

Android-Based Application Design for Goods Inventory System Using the Barcode Scan Method

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ABSTRACT

Stock information system is one of the important systems in a company. This system serves to manage and control the stock of goods in the company. One technology that can improve the efficiency and effectiveness of stock information systems is barcodes. Barcodes are two-dimensional matrix codes that can store large amounts of information. This research aims to design and build a stock information system using Android-based barcodes. The system is built using PHP and MySQL programming languages. The results of the study show that the stock information system using Android-based barcodes can increase the efficiency and effectiveness of stock management. Barcodes can be scanned using a tool that emits infrared light and is reflected by black and white lines on the barcode. This information is then decoded by sensors in the scanner and converted into numeric and letter codes. The data obtained will be submitted to a computer device or other system for further processing, such as recording transactions. This system can be used to reduce time and costs in managing stock.

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1. INTRODUCTION

Inventory is a number of tools, materials, and goods that are available and can be used at any time. Performing inventory management can maintain business stability by considering the total inflow and outflow of goods[1]. In the modern era, stock of goods is one of the important elements in the smooth operation of a company. Often times some companies face problems in matching stock data with bookkeeping data and this activity is called stock-taking activities[2]. Inventory management is necessary for any business that wants to maintain storage services for fast turnaround to ensure customer satisfaction.

The purpose of holding stock-taking is to determine the correctness of the records in the books, which is one of the functions of the internal control system (SPI)[3]. This includes ensuring the smooth running of storage activities, ensuring the availability of goods needed, and providing security and easy access to information[4].

For example, PT Everbright when a distributor wants to find a certain amount of goods that must be desired or in the warehouse by employees which of course is very inefficient and disappointing if in the end

the stock of goods is not available or empty, resulting in customers not buying the desired goods and resulting in losses to the Company[5].

In addition, when matching data on incoming goods and outgoing goods with bookkeeping data does not match, it will result in losses to the company and the company cannot determine the steps to be taken in the future because the nominal turnover is uncertain[6].

Therefore, this problem can be overcome by realizing an application model for an inventory system using an android-based barcode scanner[7]. This application can be a very helpful tool in shopping places to make it easier to find stock items[8].

The application of an inventory system using an android-based barcode scanner is an application that runs on android on the user's device. With this application, users are allowed to track or process data from the inventory of registered goods only by utilizing a scanner as a barcode scanner tool[9]. This application works by checking the item ID number obtained from barcode input to the PT Everbright server. The results of this scan are then displayed in the form of specifications of the item being searched[10].

Barcode is a collection of several codes with black and white bar lines where the barcode contains data which is usually in the form of numeric and letter data, and if the barcode is scanned by a tool as a reader link called a scanner[11]. Before buying a scan tool, of course, we must have a computer first so that we can see what information is scanned in the barcode[12]. To minimize the funds spent and not have to buy a PC and scanner, a barcode scanner application was designed and can view all information on incoming stock items, outgoing stock items, on hand stock items and stock items in the warehouse using only a smartphone[13]. Barcode reading through a smartphone is done using an application that has been designed to have a barcode scan feature. The information results after scanning the new barcode will appear and be inputted into the database.[14].

Android-based production management system using Barcode concludes that data collection through an android-based application that is integrated with a web application [15]. Easy and fast data collection through android devices with the help of Barcode Scanner. Only with an android device connected to 1 network with the server, data collection of incoming goods and outgoing goods is easy and fast to do.

2. METHOD

We designed this web-based application in the Android operating system with the Android Studio application. It has a design that is tailored to the needs of inventory data collection so that it has the flexibility to customize the database or interface menu. The barcode system is also used to facilitate the data input process because many practical equipment and equipment are small.

In the design of making this android-based application we use the Waterfall method. The stages of the research method can be seen in the figure below [16]. This methodology uses a systematic and sequential approach, where each stage must be completed before moving on to the next.

