

ELECTRONIC BARANGAY MANAGEMENT SYSTEM

**DEVELOPMENT OF A WEB – BASED ELECTRONIC BARANGAY
MANAGEMENT SYSTEM**

Georen P. Cahilig

Eunice Anrose C. Infante

Kyle Brent M. Miranda

Karla Nicole Retes

A Thesis

Presented to the Faculty of the
Computer Studies Department
College of Science
Technological University of the Philippines
Ayala Blvd., Manila

**In Partial Fulfillment of the
Requirements for the Degree
Bachelor of Science in Information Systems**

June 2023

APPROVAL SHEET

This thesis hereto entitled:

**DEVELOPMENT OF A WEB – BASED ELECTRONIC BARANGAY
MANAGEMENT SYSTEM**

prepared and submitted by **Georen P. Cahilig, Eunice Anrose C. Infante, Kyle Brent M. Miranda, and Karla Nicole Retes** in partial fulfillment of the requirements for the degree Bachelor of Science in Information System has been examined and is recommended for acceptance and approval for **ORAL EXAMINATION**.

PROF. PERAGRINO B. AMADOR, JR.

Adviser

Approved by the Committee on Oral Examination with a grade of **PASSED** on May 16, 2023.

PROF. DOLORES L. MONTESINES

Chairperson

PROF. ARIEL TOMAGAN

Member

DR. WELLANIE M. MOLINO

Member

Accepted in partial fulfillment of the requirements for the degree Bachelor of Science in Information System.

Date _____

DR. HADJI C. ALEGRE

Dean

ABSTRACT

In today's modern world, the reliance on technology has become an integral part of daily life. People worldwide are embracing technology to simplify various tasks. However, many barangays in the Philippines continue to conduct transactions manually due to the need for a well-established website. This study, titled "Development of a Web-Based Electronic Barangay Management System," introduces an innovative system that enables barangay officials and administrators to monitor records, manage household profiles, and streamline document processing. By automating barangay processes and transactions, this system aims to enhance resident requests for documents and increase the overall productivity of the barangay. The implemented system employs a structured framework consisting of Bootstrap, jQuery, and NodeJS to manage and monitor records effectively. The primary objective of the research is to design and create an automated barangay management system that maintains, manages, and secures resident records. Additionally, the system includes a blotter feature, empowering residents to file complaints online and request specific documents. Administrators can review and approve these documents while exporting comprehensive reports on the total number of residents and verifying household information in the area. The system further facilitates report generation using tabular charts, effectively reducing the workload for both citizens and officials. Throughout the development process, the system underwent Compatibility and Usability testing. Subsequently, the project was evaluated by Barangay Tangos North Officials, Residents, and IT Experts. The results demonstrate that the framework is fully functional, obtaining a grand weighted mean of 3.53, indicating a "Highly Acceptable" rating from the thirty (30) respondents. The study highlights the significant impact of implementing a web-based barangay management system, showcasing its potential to improve barangay productivity substantially.

ACKNOWLEDGMENT

We want to express our deepest gratitude to God for His unending guidance during the creation of this study and for giving us strength, knowledge, and wisdom.;

To our parents, who helped us financially, mentally, and emotionally. We want to thank you for inspiring and motivating us; without you, we would not be able to achieve our aspirations.

To Mr. Peragrino B. Amador, Jr., our kind, considerate, and motivating thesis adviser, who never ceased to offer suggestions and encouragement throughout the entire study;

To Prof. Melbern Rose Maltezo, our subject adviser, for guiding the process. Without you, our journey would not have been possible.

To Prof. Dolores L. Montesines, chair of the defense panel, for allowing us to present our work. We appreciate your patience and candor in sharing your thoughts with us so we can improve our research.

To the Barangay Tangos North Officials, especially to Capt. Margarita P. Limbaro. For sharing their experiences and allowing us to test our system.

To our participants, your willingness to share your time and insights made this thesis valuable. We appreciate your kindness and efforts.

To our colleagues and friends for their unending love and support.

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Chapter 1

THE PROBLEM AND ITS SETTING

Introduction

The rapid advancement of technology has significantly contributed to the ongoing progress of various industries. However, specific sectors lag in embracing these new technological advancements. Unbeknownst to us, technology has revolutionized every aspect of our lives in this millennium. Robots have replaced people, tasks have been streamlined through various software applications, and new inventions have been updated even before reaching a wider global audience, surpassing our wildest imaginations. These innovations aim to optimize the utilization of existing resources to produce new or enhanced products and outcomes.

Numerous institutions have embraced computerization to enhance their services, such as school enrollment processes. Computerized systems have proven advantageous in convenience and accessibility, benefiting citizens, employees, students, teachers, and parents. The digital realm is incredibly efficient, capable of processing and storing vast data. In a post-industrialized society, managing massive records and ensuring the reliable and timely processing and generation of citizen profiles and certificates becomes effortless.

By leveraging technology, the barangay duty officer can create and maintain records, announcements, reports, and reservations, providing residents easy access to relevant information. Through this project, we aim to empower Barangay Tangos North in Navotas City to eliminate paperwork and leverage computer services, enhancing their ability to serve their residents more effectively.

Background of the Study

Computer technology has become a vital aspect of modern life. People worldwide are adopting technology to make certain chores easier to complete. In the government sector, technology has made a significant impact. Different government entities, particularly barangay units, have benefited significantly from computer technology. The "Electronic Barangay Management System" research project is intended for usage by barangays. The system will automate the barangay processes and transactions. Traditionally, most barangays have relied on manual methods for daily activities and transactions. They document deals with pen and paper and conduct transactions face to face. This method is no longer relevant in today's technological age. It is prone to human error and needs to be more efficient in providing inhabitants with satisfactory service. There is a greater need to improve the barangay and its residents' mechanism to operate and perform transactions. The most efficient way to address the existing issues is to use an IT-based solution. The researchers want to create an automated management system that barangays can employ. The mentioned system will eliminate all the difficulties and errors throughout the manual process.

The system will enable barangay duty officials to make and maintain electronic records, announcements, reports, and services. The method will improve the duty officers' response time when responding to residents' requirements. Residents can online fill out the forms for barangay certificates using the technology. The method will eliminate the need for residents to interact with barangay duty officers face-to-face. The system's deployment will improve the barangay's overall services to its residents.

Objectives of the Study***General Objective***

The study's general objective is to create an Electronic Barangay Management System platform that offers its services to its residents with a modern approach to the Internet. This project also makes it easier for the residents to interact and communicate with the barangay officials through the use of the Internet.

Specific Objectives

The study has the following specific objectives:

1. Design a web-based system with the following features:
 - a. Progressive/responsive web application design.
 - b. E-Barangay online transactions (Barangay Clearance, Barangay ID, Barangay Indigency Certificate, Business Permit).
 - c. Maintain, manage, and secure blotter records.
 - d. Residents and household profiling management.
 - e. User access platforms for system administrator, barangay officials, and residents.
 - f. Audit trail management.
 - g. Dynamic website design customization.
 - h. Dashboard (Events and Announcements)
 - i. Generate reports for transactions and insights.
2. Created the system using PHP, MySQL, Bootstrap, jQuery, HTML (Hypertext Markup Language), CSS, Visual Studio Code, AWS (Amazon Web Services) Amplify.

3. Tested and improved the systems in terms of functional suitability and reliability.
4. Evaluated the level of acceptability of the proposed system using ISO 25010 criteria for quality software.

Scope and Limitations of the Study

The study focused on designing an Electronic Barangay Management System, a system that offers barangay services online with a user-friendly portal for residents' use. Moreover, the barangay's residents are considered the study's clients. For the web application to work correctly, residents must first sign up.

The Administrator can create, update, and delete a citizen's record. The Administrator is the one who will manage the Household Profiling Information and the Contact Information. The Administrator will be able to manage the dashboard, where announcements and events from the barangay are included. At the same time, the residents or users can browse it to know the latest happenings in their barangay and be kept updated. Residents or users can now apply for a Business Clearance, Barangay ID, and Barangay Indigency Certificate by filling out the E-Barangay Forms. However, residents or users must go to the Barangay Office to claim their requested documents, giving them a timeframe on when to claim it upon request. For the Blotter Management, the residents need to provide the following information: the name of the complainant, the name of the defendant, what the complaint is all about, the date of the incident, and the date of the blotter application.

This system can be easily accessed using the internet browser in a mobile device, tablet, or computer with any available hardware or software specifications.

The study will be developed using PHP, MySQL, Bootstrap, jQuery, HTML, CSS, Visual Studio Code, AWS Amplify, and ISO 25010. The system will have a server and database for storing information, a responsive web-based system that the residents or users can access. While the study intended to cover all areas of the barangay sector, this only focused on the basics of barangay administration.

Chapter 2

CONCEPTUAL FRAMEWORK

This chapter introduces the relevant literature, studies, conceptual model, and operational definitions of key terms essential to understanding and conducting this investigation.

Review of Related Literature

This section presents key concepts and ideas on the topic of the study.

Information System

According to Kumar and Mittal (2004), an information system is a structured collection of people, hardware, software, communication networks, and data resources within an organization. It aims to collect, transform, and disseminate information relevant to individuals, groups, or organizations. The system documents and organizes information to support various organizational activities.

Rollan (2004) states that an information system aids in producing, managing, and correlating data for operational and planning activities. It is characterized by planning, designing, and developing to meet the organization's needs. Establishing an information system is a response to management's recognition of demands and their efficient fulfillment.

Contributor (2023) defines an information system (IS) as an interconnected set of components that collect, store, process, and transmit data and digital information. It encompasses hardware, software, data, people, and processes working together to transform raw data into valuable information. The primary purpose of an IS is to support various business objectives, such as improved customer service and increased efficiency.

While "information system" and "computer system" are sometimes interchangeable, they are different. Computer systems are part of an information system but do not encompass all the components and processes involved. Additionally, "information technology" (IT) primarily focuses on the technical aspects of hardware and software used in enterprise computing. In contrast, an information system focuses on how people utilize IT and data to manage operations and make informed decisions.

In addition to supporting decision-making, an information system plays a crucial role in knowledge management and communication. It facilitates data sharing across different departments, ensuring consistent and reliable information for analysis by various teams. An information system supports multiple business functions, including accounting, finance, marketing, human resources, operations, and supply chain management. It can also enable new business models and opportunities like e-commerce, social media, and artificial intelligence (AI).

Management Information System

According to Al-Mamary, Aziati, and Shamsuddin (2014), a Management Information System (MIS) is primarily concerned with collecting, processing, storing, and transmitting relevant information to support management operations in an organization. It is a computer-based system that takes internal information from operational processes and synthesizes it into meaningful and useful management reports. MIS serves as an effective information system within the organization, aiming to meet the general information needs of managers at different levels.

Management, as defined by the business dictionary, involves organizing and coordinating the activities of a business to achieve specific objectives. It encompasses the

planning, organizing, directing, and controlling of organizational resources to efficiently and effectively achieve goals through the efforts of others.

MIS provides reports to various managers, mainly middle and low-level managers within the organization. These reports, especially for middle-level managers, offer insights into organizational performance and aid in predicting future performance. Nath and Badgujar note that MIS brings several benefits to businesses, including appropriate responses to business situations, effective coordination between departments, access to relevant data and documents, reduced labor requirements, improved organizational and departmental techniques, and management of day-to-day activities. MIS also saves employees time by eliminating manual data collection and facilitating faster access to needed information.

According to Babu and Sekhar, the primary purpose of management information systems is to help organizations achieve their goals by providing managers with insights into regular operations. This enables managers to control, organize, and plan more effectively. Furthermore, MIS ensures that the correct information is delivered to the right person in a suitable format and at the right time.

Overall, MIS is critical in supporting management functions, facilitating decision-making processes, enhancing coordination, and improving organizational efficiency and effectiveness.

Types of Information System***Transaction Processing System***

A management information system (MIS) typically encompasses three main components: a transaction processing system (TPS), a management support system (MSS), and an office automation system.

