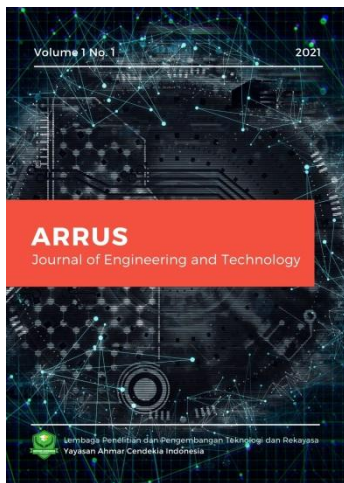




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RESEARCH ARTICLE

Implementation of Flutter-Based Inventory Management Information System for Furniture and Electronic Products

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Abstract: Inventory management plays an important role in ensuring the efficiency of operational activities within a company. However, many small and medium enterprises still rely on manual recording systems, which often lead to data inaccuracies, delays in reporting, and difficulties in monitoring stock levels. This study aims to design and implement a mobile-based inventory management information system using the Flutter framework integrated with Firebase database technology. The research was conducted at PT Mandiri Jaya, a company engaged in the sale of furniture and electronic products in Pandeglang Regency. The system was developed to support real-time recording of stock in and stock out transactions, product data management, and inventory reporting. The research method applied is a system development approach involving requirement analysis, system design, implementation, and testing. The results show that the developed system is able to improve the efficiency and accuracy of stock management, reduce human errors in recording inventory data, and provide faster access to information for management. The implementation of Flutter-based mobile applications also enables cross-platform access and improves operational effectiveness in managing inventory activities.

Keywords: Inventory Management System, Flutter, Firebase, Mobile Application, Stock Management

1. Introduction

The rapid advancement of information technology has significantly transformed the way organizations manage their business processes. Information systems are no longer limited to administrative support but have evolved into strategic tools that assist organizations in improving operational efficiency and decision-making processes (Laudon & Laudon, 2020). With the integration of digital technologies such as cloud computing, mobile applications, and data analytics, companies are able to process large volumes of data more efficiently and provide real-time information for managerial activities (Turban et al., 2021).

In the business sector, the use of information systems has become increasingly essential in supporting operational management, including inventory control. Inventory management is a



critical component of business operations because it ensures that the right products are available in the right quantity and at the right time. Effective inventory management can reduce operational costs, minimize the risk of stock shortages or excess inventory, and improve customer satisfaction (Heizer, Render, & Munson, 2020). Conversely, ineffective inventory management often leads to operational inefficiencies and inaccurate data that may negatively affect business performance.

Many small and medium enterprises still implement manual inventory recording systems using notebooks or spreadsheet applications. Although these methods are relatively simple to implement, they often lead to various problems such as delayed data updates, data inconsistencies, and difficulties in generating accurate reports. According to Stair and Reynolds (2020), manual data processing increases the likelihood of human error and reduces the efficiency of organizational information flow. As the volume of transactions increases, the limitations of manual systems become more evident, especially in businesses that handle frequent inventory movements.

PT Mandiri Jaya is a company engaged in the sale of furniture and electronic products in Pandeglang Regency. As the business grows and the number of products increases, the company faces challenges in managing inventory efficiently. The current inventory recording process is still conducted manually, which often results in discrepancies between recorded stock data and the actual physical stock in the warehouse. Additionally, the process of checking product availability takes considerable time because employees must verify stock information directly from manual records or the warehouse. This situation can slow down customer service and reduce operational efficiency within the organization.

To address these challenges, companies require an integrated information system capable of providing accurate and real-time inventory data. Mobile-based applications have emerged as an effective solution because they enable users to access information anytime and anywhere through smartphones or other mobile devices. Flutter, a cross-platform mobile application development framework developed by Google, offers high performance, flexible user interface design, and the ability to build applications for multiple platforms from a single codebase (Subramanian, 2021).

