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Development of an Appsheet-based Inventory Application for Stock Management Efficiency at PT Unilever Indonesia

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ABSTRAK

PT Unilever Indonesia Tbk merupakan perusahaan multinasional dengan rantai distribusi dan penyimpanan produk yang luas, sehingga pengelolaan data persediaan menjadi aspek yang sangat krusial. Saat ini, beberapa departemen di perusahaan masih menggunakan metode pencatatan manual, yang dapat menimbulkan risiko seperti keterlambatan, kesalahan input, dan ketidakkonsistenan data. Untuk meningkatkan efisiensi dan efektivitas dalam pengelolaan persediaan, dirancang sebuah sistem informasi manajemen inventori terkomputerisasi menggunakan platform *Google AppSheet*. Aplikasi ini dikembangkan untuk mempermudah proses pencatatan, pelacakan, dan pengelolaan data barang masuk serta keluar secara digital dan *real-time*. Metode pengembangan yang digunakan adalah metode deskriptif. Implementasi aplikasi mencakup halaman utama hingga formulir input data barang. Pengujian sistem dilakukan dengan metode *blackbox testing* dan menunjukkan bahwa aplikasi berfungsi sesuai dengan yang diharapkan. Pemeliharaan sistem juga dilakukan untuk memastikan kinerjanya tetap optimal. Hasil pengembangan ini menunjukkan bahwa aplikasi inventori berbasis *AppSheet* mampu meningkatkan efisiensi dan ketepatan dalam pengelolaan persediaan di PT Unilever Indonesia Tbk.

Kata Kunci: AppSheet; Inventori; PT Unilever Indonesia Tbk; Sistem Informasi

ABSTRACT

[PT Unilever Indonesia Tbk is a multinational company with a large distribution and storage chain for its products, making inventory data management extremely crucial. Currently, some departments within the company still use manual recording methods, which can lead to risks such as delays, input errors, and data inconsistencies. To improve efficiency and effectiveness in inventory management, a computerized inventory management information system was designed using the Google AppSheet platform. This application was developed to facilitate the recording, tracking, and management of incoming and outgoing goods data digitally and in real-time. The method used in system development was the descriptive method. The application implementation covers the main page to the goods data input form. System testing was conducted using the blackbox testing method and showed that the application functions as intended. Maintenance was performed to ensure the system continues to operate optimally. The results of this development demonstrate that the AppSheet-based inventory application can improve efficiency and accuracy in inventory management at PT Unilever Indonesia Tbk.

Keywords*: AppSheet; Inventory; PT Unilever Indonesia Tbk; Information System*

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INTRODUCTION

Inventory management is a crucial aspect of PT Unilever Indonesia Tbk's operations. Inventory control is carried out to ensure the smooth running of production and distribution processes, as well as to anticipate various risks related to the availability of necessary goods. Inventory management itself refers to the process of managing goods, including raw materials, materials, and finished products, which are used or stored to support the company's business processes. Inventory includes all items owned by the company at a given time, whether for sale or used to support production activities. Depending on the type of business, even digital systems that are not physically visible can also be categorized as part of the inventory system.

Inventory management at PT Unilever Indonesia Tbk relies heavily on an integrated recording and tracking system to support accurate goods movement. For this reason, the use of information and communication technology (ICT) is a crucial element. The company has adopted digital solutions based on information systems to enhance operational efficiency and data accuracy. Information management systems not only rely on hardware and software but also on skilled human resources capable of processing data into actionable information for decision-making.

To support supply chain operations, PT Unilever Indonesia Tbk has implemented various integrated systems, such as SAP APO (Advanced Planning and Optimization) for production and distribution planning, and the Scylla platform for inventory management through collaboration with distributors. Additionally, the company uses Oracle Fusion Cloud Supply Planning and a cloud-based eB2B platform to strengthen the supply chain and service visibility.

