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RESEARCH ARTICLE

Enhancing Financial Literacy in Young Adults: An Android-Based Personal Finance Management Tool

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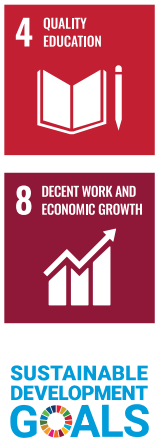

ABSTRACT

This study details the design, development, and evaluation of an Android-based personal finance management application tailored for young adults in higher education. Addressing unique financial challenges such as limited experience and fluctuating income, the application incorporates features like income tracking, expense monitoring, budgeting, and financial goal setting. Developed using the Waterfall model, the application includes secure login systems, intuitive transaction management, customizable goals, budget projections, and automated notifications to encourage financial discipline. Usability evaluations using a 5-point Likert scale with 50 users revealed an overall satisfaction score of 4.6/5, rated 'Excellent.' Users praised the intuitive design, accurate tracking, and motivational reminders, while also suggesting additional customization and deeper financial analysis for future updates. This study demonstrates the potential of targeted digital tools to foster financial literacy and resilience, offering evidence that personalized technology can significantly improve financial behaviors in young adults. Future research will explore enhanced customization and AI-driven features to further refine the application's impact.

KEYWORDS

Personal financial management; mobile app; financial habits; young adults; higher education

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1. INTRODUCTION

The rapid advancement of digital technology has transformed modern life, bringing both opportunities and challenges across various sectors, particularly in personal finance [1], [2], [3]. Personal finance

management has become critical, especially for young adults facing unique financial challenges in today's economy. Financial literacy and responsible financial behavior are increasingly important, especially after the pandemic's economic impact [4], [5]. As of December 2021, Indonesians aged 19-34 accounted for 63% of online loan users, according to the Financial Services Authority of Indonesia (OJK), with a significant concentration in urban areas. This demographic, composed mainly of students and early-career individuals, is vulnerable to financial mismanagement due to limited experience and guidance in financial decision-making [6], [7]. A survey among Informatics Education students at Universitas Negeri Padang highlighted this issue, showing that fewer than 50% consistently recorded their finances, just 20% regularly reviewed income and expenses, and merely 40% adhered to a monthly budget.

Despite increasing awareness of the importance of financial literacy, there remains a practical gap in using tools tailored to engage and empower young adults in managing their finances effectively. Many existing financial management tools are designed for a general audience, often overlooking the unique needs and behaviors of younger users, who are more inclined toward interactive, mobile-first solutions [8], [9]. Although prior studies have established the importance of financial literacy, few have explored how a targeted mobile application can directly influence and improve financial habits among young Indonesian adults [10], [11].

Addressing this gap is crucial since financial behaviors established in early adulthood have significant long-term implications. The prevalence of high online loan usage among young Indonesians highlights an urgent need for tools that encourage responsible financial habits [12], [13]. Without timely intervention, financial literacy deficits may perpetuate a cycle of debt and instability. By providing a mobile solution that promotes consistent financial tracking and budgeting, this study intends to instill positive financial behaviors early on, establishing a foundation for financial resilience.

This study aims to develop an Android-based personal finance management application tailored to the needs of young adults, equipped with features for tracking income, setting budgets, monitoring expenses, and establishing financial goals. It further evaluates the application's usability and its impact on users' financial behaviors, focusing on fostering consistent engagement and improving financial literacy. The research questions guiding this study are as follows:

1) How effective is an Android-based personal financial management application in improving the financial habits of young adults in higher education?
2) To what extent can regular engagement with the application enhance financial literacy and contribute to long-term financial resilience among users?
3) Which features most effectively promote consistent financial management behaviors, such as budgeting, expense tracking, and goal setting?

Proactive and practical steps are necessary to prevent younger generations from falling into financial difficulties. A foundational strategy for improving financial literacy is consistently recording and managing personal finances [14]. This practice helps individuals align their spending habits with their needs, plans, and goals. Effective personal financial management hinges on strategically allocating income across expenses, savings, and investments [15]. Individuals bear responsibility for managing their finances as a critical aspect of daily life, which can yield positive outcomes, particularly in curbing excessive consumerism [16].

Moreover, financial management is a vital 21st-century skill, resting on four pillars: income, expenses, savings, and planning. Healthy finances result from sustainable and deliberate money management [17]. To address this challenge, fostering financial habits requires tools that are both accessible and easy to

maintain. Research underscores that mobile phones—used frequently in daily life—are ideal platforms for cultivating such habits [18], [19], [20]. By leveraging this technology, the proposed application serves as a platform to reinforce consistent financial tracking and reflection.

This research addresses a critical gap by targeting younger demographics with a customized digital solution for personal finance management. The study contributes to advancing financial literacy as a fundamental 21st-century competency through practical implementation and evaluation. By integrating goal-setting frameworks, automated reminders, and an intuitive interface, the application offers a holistic approach to nurturing healthier financial habits and mitigating financial instability among Indonesia's young adults.

2. METHODS

This research employed the Waterfall model, a structured software development methodology, to ensure systematic progression through sequential phases: requirements analysis, design, implementation, testing, and deployment [21], [22], [23]. This approach enabled organized execution and thorough validation at each stage, minimizing iterative backtracking and ensuring alignment with user needs [24], [25]. The methodology's stages are illustrated in Figure 1.

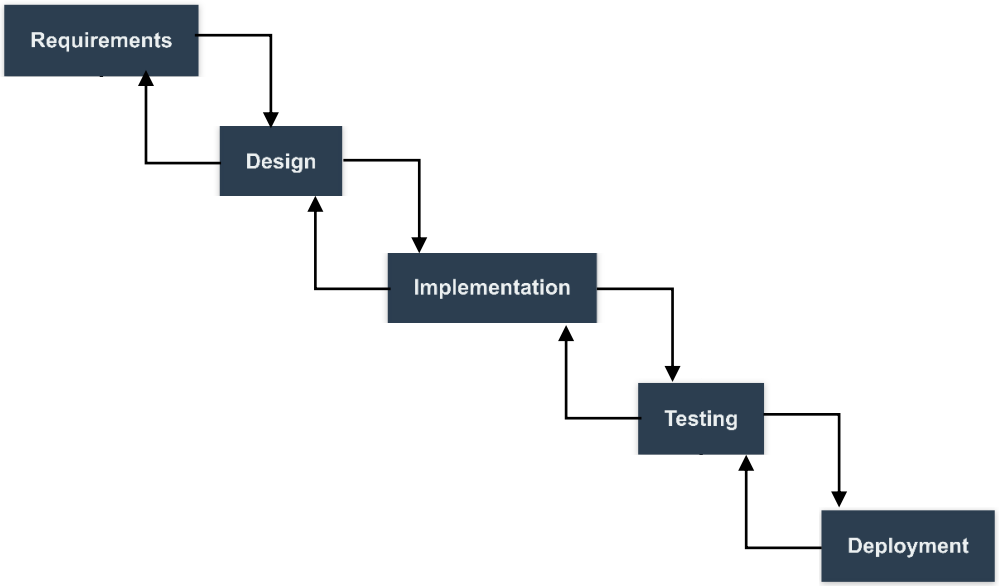


Figure 1. Phases of the waterfall model

The Waterfall model was chosen for its linear, phase-gated structure, which ensured systematic validation of user requirements before advancing to design and coding. This minimized scope creep and aligned with the study's focus on replicable, structured development for academic evaluation.

