

Development of a Mobile Application for Maintenance Request Reporting and Tracking in Subdivision for Residents and Homeowners Associations

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ABSTRACT

A village is a community with a single administration that works with the homeowners to run the entire town. However, the community becomes unmanageable as its population grows. In addition, homeowners in the village use the internet for updates, news, and announcements, and all transactions are conducted online during the pandemic. Additionally, when they have an appointment, a transaction, or an administrative report, physical contact would be problematic.. To address the issue, the Village Homeowners' Association's Online Management System is suggested .The creation of a Mobile Application for maintenance request report and tracking and repairs is the main focus of this study. A digital platform that connects homeowners with nearby service providers who can assist them with a variety of household chores was developed as part of the study. Usability, functionality, portability, and maintainability were taken into consideration when evaluating the system. Positive ratings were found in every category of the study, indicating that the system is simple to use and intuitive, offers the features required for productive interaction, is easily accessible, and is made to be easily updated and maintained. The system was created to meet the increasing demand for an easy and effective method of obtaining home repair and maintenance services. Residents can report problems with plumbing, electricity, security, housekeeping, and common areas using complaint tracking features, which also let managers assign staff and track the status of resolutions. By combining multiple services into a single, user-friendly platform, this study aims to improve service accessibility, transparency, and operational efficiency, thereby addressing major home maintenance pain points.

Keywords: *Mobile Application, Maintenance Request, Maintenance Tracking, Subdivision, Homeowners Association (HOA)*

SECTION I — INTRODUCTION (THE PROBLEM AND ITS SETTING)

1.1 Introduction

For many homeowners, managing household maintenance remains a major challenge, mainly because there isn't a centralized and easily accessible platform that links them with qualified service providers. This study explores: "How can a mobile application improve the reporting and tracking of maintenance requests for subdivision residents and HOA personnel?" The conventional method of locating a service provider entailed looking through classified ads or requesting suggestions from relatives and friends. But this method can be laborious and frequently results in limited choices. One of the main advantages of this study is to enhance the effectiveness and availability of in-home services by utilizing digital technologies.

1.2 Background of the Study

Maintenance concerns are common in residential communities and may involve shared facilities and services such as roads, drainage systems, streetlights, water facilities, and other community areas. When these concerns are reported through informal methods such as personal messages, phone calls, text messages, or verbal communication, it can be difficult for residents and Homeowners Association (HOA) personnel to maintain organized records and monitor the progress of each request. As the number of residents and maintenance concerns increases, managing these requests through separate communication channels may result in delayed responses, incomplete information, and difficulty tracking the status of reported issues.

Previous studies have explored the use of digital technologies to improve maintenance and property management. Bin Alhaj et al. (2021) examined the use of crowd sourcing for facility maintenance management and highlighted the importance of collecting maintenance information from occupants in a timely manner. Similarly, Bin Alhaj et al. (2022) explored a mobile application for occupant-centered facility maintenance management, which supported maintenance reporting and communication between occupants and facility managers. These studies demonstrate how mobile and digital technologies can support the collection and management of maintenance-related information. Other studies have also examined the use of digital systems in property and facility management. Ali et al. (2021) discussed the use of mobile applications and other digital technologies in facility management, while Palha et al. (2024) emphasized the importance of accessible and organized maintenance information in residential property management. These studies show that digital platforms can help organize maintenance records, improve communication, and support the management of maintenance activities. However, much of the existing research focuses on general facility management, apartment buildings, property management, or other residential settings. There remains a need for a mobile-based maintenance management solution specifically designed for subdivision communities, where residents report concerns to the Homeowners Association and HOA personnel are responsible for reviewing requests, assigning appropriate repair personnel, and monitoring the progress of maintenance activities. Therefore, this study proposes the development of a mobile application for maintenance request reporting and tracking in subdivisions for residents and Homeowners Associations. The proposed application will allow residents to submit maintenance concerns with descriptions, photographs, and relevant location information. HOA personnel will be able to receive and manage requests, maintain repairman information, assign appropriate repairmen, update request statuses, and monitor the progress of reported concerns. By providing a centralized platform for these activities, the proposed application aims to improve the organization, accessibility, and monitoring of maintenance requests within subdivision communities.

1.3 Objectives of the Study

- **General Objective:** To Develop a mobile application that facilitates maintenance request reporting and tracking in Subdivisions for Residents and Homeowners of Association (HOA).