The transaction processing system accumulates and organizes operational information about the company's activities. It focuses on processing transactions such as sales, purchases, and inventory updates. The TPS ensures that all transactional data is captured accurately and on time. It serves as the foundation for generating reports and providing data for other systems within the MIS.

Management support systems assist managers in making informed decisions. They include various subsystems that provide managers with the necessary information and tools to support their decision-making process. These subsystems include the information-reporting system, which generates reports based on the data collected by the TPS. Decision support systems utilize models and algorithms to help answer "what if" scenarios and provide analytical support. Expert systems, on the other hand, provide managers with advice and recommendations similar to what a human consultant would offer.

Executive information systems are tailored specifically to meet the needs of upper management. These systems provide executives with summarized and aggregated data in a format that is readily accessible and understandable. Executive information systems focus on providing high-level strategic information to aid in decision-making at the executive level.

A management information system comprises a transaction processing system for accumulating operational data, management support systems for decision-making and

analysis, and an office automation system for facilitating various administrative tasks. These components work together to provide accurate, relevant, and timely information to support managerial activities within an organization (Hickey, 2006).

Additionally, the transaction processing system refers to an information processing system that handles all transactions occurring within a business. This system is responsible for modifying, collecting, and retrieving transactional data. It is known for its consistency, efficiency, and reliability. Online businesses often utilize a transaction processing system for e-commerce activities, ensuring smooth and secure transaction processing.

A TPS has the following four components. One must understand them to know how the system works.

1. **Inputs:** Inputs are original requests for payments or products outside parties send to an organization's TPS. Typically, inputs include bills, coupons, custom orders, and **invoices**.
2. **Output:** Outputs are the documents a TPS generates after it processes all inputs, for example, the receipts stored by companies in their records. Such documents help validate transactions and offer crucial reference details for tax and multiple official purposes.
3. **Storage:** A TPS's storage component is where organizations keep their output and input data. Some businesses store the documents in a database. This component ensures the security, accessibility, and organization of all documents for late use.
4. **Processing System:** The processing system goes through every input and establishes a useful output, for example, a receipt. It helps outline the input data and defines what the outputs must be. One must remember that the processing time varies depending on the type of TPS an organization uses.

Office Automation System

According to Ash (n.d.), office automation refers to using software and computer systems to automate manual tasks related to collecting, storing, modifying, transmitting, and utilizing shared information. It provides an efficient way to manage and share data, reducing human involvement and the risk of errors. By automating repetitive tasks, office automation saves time for employees, prevents burnout, and allows them to focus on more valuable and complex responsibilities. Additionally, it streamlines processes, leading to improved results and cost savings. Office automation also enhances team communication and collaboration and makes employees more proficient in using technology.

Office automation systems (OAS), as described by Esiner (2020), consist of hardware and software solutions that facilitate data transfer between systems without requiring human interaction. These systems automate and streamline various organizational procedures, including accounting, data management, training, facilities management, and administrative tasks. The primary purpose of OAS is to increase the productivity of both clerical and knowledge workers while enhancing communication within the workplace.

Office automation offers numerous benefits, such as increased efficiency, reduced errors, time and cost savings, improved communication, and enhanced collaboration. By leveraging technology to automate tasks and streamline processes, organizations can optimize their operations and empower employees to focus on higher-value activities.

Benefits of an Office Automation System

Implementing an office automation system provides organizations with numerous advantages. These advantages include increased precision, decreased costs, decreased time and resources, data storage and management, data insights, and better-informed business decisions.

Executive Information System

An EIS is a decision support system (DSS) that aids in the decision-making process of senior executives. It accomplishes this by facilitating simple access to critical data required to fulfill strategic goals in an organization. An EIS typically includes graphical displays on a user-friendly interface. Early executive information systems were created as computer-based applications on mainframe computers to give top executives a company description, sales performance, and market research data. Senior executives, on the other hand, were not all computer literate or confident. Furthermore, EIS data only supported executive-level decisions, not the complete form or organization.

Barangay Management System

The Barangay Management System will automate the current manual processes and transactions in the barangay. Apart from effectively recording and monitoring data, the e-barangay is also capable of processing online documentary requests and complaint blotters and is supported by SMS technology. It is open to all registered residents of the target barangay (Carpio, 2020).

According to Maneja (2012), Information is essential for local officials' executive and legislative functions. The study determined the institutional and individual factors

contributing to sustaining a Barangay Management Information System (BMIS). The identified significant individual factors that influenced the barangays' decision to sustain the system were the system's user-friendly features, ease of managing the BMIS software, and usefulness of data generated in performing the functions of the local government officials.

Barangay Services Management

According to Carpio (2020), the system generally aims to develop a web-based Barangay Management System to support the functionality and operations of the barangay.

It specifically aims to:

- Create a registration module that will record barangay residents' demographic profiles.
- Create a documentary request module that will allow residents to request documents (barangay certificate and certificate indigency) online and receive updates on the status of their request via SMS.
- Create a complaint blotter module that will allow residents to file complaints and report incidents online, attach necessary evidence, and receive alerts on the status of their complaints through SMS.
- Create a report module that will generate significant statistics and reports such as the total number of requests and complaints, population growth, the main list of residents per purok, and others that can serve as baseline data for project and policy implementation; and
- Create a module that will send predefined replies to complaints.

Household Profiling System

According to Lacasandile and Labanan (2020), the barangay's profiling module encompasses basic information, expenses, and bills of the households. The collected data is encoded into the system to facilitate community monitoring. The process begins with the collection of household profiles, as depicted in Figure 4. The profiles include essential details such as a household photo, family name, cell phone number, telephone number, address, purok (subdivision), affiliation, religion, house ownership, house type, access to comfortable rooms, and a safe water questionnaire.

After completing the essential information section, households proceed to another form focusing on their expenses. This section captures data related to approximate daily consumption, daily transportation costs, house rent, house operation expenses, educational expenses, medical expenses, and recreational expenses. Additionally, the system collects information about the approximate regular bills payment, including electricity, water, cable, telephone, internet, and other bills.

Moreover, using information and communication technology to profile each household in the community contributes to good governance, with e-government at its core. Aggregating the profile data allows for the generation of essential statistics on labor and employment, family income and expenditures, demographics in terms of population and age, water and sanitation, housing types, and education. Initially focusing on profiling Zone 42, the initiative aims to expand and involve educational institutions in the barangay to contribute to these areas of concern.

Overall, the profiling module implemented in the barangay's system is a comprehensive tool to gather and organize crucial information about households, their expenses, and bills. It facilitates effective monitoring, good governance, and the generation

of valuable statistics for informed decision-making and resource allocation within the community (Lacasandile et al., 2020).

Blotter Management System

A blotter or police blotter refers to the daily written records of events, including arrests, in a police station. It serves as a log or record that provides information about the "five Ws" (WHO, WHAT, WHEN, WHERE, and WHY) and one H (HOW) of each incident. The blotter also includes crime reports, complaints, and other relevant information. When a complainant files a demand or report, the blotter is the default procedure for documenting the incident. In the context of the barangay, the blotter system for record-keeping is primarily manual, but integrating technology into records management presents more complex challenges.

Implementing a blotter management system is to effectively manage records within the barangay, specifically residents' records, blotter records, and barangay clearances. Introducing an e-blotter management system allows for the quick, easy, and paperless storage of crime-related information using computer technology. This technological advancement is expected to enhance crime prevention, detection, and resolution by providing convenient access to data and enabling prompt action by police or barangay officials.

Using an e-blotter management system makes storing and retrieving crime-related information more efficient and accessible. This technology-driven approach aims to improve the overall effectiveness of crime management, benefiting law enforcement agencies and barangay officials in taking immediate and informed actions based on readily available data.



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A more efficient and reliable blotter system for recording crime incidents not only simplifies crime documentation and modernizes data storage, but it also provides accuracy in crime data recording, dependability in storage for quick reference, and hassle-free data transmission to the end recipient of all police reports and barangay officials. The e-blotter system will provide better service by utilizing modern technology to improve and enhance the crime incident reporting system.

Audit Trail Management

As stated by AuditBoard (2023), an audit trail refers to a comprehensive record of events that occur during the execution of a transaction. It captures essential details such as the timestamp of each phase of the transaction, the parties involved (seller and purchaser), the time of sale, and the location of the sale. Audit trails serve as documentation for future review and can vary in complexity.

Audit trails, also known as audit logs, are record-keepers that document evidence of events, procedures, or operations. Their primary purpose is to reduce fraud, material errors, and unauthorized use. Even something as simple as a grocery store receipt can be considered an example of a logged audit trail. Ultimately, audit trails play a crucial role in enhancing internal controls and data security.

The importance of an audit trail lies in its ability to verify and validate financial, software, and business transactions. It tracks selected user activities or accounting financial statement amounts, linking them to the transaction, event source, and data access used to create or modify a record. By maintaining an audit trail, businesses can detect unauthorized use, errors, and instances of fraud.

In software systems, an audit trail documents each user's activity, including changes made, approvals, timestamps of dates and times, IP addresses, and user logins. The retention period for audit trail logs may be subject to government and industry regulations that apply to specific business activities. Companies should establish a company policy approved by the Board of Directors to ensure proper management and retention of audit trail logs (Cook, B., 2022).

Types of Audit Trails

Keystroke Monitoring

During an interactive session, keystroke monitoring involves observing and documenting the keystrokes a computer user enters and the computer's response. It is often considered a specific type of audit trail. Keystroke monitoring can include viewing characters as they are typed, reading electronic mail, and accessing other recorded information users enter. In some cases, routine system maintenance may also capture user keystrokes, which can be considered keystroke monitoring if the keystrokes are saved along with user identification for administrator analysis.

Keystroke monitoring aims to protect systems and data from unauthorized access or misuse by intruders. By monitoring the keystrokes entered by intruders, administrators can assess and address any damage caused. It helps identify unauthorized access and activities, enabling administrators to safeguard system security and integrity appropriately.

Keystroke monitoring is an important security measure to prevent unauthorized access and protect sensitive information. By monitoring and recording keystrokes, administrators can identify potential security lapses and take the appropriate steps to maintain the confidentiality, integrity, and accessibility of systems and data.

It is worth noting that while keystroke monitoring plays a role in maintaining system security, it is crucial to ensure compliance with applicable laws and regulations regarding user privacy and data protection. Organizations should establish clear policies and procedures regarding keystroke monitoring, outlining its purpose, scope, and the rights and responsibilities of administrators and users.

Audit Events

System audit records serve the purpose of monitoring and optimizing system performance. They allow for the identification of potential issues and the fine-tuning of system operations. On the other hand, application audit trails focus on detecting flaws within applications or violations of security policies specific to an application. These trails help identify vulnerabilities or breaches in application security.

User audit records are crucial in holding individuals accountable for their actions within the system. Analyzing user audit records can reveal various security violations, ranging from unauthorized browsing to attempts to introduce malicious software or gain unauthorized privileges.

System-enforced policies, particularly those related to system access and file permissions, are essential for maintaining security. Monitoring changes made to system configuration files that implement these policies is essential. When special access privileges, such as those of a security administrator, are used to modify configuration files, the system should generate audit records to document these activities.

Sometimes, a more detailed audit trail may be required beyond system-level records. Application audit trails can provide this increased level of recorded detail. For instance, in an email application, it may be valuable to record information such as the

sender, recipient, and message length for each email. Similarly, in a database application, it may be helpful to record details such as the user who accessed a specific database and the rows or columns of a table that were read, modified, or deleted. This level of granularity in audit trails allows for a more comprehensive understanding of application activities and helps monitor and analyze specific usage patterns or potential security incidents.

Developmental Tools

PHP

Tatroe and MacIntyre (2020) state that PHP is a programming language compatible with major operating systems, including Unix variants (such as Linux, FreeBSD, Ubuntu, Debian, and Solaris), Windows, and macOS. It can be used with popular web servers like Apache, Nginx, and OpenBSD, as well as in cloud environments such as Azure and Amazon. PHP offers excellent flexibility as it allows the generation of various document formats, not limited to HTML or text files. It has built-in support for generating PDF files and GIF, JPEG, and PNG images.

