

Stock Management Optimization at IDUFASH Using an Android Based Application

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Abstract

The current technological advancements can be utilized by institutions for managing their inventory, including the use of information system technology. Institutions of various sizes, whether large, medium, or small, can harness this technology not only for data management but also for strategic maneuvering in response to business developments. Blink Evolution Store is one such clothing store that offers a variety of fashion products, including clothing, sweaters, hoodies, jackets, and pants. Manual record-keeping on paper consumes a significant amount of time, and inventory is not well-organized. With the advancement of information technology, there is a growing need for an application that can assist the Blink Evolution Store in efficiently managing and accessing goods data in a more organized manner. Using the waterfall methodology, the author can design the system sequentially, starting from the phase of Needs Analysis, system & software design, implementation & unit testing, integration & system testing, and ultimately concluding with operation & maintenance. The results of the blackbox testing on the IDUFASH application align with the initial system plan. In User Acceptance Testing (UAT) conducted using the Likert method, the author achieved a final testing score of 95.6%, which falls under the "highly satisfactory" category.

Keywords: Inventory Management; Information System; Application; Goods; Android.

1. Introduction

Inventory management is a crucial aspect of any institution. Effective inventory management facilitates the procurement and sales processes, ultimately enhancing the quality of an institution and providing customers with easy access to product availability. If an institution fails to manage its inventory effectively, it may face challenges in both sales and procurement, leading to financial losses and a decrease in customer interest.

The current technological advancements offer opportunities for institutions to improve inventory management,

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with information system technology being a key solution[1,2]. Institutions of all sizes, whether large, medium, or small, can harness this technology, not only for data management but also to leverage its potential to significantly impact operational, tactical, and strategic aspects of manufacturing companies[3,4].

Blink Evolution Store is one of the clothing stores located on the 1st floor, Stall 7 Block C No 164, Beringharjo Market, Yogyakarta. This store offers a variety of fashion products, including clothing, sweaters, hoodies, jackets, and pants. The diverse range of products poses a challenge for the store's staff when it comes to managing inventory. Record-keeping for incoming products, outgoing products, damaged products, and reports is still done manually using paper. This manual data entry process is time-consuming and leads to poor inventory tracking. As a result, employees are often unaware of the status of the store's inventory.

Based on the issues faced by Blink Evolution Store as mentioned above, and with the current advancements in information system technology, this research aims to design and develop the IDUFASH Android-based application. The application is intended to facilitate Blink Evolution Store in improving its inventory management, ensuring orderliness and organization, thus addressing the existing challenges, and easier to access.

In conducting this research, the researcher refers to previous studies that have been conducted. Some of these studies include those conducted by[5,8], which investigated the Inventory Information System using the Waterfall Method. In his research on the Design of an Android-Based Inventory Information System Application at PT. Quantum Mitra Sinergi, the researcher successfully developed a system that enables stock data to be recorded using smartphones to expedite employee tasks. The method employed by the researcher for system design is SLDC (System Development Life Cycle)[9].

2. Research Method

The method applied by the author in the design of the IDUFASH application In this study [10,11], the method employed is the waterfall approach. With the waterfall method, the author can design the system sequentially, starting from the requirement analysis stage, system and software design, system implementation, integration and System Testing, and the final step is operation and maintenance. The Waterfall Model is a software development approach that organizes a project by breaking down its activities, starting from requirement analysis, design, coding, up to testing[12].

2.1. Requirement Analysis

The Requirements Analysis process is a key element of the initial stage in software development[13]. The analysis is carried out by referring to the data gathered in the previous stage. In this step, the author conducted interview sessions with employees and store managers to collect information related to inventory data and information for the system to be developed[14]. As a result of these interviews, the author successfully obtained data about the products sold in the Blink Evolution store. The data obtained by the author can be observed in table 1.

