Developed a web-based inventory information system to improve the efficiency and effectiveness of inventory management

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Abstract: Batam Cable Vision is a company engaged in cable TV and internet installation services. This company has problems in data processing which results in different quantities of goods. So that a system is needed that can determine the amount of inventory in the warehouse. Therefore, a web-based inventory system is designed to find out the exact amount of inventory and can be accessed via the internet. This research is designed using the waterfall method, there are five stages, namely planning is the process of designing a system like what will be made, analysis is understanding the existing system with the system to be created, system design is carried out with the aim of helping to provide a complete picture of what to do, coding is the process of writing program code, then checking and testing the system as a whole to identify possible system failures and errors, in the last stage maintenance includes error correction, improvement of system unit implementation, and system improvement and adjustment according to user needs. While the modelling used uses the Unified Modeling Language (UML) which consists of a use case diagram, activity diagram, class diagram and sequence diagram. The result of this research is a web-based inventory information system at PT Batam Cable Vision is expected to help the admin in data processing, in order to minimise errors in recording goods. Then, the inventory information system can present the right goods report information according to company needs so as to minimise the use of paper.

Keywords*: Information System; Design; Inventory; Waterfall; Web*

1. Introduction

The development of information and communication technology is increasingly sophisticated, making information systems continue to increase bigger and bigger (Fortuna et al., 2023; Prasetya, Fajri, et al., 2023). Especially the creation of information systems related to stock inventory in warehouses. Information systems related to stock inventory in warehouses are an important part of a particular company or individual (Lampropoulos et al., 2022). One of the developments in information technology is used to manage the inventory of goods owned by certain companies, so that it can help manage the stock of goods (Afandi et al., 2019; Rizaldi et al., 2020; Siswanto et al., 2021).

Information systems have a very important role, the more rapid the development of a company or organisation, the information system also has an increasingly important role (Shi et al., 2020; Widharto et al., 2021). The demand for the existence of a better information system is due to the demands of company development, technological developments, government policies, changes in procedures and demands for information needs. Information system development is often referred to as the system development process. Information system development is defined as an activity to produce computer-based information systems to solve organisational problems or take advantage of opportunities that arise (Demigha, 2021; Spring et al., 2022). System development can mean compiling a new system to

replace the old system as a whole or improving the existing system, it is done because the previous system has problems, inefficient operations, and so on.

Inventory of goods is one of the important work activities for trading companies, because inventory is a major element in the field of trade (Lim et al., 2020; Sinval et al., 2019; Sodhi et al., 2023). A small mistake regarding inventory can lead to fatal problems, be it a build-up in the warehouse or a shortage of goods (Kuzmina et al., 2022; Majchrzak et al., 2021). The company needs technological support in the form of an information system that can facilitate and accelerate providing information about the state of inventory of goods.

Batam Cable Vision is a company engaged in cable TV and Internet installation services. The inventory system at PT BCV has not been incorporated into an information system. The items used by technicians such as cables, splitters (branch tools), connectors, and boosters. According to the results of interviews with Mrs Lutfia Wahyuni as Administrative Staff at Batam Cable Vision in managing inventory data, goods are still using bookkeeping, where technicians must record goods on ledger reports when the goods will be taken to the field. Then, the obstacles in the data processing section of the inventory of goods are not yet available, resulting in a difference between the number of goods available and outgoing goods, and the reports generated are not appropriate, because the data needed to make reports may be lost or damaged. The company has difficulty finding data because there is no stock data processing system (Shah et al., 2019). For this reason, Batam Cable Vision requires supporting facilities to improve the effectiveness of employee performance. Based on the background of the above problems, the authors conducted a study entitled the design of a web-based inventory information system at PT Batam Cable Vision.

2.   Methods

The research method used in this research is the waterfall method, often called the linear sequential model or classic life flow (Prasetya, Syahri, et al., 2023). The waterfall model provides a sequential approach to the software lifecycle from design analysis, coding, testing, and support stages.

Figure 1. Stages of the waterfall method
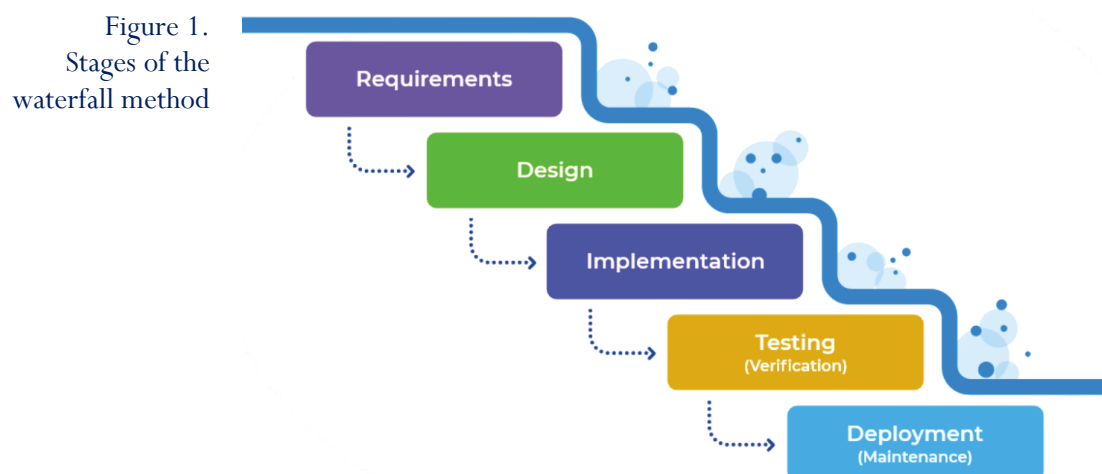
The stages of this system development according to (Amali et al., 2019), is as follows:

a.   Software requirements analysis: an intensive requirements gathering process is carried out to specify software requirements so that it can be understood what kind of software is needed by users (Sasmito et al., 2021).