2.1. Requirements Analysis

The initial phase focused on mapping user behaviors and needs through interviews and surveys targeting young adults in higher education. The goal was to identify core financial management processes and translate them into application features that promote engagement and financial literacy. Key processes observed in user workflows are summarized in Table 1.

Table 1. Key financial management processes identified through requirements analysis

No.	Process	Activity	Actor
1	Income Tracking	Users record income received in financial journals, mobile notes, or calculators.	Individual
2	Expense Tracking	Users record expenses incurred, often using financial journals, mobile notes, or calculators.	Individual
3	Budget Projection	Users use financial journals, mobile notes, or calculators to record and plan anticipated expenses.	Individual

This analysis led to identifying additional requirements to enhance the application's usability and functionality. These enhancements addressed everyday financial management needs, making the application more intuitive and adaptable to user preferences. The additional requirements are outlined Table 2, which details each feature's purpose and contribution to an improved user experience.

Table 2. Additional requirements for enhanced usability and functionality

No.	Feature(s)	Process(es)
1	Income/Expense Data Tracking	Users record the amount of income/expense received. This recording is typically conducted in financial journals, on mobile notes, or using calculators.
		Users can categorize the entered data, classifying income/expense by type, method of acquisition, and other relevant factors.
		Users may also attach notes to each entry detailing aspects such as the source of income/expense, method of acquisition, and other pertinent information.
2	Financial Goal Data Tracking	Users can input data related to their financial goals, adjusting target amounts and timeframes according to their capacity.
		Users receive progress updates on their financial goals based on their transaction history.
		Users are provided with information and recommendations on optimal saving amounts to reach their financial goals effectively.
3	Budget Projection Tracking	Users can input data for monthly budget projections based on their monthly income and expenses.
		Users receive budget information aligned with their historical financial reports.
4	Financial Reports	Users can access a summary of expenses and income based on the data they enter.

2.2. Design

2.2.1. Flowchart

A flowchart is a structured diagram that uses standardized symbols to visually represent systematic procedures for completing a process [26]. It depicts workflows through symbols such as rectangles (process steps), diamonds (decision points), and arrows (directionality) [27]. Figure 2 illustrates the system flow of the financial management application, outlining the user journey from initial login to feature interaction.

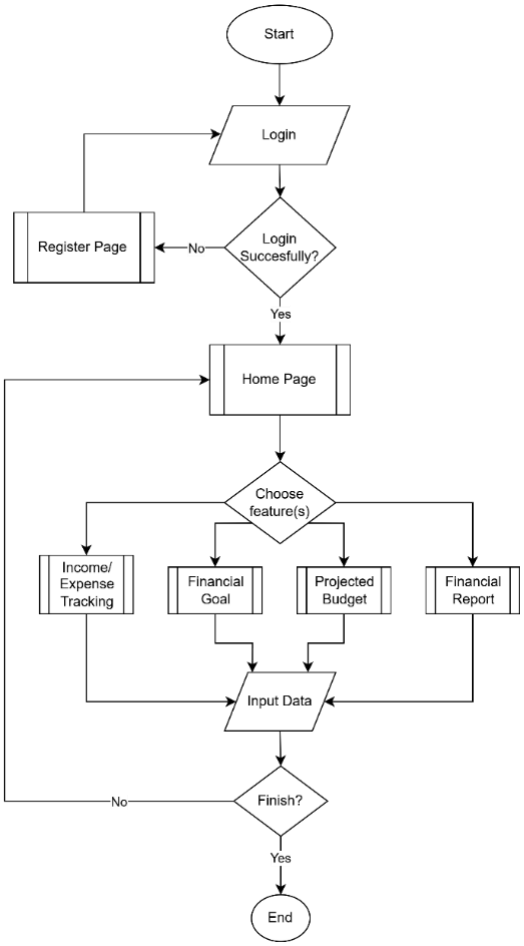


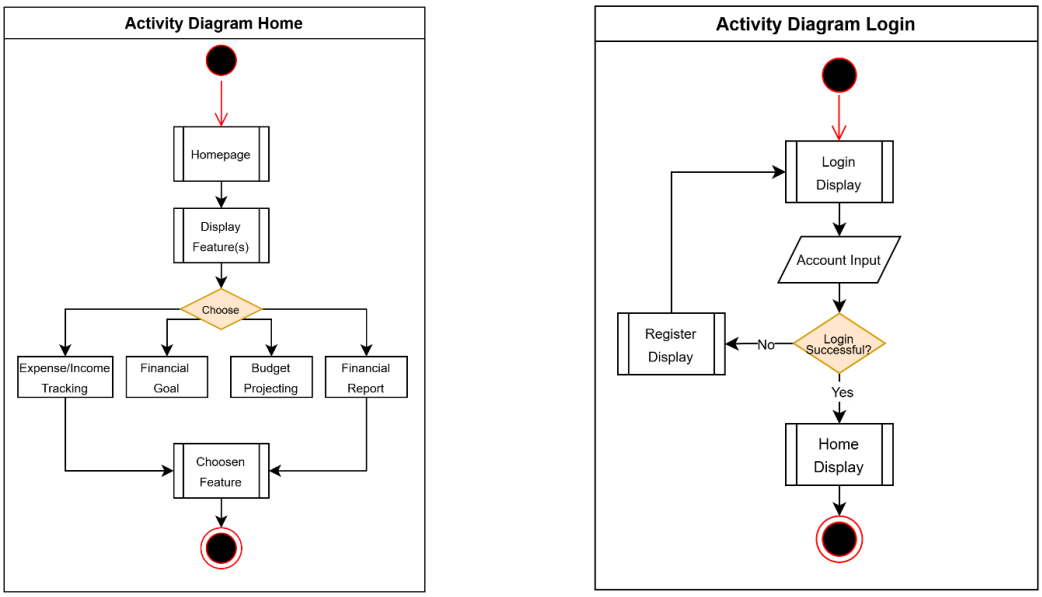
Figure 2. Application flowchart

When users launch the application, they are presented with a login screen requiring email and password entry to access their financial data. Unregistered users must complete a registration process before proceeding. Upon successful authentication, users reach the homepage, where they can navigate features including expense tracking, income recording, financial goal-setting, budget projections, and financial reports. Each feature incorporates guided input and output steps to streamline user interaction. After completing a task, users may either explore additional features or exit the application.

2.2.2. Activity Diagram

The activity diagram models the dynamic flow of system activities, emphasizing the sequence and interaction of user actions [28]. Figure 3 depicts activity diagrams for the home and login functions, capturing initial user engagement and authentication workflows.

- **Login Activity Diagram:** Details the authentication process, including registration, credential validation, and error handling for incorrect inputs.
- **Home Activity Diagram:** Represents the central interface users navigate to core features. Transitions between activities (e.g., moving from expense tracking to budget projections) are mapped to reflect user pathways.

