

Published online on the journal's website: <https://jes-tm.org/index.php/jestm/index>

Journal of Engineering Science and Technology Management

| ISSN (Online) 2828 -7886 |



Article

Financial Management Application Design and Development Android Based (Case Study: Undergraduate Students of Pahlawan Tuanku Tambusai University)

Adam winanda Maswir^{1✉}, Safni Marwa², Beny Setiawan³

^{1,2} Informatics Engineering Study Program, Faculty of Engineering, Pahlawan Tuanku Tambusai University, Riau

³ Civil Engineering Study Program, Faculty of Engineering, Pahlawan Tuanku Tambusai University, Riau

DOI: 10.31004/jestm.v6i1.350

E-mail: adamwinandamaswir20@gmail.com

ARTICLE INFORMATION

Volume 1 Issue 6

Received: 27 December 2026

Accepted: 11 February 2026

Published Online: 10 March 2026

On line: at <https://JESTM.org/>

Keywords

Financial Management
Android
Flutter
Firebase
Financial Application
Prototype

ABSTRACT

Personal financial management is a crucial aspect of maintaining financial stability, especially for students who often face financial constraints and difficulty recording daily transactions. This study aims to design and build an Android-based financial management application using the Flutter framework and Firebase as a database. The research method used was a prototype method, consisting of requirements gathering, system design, prototype creation, user evaluation, implementation, and testing. Data was obtained through interviews and observations with students at Pahlawan Tuanku Tambusai University, Bangkinang Kota District, Kampar Regency, Riau, many of whom still lack good financial record-keeping habits. The developed application provides features for recording income and expenses, budget planning, graphical financial reports, and fund allocation notifications. Black-box testing results indicate that the application meets user needs, is easy to use, and can help students track their finances more effectively and efficiently. Therefore, this application is expected to be a practical solution for improving financial literacy and student financial management habits.

1. Introduction

Financial management is a crucial aspect of daily life, particularly in managing income and expenses to achieve financial goals effectively. According to Kasmir (2010), financial management is the process of planning, controlling, and evaluating financial activities. In the context of personal finance, especially among university students, proper financial management plays an important role in maintaining financial stability, supporting academic and non-academic needs, and preventing inefficient spending caused by unstructured financial practices.

The rapid development of digital technology has provided significant opportunities to support personal financial management in a more effective and efficient manner. The use of information technology enables users to record, monitor, and evaluate financial transactions automatically and in real time (Wibowo, 2017). Various mobile-based financial management applications have been developed to assist users in transaction recording, budgeting, and financial reporting. However, many existing applications have not been specifically designed to accommodate the characteristics and needs of university students, particularly in terms of simplicity, ease of use, data visualization, and budget control features.

Based on preliminary observations and interviews with undergraduate students at Pahlawan Tuanku Tambusai University, it was found that most students do not consistently record their income and expenses in a systematic manner. This condition results in difficulties in monitoring financial conditions, planning budgets, and conducting periodic financial evaluations. Therefore, this study aims to design and develop an Android-based financial management application using the Flutter framework and Firebase as the database. The selection of Flutter and Firebase is based on their advantages in cross-platform development, ease of integration, real-time data management, and secure authentication, which are expected to provide an effective solution tailored to students' financial management needs.

Advances in digital technology have provided solutions in the form of financial management applications that help users record transactions, create budgets, and automatically present financial reports. The Android platform

is the preferred choice because it is the most widely used in Indonesia, coupled with support for the Flutter framework, which facilitates cross-platform development, and Firebase, which enables real-time, secure, and flexible data management.

2. Literature Review

2.1 Financial Management Application

Financial management is defined as the process of planning, organizing, controlling, and evaluating financial activities to achieve specific financial objectives (Brealey et al., 2011). In the context of personal finance, effective financial management enables individuals to control spending, allocate income appropriately, and maintain financial stability. For university students, financial management is particularly important due to limited income and the need to manage expenses efficiently for academic and daily necessities.

