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Enhancing Financial Discipline through Mobile-Based Budget Tracking and Real-Time Notifications

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Abstract
In today's complex financial environment, effective management of personal income and expenditure is essential for both short-term stability and long-term security. This study presents the development of Money Lover, a mo-bile application designed to enhance financial management through system-atic income and expense tracking, real-time budget monitoring, and proac-tive behavioral guidance. Unlike traditional record-keeping tools, Money Lover integrates advanced features such as Optical Character Recognition (OCR) for automated data extraction from transfer slips, interactive data vis-ualization via monthly graphs, and a notification system that alerts users when expenditures exceed predefined thresholds. The system was developed using AppSheet, incorporating comprehensive processes of analysis, design, and implementation to ensure usability and efficiency. Its integration with Google Sheets improves data accessibility and accuracy, while the user-friendly interface facilitates seamless input and editing. Key functionalities include automated expense categorization, graphical summaries for financial analysis, and an intelligent email alert mechanism that issues real-time noti-fications when monthly expenses surpass 8,000 baht. Evaluation results demonstrate that the application reduces data entry errors, enhances conven-ience, and improves financial awareness. Interactive graphs effectively sup-ported personal financial analysis, while the notification system promoted budget adherence by providing timely spending alerts. These findings high-light the importance of integrating automated data processing, visual analyt-ics, and proactive alerts in mobile financial applications. Money Lover not only provides a comprehensive platform for managing daily financial activi-ties but also represents a scalable model for advancing digital financial litera-cy and fostering sustainable financial habits in a digital economy.

Keywords: *Personal Finance Management, Expense Tracking, Budget Planning, Mobile Application, Financial Discipline.*

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I. INTRODUCTION

In the propagating turbulent economic times, people are being exposed to erratic incomes, variable costs and complicated money-making procedures. Proper financial management of a person has thus become a crucial life skill, not only in terms of providing a financial security in the short term, but also in reaching the long-term targets of saving, investing, and planning against un-foreseen events. With bad financial management, on the contrary, has been repeatedly associated with increasing numbers of personal debt, financial stress, and worse living conditions, it is clear that there is an absolute need to provide people with the tools and techniques to better manage their finances [1].

More recent developments in the information technology have revolutionized the way financial information may be accessed, analyzed, and managed. Specifically, the swift development of smartphone applications has allowed users to manage and track their finances faster and more conveniently and precisely [3], [6]. Mobile applications, as opposed to conventional manual processes of record keeping, which are usually susceptible to inaccuracies and inefficiency, offer real-time tracking of finances, automatic classification of expenditures, and the personal budget management capabilities. This is because such technological innovations have made mobile financial management applications not only an important driver in helping individuals to be more financially literate and disciplined, but also make data-driven decision-making an achievable phenomenon.

This research paper presents a mobile application known as Money Lover that aims at solving issues in the personal income and spending management, as well as promoting the formation of sustainable financial practice. The software is designed as a complex tool which helps users in tracking cash flow, managing spending and budgeting in a systematic manner. More than just data entry, Money Lover has a smart email notification feature which notifies the user when their spending is out of bounds and the predefined limits. These proactive feedback systems are important in increasing financial awareness, change behavior in a timely fashion as well as increasing commitment to personal budgets [5].

To this end, the paper will seek to examine the design, development and testing of Money Lover application as a useful technological tool to manage personal finances. The introduction proves the need to have an effective financial management in the modern society, the potential of mobile technologies in finance and Money Lover is an innovative system that can improve financial literacy and financial discipline.

II. OBJECTIVES

The objectives of research are as discussed below

2.1 To facilitate data recording:

To enable users to easily and systematically record and track their daily income and expenses [2].

2.2 To promote financial planning:

To allow users to flexibly set and adjust monthly budgets for different spending categories, leading to more organized financial planning [3].

2.3 To provide alerts and encourage behavioral adjustment:

To implement an automatic email alert system when total monthly expenses exceed the set budget, helping users stay informed about their financial status and make timely adjustments to their spending habits [4], [5].

2.4 To encourage financial discipline:

To support users in developing better spending discipline and achieving their personal financial goals more effectively [5].

III. METHODOLOGY AND SYSTEM IMPLEMENTATION

The development of the Money Lover application for personal income and expense management was conducted through a structured methodology designed to ensure technical accuracy, usability, and long-term sustainability. The implementation process was divided into two major phases: (1) System Analysis and (2) system design and development.