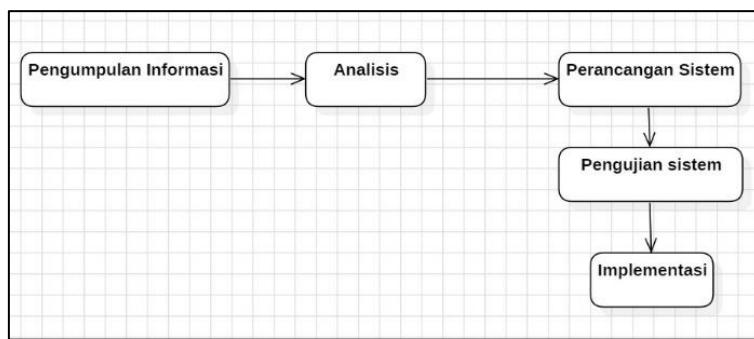


Figure 1. Research Methods

1. Information gathering

At this stage, we apply the method of direct observation and interviews with managers and employees of PT Everbright to collect information about how the stock-taking of outgoing goods, incoming goods and goods in the warehouse works. In addition, we also identify problems with PT. Everbright to find out the problems that occur precisely, so that we can provide the most optimal solution that can be used as problem solving for the problems being faced[17].

VENDOR_CODE	ITEM_CODE	ITEM_DESC	STOCK_QUANTITY	INBOUND	OUTBOUND
4674	10010002001	ABC TEH KEMBANG SLIM T/P 250 ML	0	0	0
4674	10013019001	CAPUCINI COFFEE CREAM SLIM T/P 200	15	5	0
4674	10013020001	CAPUCINI CHOCOLATE SLIM T/P 200 ML	13	4	0
4674	10013021001	CAPUCINI EXPRESSO SLIM T/P 200 ML	7	3	0
4674	10040021001	ABC JUICE ORANGE T/P 250 ML	211	84	50
4674	10040022001	MR.JUSSIE ORANGE SLIM T/P 200 ML	2	0	0
4674	10040080001	MR. JUSSIE ORANGE TWA 90ML	97	92	25
4674	10040149001	ABC JUICE ORANGE T/P 1000ML	10	78	4
4674	10040154001	ABC GOLD ORANGE JUICE 1LTR	3	18	51
4674	10041018001	ABC JUICE APPLE T/P 250 ML	71	13	97
4674	10041029001	MR.JUSSIE APPLE SLIM T/P 200ML	6	62	74
4674	10041070001	ABC JUICE APPLE T/P 1000ML	21	7	41
4674	10043016001	MR.JUSSIE LYCHEE SLIM T-P 200ML	61	32	33
4674	10043019001	ABC JUICE GUAVA T/P 250 ML	113	14	2
4674	10043020001	ABC JUICE SIRSAK T/P 250 ML	131	96	89
4674	10043023001	ABC SARI ASAM T/P 250 ML	9	68	92
4674	10043034001	ABC JUICE LYCHEE T/P 250 ML	148	21	92
4674	10043038001	ABC KC.HIJAU SLIM T/P 250 ML	254	32	40
4674	10043087001	MR. JUSSIE RED GUAVA TWA 90ML	91	48	96
4674	10043143001	ABC JUICE GUAVA T/P 1000ML	57	6	85
4674	10043144001	ABC SARI KACANG HIJAU 1000ML	48	2	86
4674	10044083001	ABC GOLD MIX JUICE 1LTR	0	72	32
4674	10046000001	ABC JUICE MANGO T/P 250 ML	58	99	25
4674	10048016001	ABC JUICE MANGGA 3+1 250ML	0	57	92
4674	10047004001	MR JUSSIE GRAPE SLIM T/P 200 ML	0	58	28
4674	10049000001	ABC JUICE JAMBU 3+1 250ML	0	71	83
4674	10049002001	ABC GOLD GUAVA JUICE 1LTR	26	24	85

Figure 2. Data Stock

2. Analyst

From the problems obtained in preliminary research, after analyzing the problem, we got an alternative solution to solve the problem, namely using software as a tool to make it easier for everyone to determine the stock of outgoing goods, incoming goods, and goods in the warehouse at PT Everbright. Data - data on stock outgoing goods, incoming goods and goods in the warehouse will later be recorded in a software. The process of inputting stock data into the application using the barcode scanner method [18].

3. Implementation System

System design is a complete design picture, as a guide for programmers in creating application programs. The design used is a use case diagram and class diagram.

a) Use Case Diagram

Use case diagrams are designed to understand the relationships and activities between users and the system. Use cases are constructions to describe how the system will look in the eyes of the user, while use case diagrams facilitate communication between analysts and users as well as between analysts and clients. The use case in Figure 3 is intended to explain the interaction of the user with the system, starting from the process of inputting goods until completion[19].

