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Design and Development of an Android-Based Merchandise Management Application for K-pop Consignment Services

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Abstact– The rapid development of technology has increased various societal needs, especially in the e-commerce sector, including the delivery service of K-pop merchandise. The global popularity of K-pop has led to high demand for related merchandise such as albums, lightsticks, and exclusive clothing and accessories, often difficult to source internationally. This demand creates challenges for businesses in managing product data, inventory, and transactions effectively. Zena.id, as a business providing K-pop merchandise delivery services, faces specific issues with ensuring accurate transaction recording and real-time inventory monitoring. An efficient system is needed to reduce human error, prevent inventory discrepancies, and meet customer expectations for product availability. This research aims to develop an Android-based application to automate transaction recording and inventory monitoring at Zena.id. The application is designed to improve operational efficiency through an integrated system for accurate stock monitoring and transaction processing. Developed using the Kotlin programming language and an Agile approach, this method allows for flexible, iterative improvements. Testing results showed a 83.33% accuracy rate in transaction processing and inventory updates, significantly simplifying management tasks and reducing potential errors. Additionally, the user-friendly interface enhances satisfaction for both business managers and customers. This application serves as an optimal solution to address the unique challenges faced by K-pop merchandise delivery services in the digital era.

Keywords: *Android, Goods data management, E-commerce, Kotlin*

I. INTRODUCTION

In the era of increasingly advanced technological development across various fields, societal needs have also grown significantly, particularly in e-commerce, where merchandise delivery services focused on K-pop have shown remarkable growth. The global rise of K-pop has triggered a surge in demand for various related products, ranging from music albums and clothing to official merchandise and collectibles. This phenomenon, known as the Korean Wave or Hallyu, began with the establishment of diplomatic relations between South Korea and China in 1992. In the mid-1990s, South Korea aggressively promoted its entertainment products, starting with musical dance performances and later followed by the boy band H.O.T's concert in Beijing. K-pop also entered Indonesia, triggered by South Korea hosting the 2002 World Cup, an event broadcast on Indonesian television that further popularized it [1].

Previous research has demonstrated the potential for real-time delivery information to enhance customer satisfaction [2]. Furthermore, a dropshipping website designed to bridge communication between travelers and luggage storage has proven effective in fulfilling goods needs through pre-order services [3], [4]. nother study developed a shopping consignment service application using JavaScript with the React Native and ReactJS frameworks, facilitating users in meeting their shopping needs [5]. Finally, a mobile application connecting buyers with travelers was designed using design thinking to understand user needs and provide a secure transaction platform [6].

The K-pop merchandise consignment business has become one of the rapidly growing sectors, especially in Indonesia. However, this business still faces various challenges, particularly in managing sales and inventory, which are still done manually. For instance, Zena.id uses a simple application for managing product data that often results in slow transaction recording and errors. Additionally, inventory monitoring is also done manually, leading to data inaccuracies and difficulties in tracking product availability in real time. To overcome these challenges, an innovative solution is needed for managing merchandise data for K-pop consignment businesses. One solution is the development of an Android-based application that can automate transaction recording, monitor inventory, and update order status by the admin. This merchandise data management application is developed using Android development technology specifically for e-commerce. Leveraging the advantages of the Android platform, this application is designed to simplify transaction processes and improve inventory management, providing an optimal solution to support the needs of e-commerce businesses.

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Mobile applications are among the most popular and rapidly growing technologies today, used for various purposes such as communication, information, entertainment, education, and business [7]. Android, a Linux-based mobile operating system, provides an open-source platform for developers to create applications and includes an OS, middleware, and applications [8], [9]. Initially acquired by Google Inc. from Android Inc., it offers a runtime environment called the Dalvik Virtual Machine (DVM), optimized for devices with limited memory. Android Studio, based on IntelliJ IDEA, serves as an integrated development environment (IDE) for Android development, featuring tools that assist developers, particularly those at a basic level [10]. Additionally, UML (Unified Modeling Language) provides a standardized set of diagramming techniques used to model system development projects from analysis through implementation [11]. Common UML diagrams include use case diagrams, which represent interactions between a system and external actors and illustrate relationships like extending and generalizing [12], [13]; activity diagrams, which model processes within a system using elements such as start, swimlanes, activities, branches, and end [14]; and sequence diagrams, which document processes, visualize technical scenarios during runtime, and help predict system behavior [15].

