Mobile Financial Management Application at Yanto Pulsa Using Flutter

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Abstract

The utilization of digital technology in financial management had become an important need for micro, small, and medium enterprises (MSMEs) to improve recording accuracy and facilitate financial monitoring. However, many MSMEs still relied on manual financial recording, which led to recording errors and difficulties in data management. This study aimed to develop a mobile-based financial recording application as a solution for financial management at Yanto Pulsa. The system was developed using the Waterfall method, which consisted of requirement analysis, system design, application development, and testing stages. The application was built using the Flutter framework with Firebase as the backend, Cloud Firestore as the database, and Google Apps Script as an integration bridge to Google Drive. The results showed that the application was able to record income and expense data in real-time, present financial summaries, and support automated profit-and-loss calculations. Black-box Testing results indicated that all application functions operated according to user requirements with a 100% functional success rate. Furthermore, User Acceptance Testing (UAT) conducted by the primary owner and a backup user confirmed that the application successfully improved operational time efficiency and data accuracy, despite several enhancement notes regarding future data restoration capabilities and input validation locks.

Keywords*: MSMEs, mobile application, financial management, Flutter, Firebase.*

1. Introduction

The development of digital technology, especially on mobile devices, has led to the emergence of various innovative applications that support human activities in various fields, including business management [1], [2]. Mobile applications are now used not only as a means of communication and entertainment, but also as a solution to improve operational efficiency, data recording accuracy, and decision-making quality [3]. This situation has encouraged businesses, including micro, small, and medium enterprises (MSMEs), to begin adopting to the use of digital technology in their daily operations [4], [5].

Nevertheless, in practice, many MSMEs have yet to optimally adopt digital systems, particularly in financial management [6]. The process of recording revenues and expenses is still frequently conducted manually or in an unstructured manner, which can potentially lead to recording errors, data loss, and difficulties in monitoring financial conditions in real time [7]. This issue is also observed at Yanto Pulsa, a micro-enterprise in the form of a small shop that offers a diverse range of products and services, including groceries and daily necessities, cellular credit and data packages, PPOB services, electronic devices, and electronic repair services.

Yanto Pulsa has utilized information technology to support its operational activities and customer service, primarily through messaging applications and online sales platforms. However, the current implementation of technology remains limited to service and transaction aspects, whereas internal data management, specifically financial administration, lacks a practical and structured digital system. Recording of income and expenditures is still conducted conventionally using physical ledgers. Furthermore, cash flow calculations, including the determination of total revenue, expenses, and net profit or loss, are still performed manually.

This issue is exacerbated by the store's daily operations, which are managed independently by a single owner. Manually recording financial transactions while simultaneously serving customers is considered impractical, leading the owner to frequently neglect the documentation of minor cash flows [8]. Consequently, the financial data becomes inaccurate, making it challenging to determine the exact profit and loss of the business. Furthermore, these unrecorded transactions result in discrepancies between physical balances and existing records [8]. Manual financial recording also hinders the owner from

preparing systematic financial reports, as the process is time-consuming and labor-intensive. Additionally, the current manual system is deemed obsolete and insecure, given that physical records are susceptible to loss or damage without any digital backup.

The absence of a practical and structured digital financial record-keeping system imposes limitations and various challenges that hinder store operations [4], [9]. Furthermore, the lack of awareness regarding the importance of digital financial documentation remains a significant factor obstructing the optimization of financial management, including at Yanto Pulsa [3]. These conditions demonstrate that the adoption of digital technology is essential for MSMEs to support their business management activities. Implementing a digital financial management system serves as a viable solution for MSMEs, such as Yanto Pulsa, to ensure that financial management processes are conducted more effectively and efficiently [3], [7].

Although various popular digital financial applications are available, such as Buku Kas, Money Lover, Wallet, Money+, and others that are equipped with various features, not all users find these applications suitable [10]. An excessive number of features can be confusing or lead to a mismatch with certain user preferences [11]. Additionally, advertisements appearing within the applications are a source of annoyance. Several reviewed studies indicate that custom-built applications with minimal features can effectively address user issues, provided the available features align with user needs and function well [11]. Prior research by [12] developed a simple financial transaction recording application based on Flutter with MongoDB database integration. The results of that study demonstrated that the developed application was able to significantly simplify the financial recording process. In line with this, similar studies conducted by [13] and [14] also showed that the Flutter framework is capable of producing applications that address user problems, even though the databases used differed from the previous study [12]. The novelty of this study, compared to previous research and similar applications, lies in the specialized interface and features tailored to user preferences, as well as the use of Google Apps Script as an integration bridge for the manual data backup mechanism to the user's Google Drive.

