

Original Research

CashFlowMate: A Cross-Platform Mobile Application for Personal Financial Management

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ABSTRACT

Personal financial recording remains a challenge for most people because it is generally done manually or solely relying on memory. This condition causes transaction data to be easily lost, is difficult to monitor, and makes it difficult for users to accurately determine income and expenditure flows. This study aims to design and build a Flutter-based personal financial recording mobile application that can record income and expenses, manage transaction categories, display financial reports in graphical form, and provide monthly installment reminders through a local notification feature. The research method used is software engineering with a Waterfall development model that includes requirements analysis, system design, implementation, testing, and maintenance. Data collection techniques were carried out through literature studies and observations of the running system, as well as system testing using black box testing and white box testing. The results of the study indicate that the application was successfully developed and all main features can function properly according to the system design, including the transaction recording process, financial report visualization, transaction history, and automatic installment reminders.

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1 INTRODUCTION

The development of digital technology in the modern era has transformed various aspects of people's lives, including personal financial management. The need to record income and expenses is increasing as daily transactions increase. However, many individuals still record their finances manually in notebooks or simply rely on memory. This method often creates various problems, such as poorly documented transaction data, difficulty monitoring financial conditions, and a lack of information regarding spending patterns [1]. This condition makes the financial decision-making process less effective, requiring a solution that can facilitate practical, accurate, and easily accessible financial recording, namely through a mobile application.

Mobile applications are a technological innovation that can facilitate various activities because they can be accessed anytime and anywhere using a smartphone [2]. In the field of personal financial management, mobile applications allow users to record transactions in real time, categorize expenses, present financial reports in visual form, and store data more securely than conventional methods [3]. To ensure the application has good performance, an attractive interface, and can be developed efficiently, this study uses the Flutter framework as an application development platform.

Flutter is an open-source framework developed by Google for building cross-platform applications using a single codebase. This framework supports application development on both Android and iOS operating systems with

performance close to native applications. Furthermore, Flutter provides various responsive interface components, a faster development process through the hot reload feature, and easy integration with various supporting libraries such as SQLite for local data storage and `flutter_local_notifications` for implementing a reminder system. These characteristics make Flutter a relevant framework for developing personal financial recording applications that are easy to use, lightweight, and able to operate without an internet connection [4]. Previous research conducted by Baihaqi [5] focused on developing mobile applications to assist with the financial management of small businesses (MSMEs). This research aimed to design a Flutter-based application that could facilitate business actors in recording transactions, managing accounts payable and receivable, and generating financial recapitulations automatically, thus making the financial management process more effective and efficient. The application development used the Prototype method, with Flutter technology as the frontend, Node.js and Express.js as the backend, and MongoDB as the database. The results showed that the developed application successfully helped business actors record daily transactions digitally, present financial reports, display data visualizations in graphical form, and make it easier for users to monitor their business's financial condition through mobile devices. However, this research was still oriented towards small business financial management with a client-server-based architecture that requires a MongoDB backend and database. Furthermore, this research did not provide installment reminders or monthly billing features and was not specifically designed for personal financial management needs that can be fully used without an internet connection. In contrast to that research, the research conducted here focused on developing a mobile application for recording personal finances based on Flutter that utilizes SQLite as a local database so that all data can be accessed offline, as well as integrating a monthly installment reminder feature using `flutter_local_notifications` [5]. The development of personal financial accounting applications is becoming an increasingly important topic in the information technology sector due to the growing public demand for effective, digital-based financial management. Advances in mobile technology, particularly cross-platform frameworks, enable applications to be developed with high performance, responsive interfaces, and efficiency in development time and costs. Furthermore, current application development trends no longer focus solely on transaction recording functions but also integrate data visualization, offline data storage, and automated reminder systems to enhance the user experience [6].

This research offers a scientific contribution through the development of a mobile application that integrates several key functions into one system, namely recording income and expenses, managing transaction categories, presenting financial reports in graphical form, storing data using SQLite, and a monthly installment reminder feature based on `flutter_local_notifications`. Unlike previous research that generally only focuses on recording transactions or managing budgets, this study combines financial monitoring functions and a payment reminder system in an application that can operate offline. This approach is expected to provide a more comprehensive alternative solution to support personal financial management while enriching the development of Flutter-based applications in the field of personal financial management. Based on the background description, this study aims to design and develop a Flutter-based Personal Financial Recording Mobile Application that is able to help users record income and expenses and group transactions by category.