II. RESEARCH METHOD

In this research, researchers first analyzed the need for managing item data required in Zena.id. This need includes recording transactions, monitoring stock in real-time, and overall inventory management to increase operational efficiency and customer satisfaction.

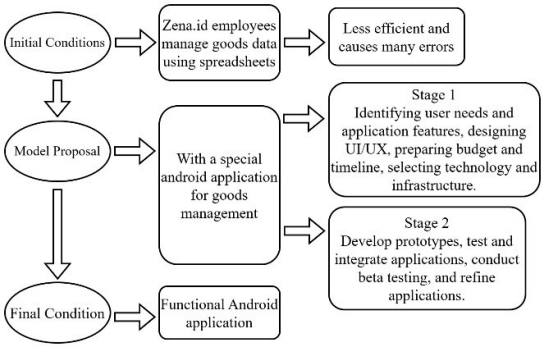

Figure 1 Research Framework

A. Initial Conditions

At this stage, the initial conditions for managing item data are still done manually. This method usually involves recording in books or spreadsheets which is errorprone and inefficient. With the increasing number of items that must be managed, manual systems are no longer sufficient. There is an urgent need to increase efficiency in stock management. Applications that can automatically update stock and provide real-time information are needed. Trends in mobile device usage drive the need for Android-based applications that can be easily accessed by users anytime and anywhere. The mobile application allows operational staff to access and manage goods data in real-time, which increases responsiveness and flexibility.

B. Proposal

Develop an Android based application that can automate stock updates and provide real-time access to users. The app is also designed to ensure a good user experience and meets industry standards.

C. Proposed Stage

This application was developed using an Agile approach, which allows for iterative development and continuous feedback at every stage. The research stages are also an ongoing and iterative process, often involving the repetition or modification of certain stages to ensure the validity and reliability of the research results [16]. The research stages carried out are as shown in Figure 2.

1. Requirements, this first stage involves analyzing the requirements to understand what features and functions the application must have.
2. Design, at this stage, the application architecture, database design, and intuitive user interface are designed.
3. Development, includes the process of writing code, system integration, and unit testing to ensure each component of the application functions properly.
4. Testing, testing is performed to ensure the functionality, performance, and security of the application is in accordance with specifications and safe to use.
5. Deployment, the application is installed on the server, users are trained, and data is moved from the old system to the new system.
6. Review, at this stage, the implementation results are reviewed, including feedback from users, to make improvements if necessary.
7. Launch, nce all processes are complete and the application has been tested and refined, the application is launched for use by users.

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Figure 2 Research Stages Using Agile Methods

III. RESULTS AND DISCUSSION

3.1 Analysis and Design

1. Functional Requirements

   Users can enter new data into the inventory with information such as name, stock and price. Users can also update stock and product prices, as well as add, edit or delete products as needed. Users can also update item data, including stock and prices, as well as add, edit and delete items as needed. Any data changes will be automatically updated in the system and validated to ensure accuracy. The low stock notification feature notifies users when stock reaches a minimum limit, allowing timely restocking or purchasing actions to be taken. Apart from that, the system also provides a complete display of item information to facilitate inventory management and monitoring. All these features a.