- **Specific Objectives:**

- 1.To allow residents to submit a minor/major requests
- 2.To enable residents to submit detailed descriptions and images of maintenance issues for accurate assessment and appropriate action.
- 3.To provide the HOA with a centralized list of maintenance requests.
- 4.To allow residents and HOA personnel to monitor the status of maintenance requests.
- 5.To allow the HOA to store and manage repairman contact information

6.To enable the HOA to assign an appropriate and qualified repairman based on the reported maintenance issue.

1.4 Scope and Limitation of the Study

- **Scope:** This study will focus on the development of a Mobile Application for Maintenance Request Reporting and Tracking in Subdivisions for Residents and Homeowners Association. The participants of this study include homeowners and registered members of the Homeowners Association of Pagsibol Village, Located at Magalang, Pampanga, as well as authorized association officers or personnel responsible for receiving, managing, and monitoring maintenance requests.
- **Limitation:** The participants must be 18 years old and above and must be residing within the selected residential community. Only homeowners or association members who have experienced or may require reporting maintenance concerns within the community will be included in the study. Participation in this research is voluntary, and all respondents will provide informed consent before participating in the evaluation of the proposed mobile application. No coercion will be involved in obtaining their participation.

1.5 Significance of the Study

Residents

Residents can report, upload photo evidence, and track maintenance issues in real time with the application's handy, centralized platform. It guarantees prompt defect correction, removes the need for in-person visits or manual paperwork, and updates residents on the progress of their repair requests.

Community of Pagsibol Village

This study contributes to a safer, and well-maintained living environment by expediting the resolution of maintenance issues, particularly in common areas. This ultimately helps preserve property values and fosters better community relations.

Homeowners Association (HOA) Officers and Staff

In order to receive, prioritize, and monitor maintenance requests, the system provides HOA management with a centralized database. It improves overall transparency in managing community repairs, minimizes delayed communications, streamlines task delegation, and lessens administrative workload.

Future Researchers

For future researchers, developers, and IT students interested in creating smart-community solutions, defect tracking apps, or neighborhood management systems, this study provides a useful baseline and reference.

1.6 Definition of Terms

Subdivision (Operational)

Pagsibol Village, which is situated in Baranggay Sto. Rosario Magalang, Pampanga is the precise residential boundary of this study.

Repairman Assignment (Operational)

The application's administrative feature enables HOA staff to choose registered repairmen from a stored contact database and assign them directly to particular issues that have been reported.

Homeowners Association (Operational)

The system's administrative body has the authority to evaluate incoming maintenance requests, designate qualified repair personnel, and update ticket statuses via the management dashboard.

Maintenance Request Reporting (Operational)

The main function of the mobile application is to enable homeowners to generate a digital report with the issue category plumbing, electrical, etc, description, and accompanying photo evidence.

SECTION II — LITERATURE REVIEW

2.1 Introduction to the Review

This chapter offers a review of literature and studies about maintenance request reporting, property and facility management, mobile applications and digital communication in communities. The review looks at how technology can help improve the process of reporting, organizing, monitoring and managing maintenance concerns within subdivisions. Maintenance concerns in communities may involve common facilities and services such as roads, streetlights, drainage systems, water facilities, garbage collection areas and other shared properties. Traditional methods of reporting these concerns, including communication, phone calls, SMS and messaging applications can make it hard to keep organized records and track the progress of reported issues. Digital systems give an opportunity to centralize maintenance requests and make information more available to both residents and Homeowners Association (HOA) personnel. Previous studies have looked at the use of web technologies in facility and property maintenance management. These studies show the potential of platforms to support maintenance data collection, communication, request management and monitoring. However there is still a chance to create a mobile-based solution that is specifically made for subdivision communities connecting residents and HOA personnel through a maintenance reporting and tracking platform. Therefore this review examines existing literature and studies about mobile maintenance management, property management systems, residential maintenance reporting, request tracking and digital communication. The findings from these sources will help build the foundation of the proposed application and highlight the research gap that the study aims to fill.