b. Design: software is a multi-step process that focuses on the design of creating software programmes including data structures, software architecture, interface representations and coding procedures. This stage translates the software requirements from the requirements analysis stage into a design representation so that they can be implemented into a programme at a later stage.

c. Creation: the programme code must be translated into a software programme. The result of this stage is a computer programme in accordance with the design that was made in the design stage.

d. Testing: focuses on the software from a logical and functional point of view and ensures that all parts have been tested. This is done to minimise errors and ensure that the output is as desired. The test used to test the application development in this report is using black-box testing system testing. According to (Nidhra, 2012), Black-Box Testing yaitu menguji perangkat lunak dari segi spesifikasi fungsional tanpa menguji desain dan kode program".

e. Maintenance: it is possible for a software to experience changes when it has been delivered to the user. Changes can occur due to errors that appear and are not detected during testing or the software must adapt to a new environment. The support or maintenance stage can repeat the development process starting from the specification analysis for changes to existing software, but not for creating new software.

3.   Results and discussion

### 3.1   Analysis of the current system

Based on the analysis that the author has done, the inventory information system at PT Batam Cable Vision is currently running quite well. However, there are still many shortcomings or difficulties that can make data difficult to find and even lose. This is due to several problems including:

a. Recording and monitoring that still uses a manual system. Assisted by Microsoft Office Excel in making reports, according to the author, it is less efficient and takes a lot of time.

b. Data storage still uses a filing system resulting in a buildup of files, this can make it difficult to find data when needed.

c. Due to the large accumulation of files, the possibility of lost or damaged files is very large, making it difficult to audit at a certain time.

The system running at PT Batam Cable Vision is as follows:

a. Technicians submit requests for goods to the admin.

b. Admin receives requests for goods from technicians, then

c. Admin checks the goods in the warehouse.

d. If the item is available, the admin hands it over to the technician, then

e. The technician receives the goods and records them in the ledger report.

f. If the goods are empty, the admin makes a shopping list for goods to suppliers, then

g. Suppliers send the ordered goods to the company, along with providing a copy of the road letter.

h. Admin receives the goods and receives a copy of the road letter

i. Admin inputs data into Microsoft Excel.

Figure 2.
Current system
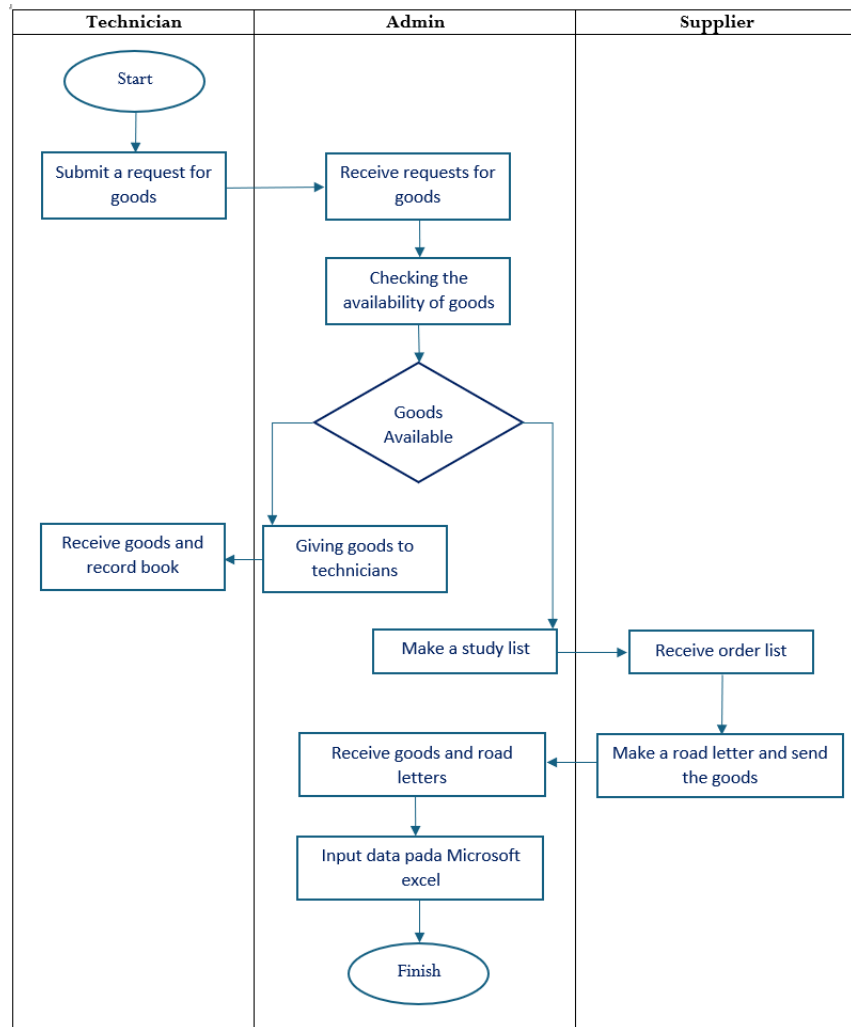
The proposed system at PT Batam Cable Vision is as follows:

a. Technicians submit requests for goods to the admin.
b. Admin receives requests for goods from technicians, then
c. Admin checks the stock of goods on the system.
d. If the item is available, the admin hands it over to the technician, then
e. Technicians receive goods from the admin.
f. If the goods are empty, the admin makes a shopping list of goods addressed to the manager, then
g. The manager approves the shopping request from the admin.
h. The admin receives the goods, then the admin updates the data on the system.
i. Admin prints reports needed for a certain period.