3.1 System Analysis

The analysis phase involved a comprehensive study of user requirements, existing financial management tools, and common challenges associated with manual expense tracking. Key functionalities were identified, including daily income and expense recording, budget monitoring, real-time notifications, and financial data visualization. Special attention was given to error reduction in data entry, leading to the integration of optical character recognition (OCR) technology for automatic extraction of key information from transfer slips.

3.2 System Design and Development

The design and development focused on creating a user-friendly interface (UI) for data entry, along with developing a budget management system that displays information through easy-to-understand graphs. This was done in parallel with building a real-time data processing system and an efficient automatic email alert mechanism. Additionally, tools for generating reports and visual graphs were created to help analyze spending behavior, making Money Lover a comprehensive tool for managing personal finances.

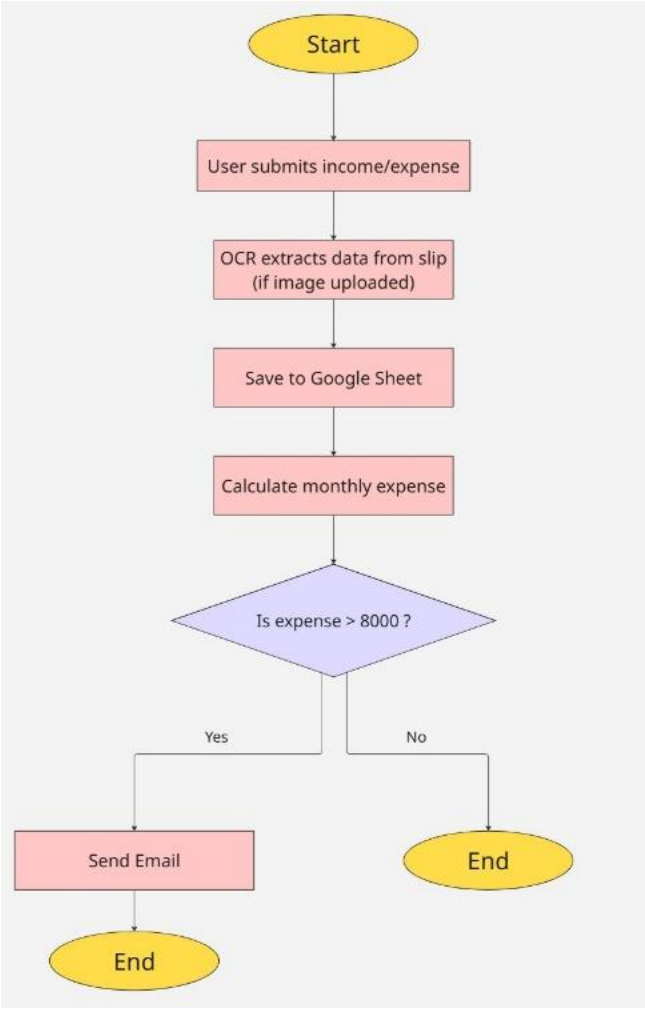


Figure 1: Flowchart Illustrating the System Workflow.

Figure 1 illustrates the automated system workflow engineered for financial monitoring and proactive notification. The process is initiated when a user submits a new income or expense entry, typically by uploading an image of a financial slip. The system then employs Optical Character Recognition (OCR) technology to automatically extract key transactional data from this image, digitizing the information for processing. This parsed data is subsequently saved to a centralized Google Sheet, which acts as the primary database for all financial records. Following each new entry, the system performs a critical analytical function: it calculates the user's cumulative monthly expense. This aggregated value is then evaluated against a predefined budgetary threshold of 8,000 Baht. This rule-based decision point is the core of the system's analytical capability. If the total expenses for the month exceed this threshold, the workflow triggers an automated email notification to alert the user, promoting immediate fiscal awareness and enabling corrective action. If the expenses remain within the budgetary limit, the process concludes without intervention. This streamlined workflow demonstrates a closed-loop system for personal financial management, integrating data capture, storage, computation, and intelligent notification to facilitate informed user decision-making.