The development of information technology has encouraged the emergence of mobile-based financial management applications that support financial recording and monitoring processes. These applications facilitate systematic transaction recording, budget planning, and automatic financial reporting, thereby improving users' awareness of their financial conditions (Halim, 2015; Pratama & Yuliana, 2021). Compared to manual methods, application-based financial management offers higher accuracy, efficiency, and ease of access.

However, many existing financial management applications are not specifically designed to address the characteristics and needs of university students. Limitations such as complex interfaces, lack of budget control features, and minimal financial notifications reduce their effectiveness. Therefore, this research focuses on developing a student-oriented financial management application that is simple, user-friendly, and capable of supporting effective personal financial management through digital technology

2.2 Android Operating System

Android is an open-source operating system, meaning its source code can be accessed, modified, and distributed by anyone. This gives developers and hardware companies the freedom to create different versions of Android devices with a wide variety

of hardware, appearance, and features. This operating system is highly flexible and can be used on a variety of devices, from smartphones and tablets to wearables (Bhatia & Kumar, 2020).

2.3 Unified Modeling Language (UML)

The Unified Modeling Language (UML) is a graphical modeling language used to visualize, design, and document object-oriented software systems. UML provides standards for creating system blueprints, such as business processes, class design, and system components, but does not regulate the implementation stages of software development (Hidayat et al., 2019).

UML is an effective tool in system development because it provides various diagrams to visualize and analyze systems systematically and structured, and has become an international standard in the software industry (Munawar, 2021). Commonly used UML diagrams include Use Case Diagrams to describe user and system interactions, Activity Diagrams to model process or activity flows, and Class Diagrams to represent class structures, attributes, methods, and relationships between objects in a system (Ayu & Fitri, 2019; Hendini, 2016; Sulianta, 2017).

2.4 Entity Relationship Diagram (ERD)

Entity Relationship Diagram (ERD) is a tool design a database that depicts the relationships between entities in a system. An ERD uses specific symbols, such as rectangles for entities, ellipses for attributes, and rhombuses for relationships. The primary purpose of an ERD is to facilitate understanding of data structures and relationships between data before implementing them into a database. (Chandra et al., 2020).

2.5 Flutter and Firebase

Flutter is an open-source framework developed by Google for building responsive and engaging user interfaces using the Dart programming language. Flutter supports cross-platform application development, including for Android, iOS, and the web, using a single codebase (Herlambang & Nugroho, 2021). Flutter's advantages lie in development efficiency through its hot reload feature and its comprehensive widget library for building dynamic interfaces, making it suitable for

developing modern applications with a consistent user experience across devices (Pratama et al., 2022; Sutrisno et al., 2023).

Firebase is a cloud-based application development platform developed by Google to support the development of mobile and web applications. Firebase provides services such as data management, user authentication, notifications, and analytics without requiring additional server management (Rizki & Susanto, 2021). Besides being easily integrated with frameworks like Flutter, Firebase offers the advantage of a real-time database service that enables direct and efficient data synchronization, making it widely used in Android application development (Putra et al., 2022).

2.6 Prototype Method

The prototyping method is a software development approach that emphasizes creating an initial model of the system for user evaluation. This method developed as an alternative to sequential models like the waterfall model, by directly involving users through feedback and iterative refinement. This allows the resulting software to be more precisely tailored to user needs and expectations (Chandra, 2018).

2.7 PIECES Method

The PIECES method is a systems analysis framework used to identify system weaknesses based on six main aspects: Performance, Information, Economics, Control, Efficiency, and Service. This approach helps evaluate system problems comprehensively and compares the current system with the system being developed as a basis for designing a more effective and efficient information system (Fardela, 2023).

3. Research Methodology

3.1 Types of research

This research used a prototype system development method. The purpose of using the prototype method is to obtain an initial visualization of the application being developed through the design phase. The following explains the plan for each research stage conducted using the prototype method. The six stages of the prototype method are as follows.

