Resource Management Mobile-Application for Property Custodian with QR Code

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Abstract - The development of Resource Management Mobile Application for Property Custodian with QR Code at Tagoloan Community College addresses the challenges of the existing manual borrowing process, including approval delays, inaccurate and easily lost records, and difficulty in monitoring borrowed items and return schedules of the school borrowing system. To solve these issues, the researchers designed a mobile-based system that automates borrowing, returning, and inventory tracking through QR code. The system was developed using the Waterfall Software Development Life Cycle (SDLC) model, which included the phases of requirements analysis, system design, development, testing&evaluation, deployment, and maintenance. The application utilized Dart and Flutter for the mobile frontend, PHP and Laravel for backend development, and MySQL as the database management system. Key features included QR code scanning, real-time inventory monitoring, automated notifications, and report generation. Functional testing results showed that the system performed effectively and met all specified requirements. The application improved efficiency, minimized paperwork, reduced errors, and enhanced tracking accuracy. The study concluded that the Resource Management Mobile Application is a reliable and effective solution that improves resource accountability and supports digital transformation in educational institutions when it comes in borrowing school resources.

Keywords - School Resources, Mobile-based, Qr-Code Scanning, Notifications, Waterfall

I. INTRODUCTION

Information Technology (IT) played an important role in improving performance and solving real-world problems in different industries, including education. The borrowing and returning of materials played a key role in helping the property custodian keep track of school resources and ensure they were available when needed. With the help of a digital system, the custodian could organize records more efficiently, maintain accurate logs of borrowed items, and manage return schedules more effectively. This system also improved inventory monitoring and reduced the chances of lost or misplaced records, making the custodian's work more manageable and reliable. Nurrohmah and Nugraha (2021) developed a digital system to improve equipment management by enabling real-time data access, reducing data loss, and preventing duplication. Their research aimed to assist officers in conducting physical checks and tracking equipment across branch offices without time restrictions.

The project was highly relevant to educational institutions, especially schools and colleges that handled equipment lending. The Resource Management Mobile Application for Property Custodian with QR Code aimed to streamline and automate the borrowing process by replacing manual approval systems. By integrating QR code technology, the application reduced paperwork, eliminated delays, and improved tracking accuracy. Students, faculty and staff benefited from a faster and more convenient way to borrow equipment, and property custodians gained a reliable system for accurately recording and monitoring borrowed resources and experienced reduced administrative tasks. Wicaksono, M. F., Syahrul, & Rahmatya, M. D. (2021) stated that using an automated system with RFID and IoT can reduce inefficiencies in manual approvals, improve tracking, reduce paperwork, and simplify the borrowing process for students, faculty, and administrators. Additionally, According to Ashar, S. F., and Iqbal, F. (2024) developed a web-based system to improve the laboratory lending process by offering a more practical and integrated IT solution.

II. PROBLEM

The property custodian faced numerous challenges due to the manual borrowing process used to manage resources. Borrowers were required to fill out paper forms to request items, which often led to delays, especially when the custodian was unavailable to review and approve requests. During busy periods, handling multiple requests became overwhelming, increasing the risk of errors and inefficiencies. Tracking borrowed items and their return dates was also difficult, as paper-based records were prone to misplacement or inaccuracy. This lack of an organized system made it harder for the property custodian to monitor inventory, resulting in a higher chance of items being misplaced or not returned. These challenges highlighted the need for a more efficient solution, leading to the implementation of the Resource Management Mobile Application with QR Code.

The property custodian experienced significant challenges due to the manual resource borrowing process. Borrowers had to fill out paper request forms and wait for approval, which often caused delays especially when the custodian was managing multiple tasks. Manual documentation

made it difficult to keep accurate records, as paper forms were prone to loss, damage, or human error. This made it hard for the custodian to monitor who borrowed which items and when they were due for return. The lack of a reliable tracking system also increased the risk of lost or unreturned resources, resulting in replacement costs that placed an additional burden on the custodian. These inefficiencies made the overall resource management process slow, disorganized, and stressful for the person in charge.

III. OBJECTIVES OF THE STUDY

The overall goal of this study is to develop a Resource Management Mobile Application for Property Custodian with QR-Code for Tagoloan Community College (TCC) that simplifies the process of borrowing and returning school resources.