Although PT Unilever Indonesia Tbk has implemented a world-class ERP system, the concept of using low-code platforms such as Google AppSheet remains relevant as inspiration or an alternative solution for small units or specific business lines that require flexibility and cost efficiency. AppSheet enables the creation of mobile and web applications without complicated coding, simply by integrating data from Google Sheets or other cloud storage platforms. Such applications can be utilized for inventory tracking, recording incoming and outgoing goods, and real-time data visualization.

When applied in the context of PT Unilever Indonesia Tbk, solutions like AppSheet can be useful for field teams, testing laboratories, or specific divisions that are not directly connected to the main ERP system. These applications can assist in collecting data on production support materials such as chemicals, packaging, or light logistics that require quick and accurate recording. As a result, AppSheet serves as a digitalization complement that promotes transparency, efficiency, and easy access to information for all employees.

Based on this approach, developing a system using AppSheet or a similar platform can serve as a model for implementing efficient and cost-effective inventory management. Especially in large companies like Unilever with diverse operational lines, this approach supports a more decentralized yet data-connected system.

LITERATURE REVIEW

Inventory management is an important aspect of company operations to maintain

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the availability of raw materials and finished products. Management information systems help convert data into information that supports decision-making and improves inventory management efficiency.

PT Unilever Indonesia Tbk uses Enterprise Resource Planning (ERP) systems such as SAP and Oracle Cloud to integrate inventory processes in real-time, which helps accelerate decision-making and reduce operational costs (SAP News, 2022). Additionally, the Vendor Managed Inventory (VMI) system strengthens coordination with suppliers and distributors.

Digital approaches based on no-code platforms like AppSheet are also widely used to simplify inventory tracking without requiring programming skills, especially on a smaller scale. Overall, the implementation of technology in inventory management plays a crucial role in enhancing efficiency and competitiveness in the digital age.

METHODS

This study uses a descriptive method with system development with the Waterfall approach in the Software Development Life Cycle (SDLC). This approach was chosen because of its systematic and sequential steps, which facilitate the design of an inventory management system that meets the needs of PT Unilever Indonesia Tbk.

1. Research Design

This research aims to design an application-based inventory management system that can optimize stock management and reduce recording errors within the company.

2. Development Method

The system development method in this study uses the Waterfall approach within the Software Development Life Cycle (SDLC) framework. SDLC is a conceptual model that explains the stages of information system development, from planning to maintenance. The Waterfall approach was chosen because it provides a systematic and structured workflow, which is highly suitable for implementing inventory management system development at PT Unilever Indonesia Tbk, given the company's high operational complexity.

Waterfall is known as a classic model in software engineering that describes the system development process in a gradual and sequential manner, resembling a waterfall. Each phase in this model must be completed thoroughly before proceeding to the next stage, thereby minimizing the risk of errors in the development process.

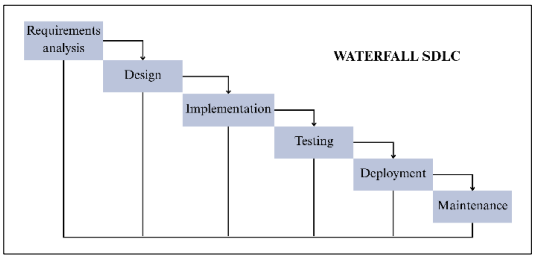

Figure 1. System Development Flow with the Waterfall SDLC Approach

a. Needs Analysis
This stage uses secondary data obtained from internal company documents, inventory reports, and literature studies related to inventory management systems and relevant application technologies. The data is analyzed to understand the system requirements and problems encountered in inventory management.

b. System Design
Based on the results of the needs analysis, a system design is developed

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that includes data structure, process flow, and user interface to accommodate the identified needs.

c. Implementation (Coding)
The system is developed using a no-code platform such as AppSheet to simplify the application development process and enable quick customization according to user needs.