One of the notable features of PHP is its extensive support for databases. It is compatible with all major databases, including MySQL, PostgreSQL, Oracle, Sybase, MS-SQL, DB2, and ODBC-compliant databases. It can even work with newer NoSQL-style databases like CouchDB and MongoDB. PHP simplifies creating web pages with dynamic content pulled from a database, making it straightforward for developers.

Additionally, PHP provides a library of code known as the PHP Extension and Application Repository (PEAR). This library offers a range of pre-built PHP components for everyday tasks such as database abstraction and error handling. PEAR is a framework

and distribution system for PHP components that can be reused, allowing developers to leverage existing code and speed up development.

Overall, PHP's compatibility with various operating systems and web servers, its support for multiple databases, and its rich library of code through PEAR make it a versatile and powerful programming language for web development.

HTML

As Fajfar (2016) mentioned, HTML (Hypertext Markup Language) is a markup language. It aims to add annotations or markup to a document, distinguishing these annotations from plain text. Markup instructions guide the program in displaying the text while remaining hidden from the viewer.

HTML is a text file that follows specific syntax, file, and naming conventions to indicate to the computer and web server that it is an HTML file. By adhering to these conventions and using a text editor, users can create and design basic webpages, which can then be uploaded to the internet.

The most fundamental HTML convention is including a document-type declaration at the beginning of the text file. This declaration, `<!DOCTYPE html>` signifies that the file is an HTML document. It must be written exactly as shown, without additional content or breaks. Content preceding this declaration will not be recognized as HTML by a computer. Doctype declarations are not exclusive to HTML but can apply to any document using SGML (Standard Generalized Markup Language). SGML is a standard for specifying various markup languages, including HTML.

Another critical requirement for creating an HTML file is saving it with a .html file extension. The file extension serves as an external signal to the computer that the file is in

HTML format. By having the doctype declaration inside the file and the .html file extension, the computer can identify it as an HTML file, whether it is being read. This becomes particularly crucial when uploading the files to a web server, as the server needs to know how to handle the files before delivering them to client computers for content rendering.

Once the doctype declaration is written and the file is saved with the .html extension, users can utilize the various syntactic tools provided by HTML to customize their web pages. After completion, they will likely have multiple HTML files corresponding to different website pages. Uploading these files in the same hierarchy in which they were saved is essential, as each page references specific file paths for other pages, enabling interlinking. Uploading the files in a different order can cause broken links and missing pages, as the specified file paths will no longer match the pages.

HTML is used to structure and present web content. It utilizes conventions such as the doctype declaration and the .html file extension to indicate its nature and facilitate proper interpretation by computers and web servers.

CSS

As Fajfar (2015) mentioned, CSS (Cascading Style Sheets) is a style sheet language that complements HTML documents by controlling their presentation. While HTML provides the structure and content of a webpage, CSS focuses on how the elements within the HTML document should be styled and displayed on the screen.

CSS is the "skin" covering the HTML "bones." It handles various design aspects such as background color, styling, layout, borders, and shadows, which contribute to the overall

appearance of a webpage. By using CSS, web designers can separate the presentation of a webpage from its content, allowing for easier customization and maintenance.

CSS has a straightforward syntax independent of HTML but can be used alongside it. It offers flexibility and allows for modifying the visual aspects of HTML elements. This separation of presentation and content enhances a web page's overall presentation and user experience.

CSS is not limited to HTML and can be used with any XML-based markup language. It provides the ability to consistently style and design webpages across different platforms and devices.

CSS is a powerful style sheet language that works with HTML to enhance web pages' visual appearance and layout. It enables designers to customize the presentation of HTML elements, improving a website's overall look and user experience. CSS's ability to separate presentation from content adds flexibility and ease of maintenance to web design.

DATABASE - MySQL

Vaswani (2009) states that MySQL is a high-performance, multithreaded, and multiuser Relational Database Management System (RDBMS) designed with a client-server architecture. Due to its speed, dependability, user-friendliness, and comprehensive range of data management tools, have garnered widespread popularity. Thanks to its favorable licensing policy and the global support community of users and engineers, MySQL has become the preferred choice for personal and business applications.

MySQL is built on the Structured Query Language (SQL) and is developed by Oracle. It is an RDBMS, which follows the relational model for organizing and managing data. In a relational database, data is stored in rows and columns of tables, with logical

relationships between data elements being maintained. An RDBMS includes the software tools for implementing, managing, and querying such a database.

MySQL plays a vital role in numerous software stacks for creating and maintaining various applications. It is employed in customer-facing web applications and data-driven B2B services. Its open-source nature, stability, rich feature set, and continuous development and support from Oracle have made it a popular choice for internet-critical organizations such as Facebook, Flickr, Twitter, Wikipedia, and YouTube.

MySQL is a highly efficient and scalable RDBMS that excels in performance and usability. It utilizes SQL as its query language and offers robust data management tools. MySQL's open-source nature, wide adoption, and support from Oracle have contributed to its widespread use in various applications across the internet.

BOOTSTRAP

Efron and Tibshirani (1993) describe Bootstrap as a statistical method that allows researchers to address statistical questions without relying on traditional formulas. It is a data-based simulation technique used for making statistical inferences. The term "bootstrap" originates from the expression "to pull oneself up by one's bootstraps," which is believed to have been inspired by a story from the Adventures of Baron Munchausen by Rudolf Erich Raspe in the 18th century.

In a different context, Bootstrap is a popular open-source front-end framework for developing responsive web pages and mobile-first websites. It offers a range of pre-defined classes that simplify the developer's work. While a basic understanding of HTML and CSS is required, Bootstrap provides a comprehensive set of HTML and CSS-based design templates for various elements such as typography, buttons, tables, forms, models,

navigation, and image carousels. Additionally, it offers optional JavaScript plugins to enhance functionality.

Bootstrap is highly compatible with modern web browsers like Firefox, Chrome, Opera, Safari, and Edge. It enables developers to create responsive designs that adapt to different devices and screen sizes. By leveraging Bootstrap's features and templates, developers can streamline the development process and ensure consistent and visually appealing designs across multiple platforms.

The bootstrap method, as described in statistics, is a data-based simulation approach for statistical inference. On the other hand, Bootstrap, as a front-end framework, provides a collection of pre-defined classes and design templates that facilitate the development of responsive and visually appealing web pages and mobile-first websites.

JQUERY

According to Gillis (2019), jQuery is an open-source JavaScript library that simplifies the creation and navigation of web applications. It provides various features and functionalities that streamline tasks such as HTML DOM manipulation, Ajax operations, and event handling. jQuery allows users to manipulate the HTML Document Object Model (DOM) by quickly finding, selecting, and modifying elements with specific properties. It also enables handling events and incorporates JavaScript functionalities to apply effects like fade-ins and outs to website elements.

One of the critical advantages of jQuery is its ability to simplify DOM manipulation, making it easier for developers to interact with and modify elements on a web page. With jQuery, users can change element attributes, respond to events triggered by user actions, and perform dynamic updates without requiring page reloads. It achieves

this through Ajax, a technique for asynchronous data transfer between browsers and servers.

jQuery's event-handling mechanism allows developers to specify the type of event they want to handle and define a corresponding event-handler function. This function can prevent the default behavior associated with the event and execute desired actions on the DOM elements. To simplify the syntax and provide efficient element selection, jQuery employs a CSS selector engine called Sizzle. Sizzle traverses the DOM elements to locate specific elements based on the specified selectors.

As GeeksforGeeks (2022) stated, jQuery is known for its speed, rich features, and lightweight nature. It is designed to make JavaScript more straightforward and efficient for modern websites. While a basic understanding of HTML, CSS, and JavaScript is recommended, jQuery aims to reduce the amount of code required to perform everyday tasks, allowing developers to achieve desired functionality with concise and readable code.

Overall, jQuery is a widely adopted JavaScript library that offers simplifications and enhancements for web development. By leveraging its features, developers can enhance productivity, improve user experience, and achieve desired effects on their websites with less code and effort.

Visual Studio Code

According to Mustafeez (2022), Visual Studio Code, commonly called VS Code, is a free and open-source text editor developed by Microsoft. It is compatible with Microsoft Windows, Linux, and macOS. Despite its lightweight nature, VS Code offers a range of powerful features, contributing to its popularity as a preferred development environment tool.

One of the critical strengths of VS Code is its extensive language support. It provides comprehensive support for various programming languages, including widely used languages like Java, C++, Python, CSS, and Go, and specialized languages like Dockerfile. This versatility makes it suitable for developers working across different programming domains.

Furthermore, VS Code offers a highly customizable environment through extensions. Users can enhance the editor's functionality by adding pre-existing extensions or creating their own. These extensions can include code linters for ensuring code quality, debuggers for efficient troubleshooting, and cloud and web development support, among other features. This extensibility allows developers to tailor their editing experience and optimize their workflow according to their needs.

In comparison to other text editors, VS Code's user interface allows for extensive interaction. In order to facilitate the user experience, VS Code is divided into five major regions:

- The activity bars.
- The sidebar
- Editor groups
- The panel
- The status bars.

ISO 25010

ISO and IEC perform essential positions in the global standardization system. According to the ISO/IEC 25010 Manual, system quality is defined as the extent to which a system meets its stakeholders' stated and implied needs and provides value. To ensure

value for stakeholders, it is essential to comprehensively specify and evaluate software and software-intensive computer systems, considering the desired quality attributes aligned with stakeholders' goals and objectives.

The ISO/IEC 25010 standard encompasses two quality models: the quality-in-use model and the quality product model. The quality product model focuses on software's static properties and computer systems' dynamic properties. It comprises eight primary quality characteristics: functionality, performance, compatibility, usability, reliability, security, maintainability, and portability. These characteristics are further divided into sub-characteristics that provide more detailed aspects for evaluating and assessing the quality of the software or system.

Organizations can establish a comprehensive framework for evaluating and enhancing their software's and software-intensive systems' quality by applying the ISO/IEC 25010 standard and its quality models. This framework considers stakeholders' diverse perspectives and needs, allowing for a systematic approach to achieving high-quality outcomes. The main can be defined as follows:

- **Functionality:** This refers to the extent to which the product or system provides the functions that meet its user's stated and implied needs under specified conditions.
- **Performance:** It represents the efficiency and effectiveness of the product or system regarding resource usages, such as processing speed, response time, and throughput, under specified conditions.
- **Compatibility:** This characteristic assesses the ability of the product or system to interact and operate successfully with other products, systems, or components while sharing the same hardware or software environment.

- Usability: It relates to the ease of use and user satisfaction when using the product or system to achieve specific goals in a specific context. Usability considers factors such as learnability, efficiency, and user satisfaction.
- Reliability: This refers to the ability of the product or system to perform its intended functions consistently and accurately over a specified period under specified conditions, without failure or errors.
- Security: It encompasses the measures and features to protect the product or system from unauthorized access, data breaches, and other security risks. Security ensures timely data access is granted to authorized individuals or systems.
- Maintainability: This characteristic assesses the ease and effectiveness with which the product or system can be modified, repaired, or adapted to changes in the environment, requirements, or technology, aiming for improved performance or functionality.
- Portability: It represents the ability of the product or system to be transferred or deployed across different hardware, software, or operational environments without significant effort or loss of functionality.

The quality-in-use model focuses on the outcome of using a product or system in a specific context. It consists of five main characteristics that assess the user's experience and satisfaction during the interaction. These characteristics are further subdivided into sub-characteristics. Here are the main characteristics:

- Effectiveness: This characteristic measures the accuracy and completeness with which users can achieve their specific goals when using the product or system in a given context.

- Efficiency: It relates to the resources expended by users concerning the accuracy and completeness of goal achievement. Efficiency considers factors such as the speed and ease of performing tasks and the optimal use of resources.
- Satisfaction: This characteristic evaluates how user needs, and expectations are met when using the product or system in a specified context. User satisfaction considers usability, aesthetics, and overall user experience.
- Freedom from risk: It assesses the degree to which the product or system mitigates potential risks to economic status, human life, health, or the environment. This characteristic focuses on ensuring that the product or system does not pose unnecessary risks to users or stakeholders.
- Context coverage: This characteristic measures the extent to which the product or system can be used effectively, efficiently, and with satisfaction in various specified contexts of use and even in contexts beyond those initially identified. It considers the adaptability and flexibility of the product or system to different usage scenarios.