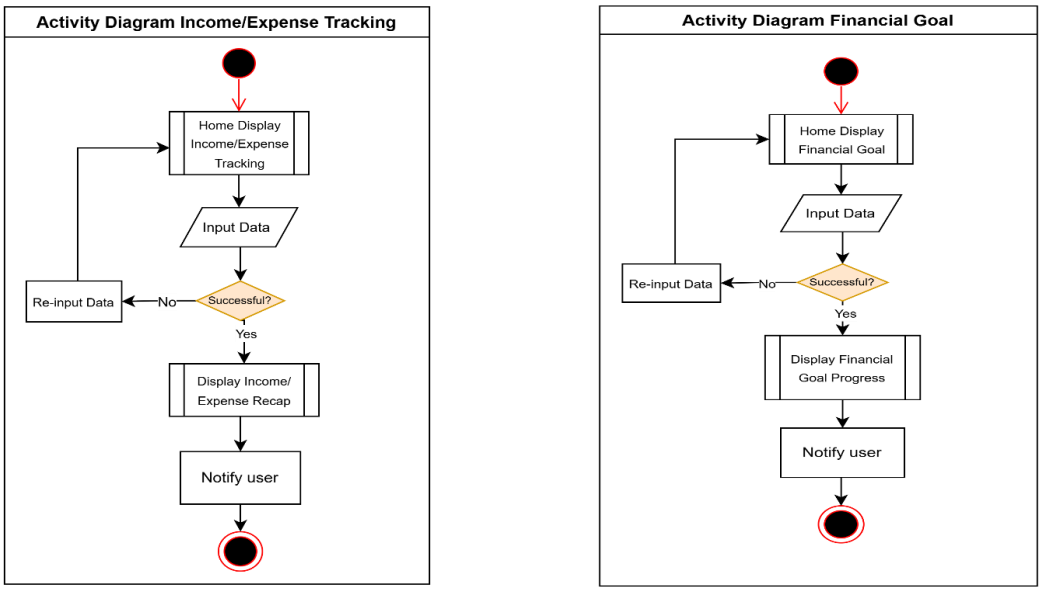


(a) (b)

Figure 3. Activity diagram: (a) Home; (b) Login

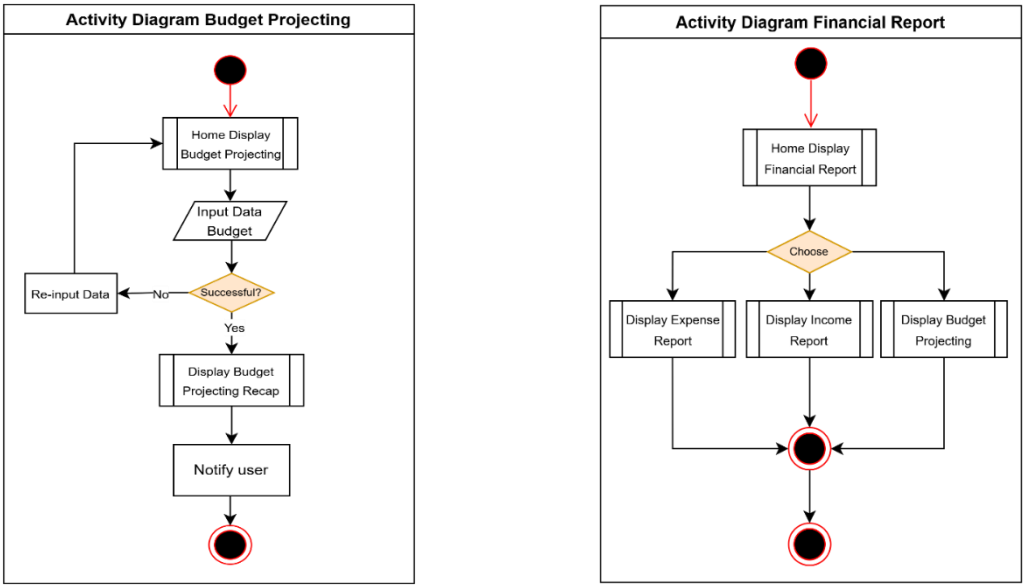
Figure 4 presents activity diagrams for income/expense tracking and financial goal management:

- **Income/Expense Tracking:** Outlines the workflow for inputting transactions, including steps for categorization (e.g., type, payment method), adding contextual notes, and saving records. Decision points validate data completeness (e.g., mandatory amount fields).
- **Financial Goal Management:** Models setting, adjusting, and tracking goals. Users define targets (amount, deadline), receive progress updates, and can modify goals based on changing circumstances.



(a) (b)

Figure 4. Activity diagram: (a) Income/expense tracking; (b) Financial goal



(a) (b)

Figure 5. Activity diagram: (a) Budget projecting; (b) Financial report

Additionally, Figure 5 displays the activity diagrams for the budget projecting and financial report features. In the budget projecting activity diagram, users input and adjust their monthly projections as needed. The financial report activity diagram gives users an overview of their recorded financial data, enabling them to review and analyze their income, expenses, and budget alignment.

2.3. Implementation

The application was developed using Laravel (backend) and Flutter (frontend), ensuring secure data handling and cross-platform compatibility. Laravel's MVC architecture facilitated RESTful API development, while Flutter's widget-based framework enabled a responsive UI across Android and iOS. Key modules were implemented as follows:

2.3.1. Login Module

The module securely manages user access to the application by providing fields for users to enter their email and password, with data encrypted using industry-standard security protocols to protect credentials. If users forget their password, they can reset it through a secure process that sends a verification code to their registered email. Additionally, the login process validates input formats, such as correct email format and minimum password length, to ensure data integrity and enhance security.

2.3.2. Income/Expense Tracking Module

This module allows users to record their income and expenses with tools for categorization and detailed tracking. Users can input transaction amounts, assign categories (e.g., 'Food,' 'Rent,' 'Entertainment'), and add custom notes to specify details such as income sources or reasons for expenses. The system enables users to edit or delete records, ensuring accuracy and flexibility in their financial tracking. Transactions are stored in a local SQLite database, providing quick access and offline functionality, with options for cloud storage synchronization.

2.3.3. Financial Goal Module

The financial goal module supports users in setting and tracking financial goals, such as saving for a purchase or building an emergency fund. Users can define specific goals with target amounts and deadlines, and the application tracks progress toward these goals based on recorded income and expenses. This module includes a progress bar that visually represents the percentage of the target achieved, and users receive updates as they get closer to their goals. The module also includes a feature that allows users to adjust goals, enabling them to modify target amounts or deadlines as their needs change. Additionally, it provides personalized saving recommendations based on analyzing the user's financial data, suggesting realistic saving amounts to help users reach their goals on schedule.

2.3.4. Budget Projection Module

This module enables users to set and monitor monthly budgets across various categories, such as "Housing," "Utilities," "Entertainment," and "Savings." Users can input specific budget amounts for each category and set durations to apply a budget across multiple months. The module compares user expenditures with the set budget, providing visual indicators (e.g., color-coded progress bars) to show users if they are within or exceeding their budget. If users exceed their budget, the system displays alerts encouraging budget adjustments. The budget data integrates with historical financial reports, allowing users to compare current and past spending habits, which helps refine future budgets.

