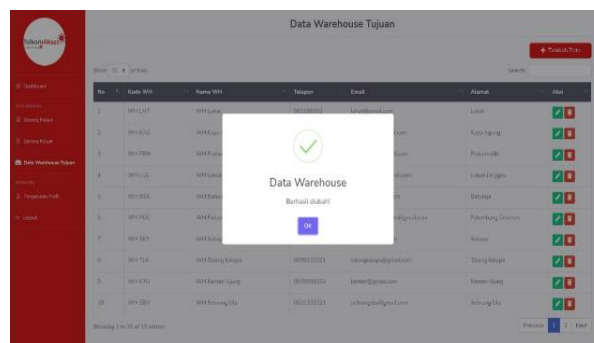


Figure 29. Popup Save Edit Warehouse Data

**Profile page**

Profile page used to change the username and password owned by the user. The profile settings page can be seen in Figure 30.

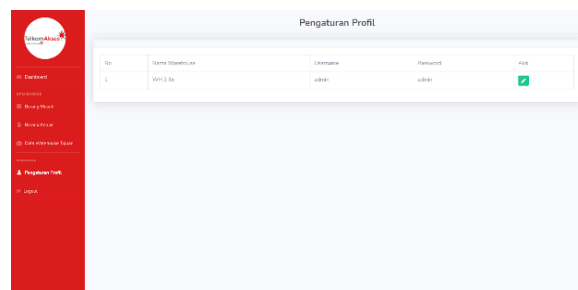


Figure 30. Profile Page

**Test Result**

After implementing or developing an inventory system, testing the system is carried out to find out whether the features in the system are in accordance with the initial design and desired needs. Testing this system using the Black-Box Testing method, where this method is a testing method used to test the functionality of the system. The results of system testing can be seen in Table 5.

Table 5. Test Result

No	Test page	Number of Successful System Functionality	Percentage
1	Login page	3	100%
2	Dashboard page	2	100%
3	Incoming data page	9	100%
4	Add incoming data page	5	100%
5	Edit incoming data page	5	100%
6	Outcoming data page	9	100%
7	Add Outcoming Data Page	5	100%
8	Warehouse Data Page	8	100%
9	Add Warehouse Data Page	5	100%
10	Edit Data Warehouse Page	5	100%
11	Profile Page	5	100%



## IV. CONCLUSIONS

Based on the practical work that has been carried out, it can be concluded that:

1. Warehouse Inventory System is a web-based inventory system that can be used by users to collect data on incoming and outgoing goods in real time.
2. Development of this inventory system uses the CodeIgniter 3 framework with the PHP programming language and uses the Scrum methodology.
3. Based on the results of the evaluation of testing using the black box testing method on the system in accordance with the initial design and desired needs.

## V. SUGGESTION

The application can be further developed to be able to monitor goods every month and year, and can be integrated with several warehouses or Telkom offices throughout the province of Indonesia.

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