2 RESEARCH METHODS

Based on the background description that has been presented, the research entitled “CashFlowMate: A Cross-Platform Mobile Application for Personal Financial Management” was conducted as an effort to provide a solution to the problem of personal financial recording which is still done manually and has not been managed optimally. To achieve this goal, a research method is needed that can systematically direct the entire application development process so that the resulting solution is in accordance with user needs. The research method used explains in detail the research procedure, data collection and analysis techniques, system development models, applied algorithms, application development design, use of data sets required during the testing process, and the analytical approach used in evaluating system performance. Through these stages, it is hoped that the developed application will be able to address the research problems effectively and produce a system that has functionality in accordance with the research objectives.

2.1 Research Design / Framework

This research uses systematic system development stages to ensure the design and implementation of the application meet user needs. Each stage has a purpose and interrelated role, starting with requirements analysis,

system design, implementation, testing, and maintenance [7].



Figure 1. Research Design

a. Requirements Analysis

This stage aims to identify the requirements of the system to be developed, including functional and non-functional requirements. Functional requirements include features for recording income and expense transactions, managing transaction categories, presenting financial reports in graphical form, transaction history with a search feature, and monthly installment reminder notifications using Flutter Local Notifications.

b. Design

The design stage involves developing the interface design (UI/UX), data structure, and system architecture. The interface is designed using Figma for ease of use, while the data structure includes category and budget models stored in a SQLite database. This design serves as a reference during the application implementation process.

c. Implementation

The implementation stage is the process of translating the design results into an application using Flutter and the Dart programming language. Data is stored using SQLite, while the notification feature utilizes Flutter Local Notifications. Each application module is tested through unit testing to ensure proper functionality.

d. Testing

Testing is conducted to ensure the application functions as required. Testing includes functional testing of all key features, such as transaction recording, categories, graphical reports, transaction history, and notifications, as well as compatibility testing to ensure the application runs smoothly on various devices and Android operating system versions.

e. Maintenance

The maintenance phase aims to maintain application quality through bug fixes and future feature development. Recommended developments include exporting reports to PDF/Excel, improving graphical displays, enhancing security, and integrating with cloud services or e-wallets. Research data was obtained from literature reviews and testing results of the developed application.

2.2 Dataset / Data Collection

To support the design and development of a Flutter-based personal finance tracking mobile application, this study utilized several data collection techniques to obtain information relevant to the research needs. The techniques used consisted of several methods [8]:

a. Observation

Observations were conducted by observing users' habits in managing their personal finances to identify their needs and challenges. The results of these observations served as the basis for determining the application features to be developed.

b. Literature Review

The literature review was conducted by reviewing books, journals, scientific articles, and previous research related to personal financial recording, financial literacy, and the development of Flutter-based applications as a theoretical foundation and reference for the research.

2.3 System Architecture / Model Design

The structure of the system model in this study is presented in the form of a flowchart to describe the flow of the application's work process, while the system design is visualized using a Use Case diagram to show the

interaction between users (actors) and the functions available in the system [9].

a. Flow Diagram

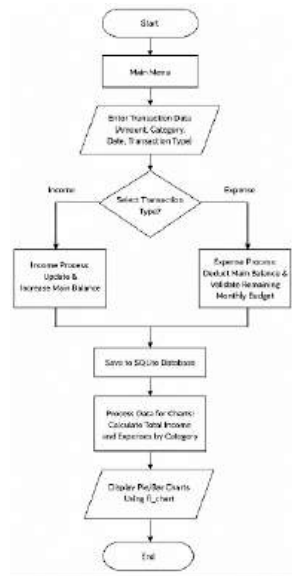


Figure 2. Flowchart System

Figure 2 shows that data stored in a SQLite database is not only displayed as a list, but is further processed through aggregation functions. Based on the theory of interactive data visualization by Romadhoni and Salim [8], the data is converted into a visual representation using the `f1_chart` package. This allows the application to dynamically present income and expenditure graphs, making it easier for users to intuitively analyze their financial condition on both Android and iOS platforms.