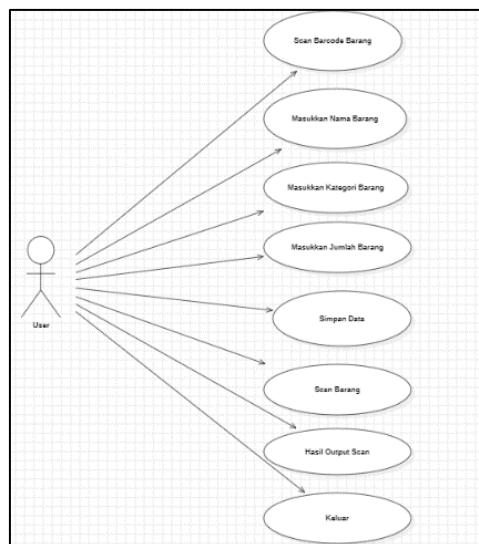


Figure 3. Use Case Diagram

Explanation:

- a. Case Scan Barcode Goods, in this case the user is required to scan the barcode on the goods in the Input Goods menu.
- b. Case Input Item Menu, in this case the user can enter item data to be displayed in the item scan input menu.
- c. Case Enter Item Name, in this case the user is required to enter the name of the item to be input.
- d. Case Enter Item Category, in this case the user is required to enter the category of the inputted item.
- e. Case Enter Number of Items, in this case the user can enter the number of items available for input.
- f. Case Save Data, in this case the user can choose to submit item data and save it in the database.
- g. Case Scan Item Menu, in this case the user can scan the item that you want to see the data.
- h. Case Scan Output Results, in this case the user can see the desired scan results.
- i. Exit Case, in this case the user can use it to leave the application.

b) Class Diagram

To find out the relationship between these database classes, a Class Diagram is made. In Figure 4 will be shown the relationship between database classes that are connected to each other[20].

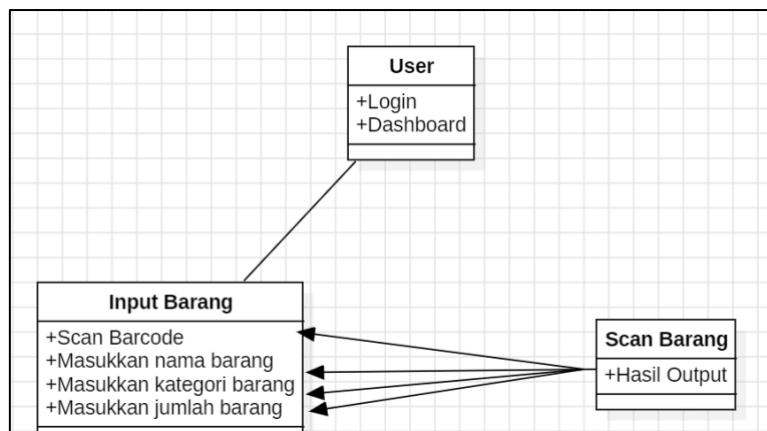


Figure 4. Class Diagram

4. System Testing

In this stage, we analyze the requirements of the system, design the security and design the user interface. Functional testing of the system tests the system's ability to accurately detect and process barcode data, while performance testing evaluates the system's response and performance to barcode scanning under various load conditions. Security aspects are tested to ensure the protection of sensitive data, while compatibility testing ensures the application can run on various platforms and devices. Usability testing identified an intuitive and responsive user interface, while disaster recovery testing and user testing validated the system's ability to deal with emergency situations and meet end-user needs[21].

In this stage of the blackbox testing method, the application will be instructed with various input conditions, then the output produced by the system is compared with the expected output. The following is a table of system testing tables [22].

Table 1. System testing tables

No.	Input Condition	Generated Output	Expected results	Conclusion
1	Login with a valid username and password	Login success	Login success	Valid
2	Login with valid username and invalid password	Login failed, "Password incorrect" error message	Login failed, Password is incorrect	Valid
3	Check the stock of available items	Display a list of stock items	List of available stock items	Valid
4	Item search	Display item search results	Corresponding item search results	Valid
5	Update stock items by scanning barcodes	Update stock	Updated stock items according to barcode scans	Valid
6	Adding new items	New item added success	New item added success	Valid
7	Edit item information	Item information successfully changed	Item information successfully changed	Valid
8	Search for items not found	Display an "Item not found" message	"Item not found" message	Valid

From the results of system testing with the black box method above, it can be concluded that the application has successfully passed all the test conditions given. This shows that the application has met the desired functional specifications and works well according to user needs. Furthermore, to ensure further quality, further tests such as security tests and performance tests can be carried out.

5. Implementation

At this stage, android development is carried out in terms of application programming, application testing, application and application debugging processes to turn the design into reality and ensure android functions properly.