2.3.5. Notification Module

The notification module enhances user engagement by providing regular reminders to update financial data and review goals. This flexible module allowed users to set notification preferences such as daily or weekly reminders. Notifications encourage users to record their expenses, check their budgets, and update their progress on financial goals. The reminders use Android's built-in notification service, ensuring they appear even when the application is closed, thus supporting consistent financial tracking and habit formation. The application sends custom alerts to users when they are close to reaching a financial goal or approaching a budget limit.

2.4. Testing

We conducted black-box testing to evaluate the application's functionality from an end-user perspective, ensuring it met performance standards without inspecting the internal code [29], [30]. This approach allowed us to test each feature for usability, reliability, and accurate functionality based on expected outcomes. The testing procedure was structured to verify alignment with the application's requirements, focusing on key modules, including login, income/expense tracking, goal setting, budget projection, financial reporting, and notifications.

Through black-box testing, we validated the application's robustness using scenarios representing typical user interactions. This approach accurately assessed the application's performance and user experience, with detailed outcomes in the results section. As shown in Table 3, the testing covered each primary module, focusing on specific aspects of functionality essential to providing a seamless user experience.

Table 3. Testing modules and evaluation focus

No.	Module	Focus of Evaluation
1	Login Page	Secure access, user credential validation, and "forgot password" functionality.
2	Home Page	Accessibility to all features, navigation between modules, and accuracy of financial summaries.
3	Income/Expense Tracking	Accuracy of data entry, categorization, and record deletion functionalities.
4	Financial Goal	Goal setting, progress tracking, and goal adjustment capabilities.
5	Budget Projection	Accuracy in budget setting, monitoring, and alerts when exceeding budgets.
6	Financial Report	Accuracy of data display, summarization of income, expenses, and budget alignment.
7	Notification	Consistency of reminders, notification customization, and functionality when the application is inactive.

2.5. Deployment

In the deployment phase, the application was evaluated directly with a selected group of end users representing the target audience. This process aimed to gather preliminary feedback on the application's functionality, usability, and user satisfaction before its official release. An evaluation was conducted in a beta testing format, involving users who matched the target profile (aged 19-34, students or individuals requiring personal financial management).

2.5.1. Direct User Evaluation Process

We randomly selected 50 university students within the target age range who met personal finance management criteria. Each student received a detailed explanation of the research goals, participant rights, and data privacy policies. Participation was voluntary, with an option to withdraw at any time. After providing informed consent, students accessed the application and received brief training on key features, including income tracking, goal setting, and budget projection. Over a two-week testing period, participants used various Android devices commonly used by the target demographic, including Samsung, Xiaomi, and Oppo models running Android 10 or later. At the end of the period, participants completed a survey about their experience. All data collected was anonymized and used solely to improve the application.

2.5.2. Evaluation Instrument

The evaluation instrument consisted of a survey based on a 1-5 Likert scale to measure users' responses to each evaluation aspect. This instrument covered the following evaluation aspects and indicators, as shown in Table 4.

Table 4. Evaluation aspects and key indicators

No.	Aspect	Code	Key Indicators
1	Usability	USA1	The application is easy to use, even for first-time users.
		USA2	Navigation between features in the application is easy to understand.
		USA3	The application's interface design makes it easy for users to access features.
2	User Satisfaction	USS1	I am satisfied with this application's income/expense tracking function.
		USS2	The budget projection feature aligns with my financial management needs.
		USS3	The reminder notifications help me stay consistent in tracking my finances.
3	Functionality	FUN1	This application accurately records and displays my financial data.
		FUN2	Each available feature functions as described and meets my expectations.
		FUN3	I have encountered no issues or errors when using the application's main features.
4	Engagement	ENG1	This application helps me stay more organized in daily financial management.
		ENG2	I am likely to continue using this application routinely over the long term.
		ENG3	The features provided motivate me to track and manage my finances more effectively.
5	Design Satisfaction	DES1	The visual design of this application is attractive and comfortable to view.
		DES2	The layout of features in the application makes it easy to find the information I need.
		DES3	The color scheme and visual elements help clarify each feature's function.
6	Feedback for Improvement	FEI1	The application would benefit from additional customization options for budget or financial categories.
		FEI2	I want a more detailed financial trend analysis feature to help evaluate expenses.
		FEI3	Adding options for notification timing would be very helpful in aligning with my schedule.

2.5.3. Data Analysis

We analyzed the data collected from the evaluation survey to identify the application's strengths and areas for improvement based on end-user feedback. The analysis centered on calculating average scores for each evaluation aspect, which were then categorized to provide a comprehensive view of the application's performance across key dimensions. This approach allowed us to highlight specific areas where the application met or exceeded expectations and pinpoint aspects that could benefit from targeted enhancements.

We recorded each user's response on a 1-5 Likert scale for every indicator, and average scores were calculated across all responses. This average score represented the application's performance on each specific indicator within an evaluation aspect. For each evaluation aspect, the average scores of all indicators were then summed and divided by the number of indicators to obtain an aspect score (Equation 1). This score provided an overall measure of the application's performance within each aspect.

$$Aspect\ Score = \frac{\sum(Indicators\ Scores)}{Number\ of\ Indicators} \quad (1)$$

The overall application score was calculated by averaging the aspect scores from each evaluation aspect, as shown in Equation 2, to represent the application's general performance across all aspects. This overall application score provided a single value summarizing the application's effectiveness and user satisfaction.

$$Overall\ Application\ Score = \frac{\sum(Aspects\ Scores)}{Number\ of\ Aspects} \quad (2)$$

Table 5 shows the scoring categories for aspect evaluations, providing qualitative interpretations based on score ranges. These categories included excellent (4.21 - 5.00), good (3.41 - 4.20), fair (2.61 - 3.40), poor (1.81 - 2.60), and very poor (1.00 - 1.80), allowing each score to be easily interpreted based on user expectations.

Table 5. Aspect scores and categories

Score Range	Category	Interpretation
4.21 - 5.00	Excellent	The application fully meets user expectations in this aspect.
3.41 - 4.20	Good	The application performs well in this aspect but may benefit from minor improvements.
2.61 - 3.40	Fair	The application meets some expectations but has areas that require improvement.
1.81 - 2.60	Poor	The application does not meet most user expectations and requires significant improvement.
1.00 - 1.80	Very Poor	The application fails to meet user expectations in this aspect. Significant changes are needed.

The final analysis included reporting each aspect's score and category along with the overall application score to provide a comprehensive view of the application's performance. High scores (excellent, good) indicated strengths in areas that met or exceeded user expectations, while moderate scores (fair) suggested areas needing targeted improvements. Lower scores (poor, very poor) highlighted critical weaknesses requiring significant adjustments. This structured analysis yielded actionable insights for future development, helping prioritize improvements based on user needs and aligning further development to enhance user satisfaction and functionality.