Conceptual Model of the Study

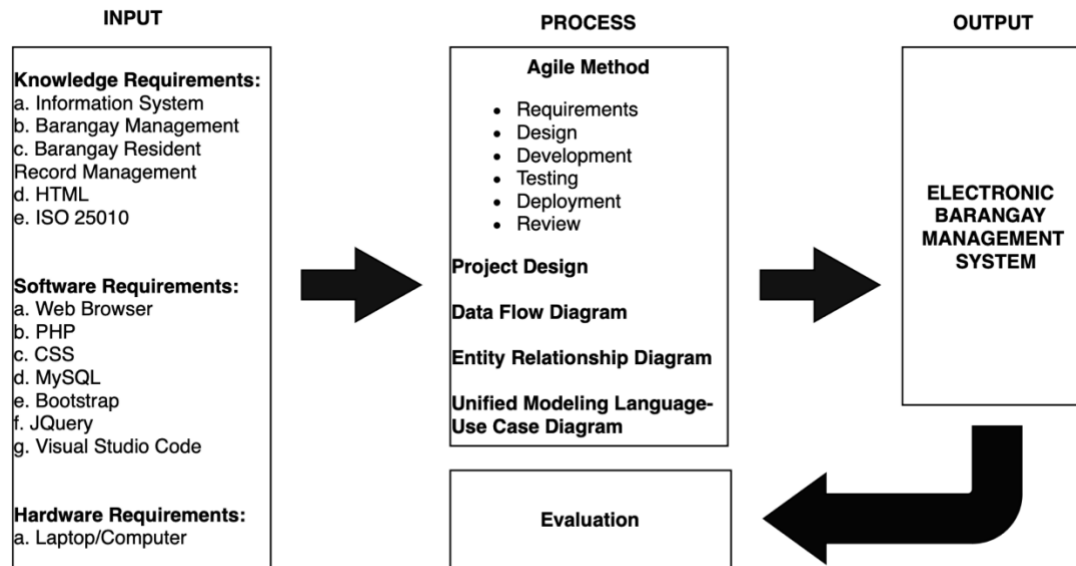


Figure 2. Conceptual Model of the Study

Figure 2 presents the conceptual model of the study using the input-process-output (IPO) model.

Input

The input block contains the knowledge, software, and hardware requirements needed to develop the system and mobile app for Hydroponics Water Maintenance System. The knowledge requirements are the concepts and facts that the researchers must comprehend and master to lay the groundwork for the investigation. These requirements include critical knowledge of Information Systems; Barangay Management; Barangay Resident Record Management; Hyper Text Markup Language (HTML); and ISO 25010. The software requirements are the application programs, programming languages, frameworks, databases, and operating systems needed to develop the electronic barangay

management system. The hardware requirements are the tools for creating the two microcontrollers used, such as laptops and Computers.

Process

Developing the Electronic Barangay Management System includes several key steps: requirement gathering, design, development, testing, deployment, and review. Here is a breakdown of each step:

Requirement Gathering

This step involves defining the criteria and identifying the business opportunities of the project. The time and effort required for completion are estimated, and technical and economic feasibility is assessed based on the gathered information.

Design the Requirement

Collaborating with stakeholders, the project requirements are defined and documented. User flow diagrams or high-level UML diagrams may be used to illustrate how new features will function and integrate with the existing system.

Develop

The development team works on their respective projects once the requirements are defined. Designers and developers work towards creating a functional product, going through multiple stages of development. The product will have basic functionality initially and will be refined over time.

Test

The testing phase involves the Quality Assurance team, which performs various tests to ensure the product's performance and identify any bugs or issues. This step ensures the quality and reliability of the Electronic Barangay Management System.

Deployment

In this phase, the developed product is prepared and implemented in the user's work environment. The necessary configurations and setup are performed to make the system ready for use.

Review

Once the product is deployed, feedback is collected from users and stakeholders. This feedback helps identify areas of improvement or issues that need to be addressed. The development team works through the feedback to make necessary adjustments and enhancements.

Output

The constructed Electronic Barangay Management System is shown in the output block. To establish acceptance, the output, especially the mobile app, was subjected to an evaluation.

Operational and Definition of Terms

In this study, the following terminologies are defined to provide a better understanding:

Barangay - refers to Barangay Tangos North, the specific barangay chosen as the client for the website development project. The officials of Barangay Tangos North have expressed the need for a well-established website as they currently need one.

Resident - refers to the individuals who are residing in Barangay Tangos North. The website's resident page includes features allowing residents to request documents and

update their profiles. However, their access is restricted compared to the administrator page.

Household Profile - refers to the information and details of the members within a family or household. The household profile feature on the website allows residents to update their profiles, and administrators can generate and manage this data.

Blotter - refers to the blotter report registration service provided on the website. Residents can use this service to register a blotter report and schedule appointments online. The registered reports are visible to the administrator for further action.

Dashboard - refers to a page on the website that displays essential information and statistics for the administrator. It includes the total number of resident requests, presented graphically for straightforward interpretation. Residents, on the other hand, have limited access and can only view this page.

Barangay Officials - refers to the profiles and lists of the current barangay officials of Barangay Tangos North. The administrator can edit and manage this feature, ensuring the accuracy and up-to-date information of the barangay officials.

By defining these terminologies, it becomes clearer how they are relevant to the study and the development of the website for Barangay Tangos North.

Chapter 3

METHODOLOGY

This chapter entails the research methodology of the study with the following sections: project design, project development, operation and testing procedures, and evaluation procedures.

Project Design

The project design of the study is discussed below using Data Flow Diagram, Entity Relationship Diagram, and Use Case Diagram to visualize the design and flow of the E-Barangay Management System Web Application.

Data Flow Diagram

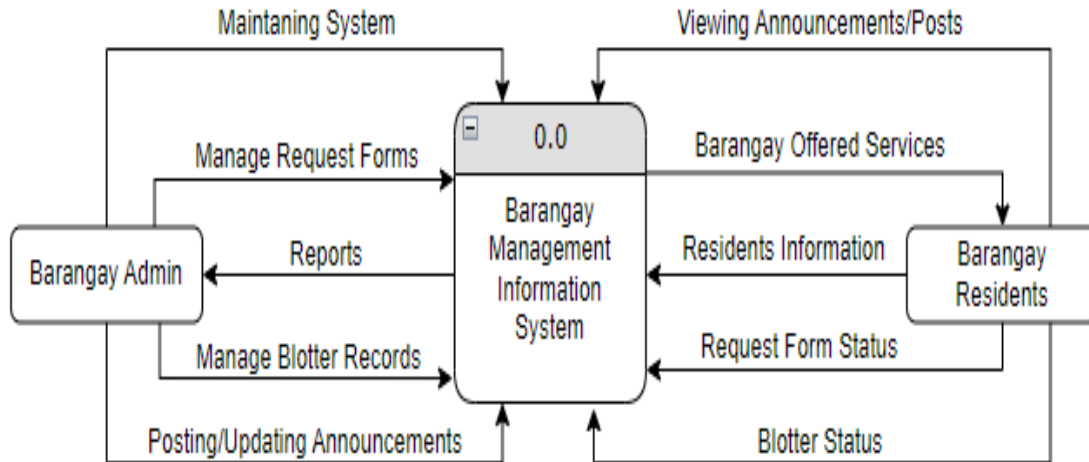


Figure 3. Context Diagram of the Developed Web-based Electronic Barangay Management System for Barangay Tangos North, Navotas City

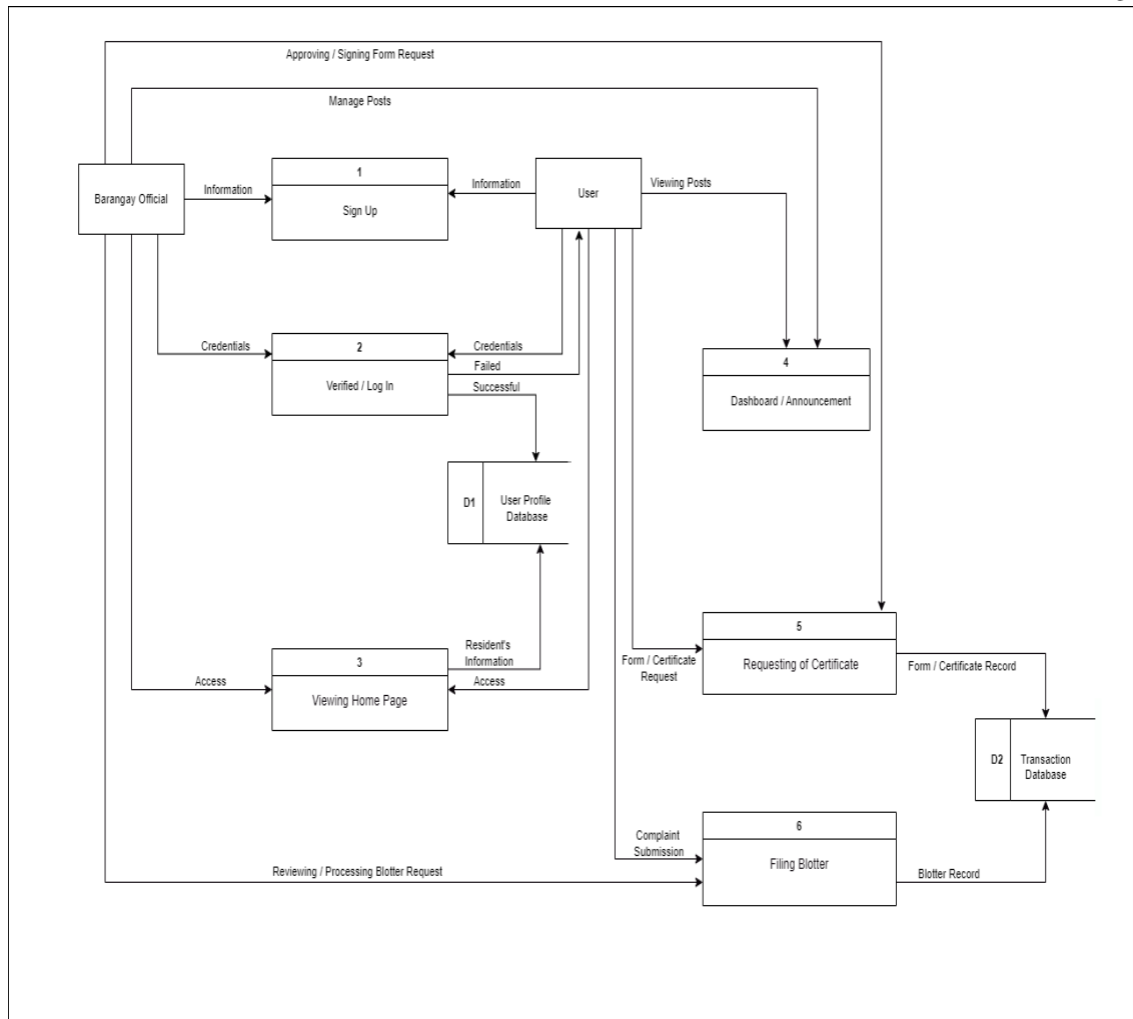


Figure 4. Data Flow Diagram of the Developed Web – Based Electronic Barangay Management System for Barangay Tangos North, Navotas City

For admin:

- Maintenance and monitoring of the System - administrator can access and manage the whole system.
- Barangay registration approval - the verification process includes uploading any valid id for the residents and administrator can verify it.
- Household profiling record - residents can update their records and administrator can verify the information.