1. Requirements Gathering and Analysis

The needs were gathered through interviews with undergraduate students at Pahlawan Tuanku Tambusai University. The analysis revealed that students lacked a financial recording system, thus experiencing difficulties in managing, tracking, and reporting their personal finances.

2. Quick Design.

System design is carried out using Use Case Diagrams, Activity Diagrams, and Class Diagrams, followed by database design and user interfaces.

3. Build Prototype.

The application prototype was developed using the Flutter framework with Firebase as the database.

4. User Evaluation.

The prototype was tested by early users using blackbox methods to obtain feedback regarding the system's functionality.

5. Refining Prototype.

System improvements were made based on user feedback. No revisions were found in this study, so the process was not repeated.

6. Implementation and Maintenance

The final system is implemented and subjected to thorough testing and maintenance to ensure the system is running smoothly.

3.2 Research subjects

The subjects of this study were undergraduate students at Pahlawan Tuanku Tambusai University who acted as application users. The research focused on developing an Android-based financial management application that supports recording income, expenses, fund allocation, and preparing financial reports according to user needs.

3.3 Data source

This study used primary data obtained directly from original sources through interviews with respondents. The data collected suggests that respondents have not used specialized tools for financial management, thus experiencing difficulties in managing and monitoring their finances.

3.4 Data collection technique

The data collection technique in this qualitative research was conducted through in-depth interviews with undergraduate students at Pahlawan Tuanku Tambusai University as potential app users. The interviews aimed to obtain information regarding user needs, challenges in transaction recording, budget planning, and expense tracking, as well as to explore user expectations regarding the features, ease of use, and interface of the Android-based financial management app.

3.5 Data validity techniques

The validity of the data in this study was carried out by testing the validity and reliability of the data through triangulation techniques, namely checking the validity of the data from various points of view to ensure the consistency and truth of the information.

Source triangulation This was conducted by cross-examining data obtained from undergraduate students at Pahlawan Tuanku Tambusai University. Technical triangulation was conducted using interviews as a data collection method to obtain more in-depth and accurate information. Meanwhile, time triangulation was conducted by collecting data between October 2024 and July 2025 to ensure data stability and consistency.

3.6 Data analysis



Figure 1. Business Perspective analysis diagram

Data analysis was conducted through problem identification, data processing, and business perspective. The results of the analysis indicate that students have not consistently recorded their finances, thus experiencing difficulties in tracking finances, preparing budgets, and evaluating financial conditions. The Business Perspective analysis diagram represented in the Use Case Diagram illustrates financial management activities that are still

carried out manually by relying on memory, including income receipts, daily expenses, and budget estimates without recording, which often causes forgetting transactions and the unavailability of historical data and financial visualizations as a basis for evaluation.

4. Results and Discussion

4.1 System Analysis

The system analysis phase was conducted using two analytical methods: the current system analysis and the new system analysis. The current system analysis phase was used to evaluate the current financial management conditions before the system design process. This analysis focused on undergraduate students at Pahlawan Tuanku Tambusai University as users. The analysis results showed that financial management was still carried out manually or without media, so users had difficulty tracking daily expenses, lacked automated financial reports, and conducted

unstructured financial planning, which had the potential to lead to waste and inefficiency.

New System Analysis (Recommendations) Based on these issues, we propose the development of an Android-based financial management application that can be used to record income and expenses in real time. The system is equipped with financial reports and data visualizations in the form of diagrams to facilitate understanding of financial conditions. With this system, users are expected to be more aware, controlled, and wise in managing their personal finances.

4.2 System description

The system is an Android-based application that allows users to manage financial data in real time. The application is equipped with essential functionalities to support transaction recording, report presentation, and effective personal financial management.