d. Testing
The system is functionally tested to ensure that all features work properly and inventory data is recorded accurately and easily accessible.

e. Implementation
The implementation phase is carried out after the system design is complete. The inventory management system was developed using AppSheet connected to Google Sheets as the database. This system enables digital and real-time recording and monitoring of inventory, thereby supporting work efficiency and data accuracy at PT Unilever Indonesia Tbk. A small-scale trial was conducted to ensure the system operates in accordance with operational needs before being fully implemented.

f. Maintenance
After the application is implemented, monitoring and improvements are made if issues arise during use to ensure the system continues to operate optimally and can adapt to future user needs.

RESULT AND DISCUSSION

System Analysis

1. Problem Identification
At PT Unilever Indonesia, there is still no system for recording goods or items based on Appsheet. This causes several problems, such as complicating and slowing down the data processing and summary of findings, which reduces the effectiveness and efficiency of work.
2. System Scope
This system is designed to assist in recording and monitoring inventory in a single work unit. Its main features include inputting incoming and outgoing goods, automatically displaying inventory levels, generating daily and monthly inventory reports, and accessing the system via laptop or mobile phone through the Appsheet application.
3. System Benefits
Accelerates the inventory recording process, reduces data entry errors, keeps inventory information up-to-date, facilitates decision-making, and ensures data is organized and easy to monitor.
4. System Requirements
This system allows users to add, edit, and delete inventory data, automatically calculate inventory levels, issue alerts when inventory is low, and generate inventory reports. The system can be accessed online via AppSheet, features a simple and user-friendly interface, and includes access restrictions based on user accounts.
5. System Capabilities
This system can display real-time inventory, generate automatic inventory reports, manage user access rights, and be accessed via mobile phones and laptops.

Application Design

- Use Case Diagram
Use Case Diagrams are used to illustrate how a system interacts with its users. These diagrams help show the relationship between users and the system, as well as explain the actions that users can perform through the

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system. The purpose of use case diagrams is to make it easier for users to understand the workflow of the system being developed. In this report, use case diagrams are used to show how the management information system being used works.

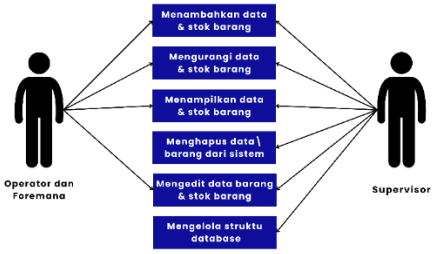

Figure 2. Use Case Diagram

Figure 2 shows the Use Case Diagram for accessing the inventory information system at PT Unilever Indonesia Tbk, which involves two main actors, namely the operator or foreman and the Quality Control division supervisor. Operators or foremen can log into the system using a username and password and have access through Appsheet to add, reduce, view, and edit data and stock items if there are changes. However, they do not have permission to delete data or stock items directly, nor access the main database. Full authority for data deletion and database management is only held by the Quality Control supervisor.

- Activity Diagram
  An Activity Diagram shows how workflows proceed within a system, including actions that users can perform such as adding, editing, and deleting orders. This diagram illustrates the sequence of activities from start to finish, including possible outcomes. In addition, Activity Diagrams can also show processes that run simultaneously when the system is running.

a. Price list activity diagram

This Activity Diagram explains the user's workflow in managing the item list through the Appsheet application in the inventory system. The process begins when the user opens Appsheet, selects the "Inventory" submenu, and then the "Item List" submenu. The system then displays the inventory page containing the item name, initial stock, and final stock.

After viewing the item list, the user has three options: delete the item, edit the item, or add a new item.

- If the user selects delete item, the process stops because it is not continued in the diagram.
- If the user selects edit or add item, the user presses the edit button or the add (+) button, which then causes the system to display the data form.