Furthermore, the integration of Flutter with cloud-based databases such as Firebase enables real-time data synchronization between users and devices. This technology allows inventory data to be updated instantly whenever stock transactions occur, thereby improving data accuracy and accessibility. Real-time database systems also support collaborative data access among different organizational roles, including warehouse staff, sales staff, and management (McGrath, 2020).

Based on these considerations, this research aims to develop a mobile-based inventory management information system using Flutter technology integrated with Firebase database. The system is expected to support real-time stock recording, provide structured transaction history, and generate inventory reports that can assist management in making accurate and timely decisions. Through the implementation of this system, PT Mandiri Jaya is expected to improve the effectiveness and efficiency of its inventory management processes while reducing the risk of errors associated with manual data recording.

2. Literature Review

2.1. Management Information Systems

A Management Information System (MIS) is an integrated system designed to collect, process, store, and distribute information to support decision-making processes within an organization. The implementation of MIS enables organizations to manage data efficiently and transform it into useful information that can support managerial planning, controlling, and operational activities. According to Laudon and Laudon (2020), management information systems play a

crucial role in organizations by integrating information technology with business processes to produce accurate and timely information for managers.

The development of information technology has significantly transformed the role of MIS in modern organizations. Initially, information systems were mainly used for recording transactions and storing data. However, with the advancement of digital technologies, MIS now supports analytical processes and strategic decision-making. Turban et al. (2021) explain that modern information systems utilize various technologies such as cloud computing, mobile platforms, and big data analytics to enhance organizational flexibility and improve access to information.

The use of MIS can improve organizational efficiency by reducing manual data processing, minimizing human error, and enabling faster information retrieval. Furthermore, the integration of information systems across different departments allows organizations to coordinate their operational activities more effectively. As a result, companies that adopt information systems strategically are able to improve productivity and gain competitive advantages in the marketplace (O'Brien & Marakas, 2019).

2.2. Inventory Management Systems

Inventory management systems are information systems designed to monitor, control, and manage the availability of goods within an organization. Effective inventory management ensures that products are available when needed while minimizing excessive stock that may lead to increased storage costs. According to Heizer, Render, and Munson (2020), inventory management is a critical component of operations management because it directly affects customer satisfaction, operational efficiency, and financial performance.

In many small and medium-sized enterprises, inventory management is still performed manually, which often leads to inaccuracies in stock records and delays in updating inventory data. These problems can negatively impact business performance, especially in retail and trading sectors where product availability is crucial. The adoption of computerized inventory systems can significantly improve stock monitoring by providing real-time updates and automated reporting features (Stevenson, 2021).

2.3. Mobile Application Development Using Flutter

Mobile application development has become increasingly important as smartphones have become a primary platform for accessing digital services. One of the popular frameworks used in modern mobile application development is Flutter. Flutter is an open-source framework developed by Google that allows developers to build cross-platform applications using a single codebase (Google, 2023).

Flutter utilizes the Dart programming language and provides a rich set of pre-designed widgets that enable developers to create visually attractive and highly responsive applications. According to Sneath (2022), Flutter offers several advantages compared to traditional mobile development frameworks, including faster development time, improved performance, and a consistent user interface across different platforms such as Android and iOS.

Another advantage of Flutter is its hot reload feature, which allows developers to instantly view changes made to the application code without restarting the entire application. This feature significantly accelerates the development process and enhances developer productivity. Additionally, Flutter applications are known for their high performance because they are compiled directly into native machine code (Sneath, 2022).

Due to these advantages, Flutter has become a popular choice for developing business applications, including inventory management systems. By utilizing Flutter, developers can create

mobile applications that allow users to manage stock data, record transactions, and monitor inventory levels efficiently through mobile devices.

2.4. Previous Studies

Several studies have examined the development and implementation of information systems for inventory management using mobile technologies. Research conducted by Rahman and Setiawan (2021) developed a mobile-based inventory system that improved stock monitoring and reduced errors in manual inventory recording. The study found that the system significantly improved the efficiency of inventory management processes.