This study develops an Android-based financial recording application for Yanto Pulsa using Flutter. The application supports real-time income and expense recording, simple financial visualization, cloud data storage through Firebase, and Google Drive backup using Google Apps Script [15]. The application is designed for the store owner as the main user and also tested by the owner’s wife as a backup administrator. Its implementation is expected to improve financial recording, support financial monitoring, reduce data loss risk, and encourage MSMEs to adopt digital technology.

2. Research Method

2.1. Research Framework

The framework of this research is carried out in six main stages, which incorporate the development methods to be conducted, as illustrated in Fig. 1 below.

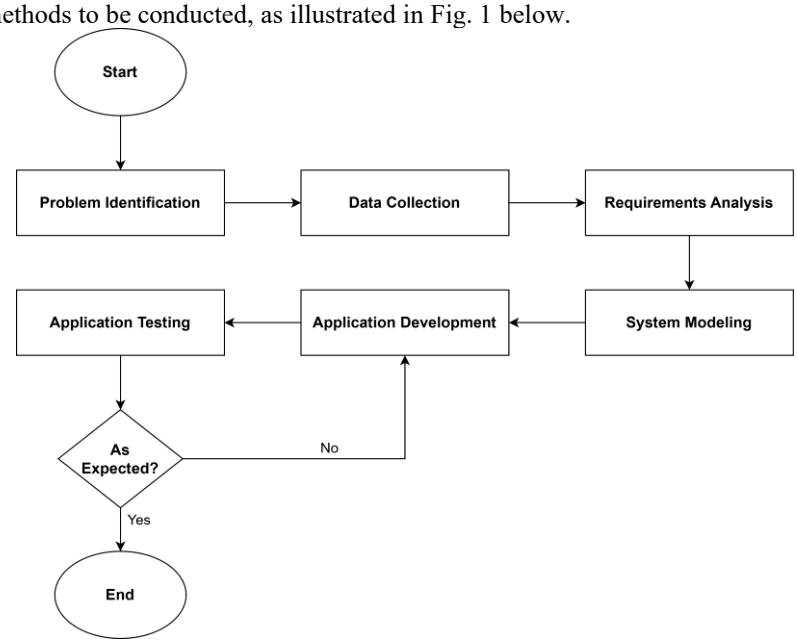

Fig. 1 Research Flowchart

Based on Fig. 1, this study was conducted through six main stages. The first stage involved problem identification to analyze the actual challenges in MSME financial management. The second stage was data collection through observation, interviews, and literature review. The third stage focused on

requirements analysis to determine user preferences, application features, and supporting development tools.

The fourth stage was system design, which included the architecture, workflow, database, interface, and main system functions using UML and wireframes. The fifth stage was application development, covering backend and frontend implementation, Firebase configuration, and feature development. The final stage was application testing using Blackbox Testing and User Acceptance Testing (UAT) to ensure that the system met user requirements.

2.2. Research Object, Location, and Timeframe

This study focused on Yanto Pulsa, a microenterprise located in Kalinongko Village, Loano District. The business is managed by Mr. Suriyanto and provides a range of services, including groceries, cellular credit, data packages, PPOB services, electronic devices, and electronic repair. The research examined the manual financial recording process through observation, interviews, and literature review to develop a suitable mobile-based financial recording application.

The research was conducted at Toko Yanto Pulsa from June to August 2025. Data collection was conducted directly at the business location in June 2025, while the application design and development were conducted in July and August 2025.

2.3. Data Collection Methods

Data were collected using a qualitative approach in June 2025 through interviews, observation, and literature review. Interviews were conducted in two stages to identify financial recording problems and determine system requirements, including the dashboard, income and expense modules, data deletion, and Google Drive backup features.

Observation was conducted for approximately 1 week to examine daily transactions, workflows, and manual recording practices at Yanto Pulsa. The findings showed that manual recording was inefficient, often incomplete, and caused discrepancies between cash balances and written records.

A literature review was also conducted to strengthen the theoretical basis for mobile application development, data management, and the appropriate system architecture for the proposed financial recording application [16]. The development method used in this study is the Waterfall method. This method was chosen because it has systematic stages and is easy to apply in the development of small to medium-scale applications [17]. As shown in Fig. 1, the development stages include requirements analysis, system design, application development, and testing [18], [19]. These steps are systematically illustrated in Fig. 2 as follows:

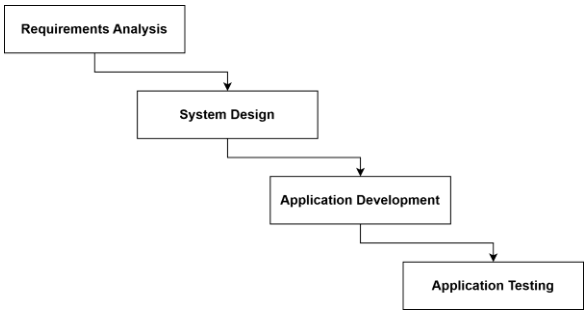

Fig. 2 Waterfall method (adapted from [18] and [19])

In the requirements analysis stage, functional and non-functional requirements of the application are identified based on the results of observations and interviews. The design stage is carried out to compile the structure and flow of the system using Unified Modeling Language (UML) modeling and wireframe [20].