Next, the user will fill in or update the item data on the provided form. After the data is entered, the user can choose to save the data by clicking the save button or cancel the changes with the cancel button. If the user selects save, the system will process the data and complete the activity.

b. Goods Receipt Activity Diagram

The Goods Receipt Activity Diagram illustrates the flow of activities performed by users when entering data on goods received into the inventory system via Appsheet. The process begins when users open the Appsheet application, select the "Inventory" submenu, and then select the "Goods Receipt" submenu. After that, the inventory system will display

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a page containing information such as date, time, total payment, barcode, item name, quantity received, unit, and description.

After viewing the list of incoming items, the user can choose three actions: delete item, edit item, or add new item.

- If the user wants to delete an item, the process will stop because it is not continued in the diagram.
- If the user wants to edit or add item data, they will press the edit or add button (+). The system will then retrieve and display the data entry form.

Next, the user will perform the incoming item data input process, then choose to save the data by pressing the save button or cancel it with the cancel button. If the save button is selected, the system will process and save the data to the database.

c. Goods Out Activity Diagram

The Goods Out Activity Diagram illustrates the steps users take to record data on goods that are taken out of the inventory system in Appsheet. The process begins when the user opens the Appsheet application, selects the "Inventory" submenu, and then enters the "Goods Out" submenu.

After the submenu is selected, the inventory system will display a page containing goods out data, such as date, time, barcode, item name, quantity out, unit, and description.

At this stage, the user is given several options:

- If they want to delete an item, the process stops.
- If they want to edit an item, the user selects the edit button.
- If they want to add a new item, the user presses the plus (+) button.

After selecting edit or add, the system will retrieve and display the data form to be filled in or modified. The user then inputs the item data and decides whether to save or cancel.

If the save button is pressed, the system will process and save the outgoing item data to the database. If cancel is selected, the input is canceled, and the system returns to the previous view.

