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Development of Financial Management System for a Barangay Cooperative

Amiel L. Aligno[1]; Precious M. Canedo[2]; Rugin Mae C. Coca[3]; Maria Fate L. Hidalgo[4]; Vernie Jerard A. Ordiz[5]; Ryan M. Reganan[6]; Kent Russell N. Casiño[7]; Neptale S. Roa III[8]

[1;2;3;4;5;6;7;8]College of Information Technology Tagoloan Community College (TCC) Tagoloan, Philippines

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Abstract: This study presents the development of a web-based Financial Management System (FMS), for the Mantibugao Agrarian Reform Beneficiary Farmers Cooperative (MARBFC), which is located at Mantibugao, Manolo Fortich, Bukidnon and they are currently relies on paper-based for processing membership applications, recording transactions, and managing loans, equipment rentals, share capital, divided and patronage refunds. This system was created using the Waterfall methodology, which included gathering requirements from cooperative officers, designing the system based on actual workflows, developing and testing the final output. The evaluation showed that the system performed requires tasks effectively, with the users noting faster processes and improved organization. The System Usability Scale (SUS) score of 60.83 indicates marginal yet good usability but still requires familiarization of using the features of the system. Overall, the system enhances transparency, efficiency, and financial record management and supports better decision-making for MARBFC.

Keywords: *Financial Management System, Dividend, Patronage Refund, Loan Management, Share Capital, Web-Based System, Waterfall Methodology.*

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I. INTRODUCTION

Information Technology (IT) is now a big part of many industries. In the field of financial management, IT has become essential, offering tools that enhance accuracy, enhance processes, and ensure real-time data access. Despite these advancements, many Cooperatives still rely on traditional paper-based record-keeping methods. This outdated system poses several challenges such as time consuming due to manual data retrieval and calculation, risk of data loss due to human oversight, lack of transparency as members don't have access to their records, and loan management. However, MARBFC currently relies on paper-based processing of membership applications, recording transactions, and managing loans, with 400 to 500 members.

According to Ratnawati, and Santoso (2024), Cooperative faces the challenge of improving operational efficiency and competitiveness in the increasingly advanced digital era, which currently still uses traditional methods. Meanwhile, Inandan, Sardañas, and Amparo (2020) stated that, using a computerized system, the cooperatives can ensure that all transactions, reports and other documents relating to inventory and loans are uniform in their presentation, regardless of who has created them. As Rilwan, Oyelakin, and Usman (2021) highlighted, the manual-based system is labor intensive and prone to errors and proposed an ICT solution to improve efficiency. While Abdulkadir, Hussaini, Yusha'u, and Mohammed (2024). This system minimizes errors and promotes informed, accountable decision-making. Padua, and Cuevas (2020), most are having problems due to limited access to the facilities of modern technology. The purpose of this study is to design and develop a web-based, Financial Management System (FMS) for MARBFC to provide a transparent way of managing financial transactions in place of the cooperative's present manual and paper-based record-keeping. The system aims to provide a more efficient, transparent, and organized way of managing cooperative records assisting the manual, paper-based process currently in use. The Financial Management System (FMS) will be developed using the Visual Studio Code as the integrated development environment (IDE), Laravel (PHP framework), for backend development, MySQL for database management, and HTML, CSS, JavaScript, Tailwind, Figma for frontend interface and design. This project contributes to the field of IT by automating traditional financial processes, replacing manual methods with an efficient, enhanced solution. The key features of the Financial Management System include

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Membership Management, Rental Management, Equipment Management, Loan Management, Share Capital, Financial Transaction, Dividend and Patronage refunds. The System Usability (SUS) score of 60.83 indicates marginal yet good usability but still requires familiarization of using the features of the system. Overall, the system enhances transparency, efficiency, and financial record management and supports better decision-making for MARBFC.