Figure 3.
Proposed system
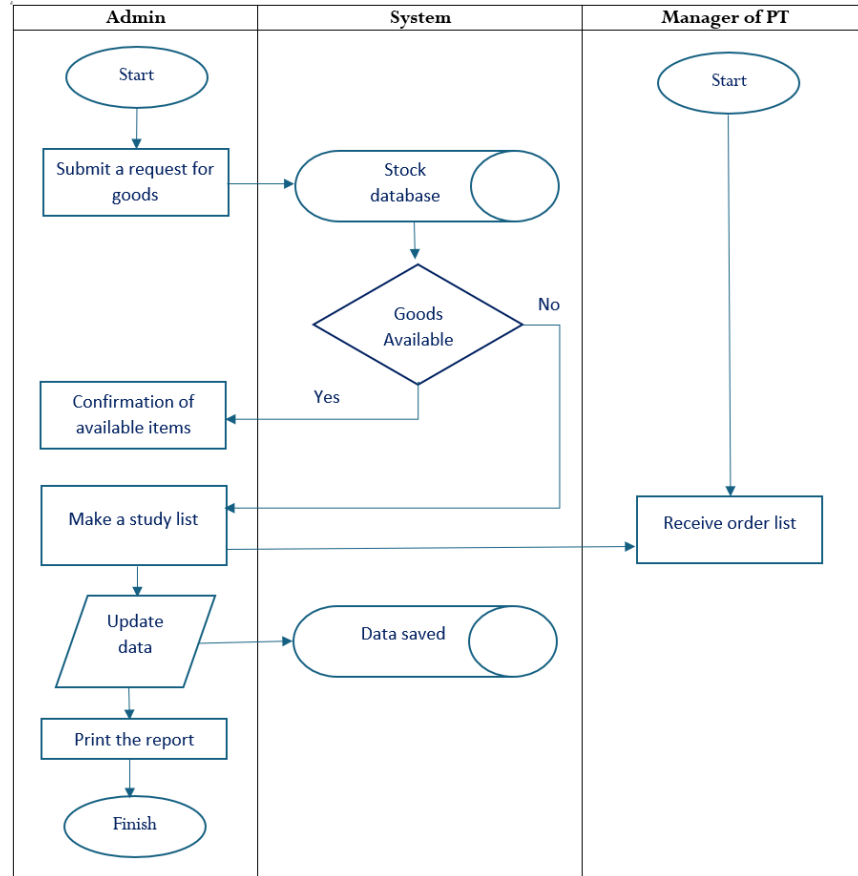
3.2   Non-functional requirements analysis

Analysis of non-functional needs of the Goods Inventory Information System Design are factors supporting the system so that the system can work optimally and optimally. This requirement contains supporting properties owned by the system, including:

a.   Hardware
b.   Software consisting of:
    1) XAMPP
    2) Notepad++
    3) Mozilla Firefox
c.   Brainware

3.3   Functional requirement analysis

Analysis of functional requirements for the design of PT Batam Cable Vision Web-based Goods Inventory Information System is as follows:

a.   Admin is the operator of the inventory system. And can do various settings as follows:
    1) Admins can add, change, and delete user data.
    2) Admins can add, change, and delete supplier data.
    3) Admins can add, change, and delete incoming goods data.
    4) Admins can add, change, and delete outgoing goods data.
    5) Admins can print reports on goods data for each period.

b. Manager is the party who approves the purchase of goods to suppliers.

c. Technicians are parties who submit requests for goods. Technicians can only see stock data.

3.4 UML modelling design

The design requirements are represented using the Unified Model Language for the design of a web-based inventory information system for PT Batam Cable Vision as follows:

3.4.1 Use case diagram

Use case diagram of PT Batam Cable Vision web-based inventory information system.

Figure 4.
Use case diagram
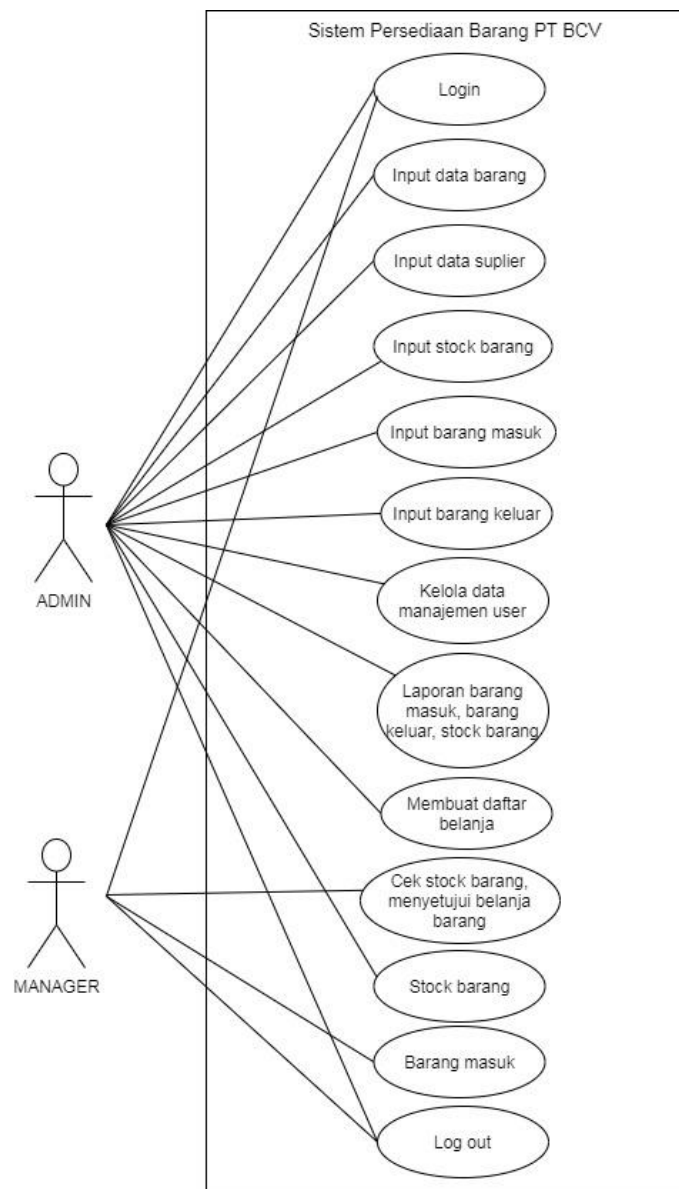
3.4.2 Activity diagram

Activity Diagram describes a series of flows of activities, used to describe activities formed in an operation so that it can also be used for other activities. There are several activity diagrams that are currently running on the PT Batam Cable Vision web-based inventory information system.