- To gather relevant data from target users, students, staff, faculty and administrator to identify their borrowing needs, challenges with existing systems, and expectations for a Resource Management Mobile Application for Property Custodian with QR Code.
- To analyze the collected data to define detailed system requirements, including resource types, user roles, borrowing policies, system permissions, and reporting needs.
- To design a user-friendly interface that allows students, faculty and staff to reserve, borrow, and return school resources.
- To design role-based access for different users to ensure secure and appropriate system control.
- To develop the complete Resource Management Mobile Application for Property Custodian with QR Code based on the approved design.
  - ➢ To develop a system that can handle both borrowing, booking and returning items that help users save time and stay organized.
  - ➢ To develop QR code scanning functionality that enables custodians and users to quickly identify items, verify their status, and update borrowing records.
  - ➢ To develop an item tracking and logging system that records transactions.
  - ➢ To develop an automated SMS or email notification system to automatically alert users about borrowing deadlines.

IV. REVIEW OF RELATED WORKS

Studies by Mustofa Abi Hamid (2021), Irsan and Tamrin (2023), Madzidon and Harun (2023), Chen et al. (2023), Liaw and Mahdin (2023), Ifriza et al. (2022), and Accad et al. (2023) focused on structured development methodologies particularly the Waterfall and Modified Waterfall models to improve efficiency and reduce manual processes in borrowing and inventory systems. These studies emphasized systematic project phases and relied on conventional software engineering practices to deliver functional and goal-oriented systems.

Meanwhile, studies by Özçelik (2020), Teves (2024), Pabelona Jr. (2025), and Briones et al. (2022) concentrated more on the use of advanced tools and technologies to optimize user experience and system performance. Özçelik, for example,

utilized WebStorm, GitHub, MySQL Workbench, and Postman to streamline the development of a responsive library management system. Similarly, other tool-driven studies integrated features such as QR code tracking, cloud-based storage, SMS notifications, and mobile compatibility. These innovations enhanced real-time access, user engagement, and digital efficiency. However, across both methodology- and tool-oriented systems, common limitations persist, including challenges with offline functionality, scalability, and integration with broader institutional platforms highlighting the need for more adaptive, scalable, and interconnected systems for educational and organizational settings.

V. METHOD

The methodology employed in the development of the proposed Resource Management Mobile Application for Property Custodian with QR Code. Based on the analysis of related literature and the nature of the identified problem, the researchers adopted the Modified Waterfall Model, a structured methodology suitable for linear development environments where requirements were well-defined from the beginning. This model ensures comprehensive documentation, a systematic flow of processes, and ease of implementation, particularly in systems that require strict tracking and record management, such as borrowing and returning of school resources, as demonstrated in the similar studies by Madzidon, A. H., & Harun, N. Z. (2022).
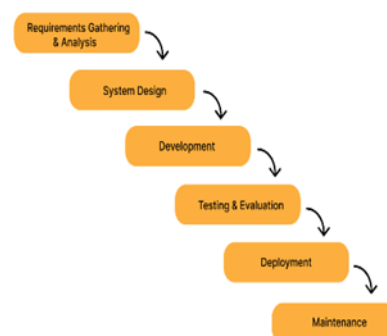

Figure 1.0 Waterfall Methodology (Rawi and Ghani, 2023)

In the development of the Resource Management Mobile Application for Property Custodian with QR Code, the use of Dart in combination with the Flutter framework significantly enhanced the user interface and overall user experience. Communication between the frontend and backend was handled using RESTful APIs, which ensured smooth and secure data exchange. To support QR code scanning on mobile devices, the system utilized Flutter's QR code scanning libraries, allowing seamless scanning through the device's built-in camera. Furthermore, the system adopted Progressive Web App (PWA) features, allowing the application to be installed on mobile phones and in low-connectivity environments.

Back-end Technology The system was built using PHP and the Laravel framework for backend development, with MySQL as the database. Laravel provided efficient tools for routing, authentication, and data processing. MySQL, a robust and scalable relational database, was used to store item details, user accounts, transaction logs, and custodial assignments. To support QR code scanning on mobile devices, the system integrated a Flutter QR code scanning package, which enables real-time scanning using the device's built-in camera without requiring any external applications. Development Tools and Workflow All development was carried out using Visual Studio Code.