Another study by Kalsum and Rakhim. (2022) focused on the implementation of mobile application technology for small and medium enterprises in managing product stock. The results showed that mobile-based inventory systems helped business owners access stock information more quickly and accurately, thereby improving operational decision-making.

Furthermore, research conducted by Wijaya and Santoso (2023) explored the development of inventory management applications using the Flutter framework. The study demonstrated that Flutter-based applications provide high performance, responsive interfaces, and improved user experience. These findings indicate that Flutter is a suitable technology for developing modern inventory management systems.

3. Research Method and Materials

3.1. Research Design

This study employed a system development research approach to design and implement a mobile-based inventory management system for managing furniture and electronic product stock. The research focused on developing an application that can assist businesses in recording, monitoring, and managing inventory more effectively.

The development process followed a system development life cycle (SDLC) approach, which consists of several stages including requirement analysis, system design, application development, system testing, and implementation.

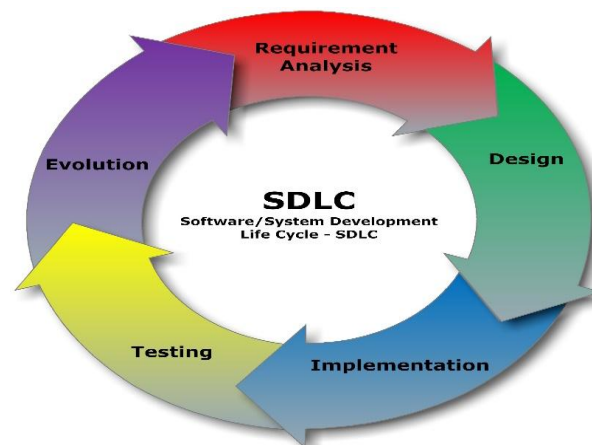


Figure 1. System Life Development Life Cycle Diagram

This approach was chosen because it provides a structured framework for developing information systems and ensures that the final application meets user requirements.

The research process was conducted through several stages starting from identifying existing problems in manual inventory management, designing a mobile-based system using Flutter, and evaluating the effectiveness of the developed system.

3.2. Research Materials

The materials used in this study consist of software tools, hardware components, and supporting technologies required to develop the mobile application. The application was developed using the Flutter framework and the Dart programming language to ensure cross-platform compatibility. The main materials used in this research are presented in Table 1.

Table 1. Main materials

No	Component	Description
1	Flutter Framework	Used to develop the mobile-based inventory management application
2	Dart Programming Language	Programming language used to build the application
3	Android Studio / Visual Studio Code	Integrated Development Environment (IDE) used for application development
4	Firebase / Database	Used to store inventory data and product information
5	Smartphone Device	Used to test and run the developed application

3.3. Data Collection Methods

Data collection in this research was conducted using several techniques to obtain accurate and relevant information regarding the existing inventory management process.

3.3.1 Observation

Observation was conducted by directly examining the current inventory management process used in the business. This method allowed the researcher to identify existing problems such as manual stock recording, delayed data updates, and difficulties in monitoring product availability.

3.3.2 Interviews

Interviews were conducted with business owners and employees responsible for managing product inventory. The purpose of the interviews was to gather detailed information regarding user requirements, current operational challenges, and expectations for the new system.

3.3.3 Documentation

Documentation was used to collect supporting data such as product lists, stock records, transaction reports, and other related documents that are relevant to the inventory management process.

3.4. System Development Method

The system development process followed the System Development Life Cycle (SDLC) method, which consists of several stages as shown in Table 2.

Table 2. System Development Stages

Stage	Description
Requirement Analysis	Identifying user needs and system requirements based on observation and interviews
System Design	Designing system architecture, database structure, and user interface
Application Development	Developing the mobile application using Flutter and Dart
Testing	Conducting system testing to ensure that the application functions correctly
Implementation	Deploying the application for user use and evaluating its performance

3.5. System Testing Method

The developed system was evaluated using functional testing, particularly Black Box Testing, to verify that each feature of the application works according to its intended function. This testing focuses on validating system functionality without examining the internal code structure.