Figure 5. (a) Activity diagram, (b) Activity diagram of incoming goods, and (c) Activity diagram of outgoing goods

(a)

(b)

(c)
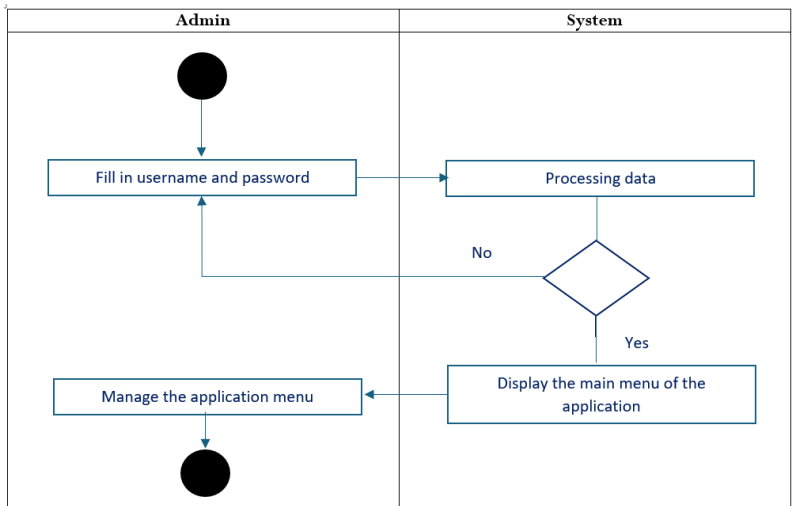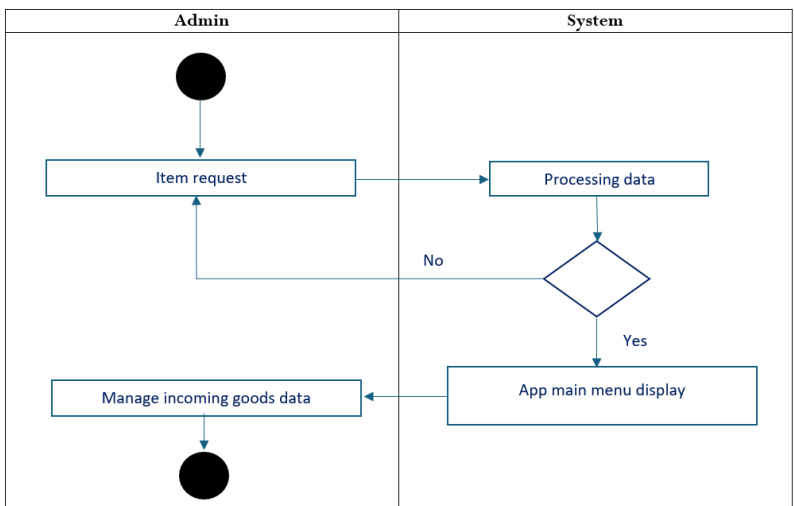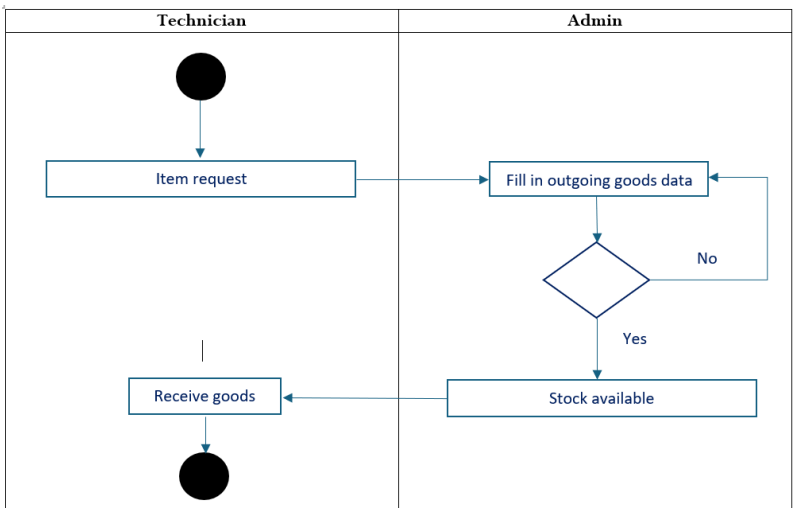
3.5   Squence diagram

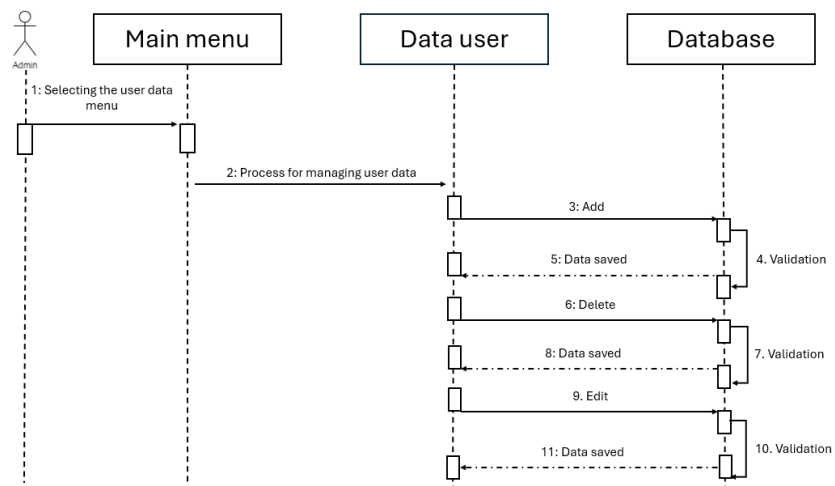Squence Diagram is a description of the sequence of events of an activity that is used to help us create statecharts.

a.   Sequence diagram login

Figure 6 (a) below is the Admin and user Login Sequence Diagram, the process starts by filling in the username and password, if the login is correct, the main menu is displayed. Figure 6 (b) is a Sequence Diagram of managing user data, if the admin will add system users.