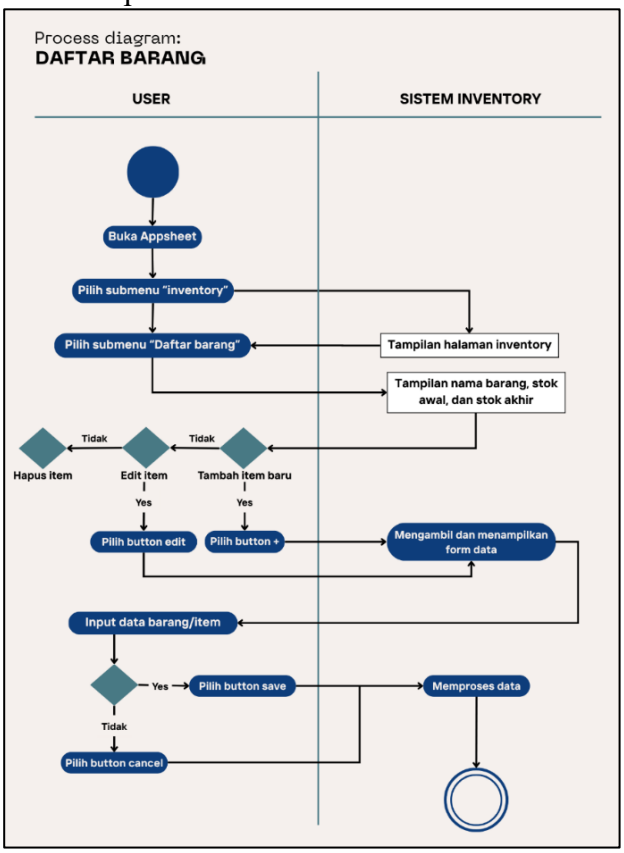

Figure 3. Activity diagram of price list

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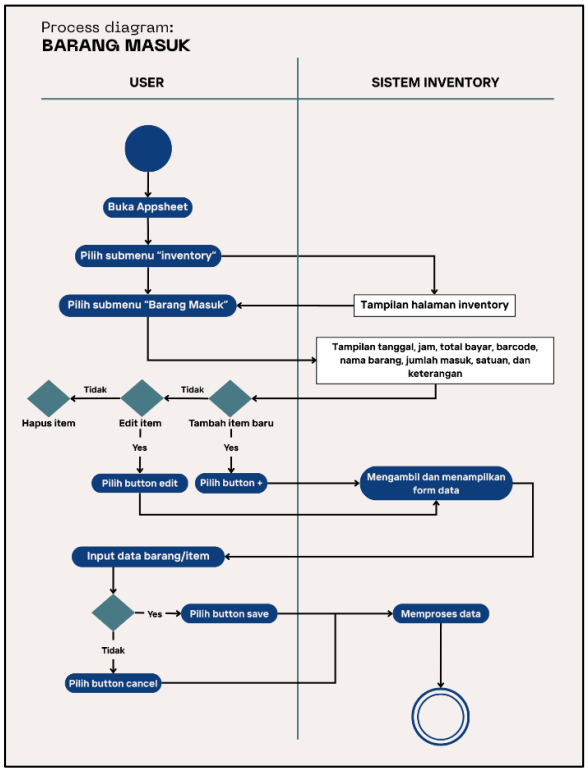

Figure 4. Activity diagram for incoming goods

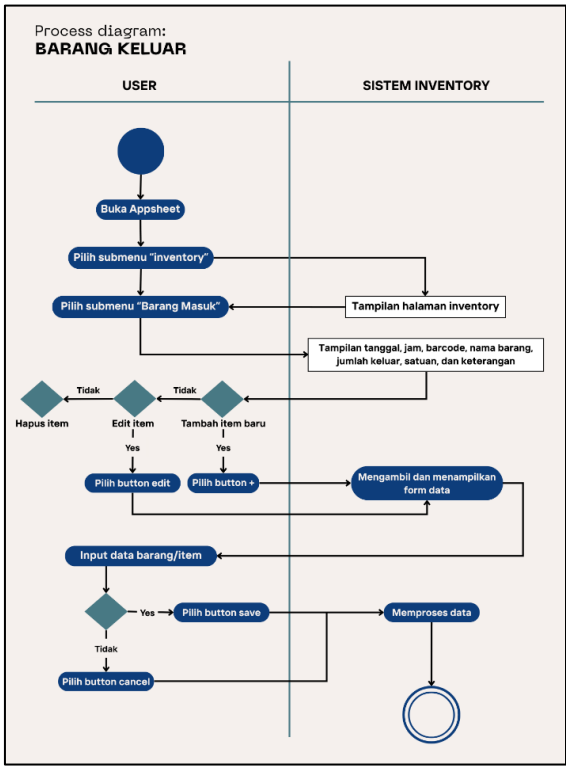

Figure 5. Activity diagram for outgoing goods

System Implementation

System implementation is the stage of applying the previously developed design to the Appsheet application. The purpose of this implementation is to evaluate the extent to which the system in Appsheet can run according to the planned functions and requirements.

1. Appsheet Main Page of PT Unilever Indonesia

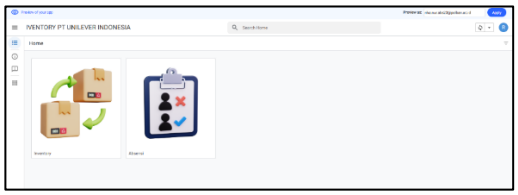

Figure 6. Appsheet Main Page of PT Unilever Indonesia

Figure 6 shows the Appsheet main page displaying the Inventory and Attendance submenus. This page contains several system support features such as a search field, refresh page, add button, and sort menu.