2.4. System Implementation Plan

2.4.1. Hardware

The application was developed using an Advan Workplus laptop equipped with an AMD Ryzen 5 6600H processor, 16 GB LPDDR4X RAM, and 512 GB NVMe SSD storage. For end-user implementation, the application is intended to run on a Motorola G45 5G smartphone with Android 15, which is also used as the main compatibility target during testing.

2.4.2. Software

The application was developed using Visual Studio Code, Flutter, and the Dart programming language. Firebase Firestore was used for real-time transaction data storage, while Google Apps Script functioned as an integration bridge for backing up data to Google Drive. Supporting tools included Draw.io for system diagrams, Canva for interface design, and Google Drive as the backup storage medium.

2.4.3. System Transition Plan

The transition from manual recording to the digital system was carried out through three stages. First, the compiled Flutter application in APK format was installed on the user's smartphone. Second, selected financial records from the previous month were migrated into the system. Third, brief user training was

conducted through direct application trials involving the business owner as the primary user and his wife as the backup user.

2.5. System Testing Techniques

2.5.1. Blackbox Testing

Blackbox Testing was conducted to evaluate the main application functions without examining the internal program structure [21]. Each feature was tested to ensure that the input produced the expected output. Testing involved the Yanto Pulsa owner to confirm that the application met daily operational needs.

2.5.2. User Acceptance Testing (UAT)

UAT was conducted qualitatively to validate whether the application met user needs and expectations [22]. The testing involved the business owner as the primary user and his wife as the backup user. Data were collected through semi-structured interviews after users operated all application features. The evaluation focused on interface usability, suitability of system functions with business workflows, and feature effectiveness in supporting daily financial recording.

3. Result and Discussion

3.1. Requirements Analysis

Requirements analysis was conducted to identify the existing financial recording process and user needs at Yanto Pulsa. Based on observations and interviews with the business owner in June 2025, financial records were still managed manually using notebooks, causing difficulties in real-time cash flow monitoring, data backup, and balance accuracy. Therefore, a mobile-based financial recording application was needed to support more practical, secure, and structured financial management.

The application is designed for the business owner as the main user and the owner's wife as a backup user. The main requirements include a financial summary dashboard, real-time income and expense recording, data deletion based on time range, and manual backup to Google Drive using Google Apps Script. The application is optimized for Android 15 and uses Firebase Firestore for secure, consistent, and real-time cloud data storage. These requirements became the basis for designing and developing the application according to the operational needs of Yanto Pulsa.

3.2. System Design

System design is conducted as a follow-up to the results of the requirements analysis with the aim of describing the application's workflow and main functions in a structured manner before entering the program code implementation stage. The system design is made using Unified Modeling Language (UML) modeling, which includes three main models with the help of Draw.io tools. A Use Case Diagram is applied to map the functional interactions between the business owner actors, including the owner's wife as a backup manager, with the system, as visualized in Fig. 3. The system's detailed workflow is represented through an Activity Diagram covering six main processes, namely view financial data, manage income data, manage expense data, back up to Drive via Google Apps Script, view application information, and delete data based on a time range. Meanwhile, the database structure, data types, and relationships between entities are defined through a Class Diagram. In addition to the logical design, the visual interface design is formed using wireframes through the Canva platform to ensure the application's visual structure remains simple, consistent, and adaptive to the screen resolution of the target Android devices.

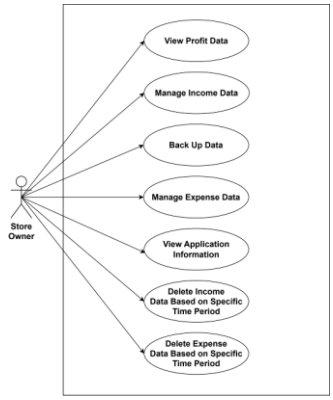

Fig. 3 Use Case Diagram

Functionally, the application manages income and expense data, displays profit summaries through a dashboard, and provides data backup to reduce the risk of data loss. Profit and loss calculations are performed automatically based on stored transaction data.