II. REVIEW OF RELATED WORK

A study that designs and builds a web-based Accounting Information System (SIA) to Optimize Financial Management by Silaen (2025), utilizing the Rapid Application Development (RAD) method, "allows a faster development cycle than traditional methods". By using Laravel 8 framework, Laravel Blade and HTML for front-end, while the back-end uses PHP and SCSS to improve interface appearance, the study demonstrates the effectiveness of digital solutions in enhancing financial management processes. "The system is designed to help the process of recording and reporting finances more efficiently, so that it can make it easier to manage financial data in a company". Rachmanto, Muriani, and Adilah (2023), developed an Accounting Information System for cash receipt and disbursements at Internet Cafes using the Waterfall SDLC, to structure requirements analysis, system design, coding, testing, and maintenance phases. As stated, "that the implementation of accounting information systems for cash receipts and disbursements at Internet Cafes is well-established". The study concluded that the system successfully achieved its effectiveness objectives, supported by clear goals, operational guidelines, proper infrastructure, and a working monitoring and control mechanism. Agtina, Cabañero, Baluan, Catungal, and Encarnacion (2024) developed a web-based fund Collections System for military finance office, aimed at digitizing manual payment transactions and improving financial data reporting. The system utilized PHP, MySQL, and Bootstrap technologies. By automating the fund collection process and generating graphical reports, it increased efficiency and transparency in financial operations. However, their system primarily focused on collection and reporting, without offering integrated membership management or comprehensive loan tracking features.

Sari and Rosyid (2025), developed a web-based cooperative management system for the Ar-Rohman Savings and Loans Cooperative in Sidoarjo, Indonesia, using the waterfall development model. They used this software to build the system, Sublime text as an editor, PHP programming language, CodeIgniter framework, Apache web server and MySQL database. As for the authors, "This structured and sequential approach supported the transition from manual bookkeeping to a computerized achievement and financial management system". Wanga (2025), developed a Saccos Management Information System for Sifa Saccos Members savings and Credits using Waterfall model because the "Phases are processed and completed one at a time". The web application was built using PHP, Apache, MySQL, and Visual Studio Code. The study concluded that, "it has automated member registration, deposits and withdraws, loan acquisition, loan payment, and reports modules", noting significant improvements in procedural efficiency and effectiveness.

Hakiki, Delianti, Marta, Cabanillas-García, Slavov, and Jalil (2025), developed a Smart Financial Management System for Savings and loan cooperatives using the waterfall methodology because, "the project has well-defined functional requirements, such as savings payment processing, loan applications, and financial report management, which were established at the outset". The system was coded using PHP and the Laravel framework, implemented within a development environment configured through XAMPP (Apache, MySQL, and PHP). The architecture followed the ModelViewController (MVC) pattern, with MySQL as the database, and user authentication features integrated using Laravel's built-in tools. "The study was deemed successful in enhancing transparency, generating automated financial reports, and increasing member trust". Laguda (2023), developed a School Loan and Savings Management System for Bentuco National High School Faculty Cooperative, using the Agile Iterative development Model. She stated that, "this development approach emphasizes flexibility and responsiveness to changing requirements throughout the development process". The system developed using MERN (MongoDB, Express.js, React.js, & Nodes.js) Stack technology and JavaScript, enabling members to access their account information, perform loan and savings transactions, and view transaction history. The system reported that, "Users were satisfied with the system and found it easy to use". However, it lacked a separated ledger system that enabled members to track their transaction and balances.

- *Synthesis*

The reviewed studies demonstrate the growing efforts to digitize financial operations within cooperatives. Most systems adopted the waterfall development model, such as Rachmanto, Muriani, and Adilah (2023), Hakiki, Delianti, Marta, Cabanillas-García, Slavov, and Jalil (2025), Wanga (2025), Sari (2023), Sari and Rosyid (2025), which highlights its suitability for well-defined and linear software development projects. These studies have a common goal: address inefficiency and error proneness in manual systems through web-based automation. However, several limitations have been identified. Some systems, such as Sari and Rosyid (2022), lacked members' dashboards, while others, such as Laguda (2023) and Agtina, Cabañero, Baluan, Catungal, and Encarnacion (2024), could not provide separate account views for the individual member tracking.