To maintain collaborative and organized development, Git was used for version control, and GitHub or similar platforms were used for code repository management. For testing backend endpoints and API responses, Postman was used. During the local development phase, XAMPP provided an environment to host and test the PHP-based backend server before deployment

VI. RESULTS & DISCUSSION

The results of the system testing showed that the Resource Management Mobile Application for Property Custodians with QR Code performed well in all major modules. All 25 test cases passed, confirming that the system correctly handles user login, item management, QR code scanning, borrowing, and item status tracking. The system responded properly to user actions and updated records in real time. This indicates that the overall workflow is operating as intended. Only a few minor interface issues were found, but these were fixed immediately and did not affect the main functions of the system.

When compared to the previous manual process, the system showed clear improvements. The manual method required more time, effort, and paper-based records, which often caused delays and errors. Meanwhile, The developed system support the efficient tracking, monitoring, and management of school resources. Compared with related systems discussed in the study, the Resource Management Mobile Application for Property Custodians with QR Code also included added features such as notifications, QR-Code Scanning and mobile access, which were not present in some earlier systems.
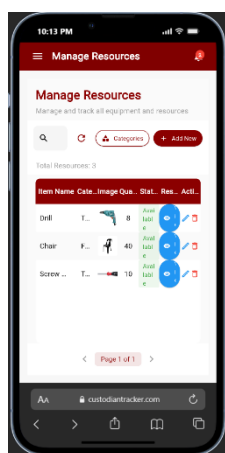

Figure 2.0 High Fidelity Mobile Interface RMMAPC with QR-Code Manage Resources

The Manage Resource screen provides a table layout showing all resources stored in the system. Each row lists item details such as name, quantity, category, and status, with Edit and Delete buttons placed at the end. At the top, there are options to Add Items, Manage Categories, and View Status. The web design ensures that all information is visible and easy to access, helping admins efficiently monitor and maintain inventory.
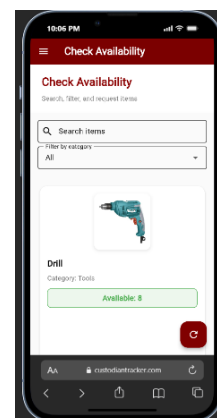

Figure 3.0 High Fidelity Web Interface RMMAPC with QR-ode User-Check Availability

The Check Availability screen allows you to search and browse all available items in the inventory. You can view each item's details, including its name, category, and current available quantity. For any item, you can then choose to either Borrow it immediately or Reserve it for future use.
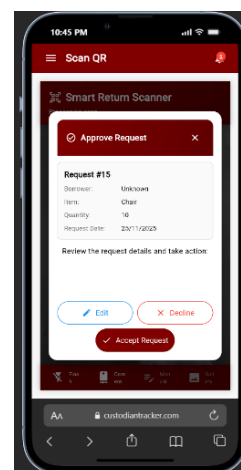

Figure 4.0 High Fidelity Mobile Interface RMMAPC with QR-Code Approve

The Scan QR screen on the web version allows administrators to scan or upload QR codes from the desktop. The layout includes a central area for the camera or upload window and buttons for Scan and Upload QR. The interface is simple and focused, helping users quickly verify items during approval of borrowing items
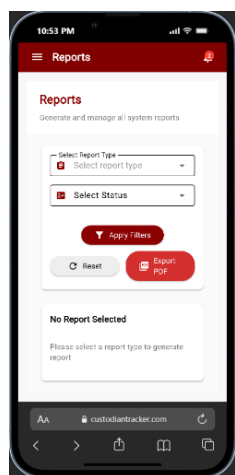
Figure 5.0 High Fidelity Mobile Interface RMMAPC with QR-Code Reports

The Reports screen provides tools for generating various types of system reports. A dropdown menu lets the admin select the report type such as Inventory Reports, Transaction Reports, Borrowed Reports. Filters for date range and a Generate Report button are included. The layout is straightforward and well-spaced, allowing admins to produce accurate reports easily.