The system uses separate income and expense collections in Firebase Firestore to simplify data management and support real-time processing. A consistent interface is also applied to improve user comfort during Blackbox Testing and UAT.

3.3. Application Development

3.3.1. Application Interface Implementation

The application interface was implemented based on the wireframe design, with adjustments made during development to ensure a simple and user-friendly display[23]. The main page is the dashboard, which presents financial summaries for today, the last seven days, and the last thirty days. Profit and loss values are calculated automatically from stored income and expenditure data, with green indicating profit and red indicating loss, as shown in Fig. 4

Fig. 4 Dashboard menu display

Next, the application provides an income menu display that is used to display daily income data based on the selected date. Fig. 5 shows a list of income in the form of cards containing the item name, amount, time of recording, and transaction amount. Business owners can change the date using the calendar icon to view data on a specific date. In addition, there is an add data button to add new income and an edit feature to update recorded data.

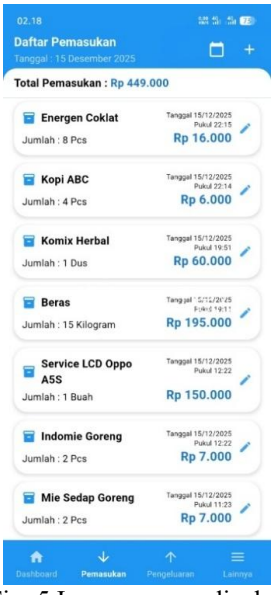

Fig. 5 Income menu display

In addition to the income menu, the application also provides an expenditure menu display that has a similar structure and usage flow. The main difference lies in the type of data displayed and the color coding of expenditure amounts, which are displayed in red. This is intended to visually distinguish expenditure data from income data. The expenditure menu display can be seen in Fig. 6 below.

Fig. 6 Expenditure menu display

The application also comes with other menus that serve as a hub for additional features and application information. This menu offers several features such as deleting income and expenditure data based on a time range, backing up data to Google Drive, information about the application, usage guides, and application version information. Each feature has an icon derived from network images and uses an open-close mechanism so that additional information can be displayed without having to switch pages. The following is another menu view that can be seen in Fig. 7 below.

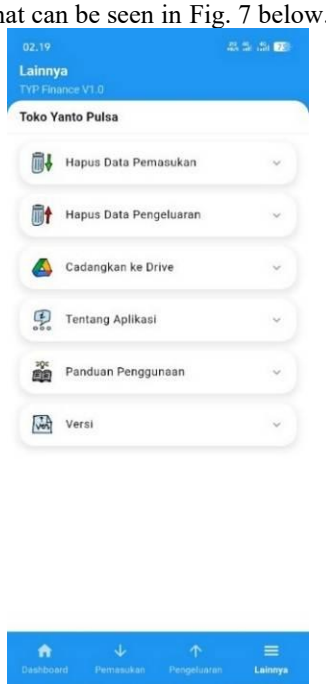

Fig. 7 Other menu display

To support more flexible data recording, the application provides date and time selection features. Fig. 8 shows both features, where the date selection display is used to display or change transaction data based on a specific date, while the time selection display is used when editing transaction data so that the recording time can be adjusted to the actual conditions.

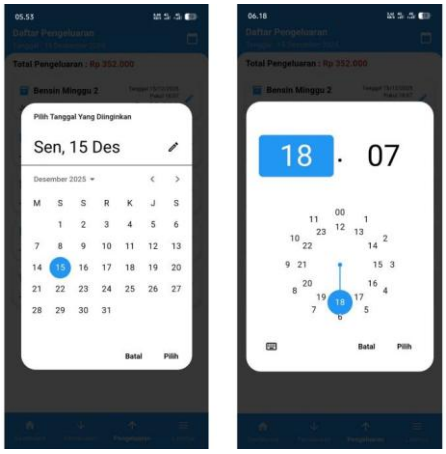

Fig. 8 Select date and time display

The transaction recording process is carried out through the add income and expenditure display, which is presented in the form of a pop-up form. This form contains input fields such as item name, quantity, unit, and transaction amount. In addition, the application also provides an edit income and expenditure display that functions to update data, such as changing the date and time of the transaction if necessary. Fig. 9 shows the add income and expenditure form, while Fig. 10 shows the edit income and expenditure form.