- Receiver of the blotter/complaints – administrator can receive complains from residents and set appointments.
- Post announcements - announcement page displays the calendar, wherein it shows the events in barangay and administrator can export the document.
- Process e-barangay application forms - residents can request documents, once the administrator approve it. They can now claim their documents.
- Back up, audit trail, and archive data - activity logs show the records of the changes made in the system.

For user/residents/barangay officials:

- Viewing of announcements - residents can see the events for the whole year on the announcement page.
- Fill up their information - the system requires residents to fill up necessary questions and information.
- Application for documents - residents can request certain documents.
- Report blotter/complaints – residents can file complains and set an appointment.

Database Diagram

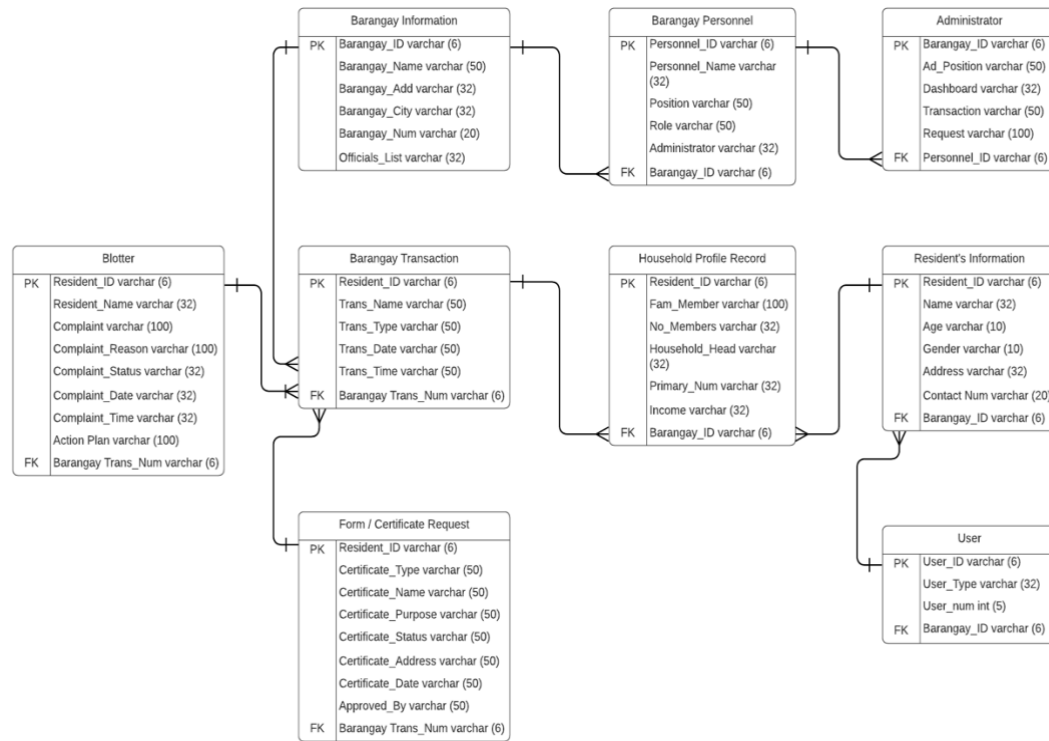


Figure 5. Entity Relationship Diagram of the Developed Web – Based Electronic Barangay Management System for Barangay Tangos North, Navotas City

Figure 5 presents the database design of the system. The database stored the resident's information, barangay's information, and barangay-issued documents such as Barangay Clearance, Barangay ID, Barangay Indigency Certificate, and Business Permit. It also included the blotter, transaction, and, lastly, the barangay household profiling.

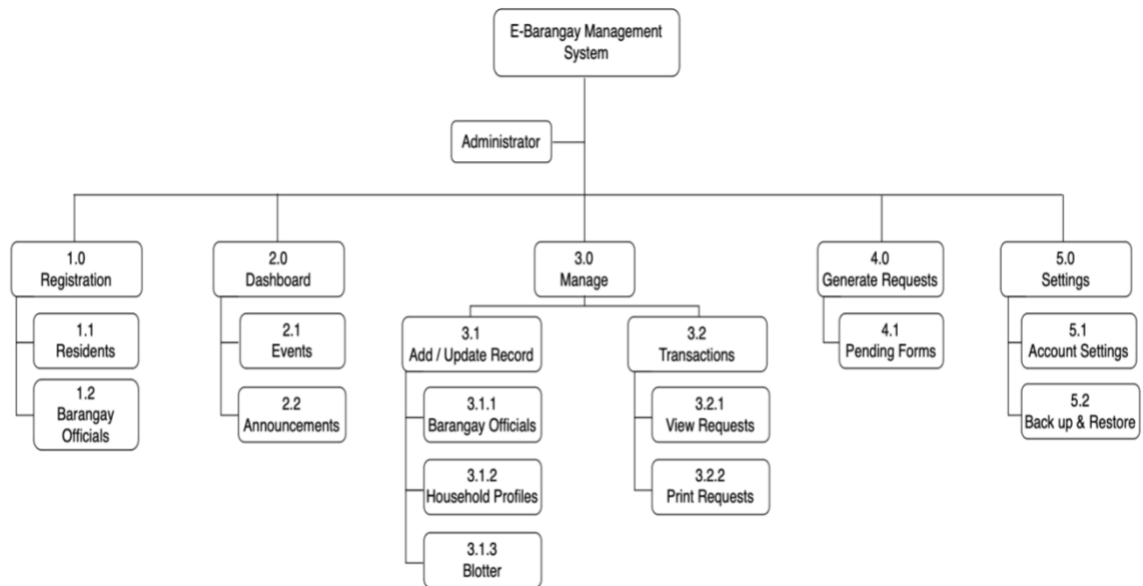


Figure 6. The Hierarchy of Modules of the Developed Web – Based Electronic Barangay Management System for Barangay Tangos North, Navotas City

The hierarchy of modules in Figure 6 shows the modules or components that the Administrator can access. The developed E-barangay Management System for Barangay Tangos North, Navotas City, is packed with features to help the user manage the properties and resources of the system. The system's 1.0 module is a registration function for residents and barangay officials. The 2.0 module of the system is the dashboard wherein we can see the latest events and announcements from the barangay.

Module 3.0 of the system covers all input modules that collect essential data. This module manages data for barangay officials, household profiles, and blotter. This module also has an override function that can edit information manually. Module 4.0 is the system's core, which analyzes all the data, including the pending forms. Module 5.0 is the system's setting module, where users can adjust account settings, backup and restore, and database synchronization.

Unified Model Language – Use Case Diagram

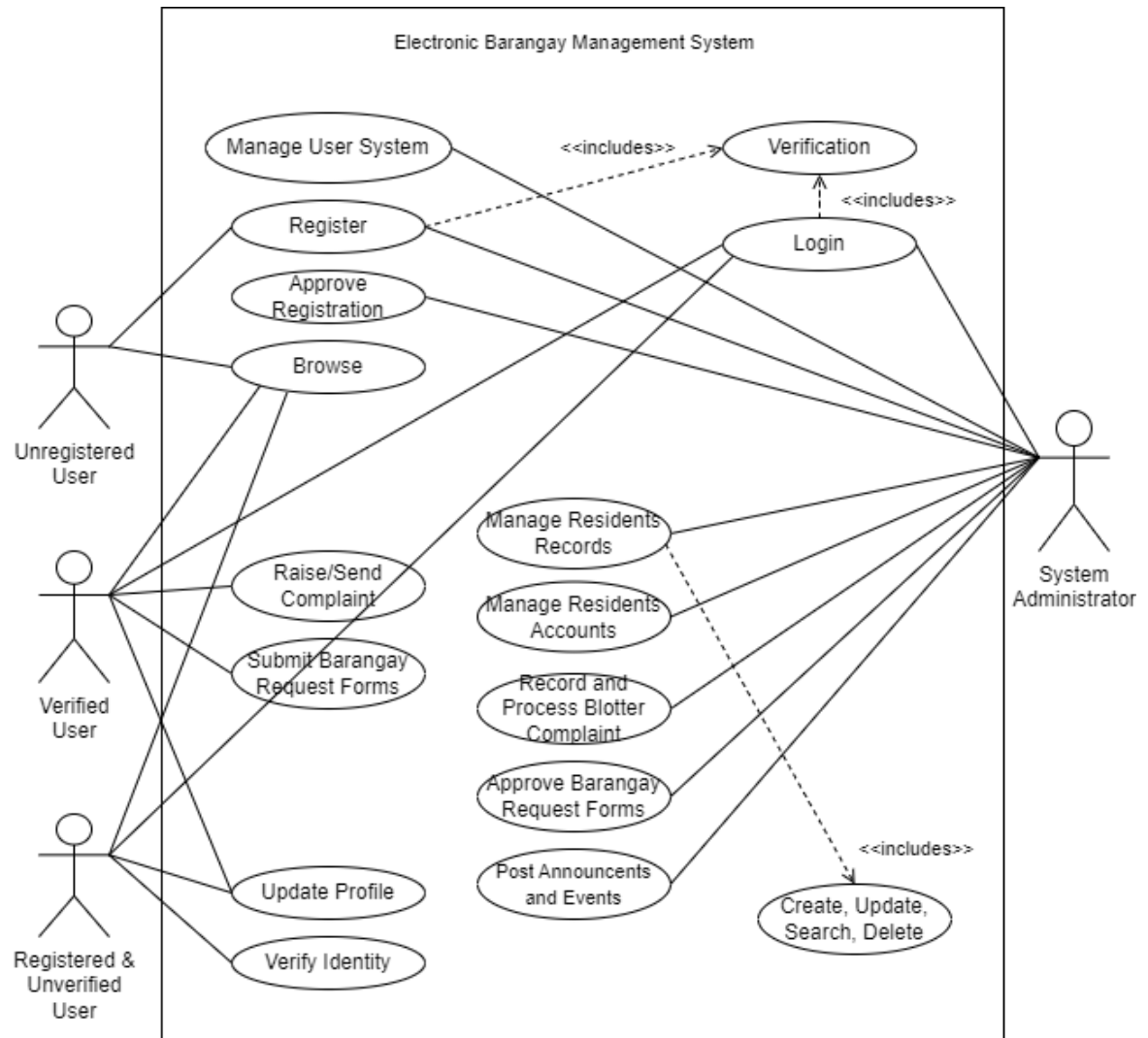


Figure 7. Unified Model Language - Use Case Diagram

Figure 7 shows the application's UML (Unified Modeling Language) Use Case Diagram. This diagram will show how users interact with the system to achieve their goals. At the top level, the use cases are, registering, approving the registration, login, verification, managing the user system, browsing, raising/sending complaints, submitting barangay request forms, managing resident records, managing residents' accounts, recording, and

processing blotter complaint, approve barangay request forms, and post announcements and events.

By default, a user is a resident, who is further categorized into three-unregistered users, unverified registered users, and verified users. When users visit the website, they may either register a new account, log in to an existing one, or browse. Browse use cases could be used by any user if the customer wants to view posted announcements and events. The verification use case allows unverified registered users to confirm their identity to access the application entirely. This would mean that once users have logged in, they may verify their identity when submitting documents and updating their profiles.

Manage resident records, manage residents' accounts, record and process blotter complaints, approve barangay request forms, and post announcements and events. Use cases are managed by the admin of the system, which has control of the system.

Raise/Send complaints, submit barangay request forms, and request barangay health assistance use cases all require a user to be logged in first and be verified.

Table 1.

Use Case Procedure of the Application.

Use Case Number	Use Case Title	Use Case Description
UC01	Register	This use case is used to create an account
UC02	Log In	In this use case, the credentials submitted will be validated using an authentication algorithm and an error message will be returned if the credentials are invalid.
UC03	Edit Profile	This use case will allow the user to update their profile details.
UC04	Verify Account	This use case will require the user to submit a document needed for verification and will be checked by identity provider.
UC05	Dashboard	This use case will allow the user to access and see the dashboard containing the announcements and events.
UC06	Household Profiling	In this use case, the users will be able to enter their details (name, age, contact details, and address).
UC07	Blotter Management	This use case will allow the users to file a complaint and enter the details (name, complaint details, barangay case number, and schedule).
UC08	E-Barangay Forms Application	This use case will allow the users to select the E-Barangay Application Form, enter their details and select what type of certificate they apply for.