2. Non-Functional Needs
   a. Operating System : Android Snow Cone (Android 12)
   b. Android Studio
   c. Laptop Acer Nitro 5 AMD Ryzen 5 3550H with Radeon Vega Mobile Gfx 2.10 GHz
   d. Smartphone Vivo Y15S

3.2 Conceptual Design

1. Use Case Diagram

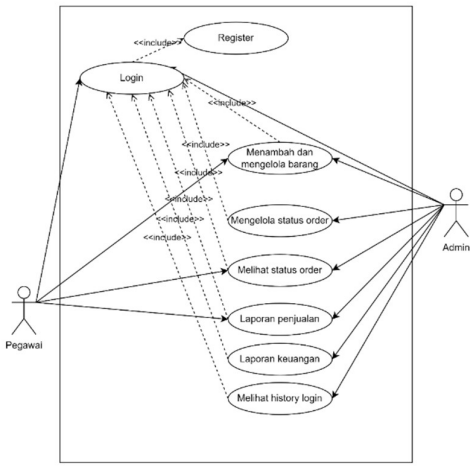

Figure 3 Use Case Diagram

In this product data management application system, there are two types of users: users (employees) and admins. Users can register and log in to access features such as adding and managing items, monitoring order status, and viewing sales reports. Admins have broader access rights, including adding, editing, or deleting items, managing order status, viewing financial reports, and monitoring user login history. This system can be accessed mobile, allowing users and admins to carry out tasks anytime and anywhere, increasing efficiency and flexibility in stock management.

2. Sequence Diagram

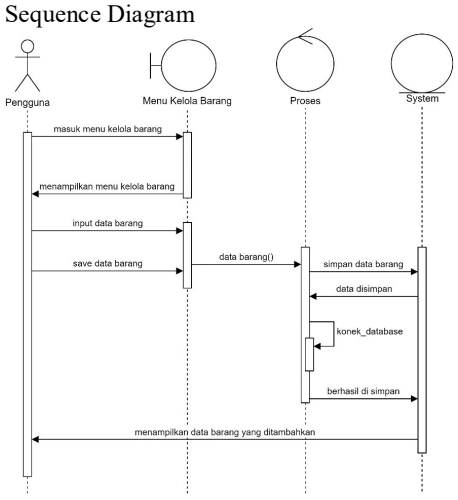

Figure 4 Sequence Diagram for Managing Goods

Shows the user opening the manage items menu. Here,, the user enters the newly added data, such as name, stock quantity, and price. After filling in all the

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information, the user presses the button to save the item data. The entered item data is sent to the "Process" component in the system. This component then contacts the database to store item data. After the item data is successfully stored in the database, the system confirms that the storage process has been successful. This confirmation is sent back to the manage items menu, which then displays the newly added items. Users can see that new items have been successfully added to the system.

3. Activity Diagram

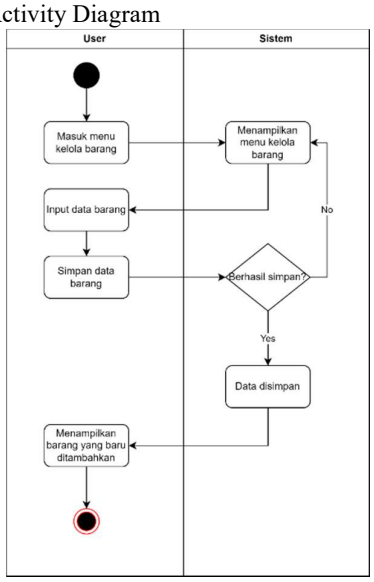

Figure 5 Activity Diagram Sequence Diagram for Managing Goods

The user accesses the item management menu in the application. The system then displays the item management menu. The user enters the data for the item they wish to add and saves that data. The system will check whether the data has been successfully saved. If the data is successfully saved, the system stores the data and displays the newly added item. If not, the system returns to the step of inputting item data for correction or to repeat the process.

3.3 Table Structure

This section discusses the tables used in the inventory management system application. A detailed table structure will help understand how data is stored and organized in the system's database. With a good understanding of the table structure, we can see how data is managed and extracted to support inventory management, transactions, and user history. The following is a detailed description of the tables used in the system.