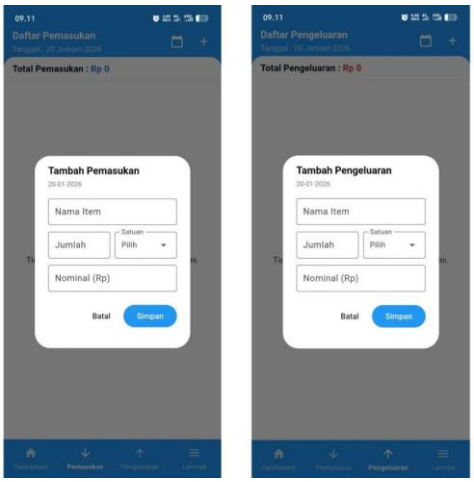

Fig. 9 Display of income and expenditure addition form

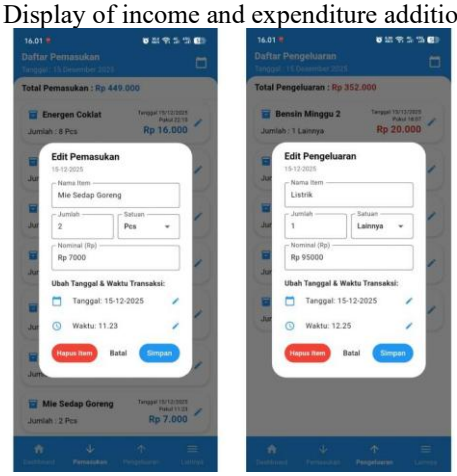

Fig. 10 Display of income and expenditure edit form

As supporting features, the application provides a feature to delete data based on a specific time range and a backup to drive feature that stores financial data in CSV file format to Google Drive. In addition, there is also a display about the application, version information, and usage guidelines to help business owners understand the functions and workflow of the application independently. All of these features can be seen in the collection of images below, where Fig. 11 shows the feature to delete data

based on a specific time range, Fig. 12 shows the feature to back up to Drive, and Fig. 13 shows the application, version, and user guide arranged from left to right.

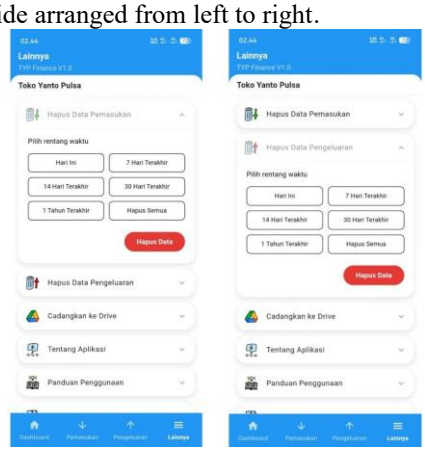

Fig. 11 Display of data deletion feature based on a specific time range

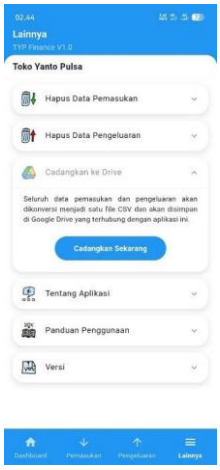

Fig. 12 Display of the backup feature to Drive

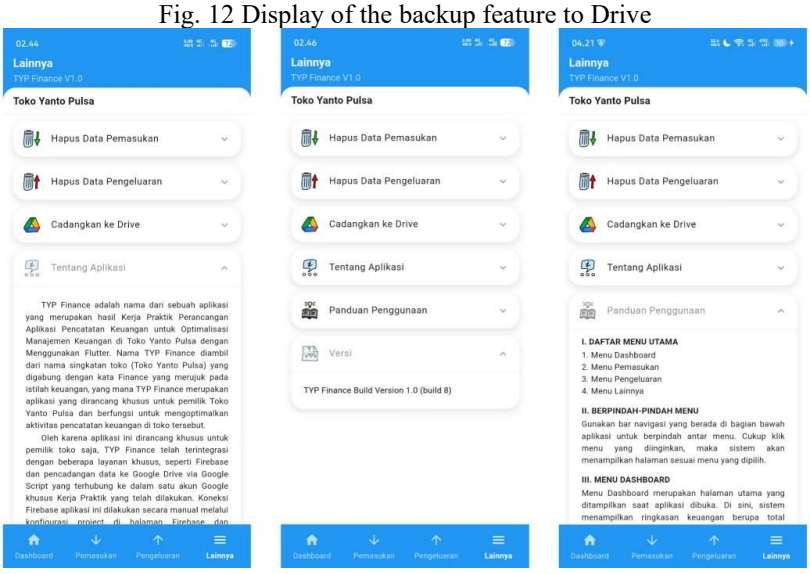

Fig. 13 Display of applications, versions, and usage guides

3.3.2. Backend Implementation and Data Management

The application backend uses Firebase Firestore Database as the main storage medium for income and expenditure transaction data [24] [25]. Data is stored in two separate collections, namely the income collection and the expenditure collection, with a similar field structure to maintain data consistency. Each transaction data is stored using a document ID that is automatically generated by the system. Fig. 14 shows the structure of the income collection and Fig. 15 shows the structure of the expenditure collection.