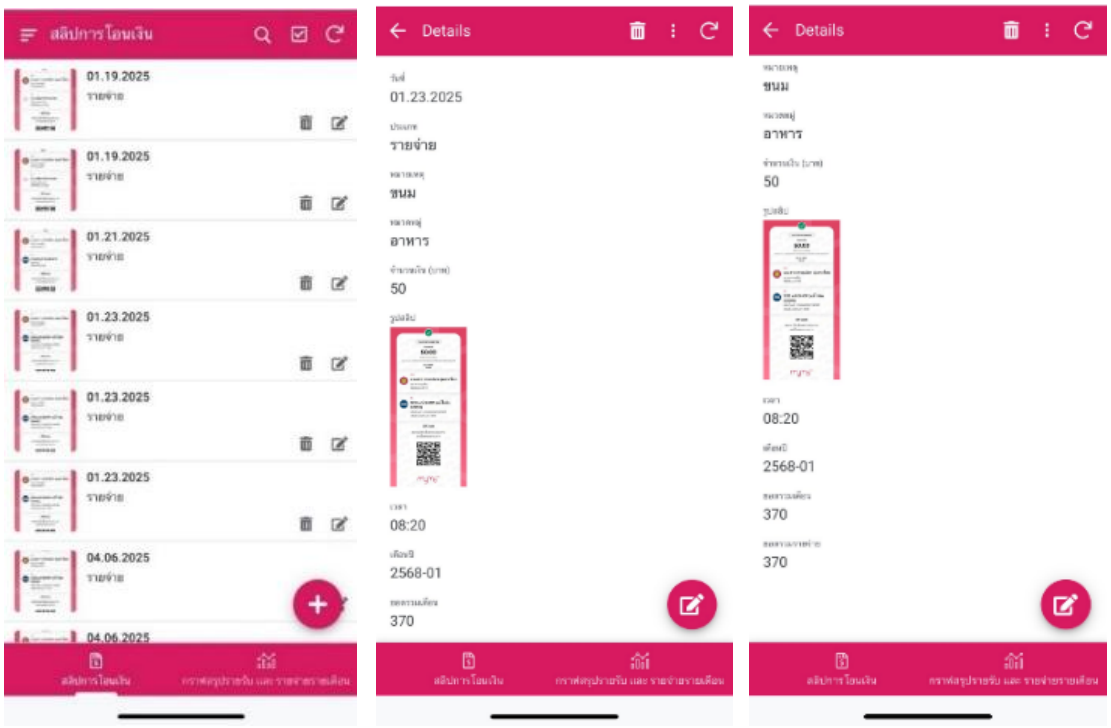
IV. RESULTS

The application's main dashboard serves as a comprehensive financial cockpit, offering users a granular view of their fiscal activities. This interface meticulously presents detailed chronological records of all income and expenditure transactions. Each entry is enriched with critical metadata, including the transaction date, a precise timestamp, a categorized type, descriptive annotations, a specific financial category, and the quantified amount in Thai Baht (THB). A pivotal feature is the integration of visual verification, allowing users to view an

uploaded image of the digital transfer slip for each transaction, thereby enhancing the authenticity and auditability of the recorded data.

Beyond passive observation, the system is designed for dynamic interaction. It provides users with the capability to perform full Create, Read, Update, and Delete (CRUD) operations, enabling the seamless addition of new financial data or the modification of existing records to reflect accurate financial states. This functionality is demonstrated in Figure 2 (a).

Furthermore, the interface synthesizes this raw data into higher-order analytical summaries. As illustrated in Figure 2 (b) and (c), the platform automatically aggregates individual entries to present users with clear, immediate insights into their financial health. This includes real-time calculations of total expenses and a consolidated monthly summary, transforming discrete data points into a coherent narrative of the user's financial trajectory and fostering informed monetary decision-making.



(a) (b) (c)

Figure.2: User interface components for financial data: (a) The primary transaction list view. (b) Expanded details of a specific expense record. (c) Expanded details of a specific income record, featuring a monthly summary.

This interface is meticulously engineered to serve as the primary hub for granular financial data acquisition. It provides a dual-mode entry system to maximize flexibility and efficiency. Users can manually input transactional details with high precision or, alternatively, leverage an automated pipeline by uploading an image of a financial document. Upon upload, the integrated Optical Character Recognition (OCR) model, a cornerstone of the system's intelligent automation, engages to parse the document. It automatically detects, extracts, and populates the relevant fields; such as date, vendor, and amount; with extracted data, significantly reducing manual effort and minimizing human error. This sophisticated symbiosis of user-driven input and AI-assisted data capture, illustrated in Figure 3, ensures both comprehensive data fidelity and an optimized user experience.