b. System Design

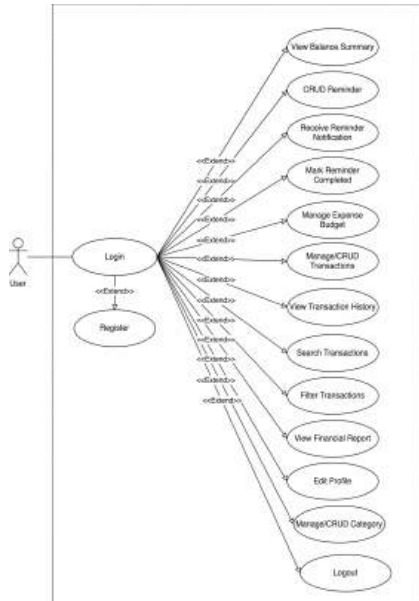


Figure 3. Use Case Diagram

The use case for the personal finance tracking application consists of several main functions accessible to users. Users first register and log in to gain access to the system. Once successfully logged in, they can view a balance summary that automatically displays total income and expenses. Next, users can manage financial transactions using the add, edit, delete, and view transaction data features. The application also provides a reminder management feature that allows users to set periodic transaction or payment reminder notifications. Furthermore, users can view financial reports in graphical form to monitor their financial condition, manage spending budgets to limit spending within specific categories, and search and filter transactions for easier retrieval of transaction history. Users can also change profile information, manage transaction categories as needed, and end a session using the logout feature. All of these use cases are designed to support effective,

structured, and user-friendly personal finance management.

2.4 Experimental Setup

In the process of designing, developing, and testing applications, adequate hardware and software support is required to ensure optimal implementation of all research stages. The hardware and software specifications used in this research are detailed as follows [10].

a. Hardware

Table 1. Hardware Specifications

Hardware Name	Minimum Specifications
Laptop / PC	RAM > 8 GB, AMD Ryzen 5 3500U with Radeon Vega Mobile Gfx
Android Smartphone	Android version 9.0 and above
Internet Connection	Stable, Minimum 10 Mbps

b. Software

Table 2. Software Specifications

Software Name	Description / Version
Flutter SDK	Latest version (minimum 3.32.0)
Dart Language	Flutter native language
Visual Studio Code	Lightweight and flexible code editor
Figma	UI interface design platform
SQLite	Local database

3 RESULTS AND DISCUSSION

This section presents the research results obtained from the design, implementation, and testing of a Flutter-based personal finance application. The research findings are presented in the form of an implementation of the application’s features according to the needs established during the analysis phase. Next, a discussion of the implementation and testing results is conducted to assess the suitability of the system’s functions, application performance, and the achievement of the research objectives [11–15].

3.1 Interface Implementation

The implementation of the user interface for CashFlowMate is organized across key modules, ranging from account authentication to financial visualization.

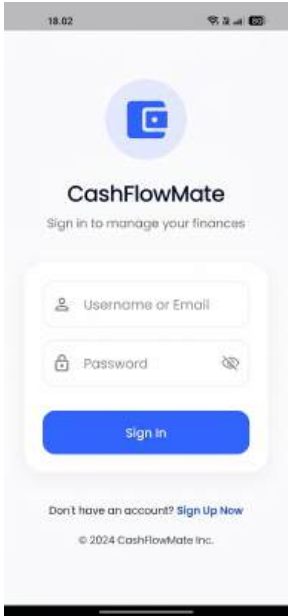


Figure 4. Login

The login page (Figure 4) serves as the user’s entry point to access the application. On this page, users are asked to enter their registered username and password. The system will validate the entered data before granting access to the application’s main page.