These gaps highlight the need for a comprehensive, user-centric and real-time solution adapted to the needs of local cooperatives. The proposed financial management system for MARBFC aims to address these limitations by integrating key features of previous systems and expanding their scope. This study, combining the strengths of existing solutions and filling identified gaps, provides a timely and relevant system that promotes operational efficiency, financial accuracy and member trust in cooperatives such as MARBFC.

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III. METHODS

This type of research uses developmental research using the Waterfall Model. The Waterfall Model is suitable for system development with well-defined requirements and used to guide the system development process, following the approach documented in several successful cooperative financial system implementations [6], [7], [8], [9], who uses the Waterfall model. The model consists of six phases, such as (1) Requirements Gathering and Analysis, (2) Design, (3) Implementation, (4) Testing, (5) Evaluation, and (6) Deployment. Each phase must be completed before proceeding to the next to ensure systematic development.

- Requirements Gathering and Analysis: The researchers will conduct a face-to-face interview with the manager of MARBFC. An interview guide with open-ended questions was used to gather accurate and detailed information. Responses were documented using the pen and paper for taking down key points, and a voice recorder (with permission) to capture the whole conversation. After the following interviews, the researchers made a manual flowchart for MARBFC workflows for further visual analysis.

- Design: The researchers will use a Use Case Diagram to show how the users interact with the system features. Context Level Diagram to visualize the interaction between the system and the external entity. The Data flow Diagram illustrates how data moves within the system module. Also, Flowcharts created to visually represent the logical flow of process and decision within the system, providing a clear roadmap for development. And the Logical Entity Relationship Diagram and Physical Database Design for organizing and structuring the data, ensuring that the database is well-defined and supports efficient data retrieval and management.

- Implementation: The development will use Three-Tier Architecture, a modular client-server architecture that consists of the Presentation Tier that is responsible for frontend development, uses HTML, CSS, JavaScript, and Tailwind to ensure visually clear and functional user experiences. The Application Tier, acting as the middle layer that manages the system's core business logic, builds using Laravel for backend logic with PHP handling dynamic processing and routing. And the Data Tier uses MySQL as the backend database to store and retrieve all system data.

- Testing: The researchers will implement Manual Testing, a method where the testers examine the software by executing its functions and features manually. Next, the Automated Testing tools provided by Laravel such as php artisan test and composer test, an automated test that runs the scripts located in the tests/Feature and test/Unit directories. And the Functional Testing ensures that each feature and module of the system meet the required specification and behaves according to the expected outcomes.
- Evaluation: The designated users will test the financial management system under real operating conditions and confirm its practical utility, operational stability, and complete compliance with cooperative requirements. As part of this phase, users will validate whether all functions perform correctly through Usability Testing and confirm the overall system measures using the System Usability Scale (SUS). These combined assessments to verify the completed system deliver a dependable user-friendly solution that meets all the defined functional needs and strategic objectives.

- Development: A complete Financial Management System (FMS) will be deployed using a cloudbased server hosted on Hostinger, a well-known web hostinger provider with a focus on ease of use, low prices, and fast performance.

IV. RESULTS AND DISCUSSION

This section presents the results and discussion of the system development process based on the methodology described in the previous section. Following the Waterfall Model, each phase from Requirements Gathering and Analysis, Design to Implementation, was methodically to develop the Financial Management System (FMS).

- Requirements Gathering and Analysis: To acquire the needed requirements, the researchers initially wrote a letter addressed to the management of the MARBFC to gather data and request access to official records or documents. Upon obtaining approval, the researchers conducted a fate-to-face interview with the cooperative manager using an interview guide, open-ended questions, and voice record to gather detailed information regarding the cooperative process. To visualize the flow of activities, a manual flowchart was developed and later refined into a swimlane diagram that illustrated the cooperative workflow. This workflow determines the essential features needed for the system, such as Membership Management, Equipment Rental, Loan Processing, Share Capital monitoring, Financial Transactions, and reporting. Including the automated calculation of dividend and patronage refunds. Moreover, the system defines specific roles, namely: Admin, Staff, and Cooperative Member.