Table 1: Data Product

No	Code of Product	Name of Product	Size	Prize
1	Hdpxl	Hoodie Blink Polos	XL	Rp.70.000
2	Hdpxxl	Hoodie Blink Polos	XXL	Rp.70.000
3	Hdpxxxl	Hoodie Blink Polos	XXXL	Rp.76.000
4	Hdpjbo	Hoodie Blink Polos	Jumbo	Rp.83.000
5	Sapxxl	Sweater Polos	XXL	Rp.55.000
6	Sapxxxxl	Sweater Polos	XXXL	Rp.59.000
7	Paialls	Parasut Cewek Impor	Allsize/L	Rp.85.000
8	Sualls	Sukajan	Allsize/L	Rp.110.000
9	Jerl	Jaket Polos Resleting	L	Rp.67.000
10	Jerxl	Jaket Polos Resleting	XL	Rp.70.000
11	Jerxxl	Jaket Polos Resleting	XXL	Rp.74.000
12	Jerxxxl	Jaket Polos Resleting	XXXL	Rp.76.000
13	Jercbo	Jaket Polos Resleting	Jumbo	Rp.83.000
14	Hoealls	Hoodie Motif	Allize/L	Rp.60.000
15	Jktfxl	Jaket Freestyle	XL	Rp.102.000
16	Kmjfm	Kemeja Flannel	M	Rp.60.000
17	Kmjfl	Kemeja Flannel	L	Rp.60.000
18	Kospm	Kaos Polos	M	Rp.40.000
19	Kospl	Kaos Polos	L	Rp.40.000
20	Kospmmm	Kaos Premium	M	Rp.40.000

2.2. System and Software Design

In this stage, the author constructs the system design by applying the research approach in design science. It covers functional and non-functional requirements that will be used to build the IDUFASH application for Blink Evolution store. Functional requirements involve the analysis of the system's capabilities and the features to be developed within the system and designed. The following are the features developed in the IDUFASH system:

- **Login Feature:** The login feature serves to identify and restrict user access rights in the IDUFASH system. Access rights restriction is achieved through the verification of username and password.
- **Product Feature:** The product feature is designed to facilitate the admin in managing product data. This feature displays product information, including the product name, category, price, stock, supplier, and date.
- **Report Feature:** The report feature is designed to assist the admin and store owner in obtaining a summary of incoming products, outgoing products, damaged products, and inventory data.
- **Logout Feature:** The logout feature is used to exit the IDUFASH application system.

Non-functional requirements involve the analysis of all equipment, both software and hardware, in

designing the system. The following are the equipment used in designing the IDUFASH system at Blink Evolution store. The hardware requirements for this research consist of 1 laptop and 1 smartphone, each with the following device specifications:

- One unit of a laptop with the brand Acer Nitro 5 AN515-43-R1PB is equipped with an AMD Ryzen 5.3500H Radeon Vega 8 processor, 12GB RAM, 1TB HDD, 256GB SSD, and the Windows 11 operating system.
- A Xiaomi Redmi Note 5 Pro smartphone has specifications that include a Snapdragon 636 processor, Adreno™ 509 GPU, 4GB RAM, and 64GB of storage.

The software used by the author to support the creation of the stock management application is as follows:

- Android Studio
- Firebase
- Figma
- Draw io

The architectural model of the system to built shows the process when goods arrive, warehouse employees input the items into the application[15] (goods in, damaged goods, and goods out), and the application then stores the item data in the Firebase database. The architectural model process can see in Figure 1.

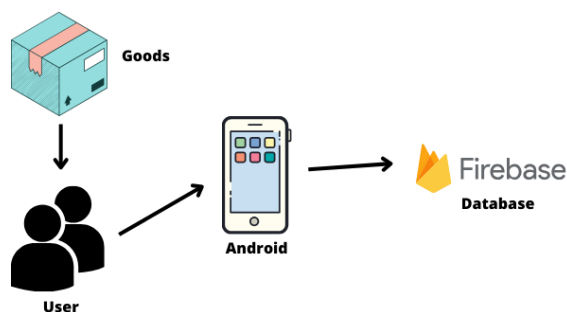


Figure 1: Program Architecture

The process model design depicts the flow of data within the system from input, processing, and output, where data will be transformed into information. In the development of the Android-based IDUFASH system in this study, data flow will be represented using Data Flow Diagrams (DFD). A Data Flow Diagram provides an overview of how data enters, is processed, and exits a system or software. It encompasses the flow of data objects into the system or software, processing by processing elements, and the flow of resulting data objects out of the system or software. The following is the process model design that occurs in the inventory management at Blink Evolution store.