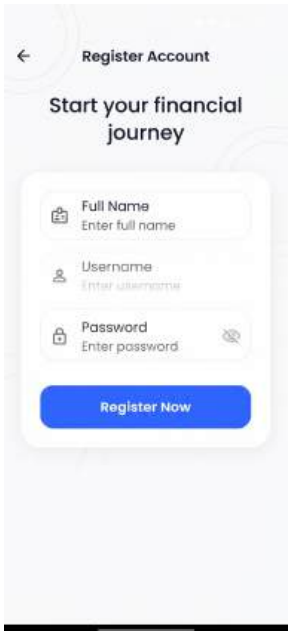


Figure 5. Register

The registration page (Figure 5) is used for new users to register before they can access all the features available in the application. On this page, users are asked to fill in some necessary information, such as their full name, username, and password. Once all data is successfully validated, the system will save the account information so users can log in and use the application according to their access rights.



Figure 6. Home Page

The dashboard (Figure 6) is the main page displayed after a user successfully logs in. This page displays information about the total balance, income, expenses, and several navigation menus that can be used to access other features. The information displayed on the dashboard is derived from transaction data stored in the database.

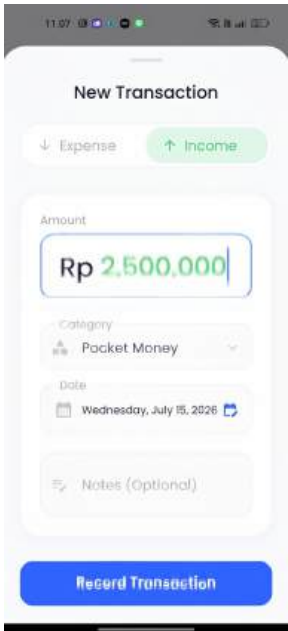


Figure 7. Add Transaction

The add transaction page (Figure 7) is used to record income and expenses. Users can enter the transaction amount, select a category, specify the transaction date, and add additional information if necessary. Once the data is saved, the system will update the balance and display the transaction in the history list.

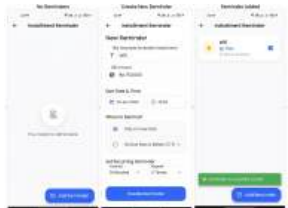


Figure 8. Installment Reminder

The payment reminder page (Figure 8) is used to schedule payments or installments. Users can specify the reminder title, amount, and due date. The system will automatically send notifications according to the specified schedule, helping users avoid missing payment obligations.

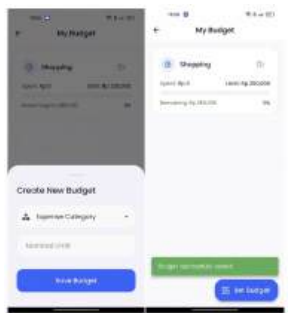


Figure 9. Budget

The budget page (Figure 9) helps users manage spending limits according to their established financial plan. On this page, users can specify budget amounts for specific categories. The budget data created is stored in a database and used as a reference for monitoring spending, displaying the spending limit status and the percentage of funds spent.



Figure 10. Transaction History

The transaction history page (Figure 10) displays all saved income and expense data. The data is displayed in a list format, making it easy for users to review past transactions. Additionally, users can search and group transactions by specific date and category.



Figure 11. Financial Statements

The Financial Reports page (Figure 11) presents a comprehensive summary of financial data through the integration of a summary module and interactive data visualization. The summary module provides a quick assessment of a user’s financial health by displaying their net balance, total income, and total expenses for the current month. This data is supported by two visualizations for in-depth analysis: a pie chart to monitor the distribution of expenses by category globally, and a bar chart to analyze cash flow trends, which can be flexibly filtered by daily, monthly, or yearly timeframes [16].

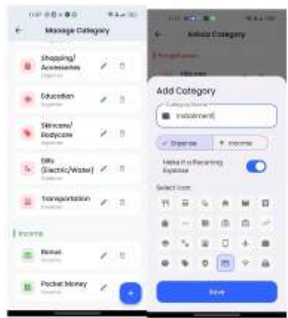


Figure 12. Manage Categories

The categories page (Figure 12) is used to manage the transaction types available in the application. Users can add new categories, edit existing category information, or delete unused categories. This feature aims to improve transaction recording efficiency.

3.2 Black Box Testing

Black box testing was conducted to evaluate the functionality of the system’s main features without examining its internal code structure. The test scenarios focus on validating user authentication processes (login and registration) as well as the financial report visualization functionality to ensure the application behaves as expected [17–20].