Project Development

The WEB – BASED ELECTRONIC BARANGAY MANAGEMENT SYSTEM was developed using software development lifecycle agile model below as shown in figure 6.



Figure 8. Agile Model

Requirement Gathering: This stage involves defining the criteria and describing the project's business opportunities. It includes estimating the time and effort required to complete the project and assessing technical and economic feasibility.

Design the Requirement: In this stage, stakeholders define the project's requirements. User flow diagrams or high-level UML diagrams can be used to demonstrate how new features will function and fit into the existing system.

Develop/Iteration: The development team begins working on the project once the requirements are defined. Designers and developers work towards releasing a functional product. The development process may involve multiple iterations, and the product will have basic functionality during each stage of development.

Test: This phase involves the testing team, specifically the Quality Assurance team, who check the product's performance and identify bugs or issues. Testing is crucial to ensure the product meets the desired quality standards.

Deployment: In this stage, the team prepares the product for the user's work environment. The product is made available and implemented in the intended setting.

Review/Feedback: After publishing a product, the concluding phase entails collecting user feedback. The team receives feedback on the product and addresses any identified issues or opportunities for enhancement.

The project development process is further described in Tables 1 and 2, which provide details on the modules used and the procedure of use cases. These tables outline the specific steps and processes involved in developing the project.

The study aims to ensure a systematic and well-structured approach to developing the Electronic Barangay Management System by following this project development process and utilizing the described modules and use case procedures.

Table 2.

Detailed process of each module used in the application.

Module Number	Module Title	Module Description
1	Accounts	An account will provide a user with a profile they can update. A new user can sign up to create an account while an existing user can directly log in their account using the credentials they provided. The Account module also comes with a “forgot password” feature in case the user forgets their account password. Once a user's account has been verified, they will be able to make purchases and sell them. products.
2	Services	This module allows the user to access the services available in the system.
3	Resident's Information	This module allows the user to update their profile details including their name, age, contact number and civil status.
4	Dashboard	This module allows the user to access and see the dashboard containing the announcements and events.
5	Household Profiling	This module allows the users to enter their details including their name, age, contact details, and address.
6	Blotter	This module allows the users to file a complaint and enter the details needed like their name, complaint details, and the schedule.
7	E-Barangay Forms Application	This module allows the users to select the E-Barangay Application Form, enter their details and select what type of certificate they apply for like Business Clearance, Barangay ID, and Barangay Indigency (Certificate).

Operation and Testing Procedures

The following are the procedures taken to operate the modules in the application and test them properly in terms of functionality and reliability.

Table 3.

Procedures to operate the modules

Modules	Steps to be taken	Expected Output
1. Register	<ol style="list-style-type: none"> Go to the home page by clicking the website. Click the <i>Sign-up</i> button. Put your personal details and press enter. You will now be taken back to the home page and can access the page. 	<ol style="list-style-type: none"> The user must have the ability to enter their information. Incomplete details are not acceptable. Complete details must be able to create an account and access the page.
2. Log in	<ol style="list-style-type: none"> From the home page click the <i>login button</i>. Enter user credentials. Click login. Users will be redirected to the home page after login. 	<ol style="list-style-type: none"> The user must have the ability to enter their credentials. The user with correct credentials will be directed to the home page. The user with incorrect credentials will not be able to access the page.
3. Edit Profile	<ol style="list-style-type: none"> Press the user navigation bar. Select <i>My Account</i>. Edit your profile photo and your details. Update details. Examine the profile page and it will execute the updated profile. 	<ol style="list-style-type: none"> The user must be able to edit their profile and enter their details. The page will reload and execute the update profile. If you encounter errors, check your details and the system must handle the error without crashing.

4. Verify Account	<ol style="list-style-type: none"> 1. Click the user at the navigation bar. 2. Select <i>Verify Account</i> 3. Enter the documents needed such as id and certificate to prove that you are a citizen of the barangay. 4. Click Submit. 5. The system will reload and verify your information. Check it after an hour and you will receive a message. 	<ol style="list-style-type: none"> 1. The user must be able to select the Verify account. 2. The user must be able to enter their documents and submit. 3. Non-citizen will remain unverified and will receive an error. 4. The user who got verified will receive a successful message.
5. Dashboard	<ol style="list-style-type: none"> 1. Select <i>dashboard</i> at the navigation bar. 2. You can now see the barangay's announcements and events. 3. Enter your suggestions and reactions by clicking the comment button below. 	<ol style="list-style-type: none"> 1. The user must be able to see the dashboard containing announcements and events. 2. The user must be able to enter their suggestions and comments.
6. Household Profiling	<ol style="list-style-type: none"> 1. Select <i>household profiling</i> at the navigation bar. 2. Enter your family details including members, address, age, and contact number. 3. Press enter and the system will reload and execute. 	<ol style="list-style-type: none"> 1. The user must be able to enter their details. 2. The system will reload and execute the updated household profile.
7. Blotter Management	<ol style="list-style-type: none"> 1. Select the <i>blotter management system</i>. 2. Enter your complaints and select a schedule and time. 3. The system will give your case number and schedule. 	<ol style="list-style-type: none"> 1. The user must be able to file a complaint and enter their details. 2. After you submit your details, the user will receive their case number together with their time and schedule.

8. E-Barangay Application Form

1. Select the *E-Barangay Application Form*.
2. Enter your personal details.
3. Click what type of certificate you need.
4. Click enter and the system will reload. You can now claim your certificate in barangay.

1. The user must be able to select the *E-Barangay Application Form*.
 2. The user must be able to enter their details and select what type of certificate they apply for.
 3. The system will generate, and the user can claim their barangay certificate.
-

Evaluation Procedure

The system evaluation consisted of two (2) stages, namely the Project Demonstration and the Final Evaluation.

Project Demonstration

1. Send invitations to participants, which consist of 30 respondents coming from Barangay Residents, Barangay Officials, and Information Technology (IT) Professionals.
2. Present the system to the Respondents.
3. Conduct a system walkthrough and encourage participants to explore and use the system.

Final Evaluation

1. Use the ISO 25010 Software Quality Metrics to prepare an evaluation tool.
2. Distribute the evaluation form through Google form to respondents.
3. Ask the respondents to respond to the evaluation tool and rate the method using the Likert Scale.

Table 4.*Likert Scale*

Numerical Scale	Descriptive Rating
4.0	Excellent
3.0	Very Good
2.0	Fair
1.0	Poor

4. Collect the data and tabulate it.
5. Calculate the mean score of each criterion and the mean score overall.
6. Interpret, using the equivalent descriptive rating in Table 2, the result and acceptability of the system.

Table 5.*Descriptive Interpretation of the Mean*

Numerical Scale	Interpretation
3.51 – 4.00	Excellent
2.51 – 3.50	Very Good
1.51 – 2.50	Good
1.00 – 1.50	Poor

Chapter 4**RESULTS AND DISCUSSIONS**

This chapter contains the project's description as well as its structure. It also expands the project's capabilities and limitations, together with its results – and is evaluated as the process of the project.

Project Description

The E-Barangay Management System is a web-based tool created to provide Barangay Tangos North residents with a cutting-edge online experience. This project provides various services in the barangay, such as requesting a document, filing a blotter, and staying informed of announcements and events, making it easier for the locals to interact and connect with the barangay officials online.

The system currently supports computers with at least an i5 processor and smartphones running iOS 15 or Android 5.0. The system was developed using PHP, HTML, CSS, Bootstrap, jQuery, and MySQL.

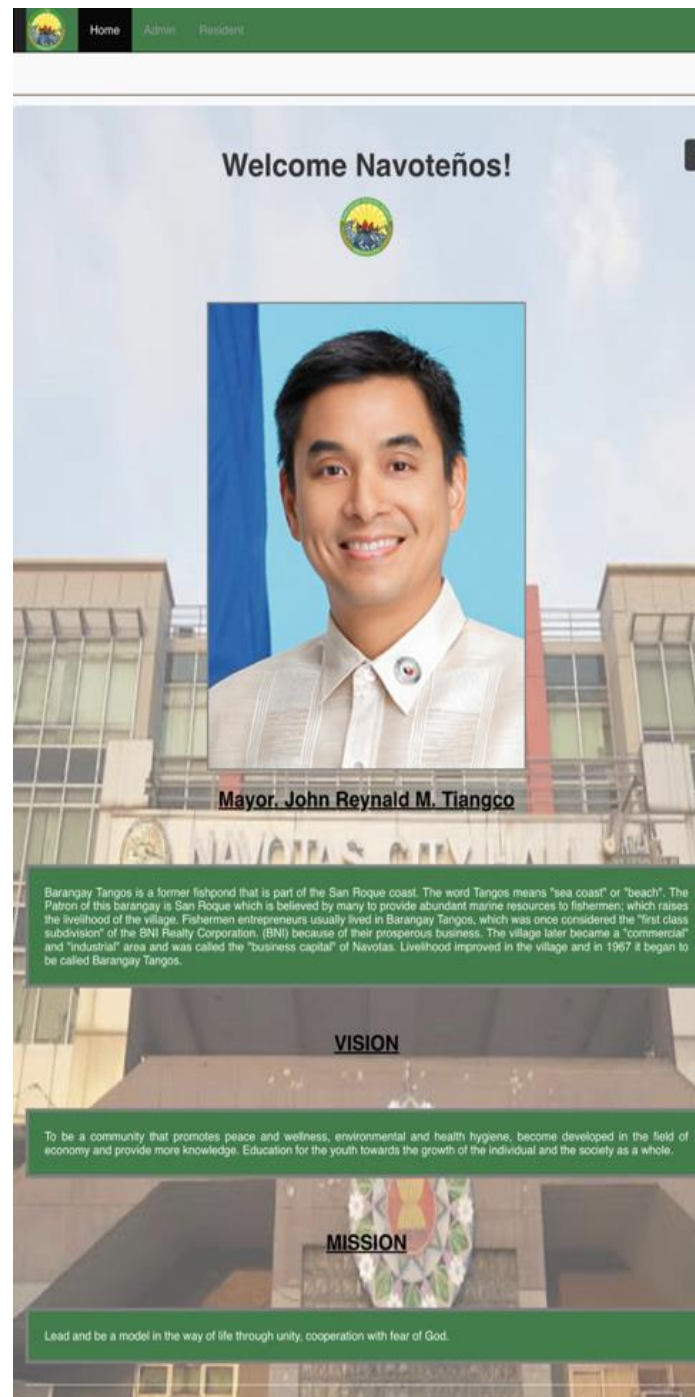
Project Structure

Figure 9. Welcome Page

Figure 9 shows the landing page or welcome page of the system that shows a brief description of the barangay and its vision and mission.