Table 1 User

Column Name	Data Type	Information
User_id	Integer	Primary Key , unique ID for each user
Name	Varchar	User's full name
Email	Varchar	Unique email address for each user
Password	Varchar	User password

The User Table stores crucial data about each application user, including a unique user ID, full name, email address, and password. The user ID (id_pengguna) acts as the Primary Key to ensure each user has a unique identity within the system. The Name column stores the user's full name, while Email and Password are used for user authentication and communication, respectively.

Table 2 Items

Column Name	Data Type	Information
Item_id	Integer	Primary Key , unique ID for each user
Item_name	Varchar	Name of item
Stock_amount	Integer	The number of stock items available.
Price	Integer	Proce of goods per unit

The Items table stores information about the goods available in the system. This table has several columns, namely Item_id, Item_name, Stock_amount, and Price. Item_id is the Primary Key with an Integer data type that serves as a unique ID for each item. Item_name stores the name of the item in Varchar format. The Stock_amount column, with an Integer data type, indicates the quantity of stock available, while Price stores the price of the item per unit, also in Integer data type. This table allows for structured storage of item data, making it easy to manage information regarding stock and pricing.

Table 3 Transactions

Column	Data Type	Information

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Transaction_id	Integer	Primary Key , unique ID for each user
Buyer_name	Varchar	Name of the buyer who made the transaction
Item_id	Integer	Fraonresiagcnti Koney, connects to the item table
Amount	Integer	Number of items purchased
Total price	Integer	Total price for the number of items purchased
Transaction_date	Timestamp	Transaction time

The Transactions table records every transaction that occurs in the system. The columns in this table include Transaction_id, Buyer_name, Item_id, Amount, Total_price, and Transaction_date. Transaction_id is the Primary Key with an Integer data type that provides a unique ID for each transaction. Buyer_name stores the name of the buyer making the transaction in Varchar format. The Item_id column serves as a Foreign Key that links this table to the Items table, allowing for the identification of items purchased in each transaction. Amount, with an Integer data type, records the quantity of items purchased, while Total_price stores the total price for that quantity of items. The Transaction_date column, which is of Timestamp type, records the time the transaction occurred. With this table, every transaction can be fully tracked, including who the buyer is, the items purchased, their quantities, and the time of purchase.

3.4 Implementation

1. Login Page

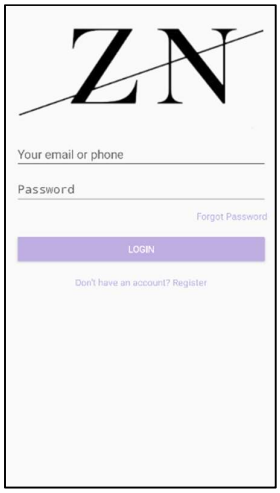

Figure 6 Login Page

On the login page, the Zena.id logo is prominently displayed at the top center, serving as a consistent and recognizable visual identity. In the middle of the page, there is a form for users to enter their email and password, ensuring easy access. Below the password field, there is a "Forgot Password" link that allows users to reset their password if needed. Additionally, a "Login" button is conveniently placed for users to access their accounts. At the bottom of the page, a message reading "Don't have an account? Register" invites new users to sign up, making navigation and access to Zena.id services simple and user-friendly.

2. Register Page

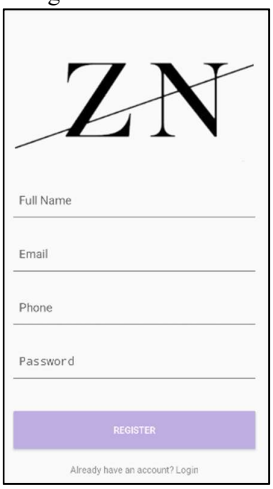

Figure 7 Register Page

The registration page prominently displays the ZN logo at the top center, ensuring brand visibility and identity.

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Below the logo, the form includes fields for users to enter their Full Name, Email, Phone, and Password, providing a straightforward and user-friendly registration process. A clearly defined Register button, styled in a light purple color, is placed at the bottom of the form for users to complete their registration. Additionally, at the very bottom of the page, a subtle message, "Already have an account? Login", encourages users who already have an account to switch to the login page. The overall design is clean, minimalistic, and functional, enhancing the user experience.