3. RESULTS

The results are presented following each stage of the development process, as outlined in the methods section. This approach explains how the application's features were implemented, tested, and refined based on user feedback.

3.1. Application Development Results

The development phase focused on creating a usable, secure, functional personal financial management application. The final product incorporated the following key features:

3.1.1. Login Page

The login page, developed based on initial design requirements, provides a secure and user-friendly interface. It features encrypted password storage to protect user credentials, while the "forgot password" option offers a streamlined recovery process for users who may have misplaced their login details. As shown in Figure 6, the login page includes fields for email and password entry, guiding users through secure access to the application. Additionally, the application stores users' financial data and records securely in the database, allowing seamless retrieval upon login. Once logged in, users can access the full range of personal financial management features the application provides, establishing a straightforward and secure entry point.

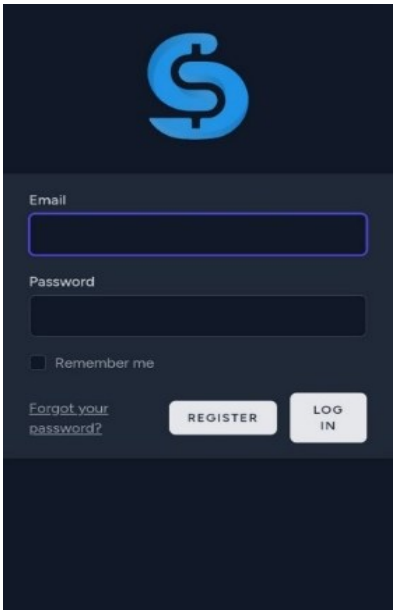


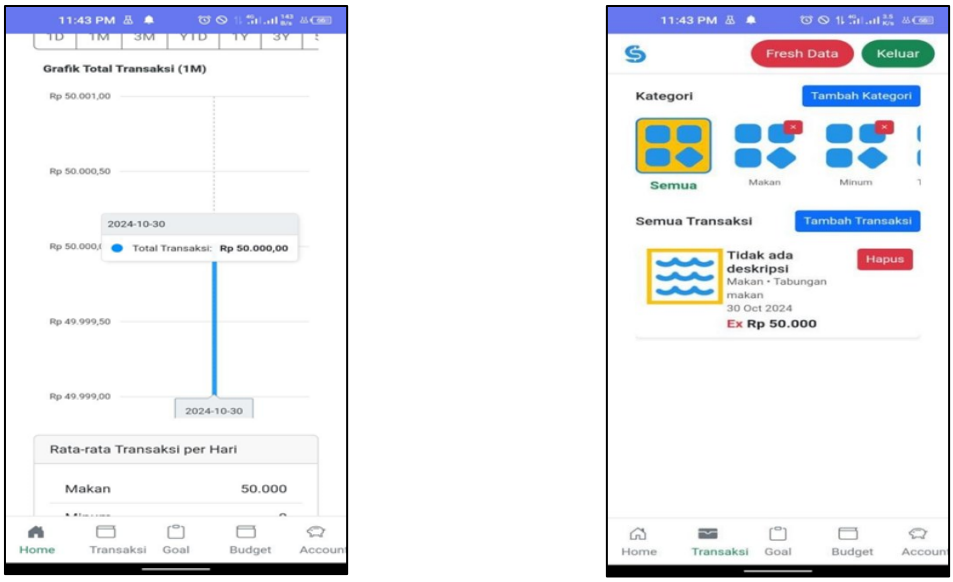
Figure 6. Login page display

3.1.2. Home Page

After a successful login, users are directed to the home page, which functions as the main dashboard of the application. This interface organizes access to all core features, including expense tracking, income recording, financial goals, budget projection, and financial reporting. As shown in Figure 7(a), the home page layout is designed to ensure that users can quickly navigate between different modules without confusion, enhancing the application's usability. The structured and intuitive design allows users to seamlessly interact with all features, promoting a cohesive experience that makes personal financial management straightforward and accessible.

3.1.3. Income/Expense Tracking

The income/expense tracking module was developed to enable users to record and categorize their financial transactions accurately. This feature enables users to input details for income and expenses, organize transactions by category, and edit or delete records as necessary, as illustrated in Figure 7(b). The application helps users maintain accuracy and stay on top of their financial data by supporting these actions. This module gives users clear insights into their spending patterns and income sources, which are fundamental for effective financial planning and control.



(a) (b)

Figure 7. (a) Home page display; (b) Income/expense tracking display

3.1.4. Financial Goals

The financial goals module allows users to actively manage and track their financial objectives. As shown in Figure 8(a), users can create categories for specific goals, such as saving for emergencies, vacation planning, or future investments, allowing them to organize and prioritize their goals more effectively. The system updates users on their progress by tracking saved or invested amounts over time, fostering a sense of achievement as they work toward their targets. Furthermore, if users need to adjust their goals to align with changing financial circumstances, they can modify or remove goals as needed. This feature motivates users to focus on their objectives while offering flexibility to adapt to personal financial shifts.

3.1.5. Budget Projection

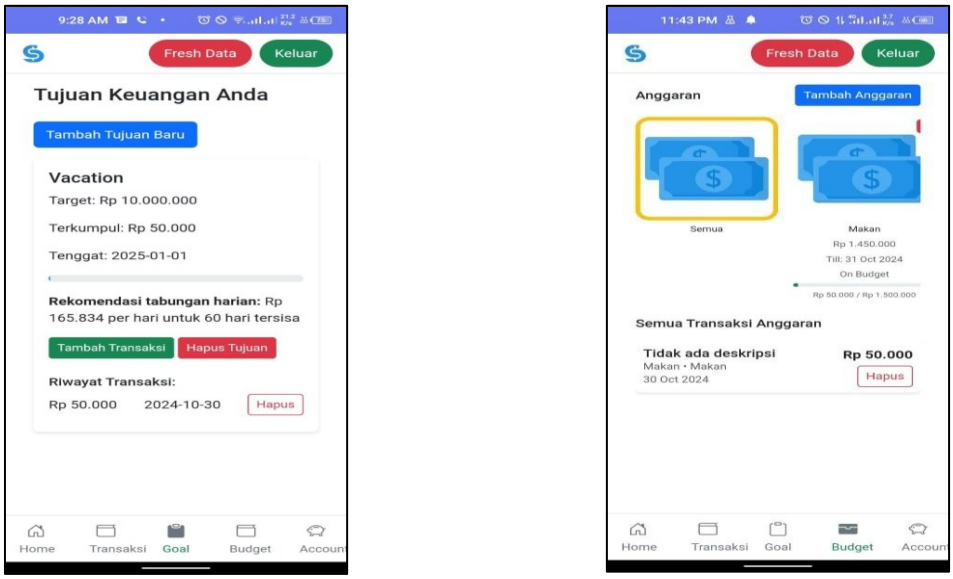
The budget projection feature enables users to set up monthly or custom plans based on their financial needs. When accessing this page, shown in Figure 8(b), users can input specific details such as budget name, category, duration, and amount. This feature helps users track and manage their budgets per their spending habits. Users can use the delete function to remove incorrect data if an error occurs, ensuring that their projections remain accurate and tailored to their preferences. This flexible and customizable approach to budgeting helps users gain better control over their financial resources, promoting thoughtful and organized spending.