- Context Diagram

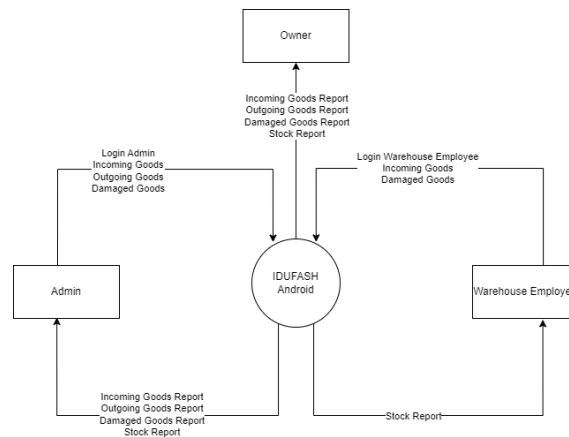


Figure 2: Context Diagram

The Context Diagram in Figure 2 represents the data flow process in the IDUFASH system, where the system involves three entities with different access rights: admin, store owner, and warehouse employee. The admin has full access to the system, the store owner can only receive data reports, and the warehouse employee can only input data for incoming, outgoing, damaged products, and stock reports.

- Hierarchy Diagram

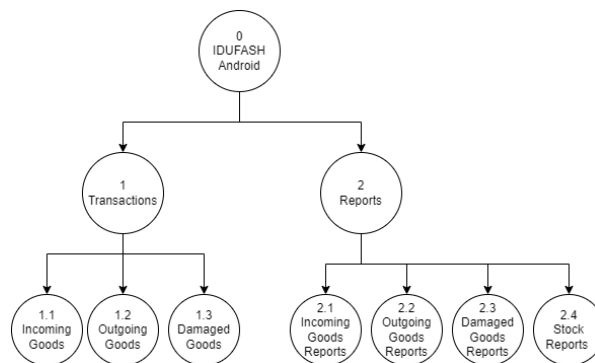


Figure 3: Hierarchy Diagram

Figure 3 represents the two main processes in this system, namely transactions and reports. The first process contains transaction processes that include three sub-processes: product input, product output, and damaged products. The final process pertains to documents that include reports on incoming products, outgoing products that have been damaged, and inventory.

- DFD Level 1

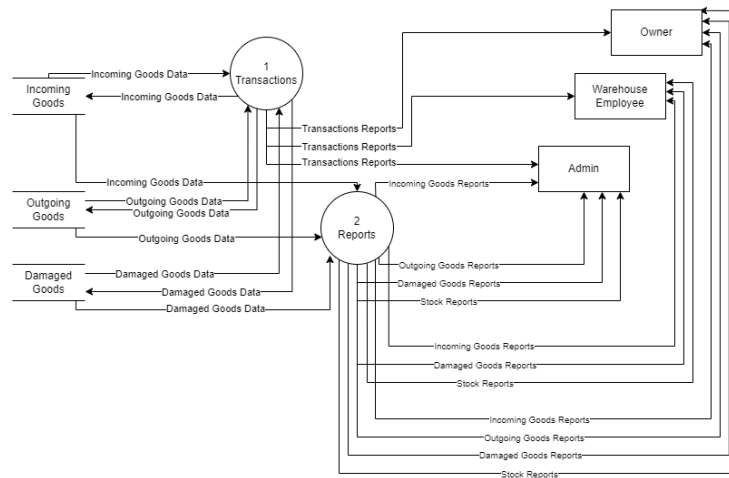


Figure 4: DFD Level 1

Figure 4 is a detailed process within the main process in the data flow diagram, which involves transactions and reports. Data from each table will be processed and then become the output of the process to inform the user. In this process, transactions contain data from the incoming product table, outgoing product table, and damaged product table. The reporting process includes data obtained from the incoming, outgoing, and damaged product data.