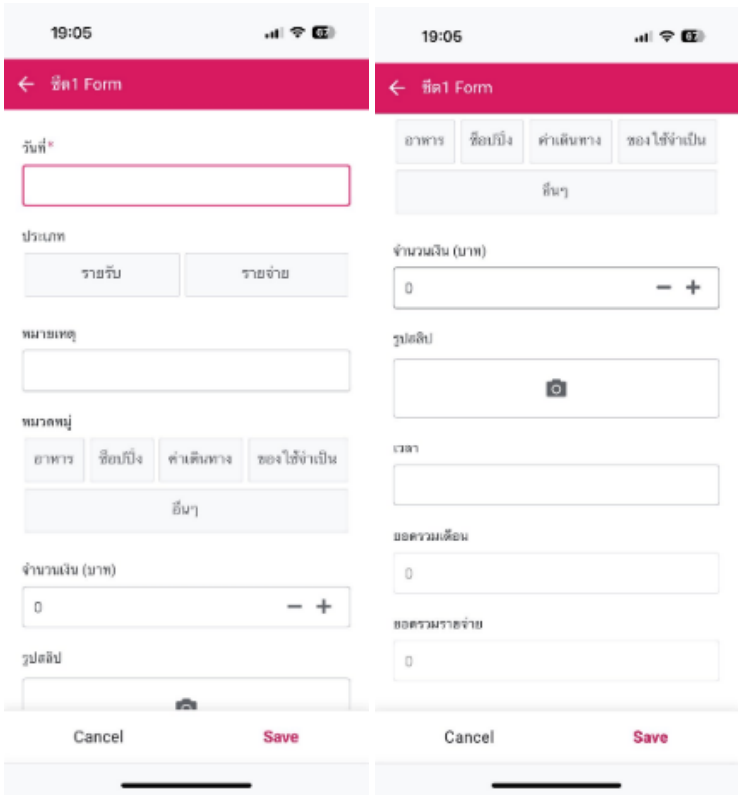
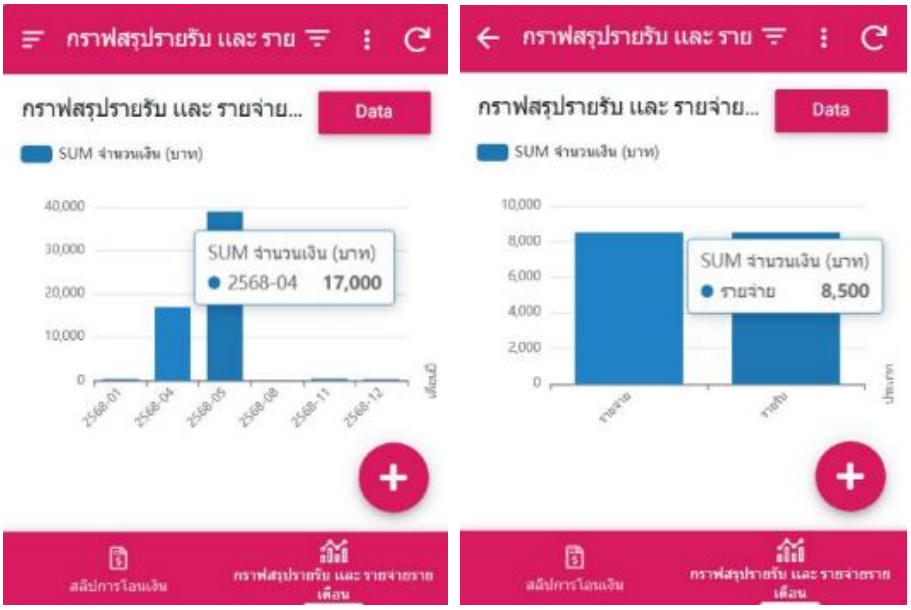


Figure.3: Data Input Page

This page presents summary graphs of monthly income and expenses, illustrating the aggregated totals of income and expenditure for each respective month, as illustrated in Figure 4.

The application's analytical dashboard provides users with a sophisticated visual synthesis of their financial activities. Upon user initiation, the interface renders comprehensive monthly summary graphs, delineating the comparative trajectories of income versus expenditures across a temporal axis, as depicted in Figure 4(a). This high-level overview serves as an interactive gateway to granular data; selecting a specific data point on either the total income or expense graph triggers a drill-down function, presenting the user with a detailed, transactional-level record of the selected financial category, illustrated in Figure 4(b). The integrity and dynamism of this visualization are underpinned by a seamless data pipeline. All information inputted via the application is persistently stored and retrieved in real-time from a synchronized Google Sheets database, which acts as the central repository, ensuring data is consistently accurate and immediately reflective of user activity, as demonstrated in Figure 5. This architecture facilitates not only robust data management but also empowers users with immediate, actionable financial intelligence.