Table1. Functional Requirements

Functional Requirements	Description
Register/Login	Users can register first or log in to the application with an email and password via previously registered Firebase Authentication or use a Google account to log in.
Transaction Input	On the home page there is an added icon for users to record income or expenditure transactions.
Manage Categories	Users can select or add transaction categories as desired.
Budget Planning	Users can create and manage monthly budgets such as adding allocations on the allocation page provided.
Financial statements	The system displays monthly financial reports in the form of pie charts that users can view at any time.
Allocation Notification	The app sends notifications when approaching the budget limit.
Profile Settings	Users can change their profile data and change their account password.
Logout	Users can safely exit the application.

4.3 Developer perspective

a. Actor : users, namely individuals who use applications to record and manage finances digitally through the application interface, so that they no longer rely solely on memory.

b. Developer use case list

U1. User: Register: The user creates a new account by entering a name, email address, and password. To access the application

U2. User: Login: Users log into the

application using a registered account, by

entering their email and password or logging in directly via Google on their gadget.

U3. User : Home : The main page that is displayed after logging in.

U4. User: Manage Transactions: Users manage income and expenses.

U5. User : Input Add Entry : Add Entry data

U6. User: Input Add Expenses: Add



Figure 5.Login page

4.4.2 List page



Figure 6.List page

The registration page is a page for users to create an account first before logging in to the application, which can be seen in Figure 6.

4.4.3 Home page

This page is the initial display after logging in, on this page the user can see and add income and expenses.



Figure 7.Home page

4.4.4 Add income page



Figure 8.Add income page

4.4.5 Add expense page



Figure 9.Add expense page

4.4.6 Transaction page

This page displays income and expenditure data that has been previously inputted.



Figure 10.Transaction page

4.4.7 Add allocation page



Figure 11.Add allocation page

4.4.8 Financial page

This page is a display to see a summary of income, expenses and remaining balance, on this page there is also a pie chart about financial reports.



Figure 12.Financial report page

4.4.9 Profile page

This page is a profile display to view User data such as Username, email, edit profile, change password, about the application, and log out of the account.



Figure 13. Profile page

4.4.10 Database user

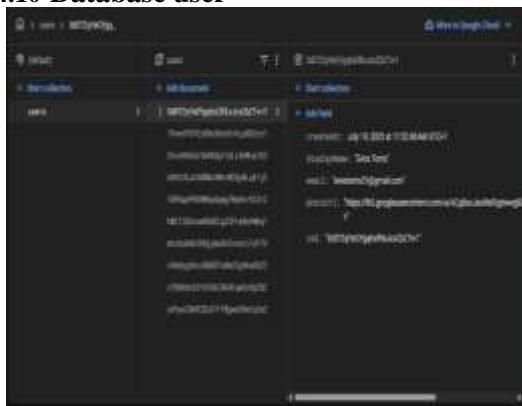


Figure 14. User database implementation

The database implementation uses Firebase Cloud Firestore as a user data storage medium with a collection-document model. The main Users collection stores user profile data, where each user is represented as a single document with an automatically generated Unique Identifier (UID). This document contains the main attributes createdAt, displayName, email, photoUrl, and uid, which are used for authentication and user data management.

4.4.11 Financial database

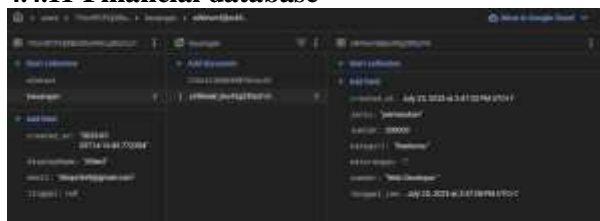


Figure 15. Financial database implementation

The database implementation uses Firebase Cloud Firestore to store user data and financial transaction records. The storage structure implements a hierarchical and flexible document-collection model. The financial collection is used to store transaction data with attributes including createdAt, type, amount, category, description, source, and date_time. This structure enables real-time integration of transaction data with user data, while maintaining order, consistency, and data security within the application.