The testing process included evaluating features such as product data input, stock updates, transaction recording, and report generation. The results of the testing process help determine whether the system operates correctly and meets user requirements.

4. Results and Discussion

4.1. System Architecture

The result of this research is the development of a mobile-based inventory management system designed to manage furniture and electronic product stock efficiently. The system was developed using the Flutter framework, which allows cross-platform mobile application development with high performance and a responsive user interface.

The system architecture consists of three main components: the user interface layer, the application logic layer, and the database layer. The user interface layer is responsible for displaying information and interacting with users through a mobile application. The application logic layer processes user requests and manages data transactions. Meanwhile, the database layer stores product information, stock data, and transaction records.

The overall architecture enables users to input product data, update stock levels, and monitor inventory conditions through a mobile device. This architecture improves data accessibility and reduces the risk of data recording errors commonly found in manual inventory systems.

4.2. System Features

The developed application provides several main features that support the inventory management process. These features are designed to simplify the process of recording and monitoring product stock within the system.

Table 3. Main System Features

No	Feature	Description
1	Product Data Management	Allows users to add, edit, and delete product information
2	Stock Monitoring	Displays current product stock levels in real time
3	Transaction Recording	Records product inflow and outflow transactions
4	Reporting	Generates reports related to product stock and transaction history
5	User Interface Dashboard	Provides a summary view of inventory information

4.3. Unified Modeling Language

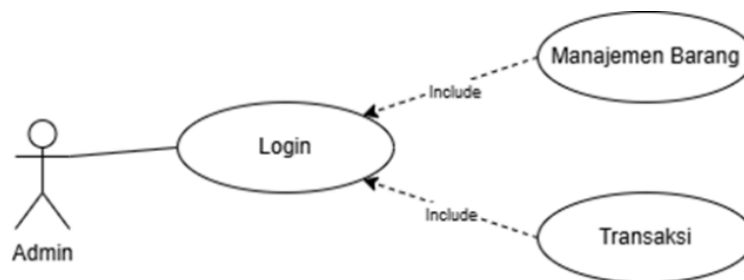


Figure 2. Use Case Diagram

Use Case Diagram is a type of diagram in the Unified Modeling Language (UML) that is used to illustrate the interaction between actors and the functionalities (use cases) within a system or application. This diagram describes how users interact with the system and identifies the features or services that can be accessed by each type of user.