3. Main Menu Page

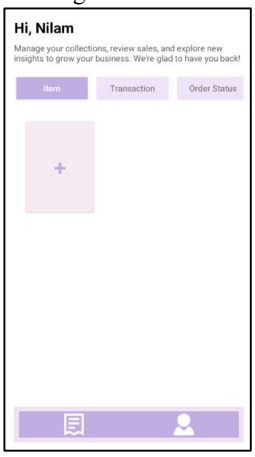

Figure 8 Main Menu

The Zena.id main menu page displays various product categories at the top, allowing users to explore products easily. There is a plus button (+) to add a new category. The navigation menu below includes “Items” to view and manage products, “Transactions” to track transactions, and “Order Status” to monitor orders. In addition, there is a "Reports" menu to access various important reports and "Profile" to manage user account information. The intuitive design ensures easy access to all important functions, providing an efficient and comfortable user experience.

4. Add Item Category Page

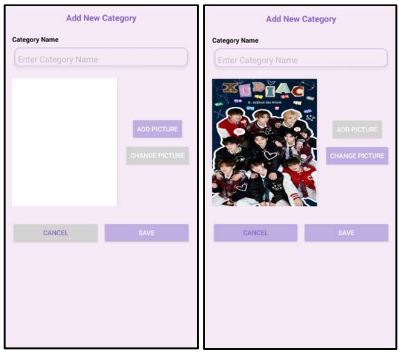

Figure 9 Add New Category

Zena.id's "Add New Category" page allows users to input category names and add photos as icons in the main menu. Users can upload photos of new icons with "Change Picture" button which makes it easy to change images. In addition, there is a "Cancel" button to cancel changes and a "Save" button to save the new category. This page design ensures the process of adding new categories is smooth and intuitive.

5. Main menu page after successfully adding an item

Figure 10 main menu page after successfully adding an item

After the image has been successfully added, the main menu page displays the new collection visible in the "Item" section. The uploaded image is clearly shown, showcasing the content related to the managed item. There is also an additional option (+) next to the image, allowing users to add a new item.

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The main navigation menu at the top still provides access to other features, such as "Transaction" and "Order Status," while the menu at the bottom continues to offer convenience for viewing reports or the user profile.

3.5 Testing

The final step is testing the system that has been created. This test was carried out to measure the extent to which problem resolution was achieved through the Zena.id application. The following is a system testing table using the black box method:

Table 4 Testing Result

No	Tested Features	Test Type	Description	Status
1.	User Registration	Functionality Testing	Test whether new users can register with valid data.	Succeed
2.	User Login	Input Validation Testing	Ensure users can log in only with the correct email and password.	Succeed
3.	Forgot Passwors	Input Validation Testing	Test whether users can request a password reset link by providing a valid email address and whether the system sends the reset link accordingly.	In Progress
4.	Upload Image	Data Limitation Testing	Test whether the system can accept images of the appropriate size and reject those that exceed the limit.	Succeed
5.	Add Item Process	Functionality Testing	Test whether users can add new items to the system with complete information.	Succeed
6.	Item Delete Process	Functionality Testing	Test whether users can delete existing items from the items list.	Succeed

IV. CONCLUSION

Based on research on the goods data management system in K-pop merchandise delivery services, it can be concluded that the system effectively restricts access based on user roles, granting owners full control over all application features while limiting staff access according to their responsibilities. This approach enhances data security and operational efficiency. The development process focuses on creating an intuitive interface, structured input forms, and

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role-based access control, making it easy for users to manage goods and transaction data. Black box testing results show an overall success rate of 83.33%, with 5 out of 6 main features functioning as expected. However, the "Forgot Password" feature remains "In Progress," accounting for 16.67% of the total tested features, indicating that further testing and optimization are required to better meet user needs and preferences.

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