2.2 Review of Related Literature and Studies

The use of digital technologies in facility and property management has increased as organizations seek more efficient ways to collect, organize, and manage maintenance information. Traditional maintenance reporting methods may rely on manual forms, phone calls, text messages, or other informal communication channels. These approaches can make it difficult to maintain organized records, monitor request status, and communicate updates

between users and personnel. Mobile applications and web-based systems provide opportunities to centralize maintenance information and improve the management of reported concerns. Bin Alhaj et al. (2021) investigated the use of crowd sourcing for facility maintenance management. Their study identified challenges in collecting facility-condition information from occupants and obtaining maintenance information in a timely manner. The researchers highlighted crowd sourcing as a potential approach for collecting feedback directly from facility users. This is relevant to the present study because subdivision residents can provide information about maintenance concerns within their community through a mobile application. Bin Alhaj et al. (2022) further examined an occupant-centered facility maintenance management application. The study addressed limitations related to maintenance reporting, location-specific feedback, and communication between occupants and facility management. The application supported the collection of information from occupants and facilitated communication related to maintenance concerns. These functions are relevant to the proposed application because residents will be able to submit maintenance requests containing descriptions, photographs, and location information. Ali et al. (2021) examined the integration of Internet of Things (IoT), data analytic, and mobile applications in facility management. Their study demonstrated how digital technologies can support facility-management activities and improve the availability of information for management purposes. The findings provide support for the use of mobile technology as part of a digital approach to managing maintenance-related activities. Research on digitalization in property and facility management has also identified several technologies that can support management processes. These include IoT, big data, augmented reality, and building information modeling. At the same time, digital property-management systems may encounter challenges involving data security, privacy, interoperability, and real-time data management. These considerations are relevant to the development of a maintenance application because the system will handle resident information, maintenance records, photographs, and repairman information. Mobile-based maintenance management has also been applied to residential and facility environments. Previous work involving mobile facility maintenance systems has demonstrated the potential of combining mobile applications and databases to support maintenance reporting and management. Such systems provide users with a way to submit maintenance information while allowing management personnel to organize and monitor reported concerns. This supports the applicability of mobile technology to residential maintenance management. Lin et al. (2018) developed a BIM- and mobile-based facility maintenance management system that integrated applications with databases to support maintenance activities. The system included functions for accessing and editing maintenance work orders. Although the study focused on BIM-based facility management, its emphasis on maintaining accessible and updated maintenance records is relevant to the proposed system. The proposed application similarly requires a centralized database where maintenance requests and their status can be stored and updated. Palha et al. (2024) investigated BIM interoperability for residential construction and the integration of warranty and maintenance management. Their study emphasized the importance of integrating and making maintenance information accessible throughout the building life cycle. This supports the importance of organized and accessible maintenance information in residential environments. Overall, the reviewed studies demonstrate several common applications of digital technology in maintenance management. First, mobile applications can provide users with convenient methods for reporting maintenance concerns. Second, centralized databases can help organizations store and manage maintenance records. Third, location information, digital communication, and work-order tracking can support the coordination and monitoring of maintenance activities. Finally, digital systems can improve the accessibility and organization of maintenance information. Despite these developments, most of the reviewed studies focus on general facility management, apartment or building maintenance, property management, or residential construction. Fewer studies specifically address maintenance request reporting and tracking within subdivision communities involving residents and Homeowners Associations (HOAs). The proposed study addresses this contextual gap by developing a mobile application specifically for subdivision residents and HOA personnel. Residents will be able to submit maintenance concerns with relevant details and photographic evidence, while HOA personnel will be able to review requests, manage repairman information, assign repairmen, update request statuses, and monitor maintenance progress. Thus, the reviewed literature provides a technological and conceptual foundation for the proposed mobile application. The present study applies these established maintenance-management concepts to the specific context of subdivision communities, focusing on the interaction between residents and HOA personnel through a centralized maintenance request reporting and tracking platform.