Figure 6.
(a) Sequence diagram login and (b) Sequence diagram of manage user data
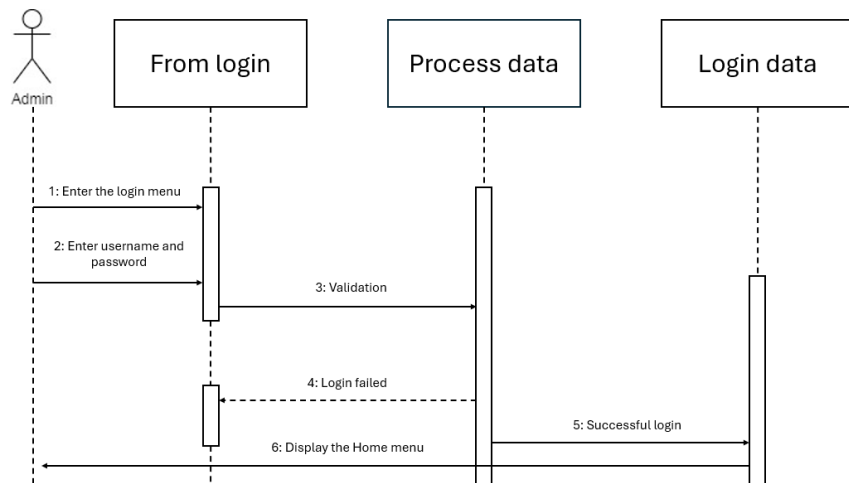
(a)

(b)

b.   Sequence Diagram of managing user data

Description of Figure 7 (a) admin has access rights, one of which is managing the supplier menu. The admin selects the supplier menu on the home menu, then the system displays the supplier data form, the admin enters the supplier data, clicks add, the system validates the data if the data is incomplete the system gives an incomplete data message, and the admin fills in the supplier form again. If the data is complete and correct the system will display the data in the supplier table then the admin clicks save.

The delete menu functions to delete data in the supplier table before the data is saved. Select data, click delete, then the system will delete the selected data. Figure 7 (b) below is the Admin and User Logout Sequence Diagram. Click the logout menu, then processed by the system, then the system displays the home menu.
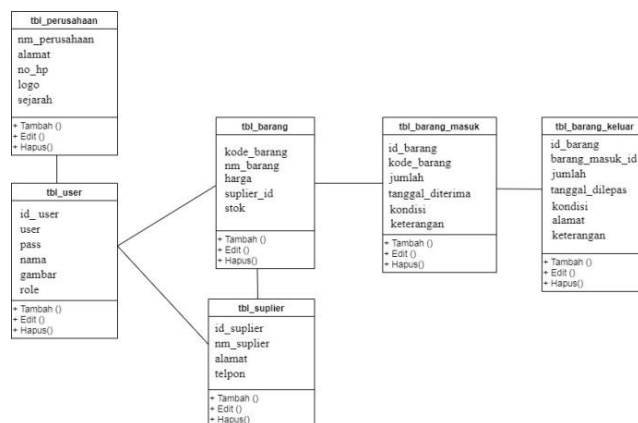
Figure 7.
(a) Sequence diagram of managing user data, (b) Admin and user logout diagram sequence, and (b) Class diagram of PT BCV's inventory information system
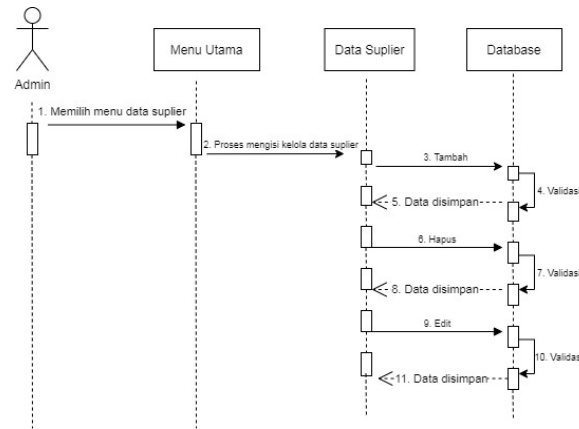

(a)
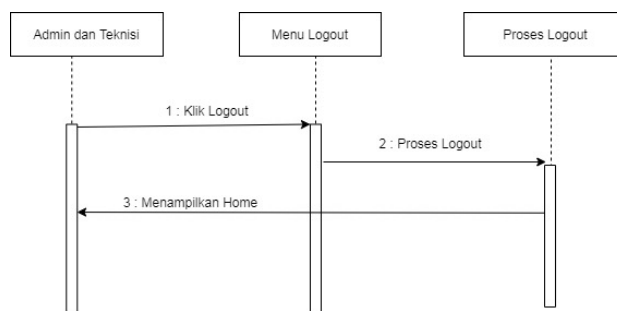
(b)

(c)