- Design: This phase presents the different design models of the FMS, describing the process flow through Use case Diagram, Context-level Diagram, Data flow Diagram, Flowcharts, and Entity relationship Diagram. Below are the sample diagrams:

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Fig 1 Use Case Diagram for Admin & Staff

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Figure 1 presents the admin and staff interaction through the system, they share the same activities but varies in role permission; the admin has full access and oversight on the system. The admin can perform major operations such as logging in, managing members, loans, equipment along with rental, daily transactions, allocate for distributions, report generation, monitoring audit trails, and managing user accounts. While the Staff, who serves as the operational user of the system. The staff's primary functions include registering a member, collecting share capital contribution, creating and processing loan applications, managing equipment rentals, record payments for loan and rentals, and recording of daily transactions.

Fig 2 Use Case Diagram for Cooperative Member

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Figure 2 presents the Cooperative Member, who interacts with the system primarily to access and review personal financial information. Members can log in into the system, view their loan, share capital records, check transaction history, view distributions, and update their Personal Information.

- Implementation: In this stage of development of Financial Management System for a Barangay Cooperative, the researchers use several software tools following the Three-Tier Architecture to build the system. Below is the High Fidelity (Hi-Fi) of each user interface along with the login page.

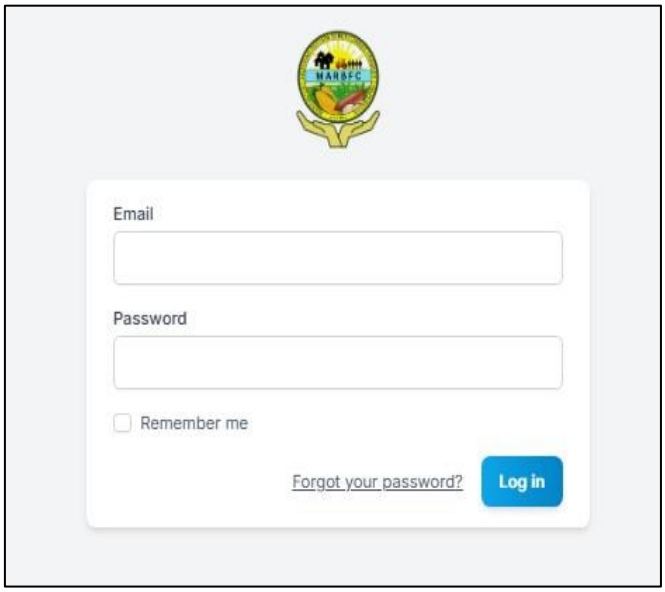

Fig 3 Login Page

Figure 3 displays the log-in page for the Financial Management System. In this page where the Admin, Staff, and Member enter their email and password to log-in. It can also reset the password when it is forgotten by clicking the "Forgot your password" link and entering the email.