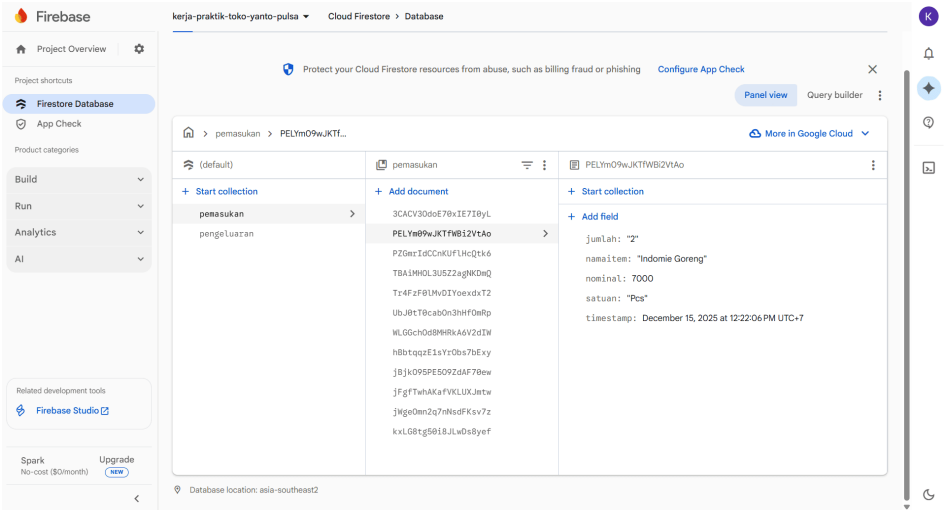

Fig. 14 Income collection structure

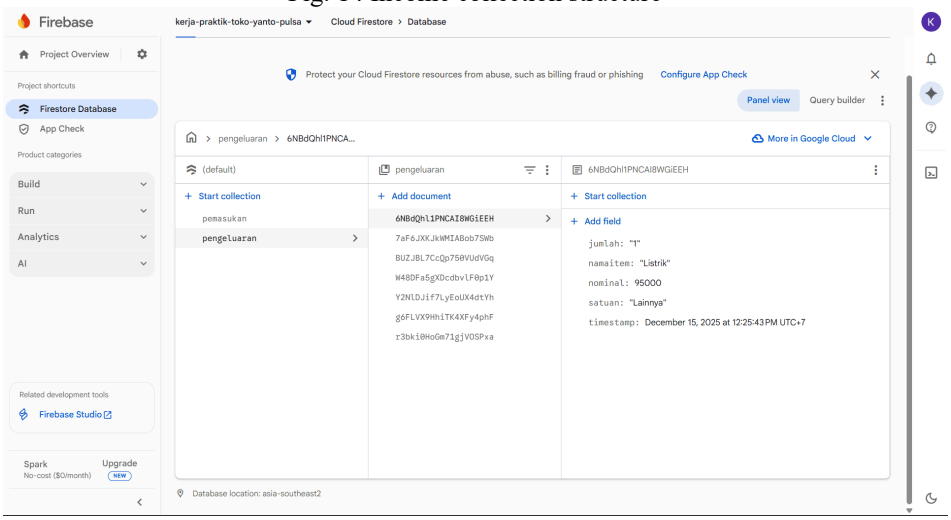

Fig. 15 Expenditure collection structure

In addition, the application utilizes Google Apps Script as an additional backend to support the data backup feature to Google Drive [26] [27]. This backend functions to process transaction data from the application and save it in a CSV file format as a data backup. This implementation aims to improve data security and provide storage alternatives for business owners. Fig. 16 shows the Google Apps Script display used.