The main menu display contains a page after we do the login process and on the dashboard there is a menu for checking stock, outgoing goods, incoming goods and updating stock items by scanning barcodes to enter stock and search for goods.

3. RESULTS AND DISCUSSION

In this section, we analyze the web-based inventory management application which has four main views: main menu/dashboard display, display of item data page, item input display, and item searching display. Each view has its own functions and features that are important to ensure the smooth running of the inventory management process.

1. Main Menu/Dashboard Display

The main menu display contains a page after we do the login process and on the dashboard there is a menu for checking stock, outgoing goods, incoming goods and updating stock items by scanning barcodes to enter stock and search for goods.

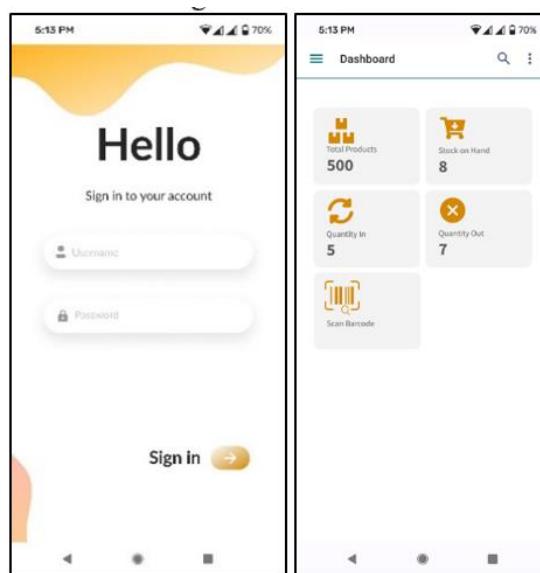


Figure 5. Main Menu / Dashboard Display

2. Display of Item Data Page

In the item data page, users can see all the categories of goods in the database and the types of goods in the category. On this page, the process of editing goods can also be carried out such as adding updating stock items, barcodes and changing the category of goods as desired.

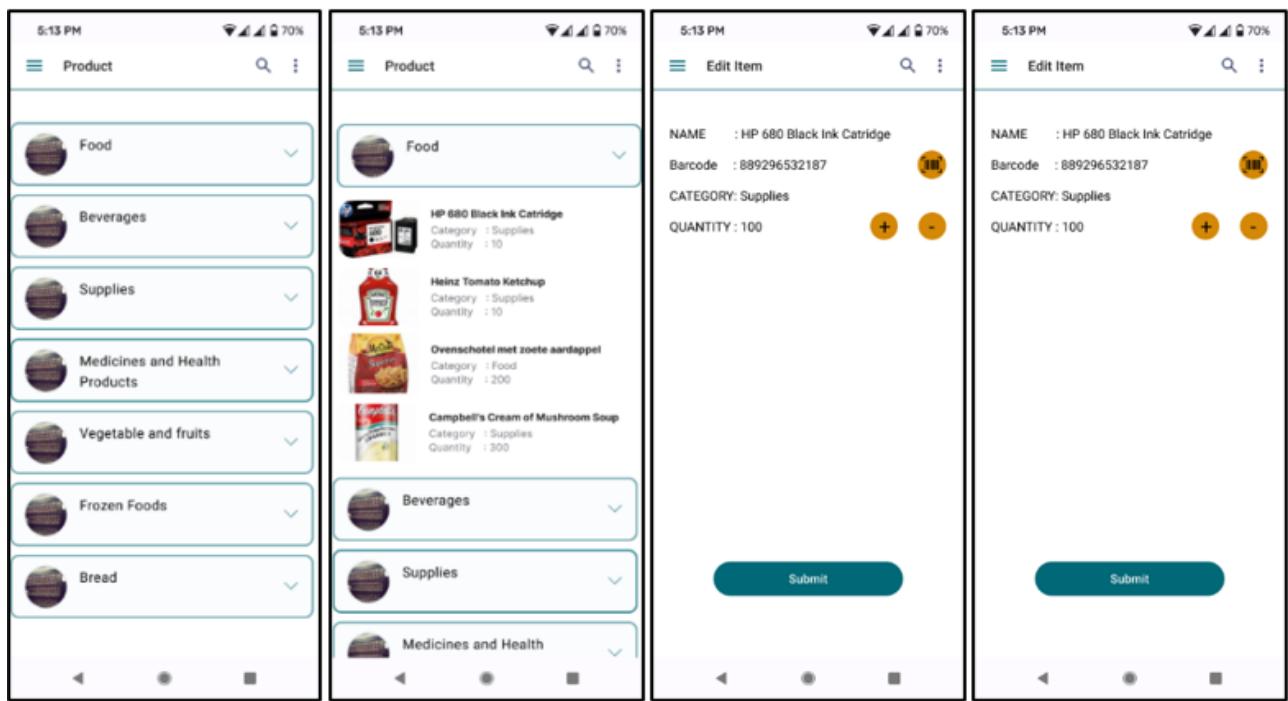


Figure 6. Display of Item Data Page

3. Item Input Display

When scanning the barcode, a display appears to input the name of the item, the category and the amount of stock available and a photo of the item.