2.3 Conceptual Framework

This conceptual framework uses the Input-Process-Output (IPO) model to explain how the proposed mobile application transforms raw maintenance data into an organized tracking system for homeowners and the Homeowners Association

Input

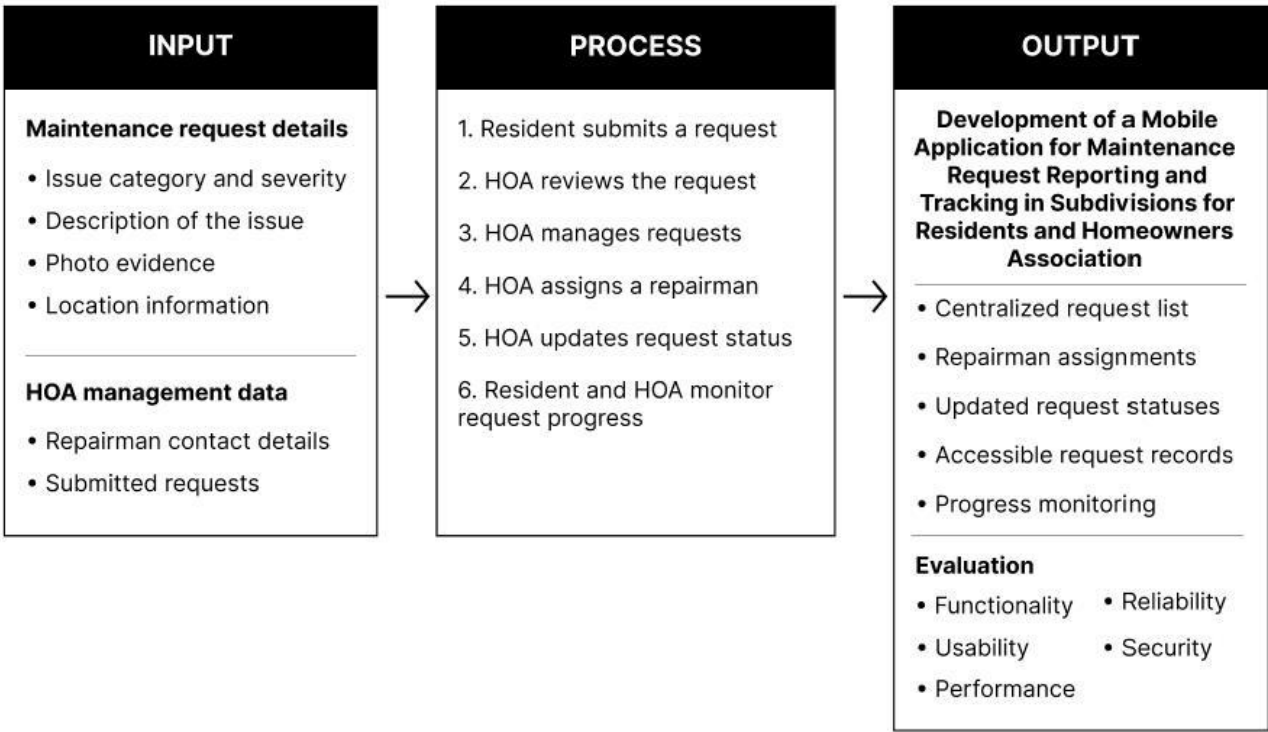
The information entered into the system, including maintenance details (category, severity, description, photos, location) provided by the resident, as well as HOA management data like repairman contact lists.

Process

The app's step-by-step workflow: a resident submits a report, the HOA reviews and manages it, assigns a repairman, updates the status, and both parties monitor progress.

Output

The Mobile Application for Maintenance Reporting and Tracking, delivering a centralized request list, repairman assignments, status updates, and accessible records.



2.4 Synthesis

The reviewed literature and studies show that mobile and digital tools are being used more in facility, property and residential maintenance management. Bin Alhaj et al. (2021) Showed that mobile crowd sourcing can help gather maintenance information and resident feedback while Bin Alhaj et al. (2022) Demonstrated how a mobile application

can help with maintenance reporting and communication between residents and facility managers. Ali et al. (2021) Highlighted that mobile applications and other digital technologies can improve facility management processes. Palha et al. (2024) Further emphasized the importance of maintenance information that's easy to access and well organized for residential construction and maintenance. Even though these studies show the potential of mobile technologies for maintenance most of the systems focus on general facility management, building upkeep, property care or residential construction. The studies provide ideas such as mobile reporting, maintenance information management, resident feedback and digital maintenance records but there remains a chance to apply these ideas specifically to subdivision communities. The proposed study addresses this chance by building an application for subdivision residents and Homeowners Association (HOA) personnel. The application will let residents submit maintenance concerns with details such as descriptions, photographs and location information. HOA personnel will be able to review and manage the requests assign maintenance workers, update request statuses and keep records of maintenance activities. Through these functions the new system will give a place for reporting and tracking maintenance concerns in subdivision communities. Thus the reviewed literature and studies provide the technology and ideas needed for the application while the new study focuses on applying these ideas to the specific context of subdivision maintenance and the interaction, between residents and HOA personnel.