- DFD Level 2 Process 2

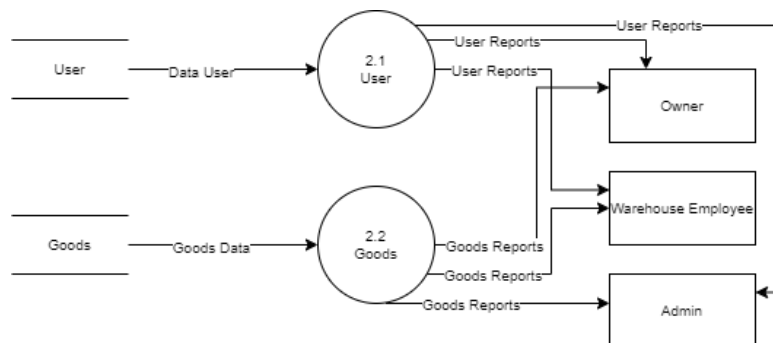


Figure 5: DFD Level 2 Process 2

DFD Level 2 Process 2 in Figure 5 provides a detailed explanation of how data is processed. It involves master data, including user, product, category, and supplier data. There are four processes involved, which are adding product data, modifying product data, saving product data, and deleting product data. All data generated from the storage process will be communicated to the user through the home page and the add product data page according to the access permissions granted to everyone.

- DFD Level 2 Process 3

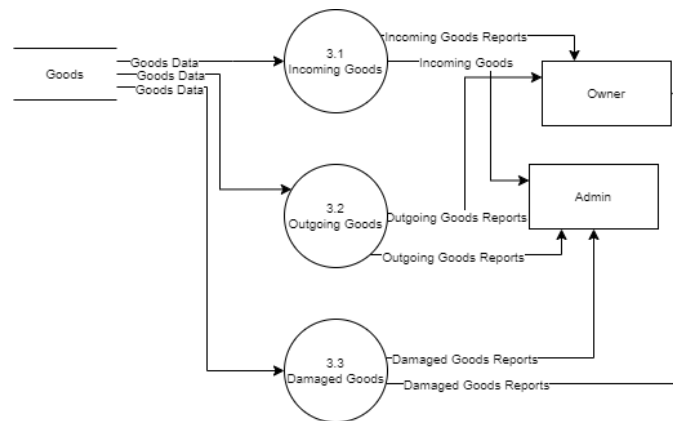


Figure 6: DFD Level 2 Process 3

DFD Level 2 Process 3 in Figure 6 is a detailed explanation of the process for receiving goods from suppliers, outgoing goods, and damaged goods. There are three processes involved: the incoming goods process, which is received by the store owner, followed by the goods input process by warehouse employees. The outgoing goods process involves data based on store sales.