3.1.6. Financial Reports

The financial report module consolidates all user data, providing comprehensive income, expenses, and budget adherence summaries. As shown in Figure 9(a), this feature displays the user-defined budget alongside a detailed history of financial entries. By offering insights into spending patterns and income trends, the report helps users make informed financial decisions. This feature highlights areas where adjustments may be needed and enables users to plan strategically for future goals, making it a valuable tool for sustained financial health and accountability.

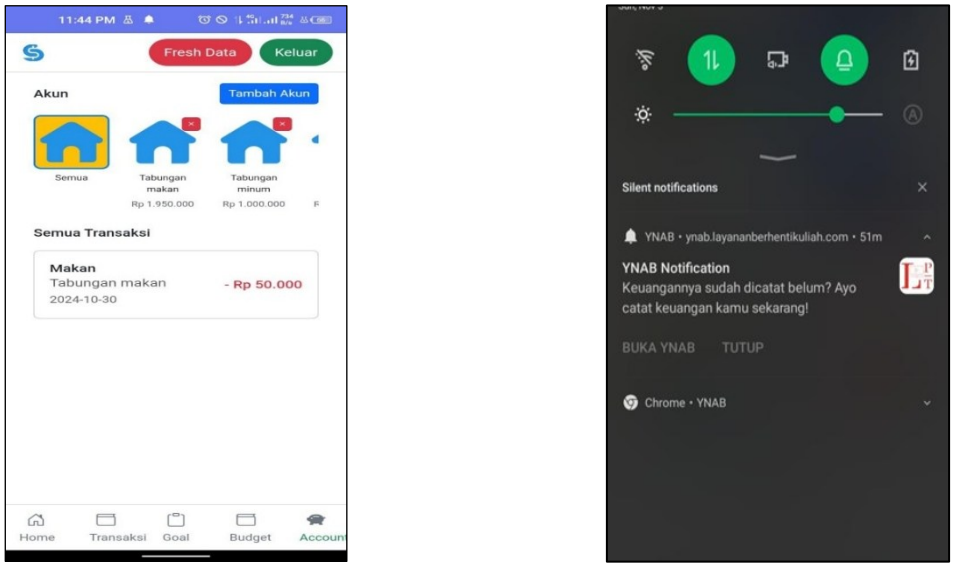
3.1.7. Notification Reminder

The notification reminder feature is essential in promoting consistent user engagement with the application. As depicted in Figure 9(b), this feature sends periodic reminders, encouraging users to log financial activities regularly. By fostering a habit of consistent tracking, the notification system aims to help users develop a comprehensive understanding of their financial status over time. This awareness enables them to make more deliberate choices regarding expenses and savings, supporting responsible and strategic financial behavior in line with their objectives.



(a) (b)

Figure 8. (a) Financial goal display; (b) Budget projection display



(a) (b)

Figure 9. (a) Financial report; (b) Notification reminder display

3.2. Application Testing Results

Each core module of the application was subjected to black-box testing, which confirmed the functionality, reliability, and user experience aspects. Below are the results for each module:

3.2.1. Login Page Test

The login page was tested to confirm that it provides secure access, validates user credentials, and supports the "forgot password" function. As shown in Table 6, the application successfully displayed the login interface, validated correct input, and directed users to the homepage upon successful login.

Table 6. Login page test result

No.	Scenario	Test Case	Test Output	Result
1	Login as a user	Click on the login button.	The application displays the login page, where users can enter their username and password. A button is also available for users who have forgotten their password.	Valid
2	Accessing application features	Click on the various buttons available on the homepage.	Each button clicked takes the user to the corresponding feature or functionality as designed in the application.	Valid
3	Logging into the application	Enter the username and password to log in.	Users with registered accounts can successfully log in and access the application's features.	Valid
4	User forgets password	Click on the "**Forgot your password?**" button.	The user is redirected to the password recovery page, and the system sends a verification code to the user's registered email address.	Valid

3.2.2. Home Page Test

Testing on the home page confirmed access to all features, smooth navigation between different modules, and accurate display of financial summaries. Users can view and select various features from the dashboard, as detailed in Table 7.

Table 7. Home page test result

No.	Scenario	Test Case	Test Output	Result
1	Users access the system after logging in	After logging in, the user enters the system to view their financial summary.	The application displays a financial summary based on the features provided.	Valid
2	Viewing financial summary in detail	The user clicks on the displayed financial summary.	The user can view a detailed and comprehensive financial summary within the application.	Valid
3	Accessing application features	The user clicks on various features available in the application.	The user selects and uses each feature according to its intended purpose and functionality.	Valid

3.2.3. Income/Expense Tracking Test

The Income/expense tracking module was tested for data entry, categorization, and deletion functionalities. As illustrated in Table 8, users could successfully enter and manage income/expense transactions with accurate categorization and record management.

Table 8. Income/expense tracking test

No.	Scenario	Test Case	Test Output	Result
1	Accessing the income/expense tracking page after login	After logging in, the user navigates to the income/expense tracking page.	The application displays a summary of the user's recorded income/expense.	Valid
2	Entering income/expense transaction data	The user clicks on the income/expense data input option displayed on the page.	The user can enter and record income/expense data into the application.	Valid
3	Deleting incorrect income/expense transaction data	The user deletes an incorrectly entered income/expense entry.	The user can remove the incorrect income/expense data, ensuring accuracy in the recorded transactions.	Valid
4	Viewing income transaction data	The user views the previously entered income/expense data.	The user can review all income/expense data entered into the application.	Valid

3.2.4. Financial Goal Test

The financial goal module testing confirmed that users could set, track, and update their financial goals. Users received progress updates and were able to adjust their goals as needed, which aligns with the intended design (refer to Table 9 for detailed results).

Table 9. Financial goal test result

No.	Scenario	Test Case	Test Output	Result
1	Accessing the financial goal page after login	After logging in, the user navigates to the financial goal page.	The application displays a summary of the user's financial goals and progress toward each goal. Options are available for adding or removing goal progress.	Valid
2	Entering financial goal data	The user clicks on the financial goal input option displayed on the page.	Users can enter data for a financial goal, including the target and progress tracking, allowing them to record and monitor their goals within the application.	Valid
3	Deleting incorrect financial goal data	The user deletes an incorrectly entered financial goal entry.	The user can successfully remove incorrect financial goal data, ensuring accurate tracking of their goals.	Valid

3.2.5. Budget Projection Test

Budget projection functionality was evaluated for accuracy in setting and monitoring budgets. The system successfully displayed alerts when expenditures exceeded the budget, and users could view and modify their budget projections. Detailed results are shown in Table 10.