SECTION III — METHODOLOGY

3.1 Research Design

This study will use a Developmental research design. It focuses on the design, development, testing, and evaluation of a mobile application for maintenance-request reporting and tracking within a subdivision community. The study will identify the current issues encountered by residents and the Homeowners Association (HOA) in monitoring, documenting, reporting, and addressing maintenance issues. These could include the use of unofficial channels for communication, incomplete or lost reports, slow responses, inability to see the status, and trouble keeping up with maintenance records. The researchers will create a mobile application that offers a centralized and easily accessible platform for tracking and reporting maintenance requests based on the issues that have been identified.

3.2 System Development Methodology

The study will use the Agile development methodology, especially an incremental and iterative method. Agile is suitable because it allows the researchers to build the system in smaller functional modules, get user input, make changes, and enhance the application as it is being developed. Iterations or repeated development cycles will be used to develop the system. A group of related features, including user registration, submission of maintenance requests, request management, notifications, and reporting, will be the focus of each iteration. Before finishing the entire application, this enables the researchers to confirm in advance whether the features actually satisfy the needs of the HOA and the residents. Planning, requirements analysis, design, coding, testing, deployment, and maintenance are all common stages in the software development life cycle. Design is guided by requirements, coding is guided by design, and testing confirms that the final system satisfies user requirements.

Planning

Describe the goals, users, project timeline, system scope, and necessary resources.

Requirements gathering

Interview, survey, observe, or review documents with HOA staff and residents.

System analysis

Examine the existing procedure, pinpoint problems, and create the suggested workflow.

System Design

Create the architecture, prototype, database design, and interface design.

Development

Write the database, back end services, and mobile application.

Testing

Test systems, usability, user acceptability, integration, and units.