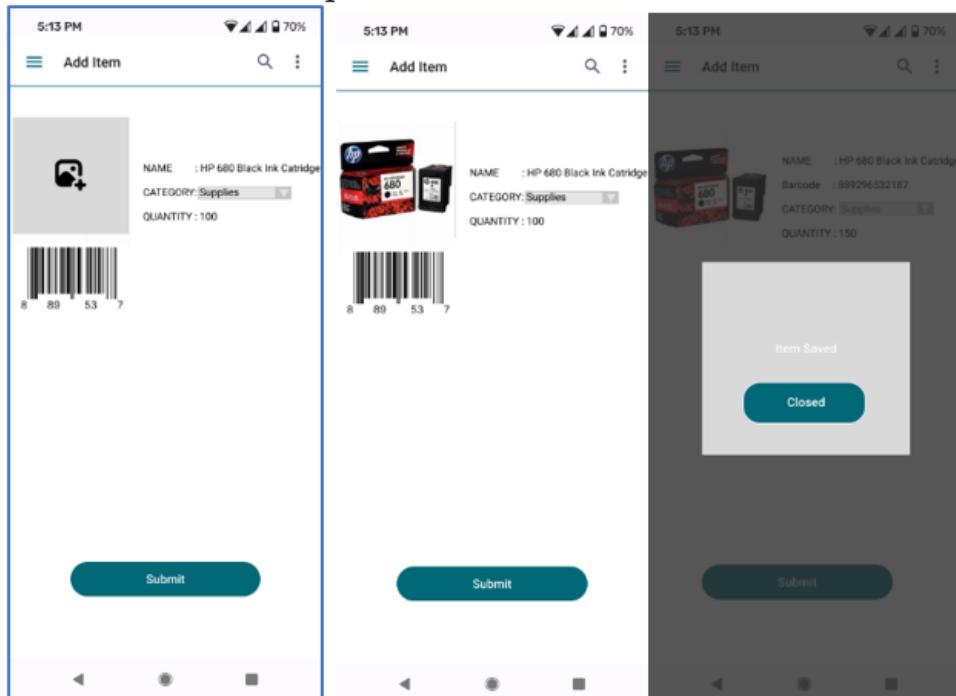


Figure 7. Item Input Display

4. Item Searching Display

In the searching view, users can see the history of searching for previous items and the last updated item.

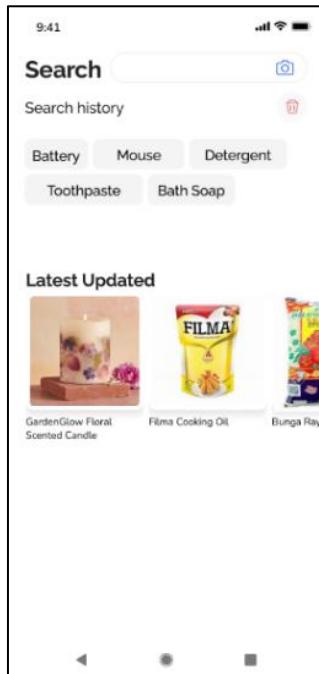


Figure 8. Item Searching Display

4. CONCLUSION

The use of the barcode scanning method in the design of an Android-based inventory application provides major advantages in data accuracy, operational efficiency, and intelligent solutions to traditional problems in stock management. Through barcode integration, this system not only improves data accuracy by eliminating recording errors that often occur in manual entry, but also significantly reduces the time required for stock verification and audit processes, thereby increasing overall operational efficiency. An additional advantage of this system is the ability to access real-time inventory data via the Android application, which allows users to monitor and manage stock more efficiently from anywhere. This feature is very important to ensure business decisions can be made quickly and based on accurate data. Furthermore, this application simplifies the process of inputting and updating incoming and outgoing stock, because each barcode scan automatically updates the database, ensuring stock information is always up to date, and reducing the risk of inventory errors.

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