Table 10. Budget projection test result

No.	Scenario	Test Case	Test Output	Result
1	Accessing the budget projecting page after login	After logging in, the user navigates to the budget projecting page.	The application displays a summary of the user's budgets, including a comparison between actual expenses and the set budget.	Valid
2	Entering budget projection data	The user clicks on the budget projection input option displayed on the page.	The user can successfully enter budget data, including the budget amount and duration, allowing for effectively tracking and managing expenses against the set budget.	Valid
3	Deleting incorrect budget projection data	The user deletes an incorrectly entered budget projection entry.	The user can remove incorrect budget data, ensuring accurate budget records within the application.	Valid

3.2.6. Financial Report Test

The financial report feature was validated for accurate data display, summarizing income, expenses, and budget alignment. As shown in Table 11, the report provided users with a comprehensive overview of their financial data, supporting better financial decision-making.

Table 11. Financial report test result

No.	Scenario	Test Case	Test Output	Result
1	Accessing the financial report page after login	After logging in, the user navigates to the financial report page.	The application displays a financial summary, including the user's budgets and financial goals.	Valid
2	Displaying financial data based on a specific budget	The user clicks on a specific budget or goal displayed on the page.	The user can view detailed financial data related to the selected budget or goal, allowing them to analyze their financial information effectively.	Valid

3.2.7. Notification Test

The Notification module was tested to ensure consistent reminders and customizable notification settings. Users received timely notifications, as intended, even when the application was inactive. Results are detailed in Table 12.

Table 12. Notification test result

No.	Scenario	Test Case	Test Output	Result
1	The user exits the application temporarily	After entering the data, the user exits the application because they have finished.	After a while, the application displays a notification reminder feature to the user after the user has finished using the application.	Valid
2	The reminded user performs the logging action by clicking on the notification.	The user clicks on the notification provided.	The user can log in, access the application's features, and start recording financial transactions immediately.	Valid

3.3. Direct User Evaluation Results

The application was evaluated by 50 users representing the target demographic to gather feedback. Table 13 summarizes the average scores for each evaluation aspect based on the Likert scale, with categories to interpret user satisfaction levels. Each aspect highlights user feedback on the application's performance, functionality, and design elements.

Table 13. Evaluation scores by aspect

No.	Evaluation Aspect	Indicator	% (Tot.) Rated 5	% (Tot.) Rated 4	% (Tot.) Rated 3	% (Tot.) Rated 2	% (Tot.) Rated 1
1	Usability	USA1	72% (36)	18% (9)	8% (4)	2% (1)	0% (0)
		USA2	66% (33)	22% (11)	12% (6)	0% (0)	0% (0)
		USA3	76% (38)	16% (8)	6% (3)	2% (1)	0% (0)
2	User Satisfaction	USS1	74% (37)	22% (11)	4% (2)	0% (0)	0% (0)
		USS2	66% (33)	28% (14)	6% (3)	0% (0)	0% (0)
		USS3	70% (35)	22% (11)	6% (3)	2% (1)	0% (0)
3	Functionality	FUN1	72% (36)	16% (8)	8% (4)	4% (2)	0% (0)
		FUN2	62% (31)	24% (12)	12% (6)	2% (1)	0% (0)
		FUN3	66% (33)	24% (12)	6% (3)	4% (2)	0% (0)
4	Engagement	ENG1	68% (34)	20% (10)	10% (5)	2% (1)	0% (0)
		ENG2	78% (39)	18% (9)	4% (2)	0% (0)	0% (0)
		ENG3	76% (38)	20% (10)	4% (2)	0% (0)	0% (0)
5	Design Satisfaction	DES1	74% (37)	18% (9)	6% (3)	2% (1)	0% (0)
		DES2	70% (35)	24% (12)	4% (2)	2% (1)	0% (0)
		DES3	64% (32)	22% (11)	10% (5)	4% (2)	0% (0)
6	Feedback for Improvement	FEI1	78% (39)	20% (10)	2% (1)	0% (0)	0% (0)
		FEI2	68% (34)	24% (12)	8% (4)	0% (0)	0% (0)
		FEI3	66% (33)	26% (13)	6% (3)	2% (1)	0% (0)

The overall application score was calculated by averaging the scores from each evaluation aspect, as depicted in Figure 10. This score reflects the application's comprehensive performance across usability, functionality, and satisfaction metrics. With an average score of 4.60, the application achieved an Excellent rating, indicating high user satisfaction and effective alignment with target user needs. This result suggests that, while the application meets expectations in most areas, future updates could address specific user requests for customization and financial analysis tools, further enhancing the user experience.

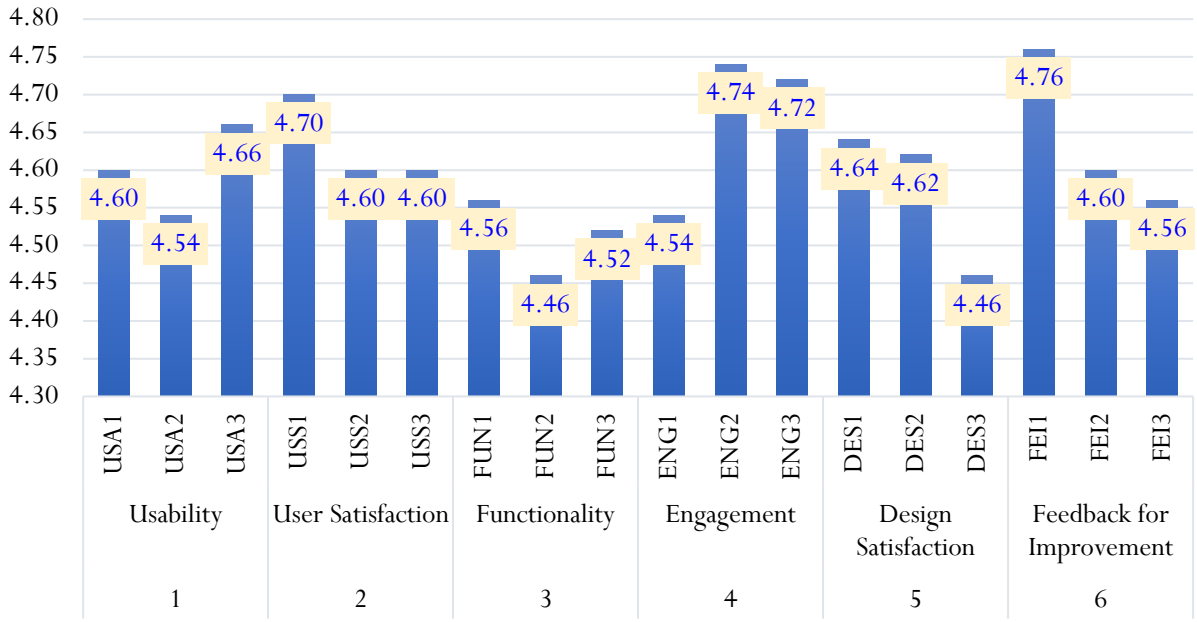


Figure 10. The average score for the evaluation aspect

4. DISCUSSION

This study developed and evaluated an Android-based personal finance management application to meet young adults' financial literacy and management needs. Through a focus on usability, engagement, functionality, and user satisfaction, the results indicate that the application successfully addresses many financial management challenges young adults encounter. The findings also suggest potential areas for refinement that could further enhance the application's effectiveness in promoting responsible financial habits.