- DFD Level 2 Process 4

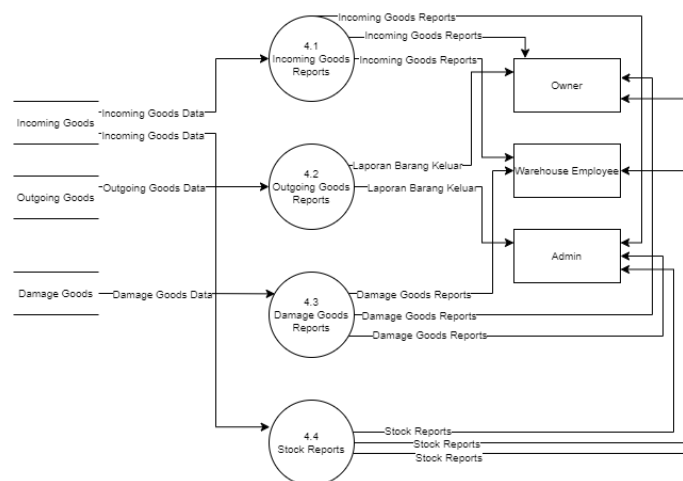


Figure 7: DFD Level 2 Process 4

DFD Level 2 Process 4 in Figure 7 involves four processes that utilize data processed in processes one through three. The first process is the creation of incoming goods reports received by the store owner and admin, originating from warehouse employees. The second process involves creating outgoing goods reports, extracting data that has been input from incoming product data. The third process is the creation of damaged product reports input by warehouse employees. The final process is for inventory reports that provide stock information.

2.3. System Implementation

At this stage, start by creating a login page, and home page, add data page containing (pages for adding data on incoming products, outgoing products, and damaged products), and a settings page. Furthermore, to manage product data on the IDUFASH Android application, you can connect to the Firebase database. The results of system implementation are the physical manifestation of the conceptual and physical design process of the Android-based IDUFASH system. The result of this process is a finished system for testing and use. The IDUFASH system was developed using the Kotlin programming language in the Android Studio and Firebase environments. These results section first discusses the business processes in the IDUFASH application.

- Login Page

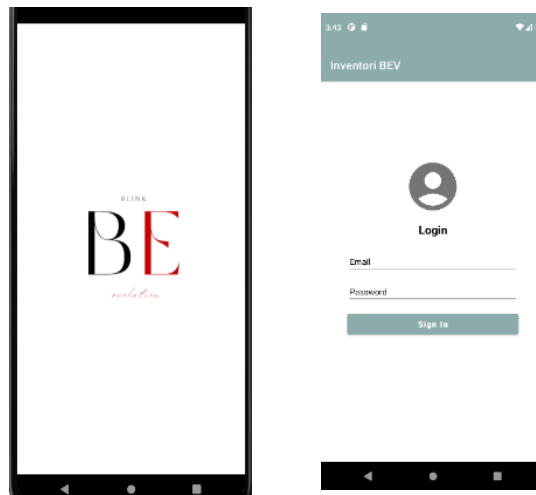


Figure 8: Implementation of Login Page

Figure 8 shows the implementation results of the login page that appears after the splash screen. The login page is used for the account registration process so that users can enter the IDUFASH application system. After carrying out the registration process, the user can enter the registered account. Thus, they can enter the application system.

- Home Page



Figure 9: Implementation of Home Page

Figure 9 shows the results of implementing the home page. Users can enter the home page after successfully completing the login process and will then be directed to the home page. This page displays data on available products.

- Add Product Page

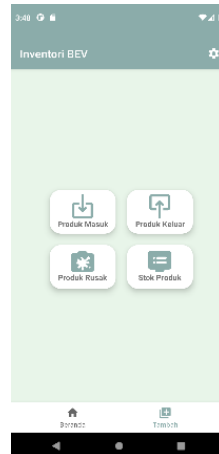


Figure 10: Implementation of Add Product Page

Figure 10 shows the results of implementing the add product page which displays options in the form of adding incoming, outgoing, damaged products and product stock. On this page, the user can choose to carry out the data input process. The incoming product menu can be used to input data when goods arrive at the shop, the damaged product menu can be used to input data when there is a damaged product, and the outgoing product menu can be used to input data when there are buyers who carry out the process of buying and selling goods. In the Blink Evolution shop, the product stock menu can be used to view the stock of products that have been entered.