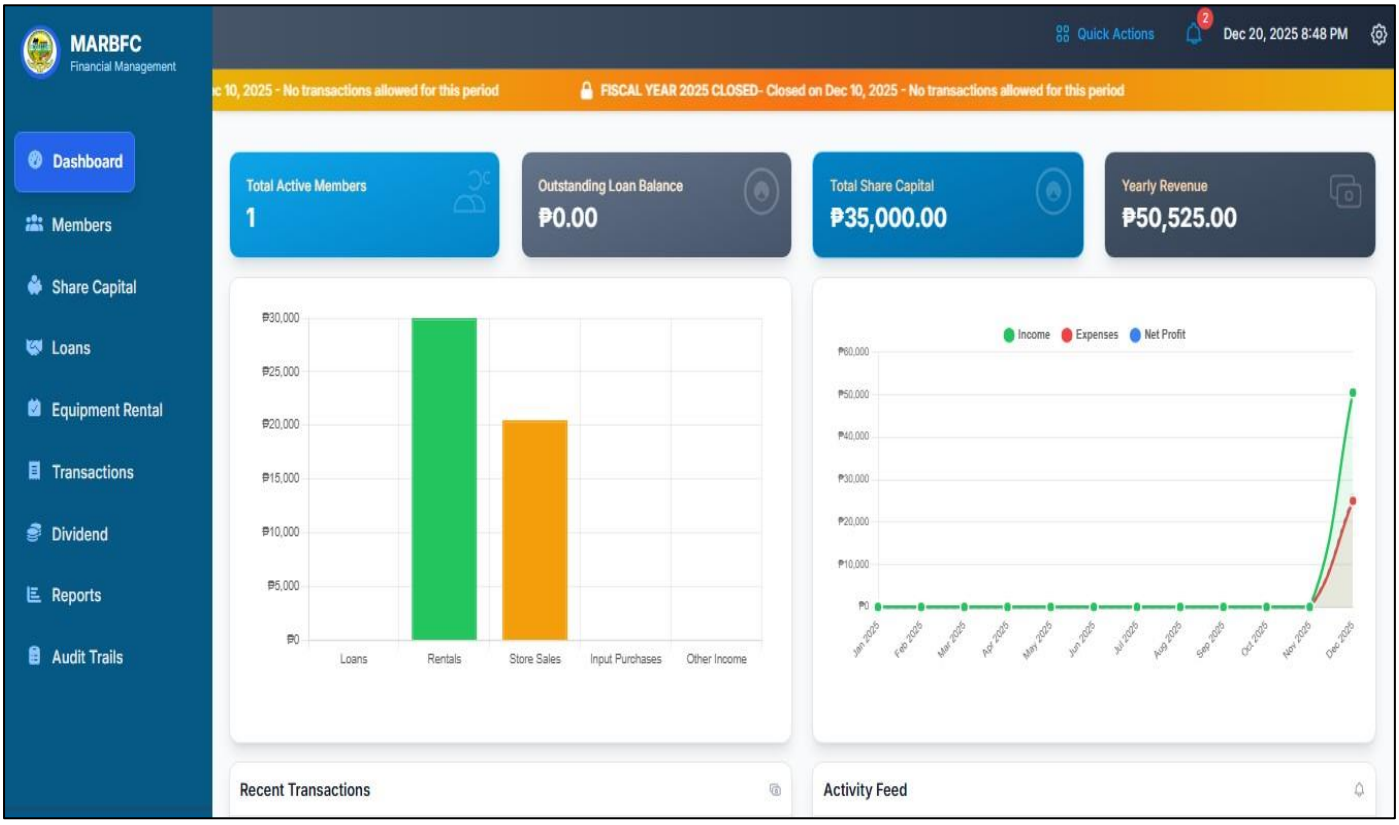

Fig 4 Admin Interface

Figure 4 displays the interface for the Admin. The admin interface has full access and control over all the cooperative operations and management features. It has a module for managing members, share capital, loans, equipment rental, transactions, dividends, reports, and audit trails. It also has the capability to add new staff and deactivate the existing staff.