2. Submenu Inventory Page

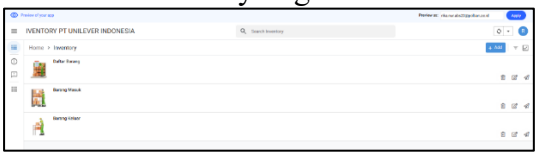

Figure 7. Appsheet Main Page of PT Unilever Indonesia

Figure 7 shows the Inventory Submenu page, which displays a list of items, incoming items, and outgoing items. This page has several supporting features, such as a search field, refresh page, add button, and sort menu.

3. Item List Form and Data Page

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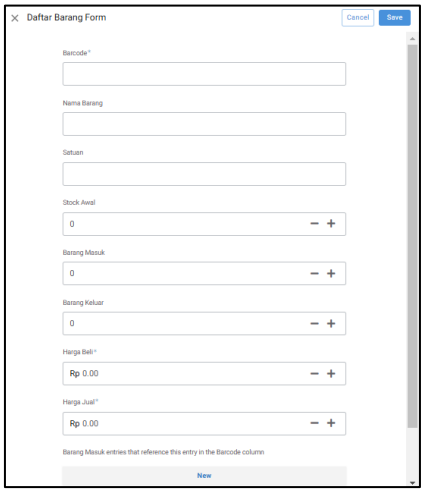



Figure 8. Form page and Item List data

Figure 8 shows the input form for adding items to the inventory system, complete with barcode, item name, unit, initial and final stock, incoming and outgoing items, and purchase and sale prices. It also displays the item list data page, which contains the item name, initial stock, and final stock, which can be edited or deleted. This page also includes search, add, sort, refresh, and checklist features.

4. Form page and incoming goods data

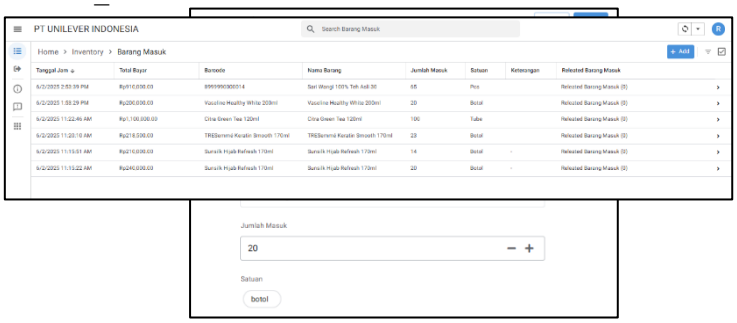

Figure 9. Form page and incoming goods data

Figure 9 shows the input form for adding incoming goods to the inventory system, complete with date and time, barcode, item name, quantity received, and unit. It also displays the incoming goods data page, which contains the date and time, barcode, item name, quantity received, unit, and notes that can be edited or deleted. This page also includes search, add, sort, refresh, and checklist features.

5. Form and data page for outgoing goods

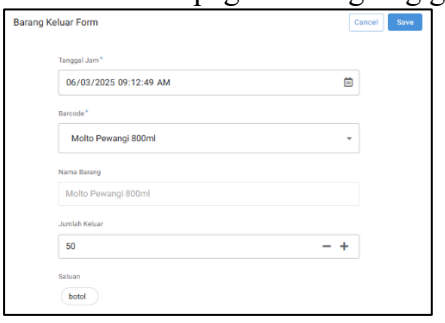



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Figure 10. Goods Out form and data page

Figure 10 shows the input form for adding goods out to the inventory system, complete with date and time, barcode, item name, quantity out, and unit. It also displays the goods receipt data page, which contains the date and time, barcode, item name, quantity received, unit, and notes that can be edited or deleted. This page also includes search functionality, add, sort, refresh, and checklist buttons

6. Spreadsheet page for the database

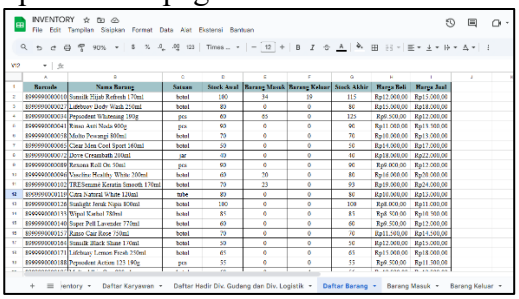

Figure 11. Spreadsheet page for the database

Figure 11 shows a spreadsheet that is directly connected to Appsheet, so that all activities such as adding, removing, or changing data can be monitored. Access to this spreadsheet can only be done by users who have permission via a Google Drive link.