- Add Product Data Page

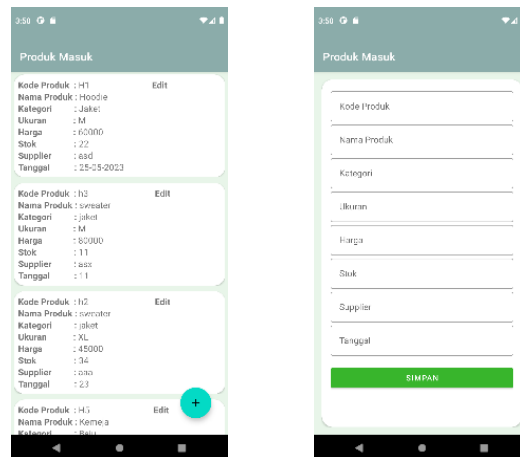


Figure 11: Implementation of Add Product Data

Figure 11 shows the results of the implementation of the add product data page which functions to display and enter product data. Store employees can input item data such as item code, item name, category, size, price, stock, supplier, and the date item arrived by pressing the button. Then, save the data that has been entered is stored in the Firebase database.

- Product Stock Page

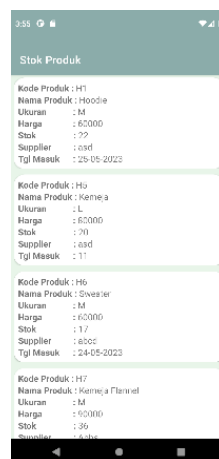


Figure 12: Implementation of Product Stock Page

Figure 12 shows the results of the implementation of the product stock page which functions to display data on product stock that has been successfully entered on the add incoming products, outgoing products, and damaged products page. On this page, employees can see the stock of products that are still available or have run out. By

utilizing this feature, employees can directly contact the distribution party to process the purchase of goods whose stock is out of stock.

- Setting Page

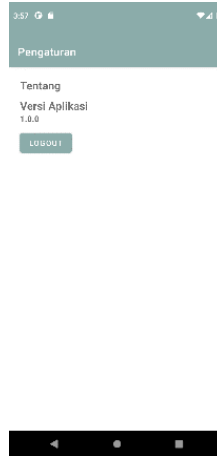


Figure 13: Implementation of Setting Page

Figure 13 shows the results of the implementation of the setting page which functions to display information about the application version as well as a logout feature that can be used by users to exit the IDUFASH application.

2.4. Integration and System Testing

After code development is complete, the system is tested to ensure that the system can operate properly without any errors[16]. In this research, the application was tested by applying Black Box Testing[17]. Discussion of the results of the IDUFASH system built in this research was carried out by direct testing of the system, which prioritizes the functional requirements of the system. Testing this process involves providing input to the program, and the input is then processed according to its functional requirements. The goal is to check whether the application operates and produces the expected results. The following shows the results of black box testing which can be visualized in Table 2.

Table 2: Black Box Test Results

No	The tested Functions	Test Scenarios	Test Results	Status
1	Splash Screen	Open the app.	The application displays a splash screen page.	Valid
2	Login	Fill in the data on the login page and click the login button.	As a result, the system experienced success, and the user redirected to the home page.	Valid
3	Dashboard	Go to the home page.	The process succeeds, the home page is displayed.	Valid
4	Add Product	Go to the Add Product page.	The process succeeds, the Add Product page is displayed.	Valid
5	Add Product Data	Go to the Add Product page Enter and fill out the Item Data Input Form, and then click the Save button.	Process Successful, Item Data Stored in Database.	Valid
6	Stock Product	Go to the product stock page.	The process succeeds, the product stock page is displayed.	Valid
7	Settings	Go to the Settings page.	The process succeeds, the settings page is displayed.	Valid
8	Logout	Clicking the Logout Button in Settings Page.	The process is successful, then the user exits the application and returns to the login page.	Valid

Testing was also carried out by means of user acceptance testing on the IDUFASH application conducted to employees at the Blink Evolution store. This application testing aims to create a document that determines whether the application that has developed meets the standards of acceptance by users or not. In a survey of 5 employees at the Blink Evolution store, there were two assessment criteria, namely questions from 1 to 5 related to the appearance of the application and questions from 5 to 10 related to the function of the application that has been built. The evaluation of user acceptance testing carried out using five answer options, namely Very Appropriate (VA), Appropriate (A), Less Appropriate (LA), Not Appropriate (NA), and Not Answered (NS) with a positive score of 5, 4, 3, 2, 0 and with a negative score of 2, 3, 4, 5, 0. The following is a table of Black Box testing conducted on the IDUFASH application, which visualized in Table II. The results of User Acceptance Testing (UAT) presented in Table 3.