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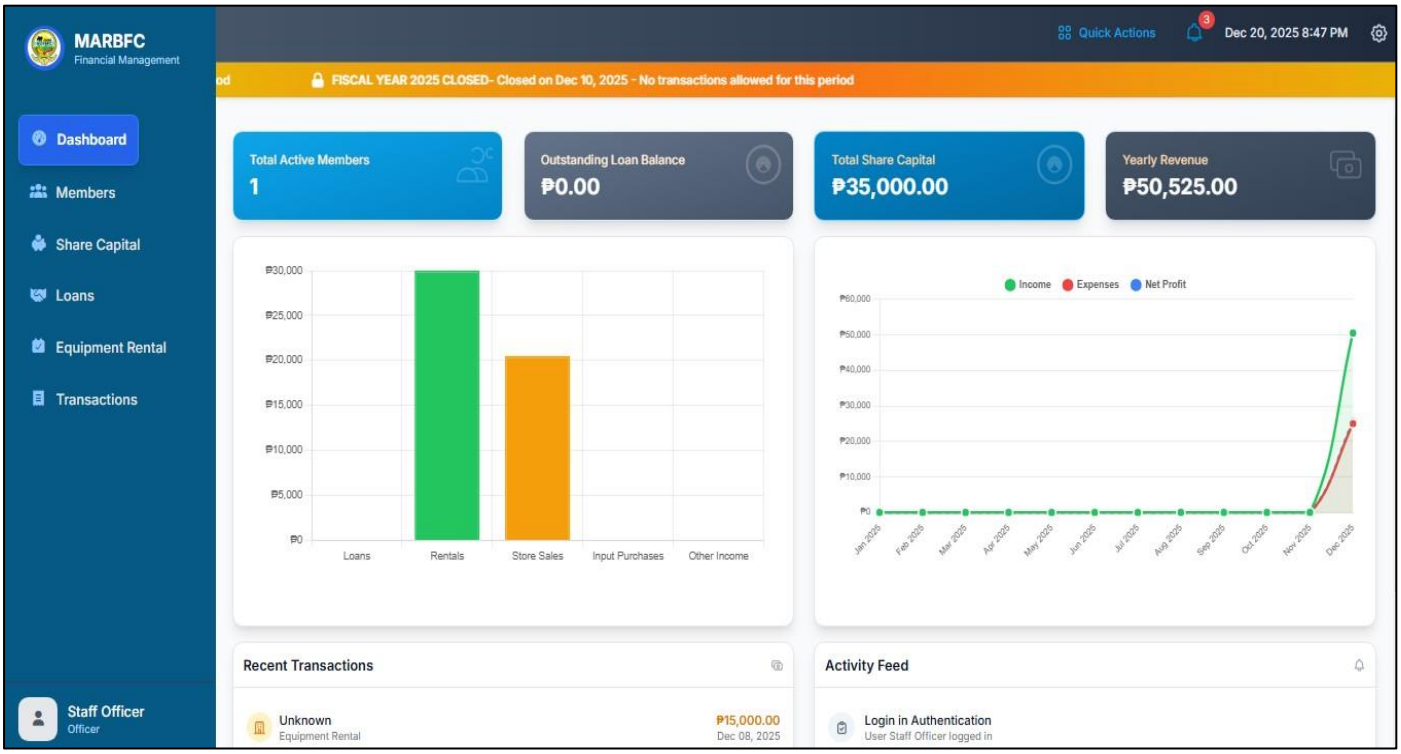

Fig 5 Staff Interface

Figure 5 displays the interface for the Staff. The staff interface has limited access and control over the cooperative operations and management features unlike the admin. It can only manage members, share capital, loans, equipment rental, and transactions. This interface is designed for day-to-day monitoring and managing cooperative operations.