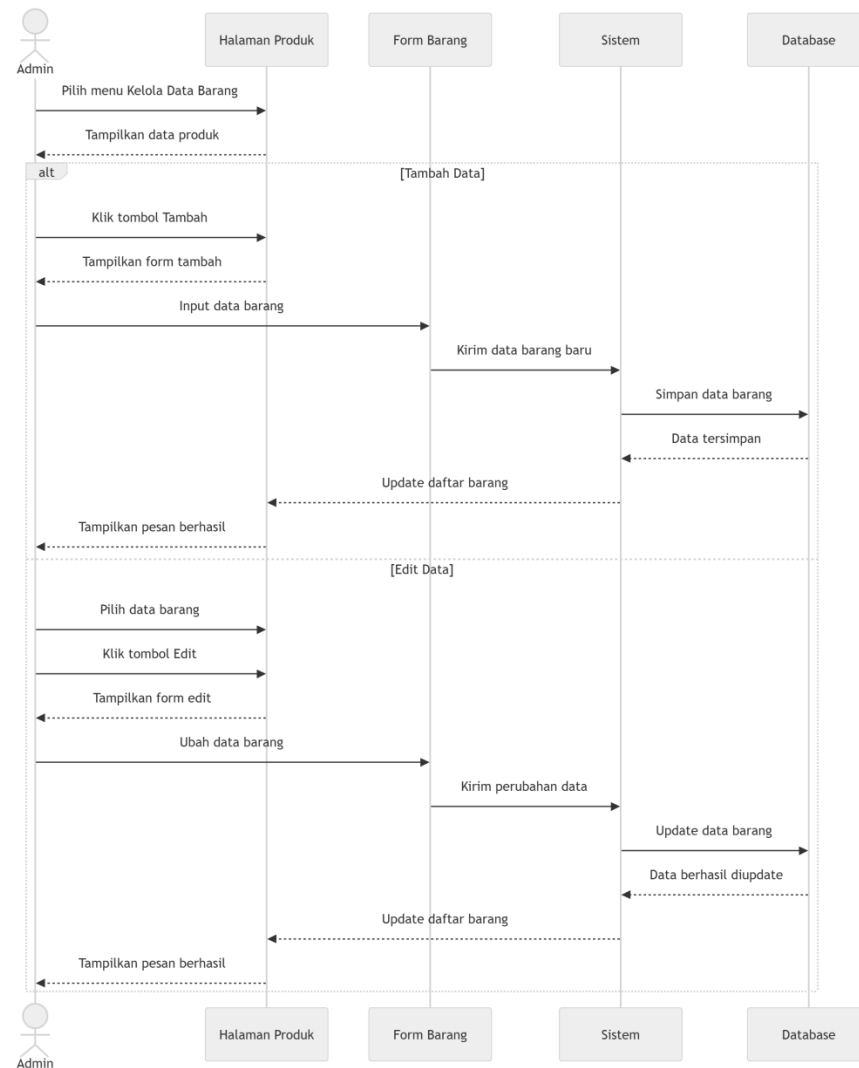


Figure 3. Sequence Diagram

4.4. Application Interface

The application interface was designed to be simple and user-friendly to ensure that users can easily operate the system. The main interface includes several screens such as the login page, dashboard page, product management page, and transaction page.

The dashboard interface provides a summary of product stock information and allows users to quickly access different system features. The product management interface allows users to input product data including product name, category, price, and stock quantity. Meanwhile, the transaction interface is used to record product inflow and outflow, which automatically updates the inventory database.

The use of Flutter widgets enables the application to present a modern and responsive user interface that improves user experience during system interaction.