4.4.12 Allocation database

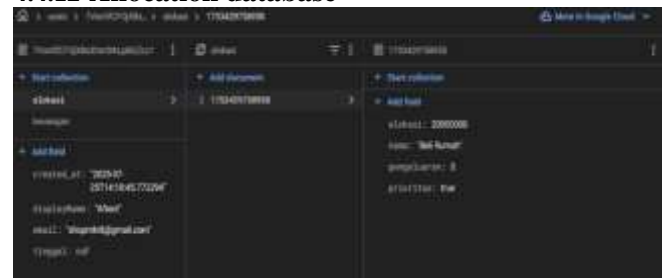


Figure 16. Allocation database implementation

The database implementation uses Firebase Cloud Firestore to store user budget allocation planning data using a collection-document model. The allocation collection records planned budget usage based on goals and priorities, including the allocation amount, goal name, expenditure amount, and priority status. This structure facilitates real-time monitoring of budget allocation progress, allowing users to effectively evaluate and adjust their financial plans.

4.5 Software testing

This stage includes the system testing process, which aims to identify errors or bugs in the software being tested. This testing is conducted to ensure that the software meets the specifications established in the design. The method used is black-box testing, which focuses on testing the software's functions without examining the program's internal structure or design. The following are the results of testing using the black-box testing method:

Table 2.Black box testing

Testing	Which are expected	Conclusion
List Page	The account registration form displays, where you enter your username, email address, and password. Afterward, the user must confirm by clicking the link sent to their email address. The account registration is complete.	Succeed
Login Page	Displays the login form with username and password input. Successful login.	Succeed
Home Page	Displays a page containing income, expenses, differences and transactions	Succeed
Add Income Page	Displays the Add Income form with input for date, time, source of income, category, amount, description and save.	Succeed
Add Expense Page	Displays the add expense form with input date, time, source of expense, category, amount, description and save.	Succeed
Add Allocation Page	Displays the add fund allocation form by inputting the allocation name, allocation amount, priority and save.	Succeed
Allocation Page	Displays the previously added allocation form.	Succeed
Transaction Page	Displays previously inputted income and expenditure data.	Succeed
Financial Report Page	Displays a summary of income and expenditure data, balances and pie charts.	Succeed
Profile Page	Displays profile data such as Username, email, edit profile, change password, about the application, and exit.	Succeed

Based on the results of software testing using the Blackbox Testing method, all main functions of the application were declared to run according to the established specifications. Testing on each page, including the account list, login, homepage, add income, add expenses, add allocations, allocations, transactions, financial reports, and user profiles, showed that the system was able to produce output according to requirements without any significant errors (bugs). Therefore, it can be concluded that this Android-based financial management application has met the functional requirements and is suitable for use in the next development or implementation stage.

5. Conclusion

Based on the results of research and development of Android-based financial management applications using Flutter and Firebase, it can be concluded that the application was successfully developed by applying the prototype method, which. It allows for an iterative design process tailored to user needs. This app is equipped with key features such as recording income

and expense transactions, monthly budget management, graphical financial reporting, financial notifications, and data security through Firebase Authentication and Firestore Rules.

Test results using the Black Box Testing method indicate that all of the application's main functions operate according to established specifications. Furthermore, usability testing results demonstrate a high level of user satisfaction, indicating that the application is easy to use and can effectively support personal financial management. The implementation of Flutter and Firebase has proven effective in producing a responsive, secure, and stable application on Android-based devices.

References

- Ayu, F., & Fitri, N. (2019). Designing an online wedding organizer booking information system. *Intra Tech Journal*, 3(2), 92–104.
- Bhatia, K., & Kumar, A. (2020). Introduction to Android Operating System. *International Journal of Computer Science and Mobile Computing*, 9(6), 72–79.
- Brealey, R.A., Myers, S.C., & Allen, F. (2011).