(a) (b)

Figure.4: Income and Expense (a) Monthly detail (b) Total detail.

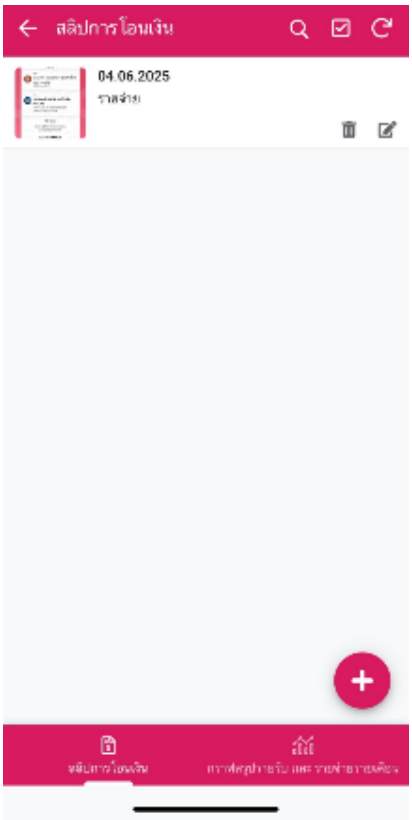


Figure.5: Transfer Receipt Page

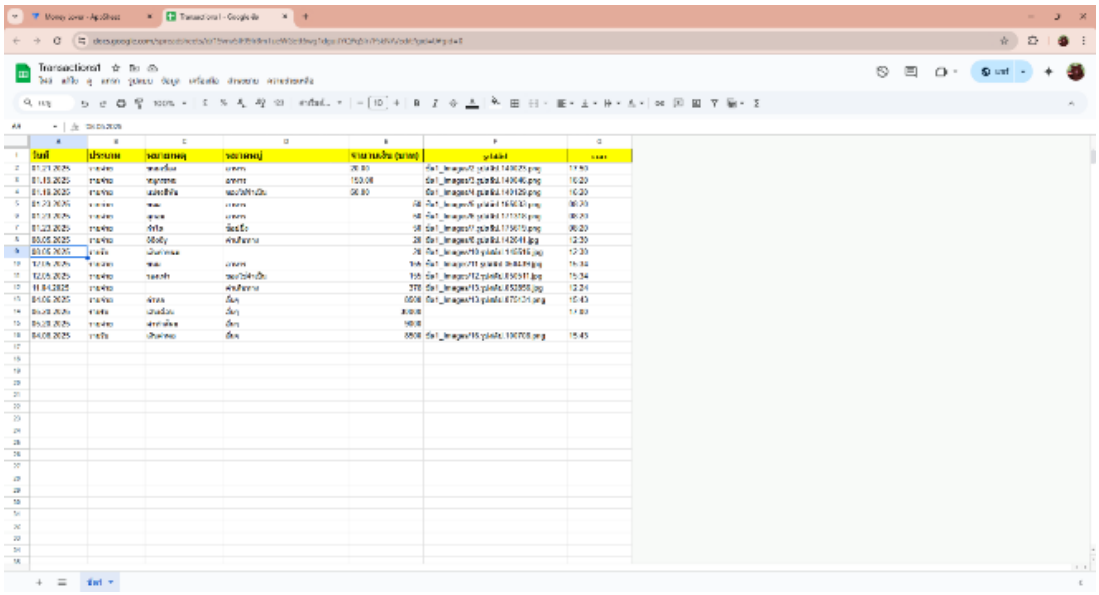


Figure.6: The data table recorded from using the Money Lover application.

The system incorporates a proactive, rule-based notification mechanism to foster financial discipline and awareness. Upon the completion of each new transaction entry, the platform continuously aggregates and monitors monthly expenditure in real-time. A critical analytical function is executed, wherein the total expense is evaluated against a predefined budgetary threshold of 8,000 baht. Should this ceiling be breached in any given month, an automated workflow is instantaneously triggered. This process generates and dispatches a precise email alert to the user, serving as an immediate notification of a budget overrun. This feature, illustrated in Figure 7, is grounded in principles of behavioral economics [4] and is designed to empower users with timely insights, enabling corrective fiscal actions and promoting sustained financial health [5].