QUESTIONS	PARTICIPANTS				
	P1	P2	P3	P4	P5
1. I think that I would like to use this system frequently	3	4	4	4	4
2. I found this system unnecessarily complex.	3	2	3	2	4
3. I thought the system was easy to use.	3	4	3	4	4
4. I think that I would need the support of a technical person to be able to use this system.	3	1	2	3	4
5. I found the various functions in this system were well integrated and organized.	3	4	3	3	3
6. I thought there was too much inconsistency in the system.	4	3	3	3	3
7. I would imagine that most people would learn to use this system very quickly.	4	4	4	3	3
8. I found the system very cumbersome to use.	4	4	3	4	2
9. I felt confident using the system.	3	3	3	3	3
10. I needed to learn a lot of things before I could get going with this system.	3	2	2	3	3
TOTAL SCORES:	82.5	77.5	72.5	80	82.5
OVERALL SCORE:	395				
SUS SCORE:	79				

Table 1.0 Adjusted SUS Scores (Item by Item)

Table 1.0 shows the calculated System Usability Scale (SUS) scores of five participants after their ratings have been processed. Each participant's scales were evaluated according to SUS scoring rules, where odd-numbered questions subtract 1 from the user score, and even-numbered questions subtract the user score from 5. The adjusted values were then added together, and the sum multiplied by 2.5 to convert it into the SUS 0–100 scale and to determine the final SUS score. For example, participant 1 with an adjusted score of 33 has a final SUS score of 82.5, computed as $33 \times 2.5 = 82.5$.

This method ensures that both positively and negatively worded questions are correctly accounted for in the usability assessment.Using this computation, the five participants obtained final SUS scores of 82.5, 77.5, 72.5,80,82.5, resulting in an overall mean SUS score of 79. Based on the SUS interpretation scale, a score within the 70–80 range is considered "Good" and acceptable, indicating that the system offers a positive user experience with generally easy navigation and learnability.

Most participants said they were confident using the system and believed that new users could learn it easily. They also shared that the system's features were organized well and worked smoothly together. However, some users still found a few parts a bit confusing or inconsistent, and they thought they might need help the first time they use it. This means that some parts of the interface may need small improvements to make it easier to understand

VII. CONCLUSION & FUTURE WORK

The study concludes that the Resource Management Mobile Application for Property Custodian successfully achieved its main objective of digitalizing and improving the processes of borrowing, booking, and returning school resources at Tagoloan Community College. The system allows users to handle borrowing and returning tasks more easily, see the status of items right away, and remove the need for paper forms or handwritten records. With the QR code scanning feature, users and custodians can quickly recognize each item, view its status, and update the records correctly.

Furthermore, the test results and user feedback show that the system works well in its main functions and is generally easy for users to understand and use. The SUS score also shows a positive view of the system's usability. However, there are still parts that need improvement, especially in the design of the interface and some features that could help users more. Although the system has strong potential to support property custodians tasks, more updates such as improving the layout, navigation, and adding helpful features are recommended so the system can be used more effectively in different school settings and meet the needs of other institutions.

Future Work
1. **System Deployment** – Future researchers should make sure the system is fully used by both Admins and Borrowers. This includes testing how the system is set up, creating easy-to-follow guides, and checking that it still saves time and keeps records organized.
2. **Stakeholder Actions** – Future researchers should consider how users learn to use the system. They should help users and developers communicate to each other more easily, give better instructions, and check the system's performance often. Understanding the problems users face is a key to making the system better in the future.
3. **Enhanced Features** – In the future, researchers can add mobile alerts to send updates instantly. These alerts should work even if the app is not open. This helps stop

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4. users from missing updates. It is also important to test if users like these new features.

5. **Performance and Technical Improvements** – It is important for the future researchers to make the system work well even with slow internet. Future researchers should prioritize making the app faster and the UI design better. This way, users can complete their tasks smoothly.

6. **New Features** – Future researchers should add a messaging feature to the system. This helps user fix problems faster by talking directly to the Admin. It also means they won't need to use separate apps to communicate.

7. **Integration and Expansion** – Future researchers should add a secure way to back up files so that no information/records is lost. They should also let users save reports as Excel files, not just PDFs. This will keep the data safe and make it easier for users to use.

8. **Training Actions** – Future researchers should provide easy ways for users and admin to learn the system using guides and tutorials. They should check if these materials make the system easier to use. Future studies could also look at how well these training methods work.

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