- Principles of corporate finance (10th ed.). McGraw-Hill Education.
- Chandra, I., Putri, N., & Santoso, W. (2020). ERD Development for Android-Based Information Systems. *Indonesian Journal of Information Systems*, 9(2), 45–50.
- Fauzan, AN (2022). Development of an Android-Based Financial Management Application to Improve Tax Compliance in Micro, Small, and Medium Enterprises (MSMEs). Thesis, Muhammadiyah University of Yogyakarta.
- Fitri, R., & Sari, M. (2020). Implementation of Financial Literacy and Financial Technology in MSME Financial Management. *Jurnal Publicuho*, 3(2), 123–134.
- Fardela, R. (2023). Analysis of the Otatik Forum Website Using the Pieces Method at the Lima Puluh Kota Regency Communication and Information Service. *JIKO (Journal of Informatics and Computers)*, 7(1), 79–87.
- Google. (2024). Platform and Version Distribution Home.
- Halim, A. (2015). Business Financial Management. Media Discourse Partners.
- Hendini, A. (2016). UML Modeling of Regional Development Program Monitoring and Evaluation Information System. *Khatulistiwa Informatika Journal*, 4(2), 109–115.
- Herlambang, F., & Nugroho, R. (2021). Implementation of Flutter in Cross-Platform Application Development. *Journal of Information and Computer Technology*, 16(2), 78–85.
- Hidayat, N., & Setiawan, E. (2020). Data Security in Android-Based Financial Management Applications. *Journal of Informatics Engineering and Information Systems*, 12(3), 210–221.
- Hidayat, T., Priambodo, TA, & Agustine, D. (2019). Designing an Elementary School Academic Information System Website (Case Study: SDS Arya Jaya Sentika – Tigaraksa, Tangerang Regency). *SATIN - Science and Information Technology*, 4(2), 1. <https://doi.org/10.33372/stn.v4i2.394>
- Kasmir. (2010). Financial Management. PT RajaGrafindo Persada.
- Ningsih, A., & Pratama, Y. (2021). Canva as a Design Tool for Beginners. *Journal of Graphic Design and Information Technology*, 15(2), 100–110.
- Nugraha, D. (2023a). Analysis of Figma Usage in Android Application Interface Design. *Journal of Interaction Design and UX*, 5(1), 12–23.
- Nugraha, D. (2023b). Utilizing Canva in the Design Process for Application Development. *Journal of Digital Technology and Creativity*, 5(1), 45–56.
- Nugraha, W., & Syarif, M. (2018b). Application of the Prototype Method in the Design of a Website-Based Information System for Calculating Beverage Sales Volume and Cost. *JUSIM (Musirawas Information System Journal)*, 3(2), 94–101. <https://doi.org/10.32767/jusim.v3i2.331>
- Pratama, DA, & Yuliana, S. (2021). Implementation of an Android-Based Personal Financial Management Application for College Students to Improve Financial Literacy. Thesis, Sunan Kalijaga State Islamic University, Yogyakarta.
- Pratiwi, AE, & Susanti, S. (2021). Performance Evaluation of the Accurate Accounting Enterprise Accounting Information System Using the Pieces Method. *Responsive Journal: Science and Informatics Research*, 3(1), 63–74.
- Putra, A., Kurniawan, D., & Hidayat, R. (2022). Utilizing Firebase for Android-Based Mobile Application Development. *Journal of Information Systems and Information Technology*, 14(2), 89–98.
- Putra, A., Nugraha, D., & Hartono, A. (2022). ERD Analysis for Mobile Applications in the Context of Personal Finance. *Journal of Informatics Engineering and Information Systems*, 14(3), 120–129.
- Putri, MN, & Arifin, Z. (2021). The Effect of Financial Management Applications on Financial Literacy in College Students. *Journal of Economic Education*, 14(4), 292–307.
- Rahayu Dewi, NLAM, Hartati, RS, & Divayana, Y. (2021). Application of the Prototype Method in Designing a Website-Based Employee Recruitment Information System at Berlian Agency. *Scientific Journal of Electrical Technology*, 20(1), 147. <https://doi.org/10.24843/mite.2021.v20i01.p17>