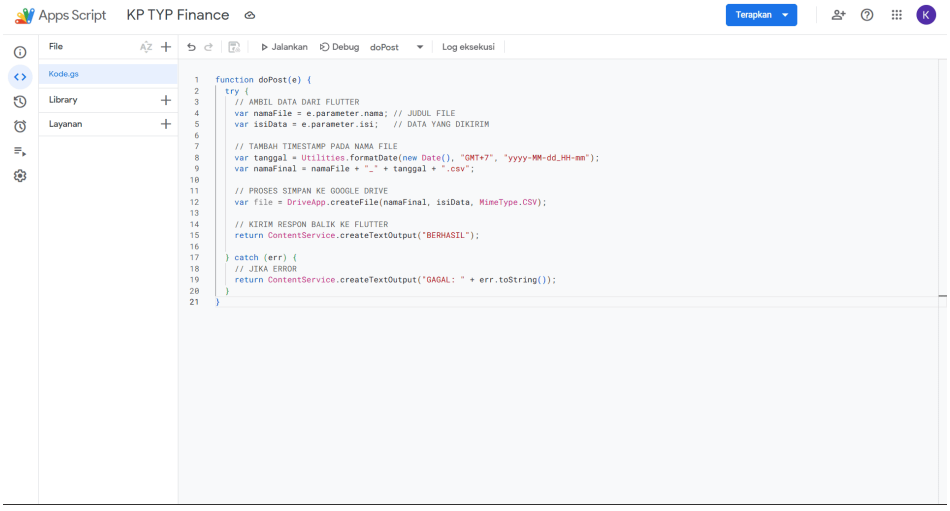

Fig. 16 Google Apps Script display structure

3.4. Application Testing

3.4.1. Blackbox Testing

Based on the results of the Blackbox Testing that has been conducted, all of the application's main functions can run in accordance with system requirements, and no functional errors were found in the features that were tested. The test results data can be seen in Table 1 below.

Table 1. Results of testing with Blackbox Testing

Features Tested	Expected Results	Actual Results	Status
Menu Navigation	All menus are accessible and you can move between menus	Navigation is running normally	Pass
Financial summary dashboard	The dashboard displays financial summaries well	The data is displayed well and according to the time range	Pass
Displaying data	Income and expenditure data can be displayed	The data is displayed well	Pass
Displaying data by date	Income and expenditure data can be displayed based on the selected date	The data is displayed correctly according to the selected date	Pass
Add data	Income and expenditure data can be added	Data can be added	Pass
Edit data	Income and expenditure data can be edited	Data can be edited	Pass
Delete data	Income and expenditure data can be deleted	Data can be deleted	Pass
Delete data based on time range	Income and expenditure data can be deleted based on the selected time range	Data can be deleted according to the selected time range	Pass
Back up data	Data can be backed up to Drive	Data successfully backed up to Drive	Pass
Other additional menus	The menu about the application, user guide, and version can be accessed	All other additional menus can be accessed	Pass

Based on the test results in Table 1, all ten features tested through Blackbox Testing received a pass rating. Thus, it can be concluded that this application has a functionality success rate of 100%, meaning that the system is deemed feasible and runs well in accordance with the needs of users at Yanto Pulsa.

3.4.2. User Acceptance Testing (UAT)

UAT testing is conducted on two users, namely the business owner as the primary user as well as the end user, and the business owner's wife who is a backup user. In this testing, the involvement of two user subjects also aims to reduce elements of subjectivity and increase the reliability of the evaluation results. The test scenarios are conducted based on the features that have been tested in the previous Blackbox Testing. Users will be given time to try the overall application features, followed by a Q&A session. Responses from the users will be summarized into an argument, which is then drawn into a conclusion based on that argument [28]. Conclusions will be divided into successful, successful with notes, and failed. As for the results of the UAT testing conducted by both subjects, they can be seen in the following two tables. Table 2 shows the UAT testing results of the business owner, while Table 3 shows the UAT testing results of the primary owner's wife.

Table 2. UAT testing results of the business owner

Features Tested	Results and Feedback	Conclusion
Menu Navigation	The standard navigation menu looks great, and it's very easy to move between menus. The navigation interface is similar to that of most apps today.	Successfull
Financial summary dashboard	The interface is simple and attractive, and the financial summary is displayed as requested.	Successfull
Displaying data	The display for both income and expenses looks exactly the same. The interface is simple yet informative. I can see when data was added or modified, as well as the quantity of items and their prices. The only thing is that all the icons for each item look the same, it would be great if they could be customized in the future.	Successful with notes
Displaying data by date	The feature displays data based on the current date as usual. The calendar view and the steps involved are easy to understand. However, when the data being displayed is from the past, you cannot add new data. So you must first add the data for today and then edit the date so that the past data can be successfully added.	Successful with notes
Add data	Data entry works normally, the interface is simple and clean. The category options are exactly as requested.	Successfull
Edit data	Data editing also works as expected, the interface is simple and clean. The	Successfull

	interface is also consistent with the data entry feature.	
Delete data	The data deletion feature works as expected. The red button is in the correct position. Data is deleted immediately without any warnings or prompts, which speeds up data management.	Successfull
Delete data based on time range	The features work well. The option to select a time range is great, it lets you delete data in bulk. I also like that the features for deleting income and expense data are separate. The only thing is that when you use the delete feature, the data is deleted immediately, so you have to be a little more careful when using it, make sure you don't press the wrong button.	Successful with notes
Back up data	The backup feature is excellent. Your data is saved to Google Drive. However, the feature is limited to just backing up. Just a quick note: it would be great if, in the future, you could restore data from Google Drive back to the app.	Successful with notes
Other additional menus	The additional menu is great, the interface is great too, and there's a user guide as well. Perhaps in the future, this menu could be further developed to include other features that are needed. Overall, the features are more than enough for me to replace manual record-keeping.	Successful with notes