3.6 Interface design

The next stage is to design the interface that will be made as a reference in building the Goods Inventory Information System website. The initial design carried out by researchers is to design the appearance of the login page before entering the system and the following is the design:
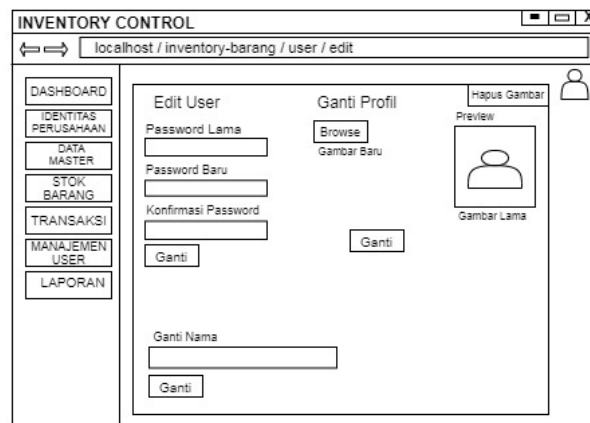
Figure 8.
(a) Admin login page design, (b) Admin main menu design, (c) Edit profile menu design, and (d) System logout menu design
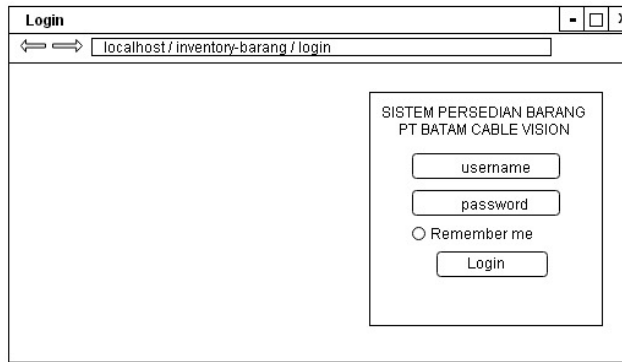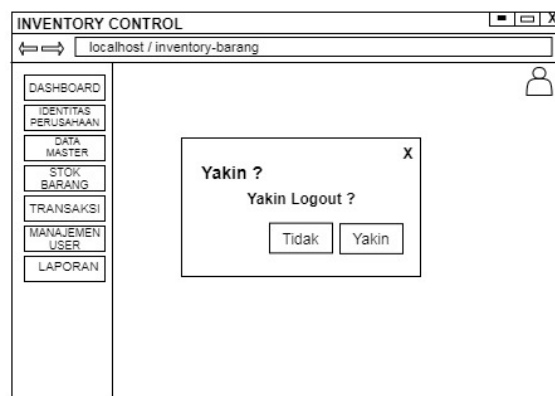

(a)
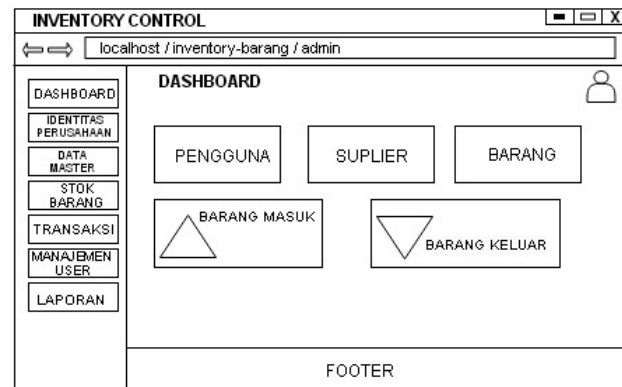
(b)

(c)

(d)

3.7 Application of Programme usage

The implementation of PT Batam Cable Vision's web-based Goods Inventory Information System programme is divided into two interfaces, the admin interface and the user interface. In Figure 9, there is a column to fill in the text in the form of username and password. Then click on the Login button to enter the system. Users entering the system are divided into three categories, namely Admin, Technician and Manager. Below is the initial page display in the form of a dashboard for the Inventory Admin user.

Figure 9.
Admin login page
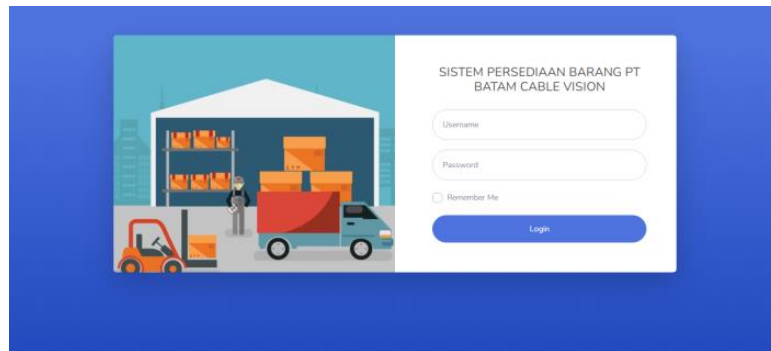
As can be seen in Figure 11, there are menus that can be accessed by the Inventory Admin, including User Data, Supplier Data, Item Data, Inbound Goods, Outbound Goods, Stock Item Data, Item Requests. Here is a view of the dashboard page for the Inventory Admin user.
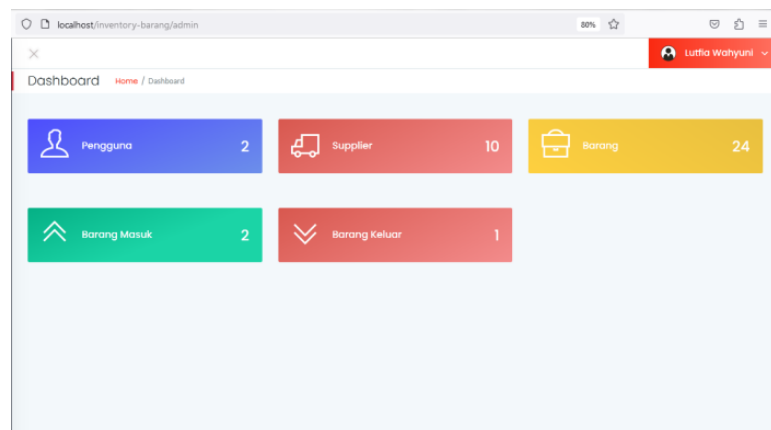
Figure 10.
System dashboard page

Figure 11 is a menu that contains information about all the items in the warehouse. On this page the admin can edit, delete, search and add items.