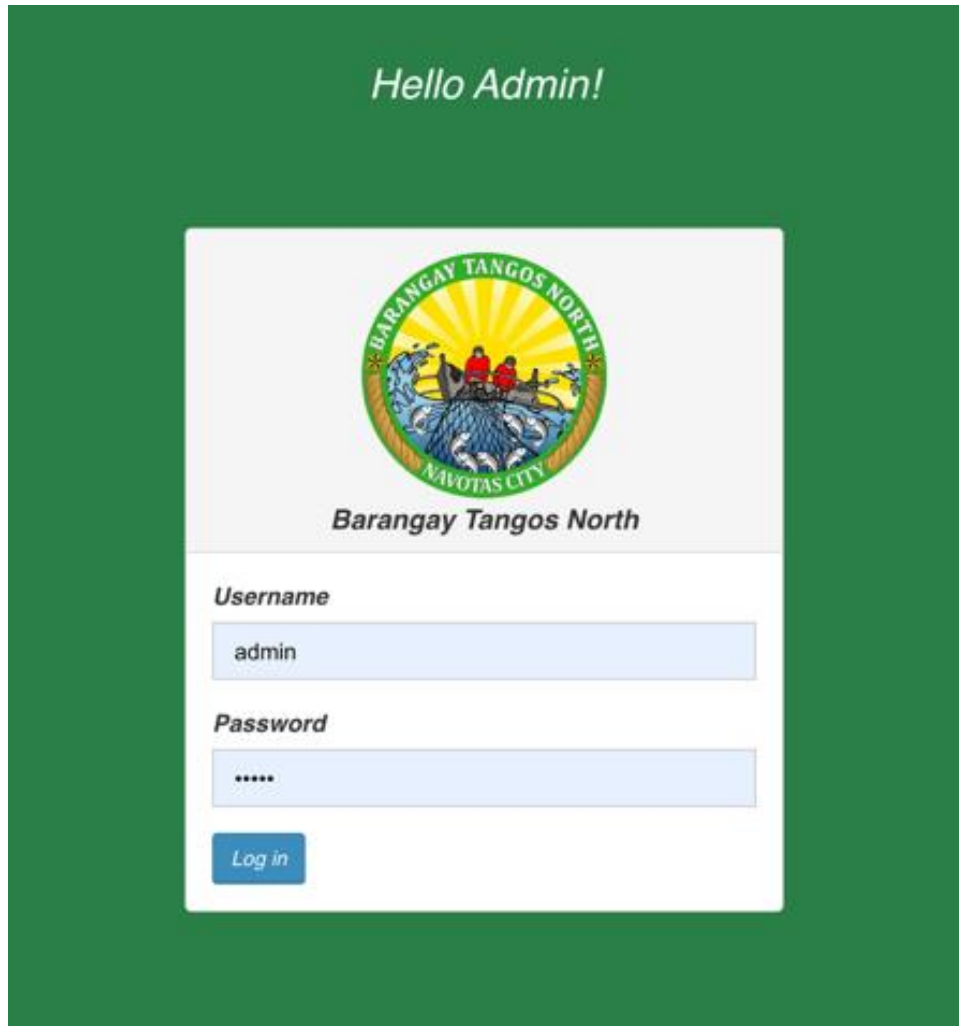


Figure 10. Admin Page - Log in

Figure 10 shows the log in page for the admin of the barangay in which 2 admins will manage the system.

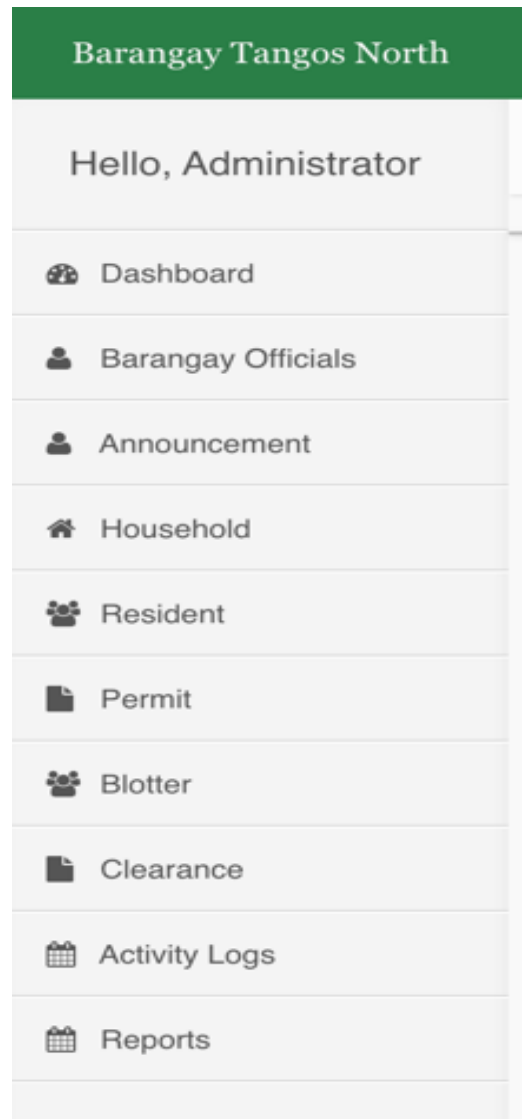


Figure 11. Admin Page - Side Navigation Menu

Figure 11 shows the side navigation menu where the admin can access the dashboard, barangay officials, announcements, household, resident, permit, blotter, clearance, activity logs, and reports.

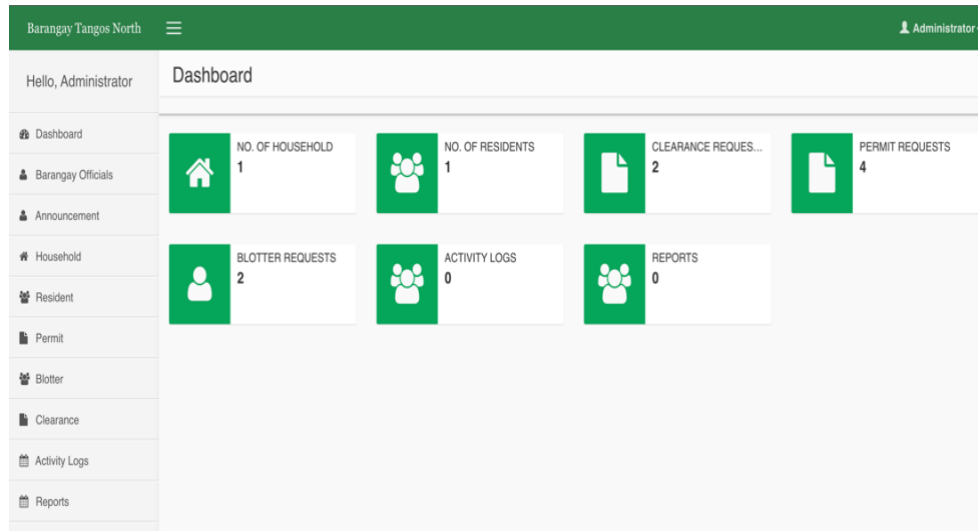


Figure 12. Admin Page - Dashboard

Figure 12 shows the dashboard of the admin, where the number of households, number of residents, permit requests, clearance requests, blotter requests, activity logs, and reports can be seen.

Barangay Tangos North						
Barangay Officials						
Add Officials Remove						
<input type="checkbox"/>	Position	Name	Contact No.	Start of Term	End of Term	Manage
<input type="checkbox"/>	Captain	Margarita P. Limbaro		2016-10-03	2016-10-06	Edit
<input type="checkbox"/>	Kagawad	Dennis L. Trangla		2016-10-31	2016-11-17	Edit
<input type="checkbox"/>	Kagawad	Orlando D. Duque Jr.		2016-10-31	2016-11-24	Edit
<input type="checkbox"/>	Kagawad	Divina J. Cordevilla		2016-11-13	2016-12-01	Edit
<input type="checkbox"/>	Kagawad	Jackle Q. Soyangco		2016-11-06	2016-11-30	Edit
<input type="checkbox"/>	Kagawad	Romario V. Antonio		2016-11-06	2016-11-22	Edit
<input type="checkbox"/>	Kagawad	Amado L. Libao		2016-11-06	2016-11-25	Edit
<input type="checkbox"/>	Kagawad	Daniel C. Limbaro		2016-10-31	2016-11-28	Edit
<input type="checkbox"/>	SK Chairman	Hon. Ernesto B. Carangalan		2016-11-13	2016-12-01	Edit

Figure 13. Admin Page - Barangay Officials

Figure 13 shows the officials of the barangay with their positions, names, contact numbers, start of their term, and end of their term. The administrator can also edit the information of the officials once their term ends.

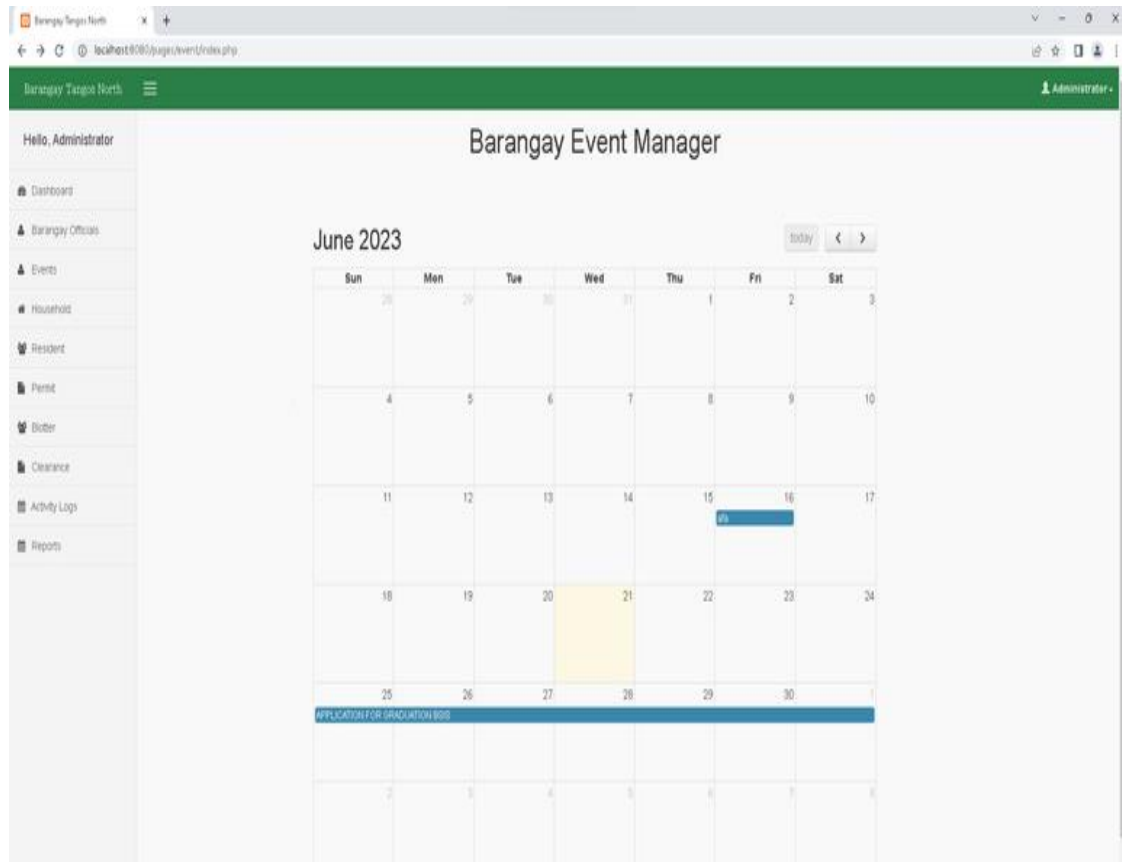


Figure 14. Admin Page - Announcement

Figure 14 shows the announcement page where the admin can create an announcement or an event that includes the title and the details of the said event.

The screenshot shows the 'Household' management page for 'Barangay Tangos North'. The page has a green header bar with the location name and a user profile 'Administrator'. Below the header, the title 'Household' is displayed. On the right, there are two buttons: 'Add Household' (green) and 'Remove' (red). Below these buttons, there is a search bar and a dropdown menu set to '10 records per page'. The main content is a table with the following columns: 'Household No.', 'Street', 'No. of Members', 'Head of the Family', and 'Manage'. A single entry is shown with Household No. 386, Street R. Domingo Street, 3 members, and Head of Family Cahilig, Georen Padre-e. The 'Manage' column for this entry contains an 'Edit' button. At the bottom, it says 'Showing 1 to 1 of 1 entries' and has pagination links for 'Previous', '1', and 'Next'.

<input type="checkbox"/>	Household No.	Street	No. of Members	Head of the Family	Manage
<input type="checkbox"/>	386	R. Domingo Street	3	Cahilig, Georen Padre-e	Edit

Showing 1 to 1 of 1 entries

Previous 1 Next

Figure 15. Admin Page - Household

Figure 15 shows the household page where the admin can see the address, the head of the family, and the number of members in the household.