Based on the evaluation results in Table 2, the testing conducted with the primary owner of Yanto Pulsa yields predominantly positive ratings, particularly on the aspects of navigation simplicity and automated calculation functionality. Nevertheless, there are several critical notes from the primary user that become important parameters for further system development. These notes include the need for customization of visual icons for each type of item, restrictions on adding data to past date manipulations, as well as the need for adding a feedback feature (warning prompt) before the execution of bulk data deletion is performed to minimize the risk of operational negligence. This record of arguments confirms that although the system is considered highly feasible to replace physical cash books, the integration of database manipulation flexibility still needs to be improved.

Table 3. UAT testing results of the owner's wife

Features Tested	Results and Feedback	Conclusion
Menu Navigation	The navigation works well, and the interface is user-friendly.	Successfull
Financial summary dashboard	The dashboard is simple yet effective, it automatically displays totals for income, expenses, and profit or loss. Different colors are used to indicate profit and loss, and the system is easy for anyone to understand.	Successfull
Displaying data	Income and expenses are tracked effectively, the interface is user-friendly and informative. You can also view the total income and expenses at a glance, overall, it's a great app.	Successfull
Displaying data by date	The feature works well; the data updates according to the selected date. However, adding older data seems a bit complicated, so it really needs to be entered manually.	Successful with notes
Add data	The data entry feature is excellent. The only drawback is that all fields must be filled in during data entry. While the quick-entry feature is still lacking, it's more than sufficient compared to manual data entry.	Successful with notes
Edit data	The data editing features are also great. They're excellent, comprehensive, and easy to use.	Successfull
Delete data	The data deletion works well and functions as intended.	Successfull
Delete data based on time range	Deleting data by time is great, you can select a time range. The only thing is, the feature is a bit scary because the time range options are quite broad. But that's actually a good thing, since it allows for quick deletion. A suggestion for the future, perhaps you could add a verification step or simply lock the feature to prevent accidental taps.	Successful with notes
Back up data	The backup works well and functions normally.	Successfull
Other additional menus	The other menu items are good, though they're just extras. Overall, everything is great. I just have one suggestion, perhaps the app could be made available offline in the future, given that you never know what might happen.	Successful with notes

Referring to the evaluation results presented in Table 3, the testing involving the store owner's wife as a backup manager provides a supporting perspective focused on the practical aspects of daily

management. The second user emphasizes the aspect of color-contrast visualization that facilitates the identification of profit-deficit as well as the functionality of the time range for bulk data deletion. However, the constraints of filling out mandatory fields are assessed to reduce the speed of data entry when the store is crowded with visitors. In addition, the emergence of a proposal for offline access functionality becomes an important finding to anticipate the instability of the internet network at the business location, so that the continuity of financial administration can be maintained under all conditions.

3.4.3. System Results Analysis

Based on Blackbox Testing and UAT results, the application improved financial management at Yanto Pulsa by replacing manual recording with a real-time digital system. Previously, manual bookkeeping often caused missed transactions, balance discrepancies, and difficulty in calculating daily profit and loss.

After implementation, income and expense data can be recorded directly through smartphones, while cash flow and profit-loss calculations are processed automatically using Firebase Firestore. The Google Drive backup feature also improves data security and reduces the risk of data loss. Overall, the application increases recording accuracy, operational efficiency, and supports better business decision-making.

4. Conclusion

Based on the development and testing results, the mobile-based financial recording application was successfully developed using Flutter with Firebase as the backend. The application supports income and expense recording, financial summaries, date-based data grouping, and Google Drive backup, enabling Yanto Pulsa to replace manual recording with a more efficient, structured, and real-time digital system. Black-box Testing showed that all functions operated properly with a 100% success rate, while UAT confirmed that the application helps reduce recording omissions, save administrative time, and support better financial decision-making.

For future development, the application should be improved by adding a restore feature from Google Drive, a confirmation dialog before bulk data deletion, and local caching to support offline or unstable internet conditions.

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