Table 3: UAT Test Results

No	Question	VA	A	LA	NA	NS
1	Is the appearance of the Splash Screen page on the IDUFASH application interest?	2	3	-	-	-
2	Is the menu on the IDUFASH application enough to display inventory information?	3	2	-	-	-
3	Is the appearance of the home page on this application attractive?	4	1	-	-	-
4	Is the add product data page display attractive?	5	-	-	-	-
5	Is the Product Data Input Form Display attractive?	5	-	-	-	-
6	Can the application that built already be able to perform the login process?	4	1	-	-	-
7	Can this app already display product data on the home page?	4	1	-	-	-
8	Can this application already save the product data inputted?	5	-	-	-	-
9	Is this app easy to use?	4	1	-	-	-
10	Is there a menu of this application that cannot run?	-	-	2	3	-
Total		36	9	2	3	-

Interpretation of scores with the Likert scale A used to be able to determine the results of criteria from tests carried out by means of UAT (User Accepting Testing). The following visualizes the Likert score scale in table 4.

Table 4: Score Interpretation with Likert Scale

Score at intervals of 20	Information
0% - 19%	Very unsatisfactory
20% - 39%	Unsatisfactory
40% - 59%	Usual
60% - 79%	Satisfactory
80% - 100%	Very Satisfactory

By completing stock management system testing using blackbox testing and user acceptance testing, researchers can conclude that:

In blackbox testing, when every application scenario that has developed itested where it runs as expected. Based on the tests have been carried out, the IDUFASH application can display item data in the Blink Evolution store, input item data and display stock items that are still available or out of stock. The IDUFASH android application has been in accordance with the system design that has set initially.

Testing conducted by means of user accepting testing found that of all questions asked who answered Very Appropriate (VA) which 72%, individuals who answered Appropriate (A) which 18% answers which showed that the appearance and menu of the IDUFASH application were in accordance with the needs of the Blink

Evolution store in managing item data. For individuals who answered Less Appropriate (KS) 6%, individuals who answer Not Appropriate (NA) 4% were answers to negative questions about menus that could not run or bugs contained in the IDUFASH application, which means that the results of UAT testing are, Very Appropriate (VA) 78%, Appropriate (A) 22%, Less Appropriate (LA) 0%, Not Appropriate (NA) 0% and Not Answered (NS) 0%. Using the Likert scale, the measurement results reached a total score of 239 out of 250, is equivalent to 95.6% in percentage terms. Thus, based on the Likert scale, the IDUFASH application can be classified as very satisfactory.

2.5. Operation and Maintenance

The final stage in the waterfall method involves system maintenance. At this stage, maintenance is carried out to ensure that the application/system always meets user needs. In addition, at this stage, application revisions can be made, if necessary, at any time[18]. Maintenance is an unavoidable stage[19]. The final stage is application development, and after going through analysis, design, and implementation, the finished application will be distributed to the Blink Evolution Store.

3. Conclusion

From the results of the study conducted by the researcher in analysing and designing the Android-based IDUFASH fashion application at the Blink Evolution Store, it can be concluded that the Blink Evolution Store needs the IDUFASH application to make it easier for store employees and store owners to record incoming, outgoing, damaged products, and product stock information, and the IDUFASH application can minimize the occurrence of accumulation of goods or shortages of goods stock. Thus, the IDUFASH application can help manage goods data at the Blink Evolution Store to be better, neater, and easier to access. The test results of 95.6% were classified as very satisfactory, indicating that the IDUFASH application can be used by employees in collecting data on goods at the Blink Evolution store.

The suggestions for developing the IDUFASH application in the future include adding a notification feature when supplies start to run low. It is to notify that the employees immediately carry out the process of re-stocking goods at the Blink Evolution store.

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