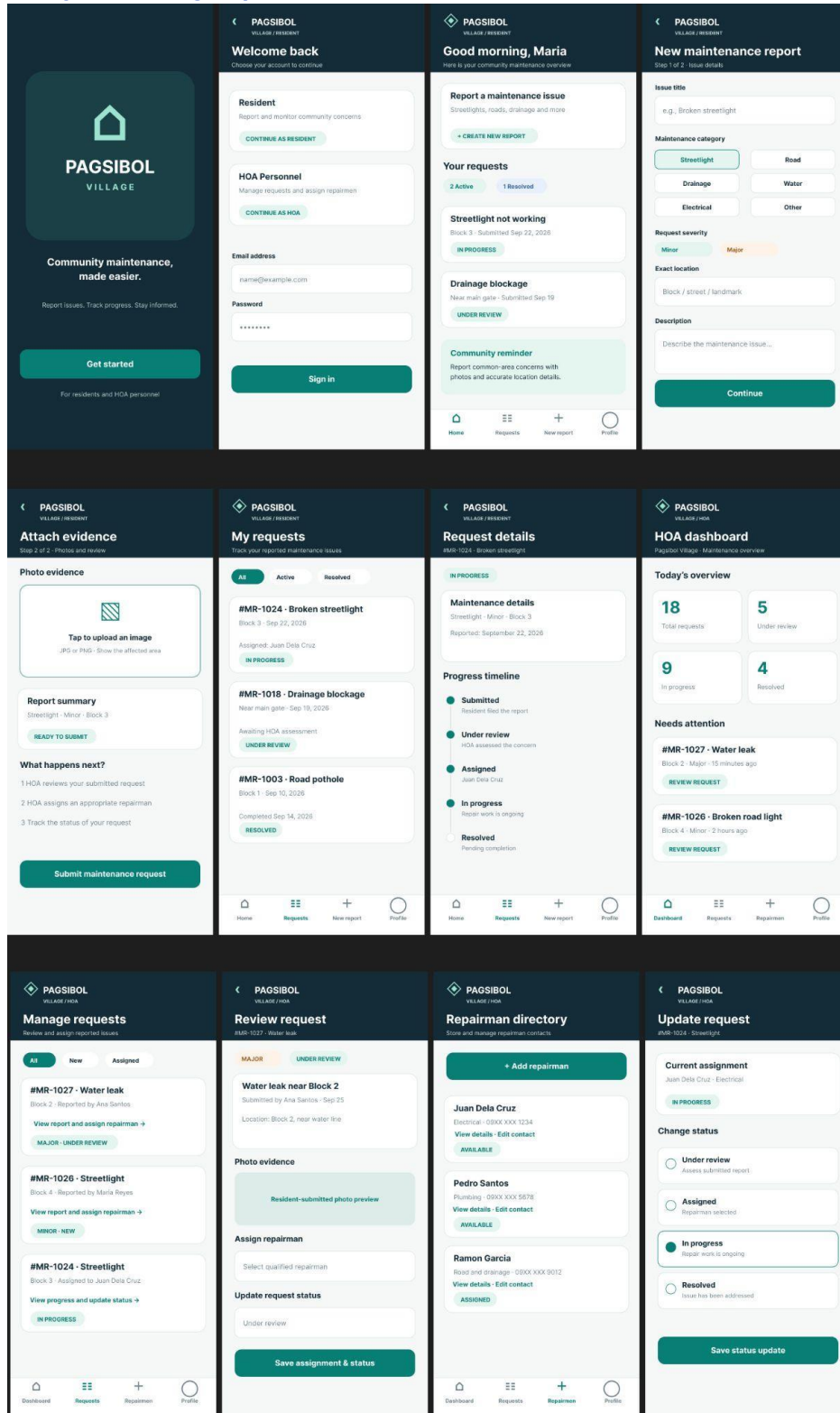
Evaluation and refinement

Get input from evaluators and make the application better.

3.3 Requirement Specification and Analysis

To track the flow of maintenance-request data between residents, HOA administrators, and the suggested mobile application, the researchers will employ Data Flow Diagrams (DFDs), specifically Level 0 and Level 1 DFDs. The relationships between the six main database tables Users, Maintenance Requests, Assignments, Attachments, Status History, and Notifications will also be mapped using an Entity-Relationship Diagram (ERD). These tools will direct the creation of the database structure, process flow, and functional requirements of the system.

3.4 System Design Specification



Source: (FIGMA) <https://www.figma.com/design/m6U9qyxq3q16Hx7bJkxL4/Untitled?node-id=0-1&t=hN7BBQPm4ilZCFmz-1>

3.5 Implementation

During the implementation phase, researchers will work on developing and integrating all of the functionalities such as mobile application's resident and HOA modules, database, maintenance reporting features, and request tracking functions. The residents can submit their maintenance requests through this module after choosing a particular type of concern related to maintenance and giving relevant description along with location details and also by providing photographic evidence if any. Then these requested maintenance are saved into the database of that application to track further. In the second part, HOA Module, the authorized people have accessibility over the submitted maintenance requests and they can check those maintenance issues accordingly from here, maintain repairman contacts, appoint suitable ones for handling that problem and monitor status updates of every request. The database stores all relevant information such as resident's account, maintenance requests' details, photographic evidence, contact info of repairmen, their assignment status, and request statuses. Researchers will then perform some preliminary tests with integrated applications modules & database to ensure proper submission, storage, retrieval, and updating of information. Finally, after selecting the last programming language, development framework, DBMS and hosting platform, we'll document everything else on the selected tech stack when we finalize the app's tech requirements.

3.6 Testing and Evaluation

The developed mobile application will go through a process of system testing to identify technical errors and confirm that its features function according to their required roles.

The testing will focus on the following areas:

Functionality — Checks whether the application functions as intended, including maintenance request submission, photographic evidence uploading, maintenance request management, repairman assignment, and request status updates.

Usability — Checks the application's interface and ease of use.

Performance — Determines the responsiveness and behavior of the application, including its ability to process and retrieve maintenance request information.

Reliability — Confirms that the software consistently performs its intended functions and maintains accurate maintenance request records during normal operations.

Security — Ensures that the application offers appropriate access to resident information, maintenance records, and HOA management functions based on the user's assigned role.

The researchers will perform functional and integration testing to determine whether the application's modules function correctly individually and together with the database. The proposed application may go through a process of User Acceptance Testing with selected eligible residents and authorized HOA personnel of Pagsibol Village. The results of system testing will be recorded and used to identify technical problems, correct errors, and make necessary improvements before finalizing the application.

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