7. The display cannot log in to the application.

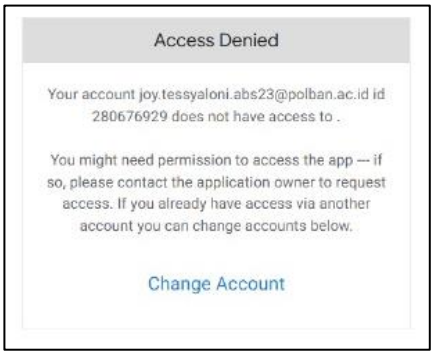

Figure 12. Unable to log in to the application

Figure 12 shows a notification indicating that if you do not use the email provided, you will not be able to log in to Google Appsheet because you do not have permission from the admin.

Testing and Verification

The final stage in this process is testing the inventory application to ensure there are no bugs before it is used by users. This testing aims to assess whether the application features function as expected. The method used is blackbox testing with a Use Case approach, which involves running the application from start to finish without viewing the program code. The goal is to ensure all application functions work properly. The testing results are displayed in Table 1.

No	Tes Case	**Status**
1.	The system can display the Appsheet main page.	Successful
2.	The system can display the Inventory page.	Successful
3.	The system can display the form and data list of items on the Item List page.	Successful

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4.	The system can perform edit, add, and delete actions.	Successful
5.	The system can display the Incoming Items page.	Successful
6.	The system can display the form and data of incoming items on the Incoming Items page.	Successful
7.	The system can perform edit, add, and delete actions on incoming item data.	Successful
8.	The system can display the Outgoing Items page.	Successful
9.	The system can display the form and data for outgoing items on the Outgoing Items page.	Successful
10.	The system can perform edit, add, and delete actions on outgoing item data.	Successful
11.	The system can integrate and display reports for each incoming and outgoing item.	Successful

Table 1. Test Results

A total of 11 systems were tested, including inventory management, incoming goods, and outgoing goods, and all ran smoothly without errors. The testing was conducted directly by supervisors and foremen. Following that, verification was performed to ensure the systems aligned with the initial requirements and design. Once confirmed, Appsheet was implemented in the relevant division by sharing access via email and enabling features to allow the application to be installed on operators' and foremen's devices.

Maintenance

Software maintenance is the final stage aimed at improving, preventing issues, and developing the system to ensure it remains optimal. During this stage, developers regularly perform updates. If any bugs or discrepancies are still found, they will be addressed here. However, if the system is already functioning well and meets the requirements, no further improvements are necessary.

CONCLUSIONS

The development of an AppSheet-based inventory application at PT Unilever Indonesia Tbk has been successfully implemented as an effective digital solution to assist in real-time recording and monitoring of stock. This application is designed with a simple yet functional interface, including features for inputting incoming and outgoing goods, daily to monthly stock reports, and user access rights settings. With integration into Google Sheets, the system is able to provide more accurate data that is easily accessible and can be monitored online via laptops or smartphones.

The implementation results show that the application is able to address manual recording issues, streamline administrative processes, and reduce the risk of input errors. System testing using the blackbox method indicates that all features function properly and meet user needs.

Although the Waterfall method provides a structured workflow, future development is recommended to adopt a more flexible approach like Agile to adapt to potentially

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changing user needs. Additionally, using the paid version of AppSheet could be considered to access additional features and enhance the system's overall capabilities.

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