The study's first objective was to assess how effectively the application improved users' financial management behaviors. With over 90% of users rating it at (4) four or above on the Likert scale, the high usability ratings indicate that the application's design was intuitive and accessible, even for those with minimal experience in financial tracking. Usability is critical in fostering consistent usage, as applications that are easy to navigate and visually appealing are more likely to be used regularly. The positive user feedback on core features such as expense tracking and budget projections supports this, suggesting that users found the application useful and practical for their daily financial activities.

Notably, features like income and expense tracking were highly rated in functionality and satisfaction, underscoring their value in enhancing users' awareness of their spending habits. Encouraging users to categorize and analyze their expenses, the application promotes mindful spending, a behavior crucial for long-term financial stability. However, while most users engaged consistently with these features, some desired more personalized options, such as customized budget categories and detailed expenditure analysis. These suggestions align with prior studies indicating that personalized financial tools can improve engagement by making users feel more connected to their financial data [31], [32].

The second research question focused on whether regular engagement with the application could enhance users' financial literacy and contribute to long-term financial resilience. The engagement scores indicate that the application succeeded in motivating users to track their finances consistently, with a significant proportion of reporting plans to continue using the app. This regular interaction

reinforces positive financial habits and increases financial literacy by exposing users to daily spending and saving decisions.

The findings suggest that the application's design elements, such as progress bars for financial goals and notification reminders, were important in maintaining user engagement. This aligns with behavior change theory, which posits that timely reminders and visible progress indicators can reinforce positive habits by making achievements tangible [33], [34]. Users specifically mentioned that the visual tracking of financial goals motivated them to set and work toward achievable financial objectives, demonstrating the application's potential to foster a proactive approach to financial planning. While notifications were generally well-received, some users expressed interest in more customizable reminder options, such as setting personalized alert times. Incorporating such feedback could enhance user engagement by providing a tailored experience that aligns with individual schedules, which has been shown to increase the likelihood of habit formation in digital applications [35], [36], [37].

The study also sought to identify which features most effectively encouraged consistent financial management behaviors. Based on user feedback, features such as income and expense tracking, budget projections, and financial goal setting were the most impactful. These features align closely with the primary behaviors associated with financial responsibility: tracking, planning, and setting achievable financial targets. In particular, the financial goal-setting feature was instrumental in helping users focus on saving for specific objectives. This functionality resonates with the concept of "goal-oriented behavior," which research indicates can lead to increased motivation and better long-term financial outcomes [38], [39]. By enabling users to break down their financial goals into manageable steps, the application helps build confidence and competence in managing money, which are critical to financial resilience.

However, some users noted that while the budget projection feature was helpful, it could be further improved by allowing for more nuanced budget categories. Additionally, users suggested incorporating a more comprehensive financial report that could offer insights into spending trends over time. Such enhancements would provide users with a deeper understanding of their financial patterns and help them make more informed decisions, a need highlighted by various studies on digital finance tools [40], [41], [42]. Integrating these improvements in future updates would likely enhance the application's role as an educational tool for financial literacy. This application's success in engaging young adults underscores the broader potential for mobile solutions to influence financial behavior. Digital platforms are uniquely positioned to reach young users who are comfortable with technology but may lack financial literacy. By offering an accessible and engaging tool, the application supports the development of financial skills essential for navigating complex economic environments.

The findings suggest that, beyond practical utility, financial applications should emphasize personalization and adaptability to cater to individual financial needs and schedules. As young adults transition through various life stages, their financial priorities shift; thus, applications that adapt to these changes can sustain users' financial journeys. Moreover, this study highlights the importance of user-centered design in financial applications, as it significantly impacts engagement and satisfaction. Future research could explore the longitudinal impact of consistent app use on financial literacy, particularly concerning debt reduction, savings growth, and investment behavior. While the study achieved its objectives, it is important to recognize certain limitations. The relatively short evaluation period may not fully capture the application's impact on long-term financial habits. Additionally, while the sample was representative of the target demographic, a more extensive and diverse user base would provide a broader perspective on user needs and preferences. Future studies could include longitudinal research to assess the sustained impact of the application on financial literacy and behavior change.

Furthermore, implementing user feedback for added features, such as trend analysis and advanced customization options, could enhance the application's value. Expanding the application's scope to include educational content on financial literacy topics may also increase its impact by providing users with practical tools and theoretical knowledge. Given the rapid evolution of financial technology, integrating adaptive AI algorithms to offer personalized financial advice could be a promising future direction.

5. Conclusion

This study successfully developed and evaluated an Android-based personal finance management application specifically designed for young adults, focusing on usability, engagement, and functionality. The application aimed to address its target audience's specific financial management needs by providing tools for tracking income and expense, budget projection, and setting financial goals. Through direct user evaluations, the findings revealed high levels of user satisfaction across these core features, indicating that the application effectively supports users in managing their finances and developing positive financial habits. Key outcomes showed that the application's user-friendly design, interactive features, and reminder notifications were essential in encouraging consistent engagement with financial management. Features such as financial goal tracking and budget projection fostered mindful spending and motivated users to set and work toward achievable financial goals, an essential aspect of financial responsibility. Despite these successes, feedback suggested room for improvement. Users expressed interest in additional customization options, such as personalized budget categories and a more detailed analysis of spending trends. Future updates could also incorporate AI-driven recommendations, offering users personalized financial insights based on spending behavior, further enhancing the application's functionality. Implementing these features could make the application even more responsive to individual user needs and preferences. Overall, the application demonstrates significant potential to enhance financial literacy and behavior among young adults. By offering an accessible, adaptable platform for personal finance management, this application contributes significantly to efforts toward improving financial resilience in the digital age. Future research could explore the long-term effects of regular app usage on financial behavior, including savings growth, debt reduction, and investment practices.

Declarations

Author Contributions

Riswandha Imawan: Conceptualization, Methodology, Software, Data curation, Writing - Original Draft. **Wahyu Permana Putra:** Visualization, Writing - Review & Editing. **Rabee Alqahtani:** Formal analysis, Writing - Review & Editing. **Emmanouil D. Milakis:** Validation, Formal analysis, Writing - Review & Editing. **Mykhailo Dumchykov:** Formal analysis, Writing - Review & Editing. All authors have read and approved the final version of this manuscript.

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Competing Interests

The authors declare no competing interests.

Generative AI and AI-Assisted Technologies Statement

The author(s) declare that no generative AI or AI-assisted technologies were used to prepare this manuscript. All content was created, reviewed, and edited manually by the author(s), who take full responsibility for the accuracy and integrity of the manuscript.

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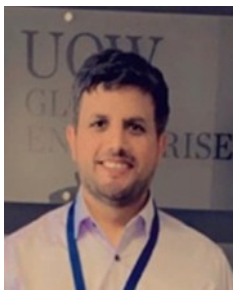

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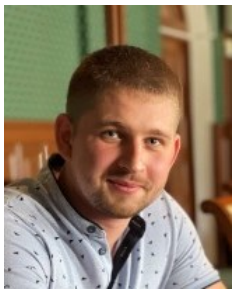

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