Figure 11.
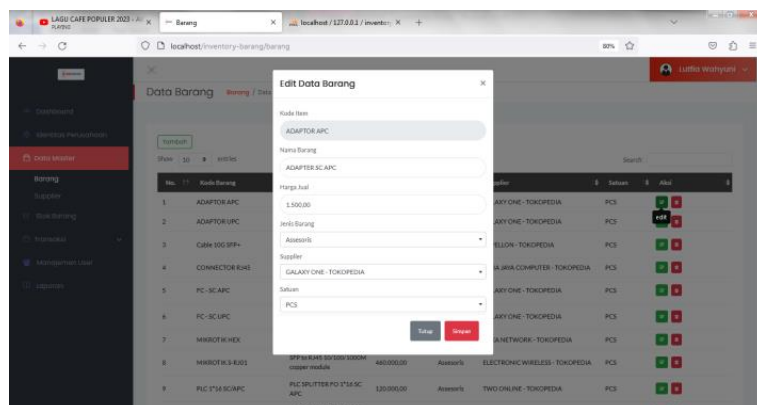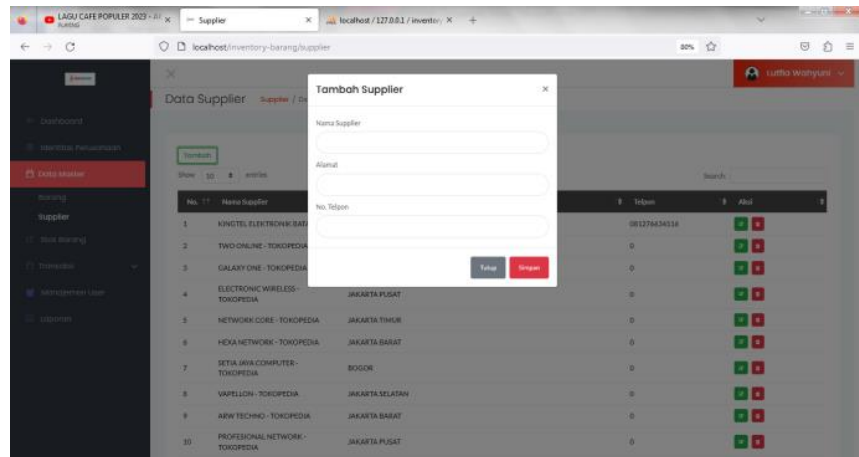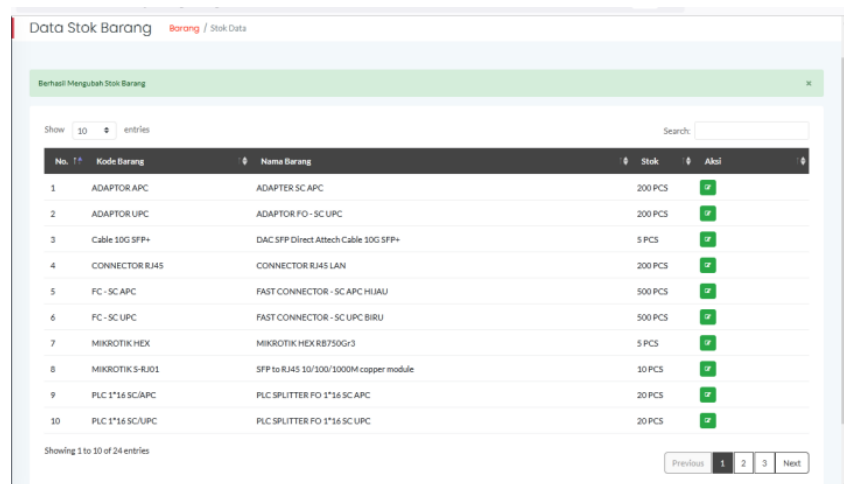Display of the add item menu

Figure 12 shows a page containing information on all supplier data. Admins can edit, delete, search and add.

Figure 12.
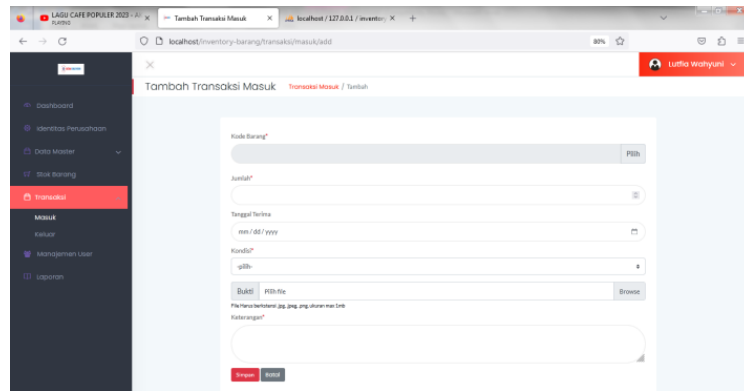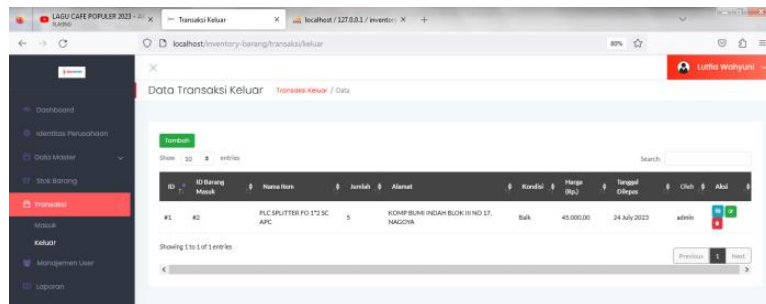(a) Supplier menu display and (b) Display of stock item menu

(a)

(b)