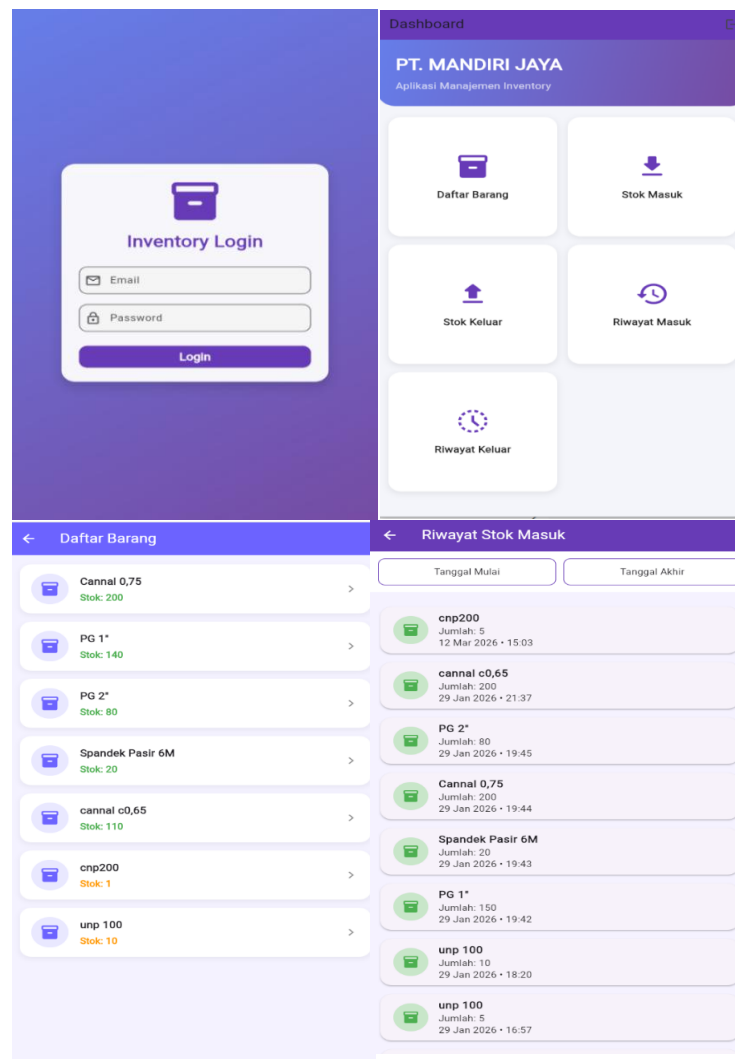


Figure 4. User Interface

4.5. Testing

System testing was conducted to evaluate the functionality and reliability of the developed mobile-based inventory management application. The purpose of this testing phase was to ensure that all system features operate correctly and meet the user requirements identified during the system analysis stage.

In this study, the Black Box Testing method was used to verify the functionality of the system. Black Box Testing focuses on examining the system's functionality based on input and output without analyzing the internal program structure. This method is commonly used in software testing to validate whether the developed application performs according to the expected system specifications (Pressman & Maxim, 2020).

The testing process involved evaluating several important functions of the application, including login authentication, product data management, stock monitoring, and transaction recording.

Each function was tested by providing specific input scenarios and observing whether the system produced the expected output. The results of the testing process are presented in Table 5.

Table 5. Functional Testing Results

No	System Component	Test Scenario	Expected Result	Test Result
1	Login System	User enters valid username and password	User successfully accesses the system	Successful
2	Product Data Input	User adds new product information	Product data stored in database	Successful
3	Product Data Update	User edits existing product information	Updated data saved correctly	Successful
4	Product Data Deletion	User deletes product data	Product removed from database	Successful
5	Stock Monitoring	User views stock information	System displays accurate stock data	Successful
6	Transaction Recording	User records product inflow/outflow	Stock quantity updated automatically	Successful
7	Report Generation	User generates inventory report	System displays accurate report	Successful

Based on the testing results, all application functions operated according to the expected outcomes. The testing results indicate that the system successfully performs inventory management processes such as recording product data, updating stock levels, and generating reports.

Furthermore, the testing process confirmed that the application interface is responsive and easy to use, allowing users to interact with the system efficiently. This suggests that the developed mobile application is suitable for supporting inventory management activities in small and medium-sized businesses dealing with furniture and electronic products.

Overall, the testing results demonstrate that the implemented system meets the functional requirements and can improve the accuracy and efficiency of inventory management compared to conventional manual methods.

5. Conclusion

This study aimed to design and develop a mobile-based inventory management system for managing furniture and electronic product stock using the Flutter framework. The development of this system was motivated by the limitations of manual inventory management processes, which often lead to data inaccuracies, delays in stock monitoring, and difficulties in managing product information efficiently.

The results of the study show that the developed application successfully provides several important features, including product data management, stock monitoring, transaction recording, and inventory reporting. These features allow users to manage inventory data more efficiently and accurately through a mobile application. The use of the Flutter framework also enables the system to provide a responsive user interface and reliable performance across mobile devices.

System testing using the Black Box Testing method indicates that all application functions operate according to the expected system requirements. The testing results confirm that the application can effectively support inventory management processes such as adding product data, updating stock information, recording transactions, and generating reports.

Overall, the implementation of the mobile-based inventory management system contributes to improving operational efficiency and reducing errors in inventory recording compared to conventional manual methods. The system can serve as a practical solution for small and medium-sized businesses in managing product inventory more effectively.

For future research, further development can be carried out by integrating the system with cloud-based databases, implementing real-time data synchronization, and adding analytical features to support better business decision-making.

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