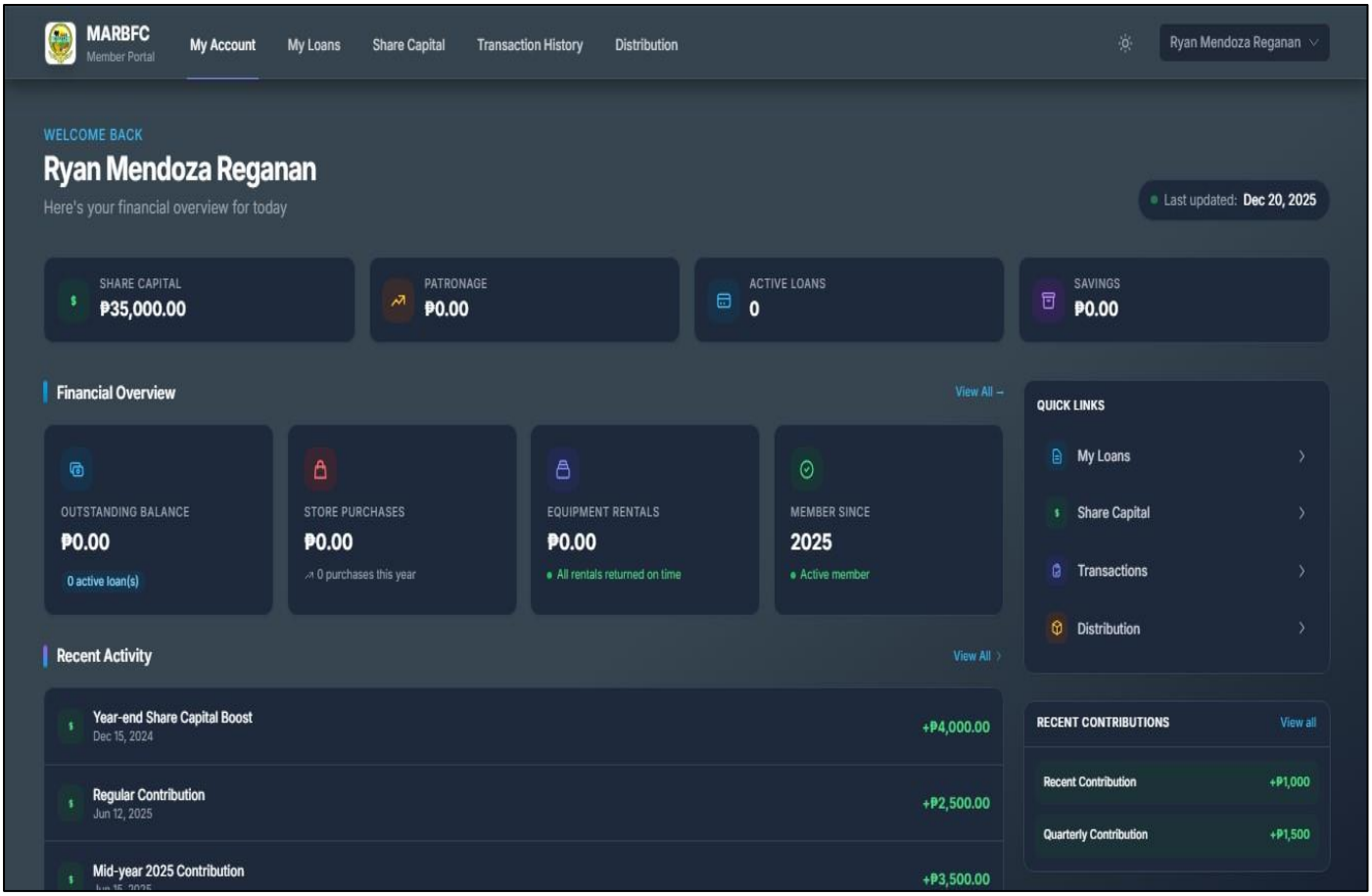

Fig 6 Member Portal

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Figure 6 displays the interface for the Member. The member interface allows the members to view their share capital, active loans, and overall financial performance. Unlike the admin and staff interface, the member interface is a view-only interface.

- Testing: After the functional testing using the test cases, the result shows that all the tests passed successfully, confirming that the system operates as expected. Tested modules performed successfully according to their indented functions, and no errors were reported during the testing process.
- Evaluation: The System Usability Scale (SUS) was conducted at MARBFC's office, where actual users interact with the system. Below is the System Usability Scale Result, that was participated by six users, namely two Admins, three Staff, and one Cooperative Member.