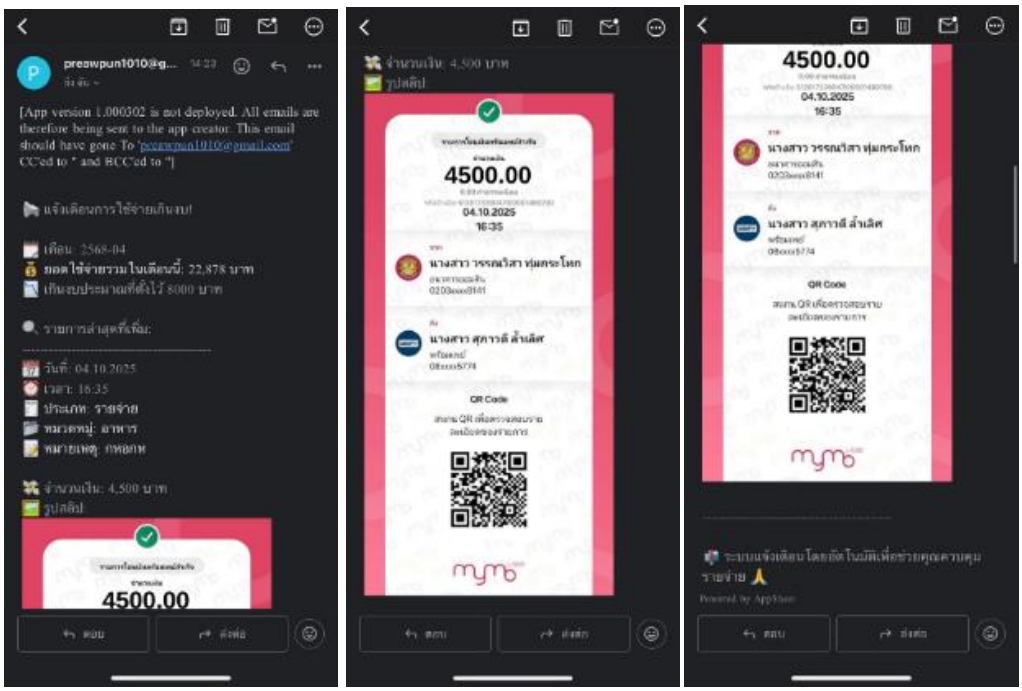


Figure.7: The page displaying the results of email notifications.

V. CONCLUSION

From the development of the income and expense management application using AppSheet, which includes features such as uploading images of transfer slips, displaying monthly summary graphs, and email notifications, it was found that the developed system effectively meets user needs in several dimensions as follows:

5.1 Ability to Record Income and Expense Data from Images

The system supports uploading images of transfer slips, which can be processed by the OCR Model (Beta) to automatically extract key information such as date, amount, and time. This helps reduce data entry time and minimizes errors caused by manual input [2].

5.2 Data Visualization through Graphs for Analysis

Data is displayed in monthly summary graphs, allowing users to clearly see an overview of income and expenses each month. The graphs are interactive, enabling users to click and view detailed information of each entry, making personal financial analysis convenient and efficient [3].

5.3 Automatic Email Notification System

If expenses exceed 8,000 baht in any month, the system will automatically send an email alert to help users control their spending according to the set budget. This feature is highly beneficial for financial planning and fostering financial discipline [4], [5].

5.4 Convenience in Adding and Editing Data

Users can directly add or edit income and expense data from the main app page, along with attaching images of transfer slips to support the information. This makes the system flexible and user-friendly [3], [7].

VI. FUTURE WORKS

Based on the paper's findings, a key idea for future work is to expand and refine the application's intelligence and scope. This could involve enhancing the Optical Character Recognition (OCR) system to automatically categorize transactions with higher precision, moving beyond the current manual selection to further reduce user effort and data entry errors. Furthermore, the project could explore integrating predictive financial modeling by analyzing past spending trends to proactively suggest dynamic, personalized budget thresholds, rather than relying solely on the static 8,000 Baht limit. Finally, to further foster sustainable financial habits, the system could be extended to include gamification elements or interactive educational content tailored to user behavior, transforming the application from a mere tracking tool into a comprehensive platform for advancing digital financial literacy.

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