Figure 13 (a) shows a page containing information about all the goods entering the warehouse, which can be searched and added to by the administrator. Figure 13 (b) shows a page containing general information about goods data from the warehouse. On this page the administrator can search and add. Figure 13 (c) shows a report menu used by the administrator to check item data over a specified period. After the user selects the report period to view, the user selects the Browse or Print button to view the report. Researchers take the Incoming Goods report as an example of the display after the user selects the print option, the display is shown in Figure 13 (d).
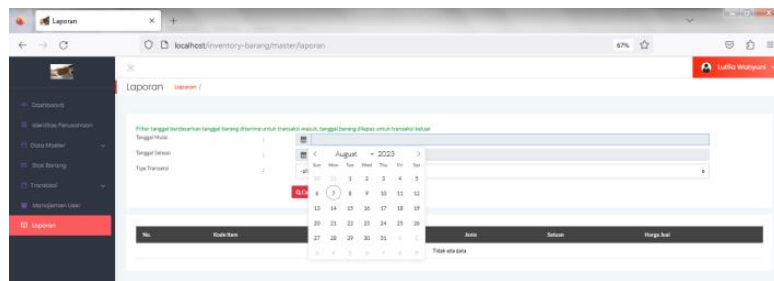
Figure 13.
(a) Display of the add item menu, display of the add incoming goods menu, (c) Display of the report menu and (d) Incoming goods report display

(a)

(b)

(c)

(d)

Figure 14 (a) shows a page containing information about all users. From this page the Admin can edit, block and add system users. Once clicked, a screen similar to the one below will appear with three submenus including Change Password, Change Photo and Change Name. The Change Password submenu is used to change the user's password, the Change Photo submenu is used to change the user's profile photo, and the Change Name submenu is used to change the user's password. In addition, when you click on the Change Photo submenu, a screen will appear as shown in Figure 14 (b). Figure 14 (c) shows a system logout confirmation screen.

Figure 13. (a) Display of the add item menu, display of the add incoming goods menu, (c) Display of the report menu and (d) Incoming goods report display
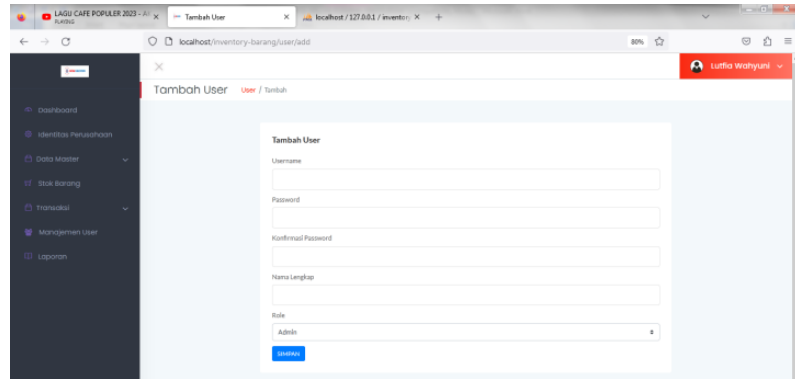
(a)
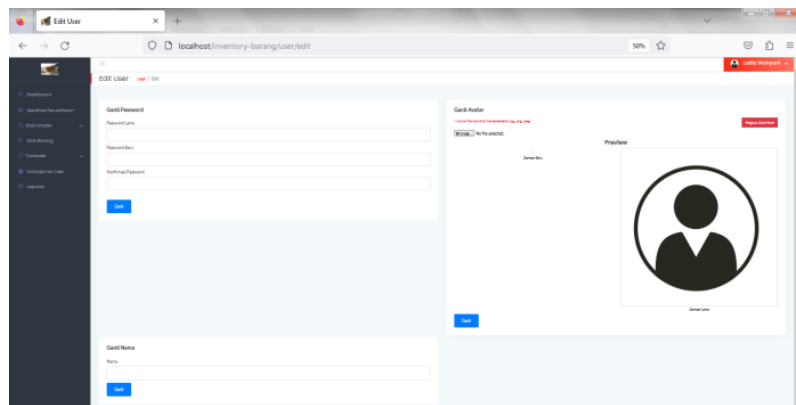
(b)

(c)

4. Conclusion

Based on the results of the research and the author's observations, the following conclusions can be

drawn:

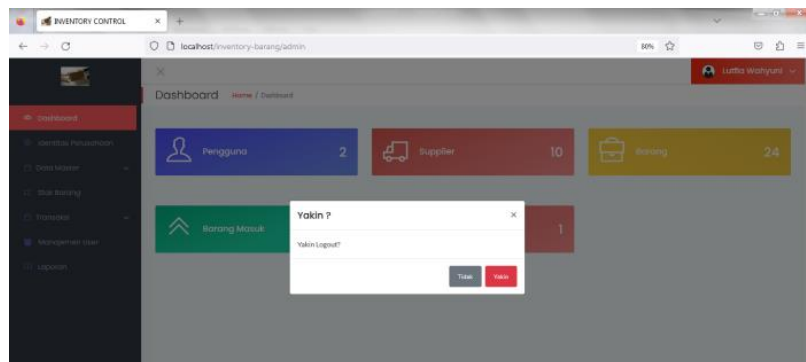a. The development of a web-based inventory information system at PT Batam Cable Vision is expected to assist the administrator in data processing to minimise errors in the recording of goods.
b. The design of the inventory information system can present the right information for the goods report according to the company's needs to minimise the use of paper.

Based on the results of the research, the authors made suggestions that can be used as input to overcome the obstacles faced by PT Batam Cable Vision, including:

a. There is a need for continuous data updates and data backups to reduce the occurrence of data loss that can harm the data and information processing process.
b. Adding new features that can make it easier for users to use this inventory information system.

Acknowledgement

Declarations

Author contribution

Willya Kusuma as research implementer, media design and data collection. Novi Hendri Adi as researcher and article concept designer. Afrina as research and article concept designer. John Rey A. Jimenez as proofreader.

Funding statement

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical clearance

There are no human subjects in this manuscript and informed consent is not applicable. The research company has agreed to carry out the research and is willing if the results of this research are published.

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