Table 1 System Usability Scale (SUS) Raw

System Usability Scale	Participants					
	1	**2**	**3**	**4**	**5**	**6**
1. I think that i would like to use this system frequently.	5	4	4	4	5	4
2. I found the system unnecessarily complex.	4	4	4	3	2	4
3. I thought the system was easy to use.	5	5	3	4	5	4
4. I think that I would need assistance to be able to use this system.	5	5	2	4	4	2
5. I found the various functions in this system were well integrated.	4	4	4	3	4	4
6. I thought there was too much inconsistency in this system.	4	4	4	3	2	2
I would imagine that most people would learn to use this system very quickly.	4	4	4	3	4	4
8. I found the system very cumbersome or awkward to use.	2	3	2	2	2	2
9. I felt very confident using the System.	5	5	4	5	5	4
10. I need to learn a lot of things before I could get going with the system.	5	5	2	5	5	4

A total of six female participants who took part in the SUS evaluation. Where Participants 1 & 2, is the admins responses, Participants 3, 4, & 5 are the staff responses, and the Participants 6 is the member response. Table 1 presents the raw response of each participant, reflecting their impression of the system's ease of use, complexity, functionality, and learning effort. This response serves as the foundation for computing the adjusted SUS score and determining the system's overall usability.

Table 2 System Usability Scale (SUS) Overall Result

System Usability Scale	Participants					
	1	**2**	**3**	**4**	**5**	**6**
1. I think that i would like to use this system frequently.	4	3	3	3	4	3
2. I found the system unnecessarily complex.	1	1	1	2	3	1
3. I thought the system was easy to use.	4	4	2	3	4	3
4. I think that I would need assistance to be able to use this system.	0	0	3	1	1	3
5. I found the various functions in this system were well integrated.	3	3	3	3	4	3
6. I thought there was too much inconsistency in this system.	1	1	1	2	3	3
7. I would imagine that most people would learn to use this system very quickly.	3	3	3	2	3	3
8. I found the system very cumbersome or awkward to use.	3	2	3	3	3	3
9. I felt very confident using the System.	4	4	3	3	4	3
10. I need to learn a lot of things before I could get going with the system.	0	0	3	0	0	1
Participants Score:	**23**	**21**	**25**	**22**	**29**	**26**
Total Score (PS * 2.5)	**57.5**	**52.5**	**62.5**	**55**	**72.5**	**65**
Total SUS Score (TS/6):	**365**					
Average SUS Score:	**60.83**					

Table 2 presents the overall result of the SUS using the Raw response of the participants. The score of all odd numbers [1,3,5,7,9] is calculated by subtracting their answers from 1 (score-1). While the even numbers [2,4,6,8,10] are calculated by subtracting 5 from their responses (5-score). The score then calculated by multiplying each participant's score by 2.5. The sum of Total SUS score across all participants is 365, and then divided by the number of

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participants (6) to get the average SUS score. The Average SUS Score is 60.83, indicating a marginal and good rating according to the participants.

V. CONCLUSION

The development of the Financial Management System successfully addressed the cooperative's need for a more organized, accurate, and transparent method of handling the financial records of the cooperative. The system helps to minimize delays and issues caused by handwritten and paper-based documentation and provides a better platform for recording their transaction with managing members' accounts, tracking loans, share capital, and financial reports. The System Usability Scale (SUS) evaluation resulted in a score of 60.83, indicating that the system's usability is good, but requires more familiarity in using the system. Despite these areas for improvement, the system was able to meet user requirements and received positive feedback from the participants.

The findings suggest that while the system is functional and manageable, it would still benefit usability refinement to support first time or less technical users. In conclusion, the Financial Management System (FMS) represents the advancement in managing financial data efficiently. While the usability challenges were identified especially for beginner-level users, the strength observed in the system shows the potential to become a dependable and effective tool for their financial operations. With further enhancement and continuous practice and familiarization of the system features. This proficiency provides guided training and continues to improve the system to ensure successful adaptation and long-term effectiveness within the cooperative.

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