Table 3. Black Box Testing Results

No.	Test Scenario	Test Factor	Result	Information
1	Successful Login	Enter the registered username and password correctly.	Valid	The system accepts access and displays the Dashboard Page.
2	Failed Login	User entered an incorrect username or password.	Valid	The system denies access and displays the error message "Incorrect Username or Password".
3	Successful Registration	Fill in all valid forms and press the "Register Now" button.	Valid	The system successfully saved the data to the database and displayed a success message.
4	Failed Registration	Leave one of the mandatory fields blank and then press "Register Now".	Valid	The system refuses data storage and places a red mark on empty fields.
5	Financial Report Display	Go to the Reports page.	Valid	The system successfully processed aggregation queries from SQLite to accurately display the Summary Card (total income, expenses, and remaining balance). Furthermore, the system successfully rendered proportional and interactive data visualizations in Pie Charts and Cash Flow Trends (Bar Charts).

3.3 Discussion

The implementation and evaluation results demonstrate that the developed Flutter-based personal finance application successfully addresses the fundamental issues of manual recordkeeping, such as poorly documented transaction data and difficulty in monitoring daily cash flow. By utilizing cross-platform capabilities via the Flutter framework, the application provides a lightweight, responsive, and cross-device user experience while keeping operational resource requirements low.

A core advantage of this application lies in its architecture and data management model. Previous research by Baihaqi [5] focused on small business financial management using a client-server architecture with a Node.js backend and MongoDB database. While effective for business operations, that approach requires continuous internet connectivity and external server maintenance. In contrast, this study leverages SQLite for local, on-device data storage. This standalone approach ensures 100% offline functionality, guaranteeing data privacy and immediate accessibility without reliance on server infrastructure or internet availability.

Furthermore, the integration of data visualization through interactive pie charts and cash flow trend bar charts (powered by `fl_chart`) aligns with the interactive visualization principles outlined by Romadhoni and Salim [8]. The application transforms raw transaction rows stored in SQLite into dynamic financial summaries. The inclusion of budget threshold monitoring and automated installment reminders via `flutter_local_notifications` provides proactive financial tracking, a feature lacking in earlier local tracking tools.

The validation via black box testing confirmed that all functional modules (authentication, transaction management, budget allocation, local notifications, and report rendering) operate accurately according to design requirements. The SQLite aggregation queries executed properly to feed visual charts without logical errors or performance bottlenecks. Consequently, the system successfully bridges the gap between simple manual logging and complex client-server platforms, offering a comprehensive, offline-first personal finance management solution.

4 CONCLUSION

This study successfully designed and developed a Flutter-based mobile application for personal financial recordkeeping using the Dart programming language. By leveraging SQLite as an offline-first local database, the application enables users to log income and expenses, manage categories, set spending budgets, view transaction history, and receive automated installment reminders via `flutter_local_notifications` without requiring an internet connection or external server infrastructure. Interactive data visualizations through pie and bar charts effectively simplify cash flow analysis for users.

Black box testing results confirmed that all core functionalities, ranging from user authentication to query aggregation for financial reports, executed seamlessly according to design specifications, with zero logical or validation errors. Ultimately, the system provides a lightweight, secure, and accessible alternative to manual recordkeeping, bridging the gap between simple paper logs and heavy client-server platforms. Future developments can extend this work by incorporating PDF/Excel report export features, cloud synchronization options, and biometric authentication to further enhance security and usability.

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DECLARATIONS

Author Contributions:

Hasnawati: Conceptualization, Methodology, Software, Writing – Original Draft.

Nurhalisa: Data Curation, Investigation, Validation.

Untung Suwardoyo: Formal Analysis, Resources, Supervision.

Ade Hastuty: Project Administration, Visualization, Writing – Review & Editing.

Muhammad Basri: Validation, Supervision, Writing – Review & Editing.

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The authors declare that they have no competing financial or personal conflicts of interest regarding this publication.

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AI Use Statement:

During manuscript preparation, the authors utilized AI tools solely for language refinement and readability improvement. All scientific content, data analyses, experimental models, and conclusions were originally developed and verified by the authors.

Additional Information:

No additional information is available for this paper.

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