Barangay Tangos North

Administrator


Resident

Add Residents

Remove

10 records per page

Search:

<input type="checkbox"/>	Account Number	Image	Name	Age	Gender	Address	Street	Manage
<input type="checkbox"/>	00000000025		Cahilig, Georen Padre-e	22	Male	386	R. Domingo Street	<div>Edit</div>

Showing 1 to 1 of 1 entries

Previous

1

Next

Figure 16. Admin Page - Resident

Figure 16 shows the resident page where the admin can see the information of the residents such as their name, age, gender, address, and the image they provided.

Barangay Tangos North
Administrator

Permit Clearance

Add Permit
Delete

Requests
Approved
Disapproved

<input type="checkbox"/>	Resident	Business Name	Business Address	Type of Business	OR Number	Amount	Manage	
<input type="checkbox"/>		asda	sdfs	Option 1	43434	₱ 45,454.00	Approve Disapprove Generate	
<input type="checkbox"/>		23	asda	Option 1	342	₱ 434,543.00	Approve Disapprove Generate	
<input type="checkbox"/>		sa	sa	Option 1	2	₱ 12.00	Approve Disapprove Generate	
<input type="checkbox"/>		hahaha	hehe	Option 1	1234	₱ 1,234.00	Approve Disapprove Generate	

Figure 17. Admin Page - Permit

Figure 17 shows the permit requests from the residents of the barangay. The admin can see the resident who requested the permit, their business name, business address, the type of business, the OR number, and the amount. The admins have choices if they will approve or disapprove of the requests.

Barangay Tangos North

Administrator

Blotter

Compose

Delete

<input type="checkbox"/>	Date	Name of Complainant	Person To Complain	Location of Incident	Complaint
<input type="checkbox"/>	2016-10-15	sda, as das		213asd	asdsa
<input type="checkbox"/>	2023-06-06	Cahilig, Georen Padre-e	Cahilig, Georen Padre-e	DIYAN LANG	BIDA BIDA

Figure 18. Admin Page - Blotter

Figure 18 shows the blotter information sent by the residents that includes the date, the name of the complainant, the person to complain, the location of the incident, and their complaint.

Barangay Tangos North

Administrator

Clearance

Add Clearance

Delete

Requests

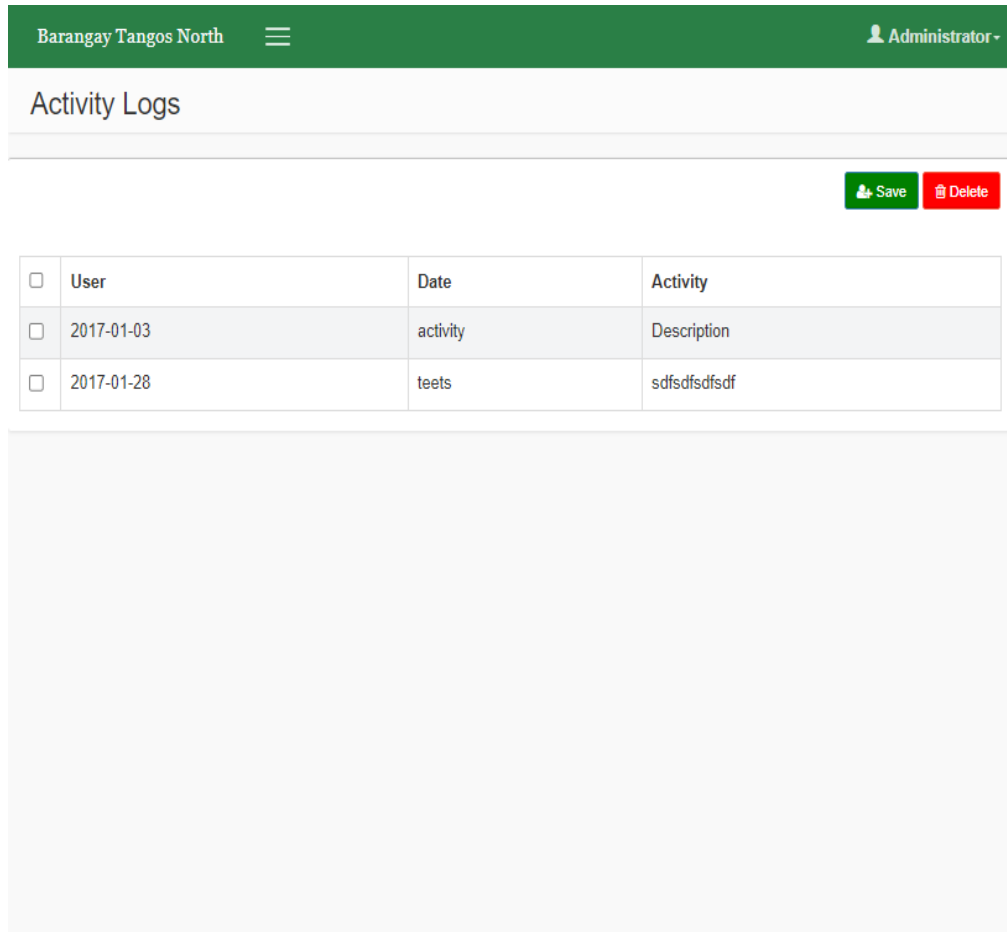
Approved

Disapproved

<input type="checkbox"/>	Clearance #	Resident Name	Findings	Purpose	OR Number	Amount	Manage		
<input type="checkbox"/>	1234		asdada	local employment	12	₱ 3,434.00	<div>Approve</div>	<div>Disapprove</div>	<div>Generate</div>
<input type="checkbox"/>	123		qwe	qwe	213	₱ 2,123.00	<div>Approve</div>	<div>Disapprove</div>	<div>Generate</div>

Figure 19. Admin Page - Clearance

Figure 19 shows the clearance requests from the residents of the barangay. The admin can see the name of the resident who requested, findings, purpose, OR number, and the amount. The admin also has the choice whether to approve it or not.



Barangay Tangos North Administrator

Activity Logs

[Save](#) [Delete](#)

<input type="checkbox"/>	User	Date	Activity
<input type="checkbox"/>	2017-01-03	activity	Description
<input type="checkbox"/>	2017-01-28	teets	sdfsd fsdfsdf

Figure 20. Admin Page - Activity Logs

Figure 20 shows the activity logs of the admins where we can find the user, the date, and the activities they've done in that specific date.

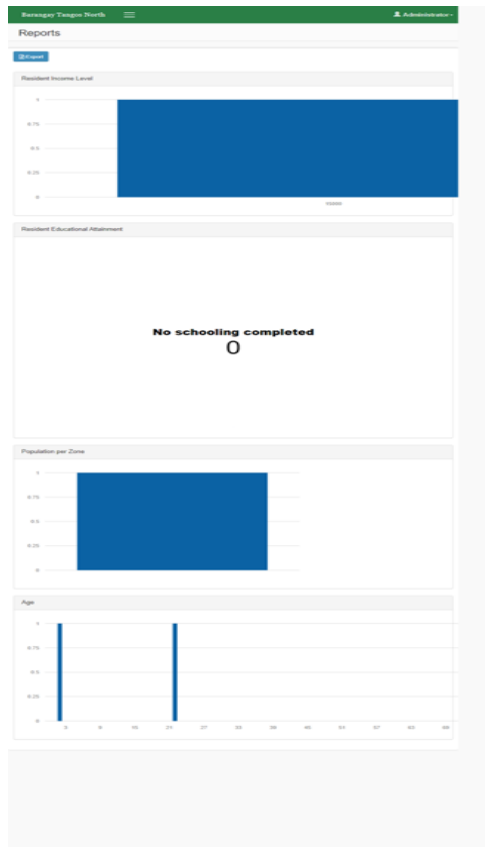


Figure 21. Admin Page - Reports

Figure 21 shows the reports page where the admin can see the number of requests made by the residents of the barangay every day.

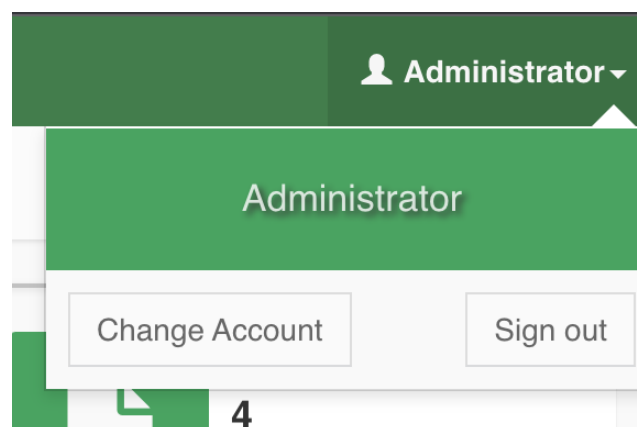


Figure 22. Admin Side Navigation Menu

Figure 22 shows the administrator side navigation menu where administrators have options to change account or log out account.

Create your account

Last Name *
Enter your last name

First Name *
Enter your first name

Middle Name *
Enter your middle name

Birth Date *
Date of Birth

Birth Place *
Enter your birth place

Date *
Enter your date

Total Household *
Enter the total household count

Differently Abled Person *
Enter number of persons

Relation to Head *
Enter your relation to head of the household

Marital Status *
Select Marital Status

Blood Type *
Select Blood Type

Occupation *
Enter your occupation

Monthly Income *
Enter your monthly income

Household Number *
Enter your household number

Length of Stay *
Enter the length of stay

Region *
Select Region

Nationality *
Select Nationality

Gender *
Select Gender

Bldg *
Enter bldg

Valid ID *
Enter your valid ID

PhilHealth Number *
Enter your PhilHealth number

Highest Educational Attainment *
Select highest Education Attainment

House Ownership Status *
Select house ownership status

Land Ownership Status *
Select Land Ownership Status

Dwelling Type *
Select Dwelling Type

Water Usage *
Enter your water usage

Lighting Facilities *
Enter details

Partner Address *
Enter details

Remarks *
Enter details

Wage *
Select Wage

Username *
Enter your username

Password *
Enter your password

Confirm Password *
Enter your password

Sign Up

Figure 23. Resident Page - Sign up.

Figure 23 shows the sign-up page for the residents of the barangay. The resident is required to sign up first to create his/her account. Once the admin receives the request for an account, he will process it and send the information back to the resident.

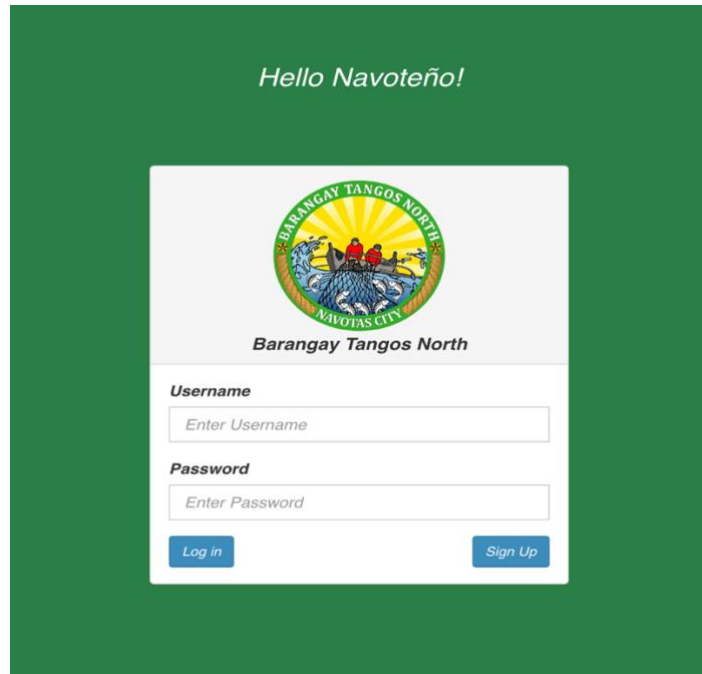


Figure 24. Resident Page - Log in

Figure 24 shows the log in page for the residents of the barangay. The resident can log in the account provided by the admin of the barangay. After receiving the account, the resident can finally use the username and password provided.

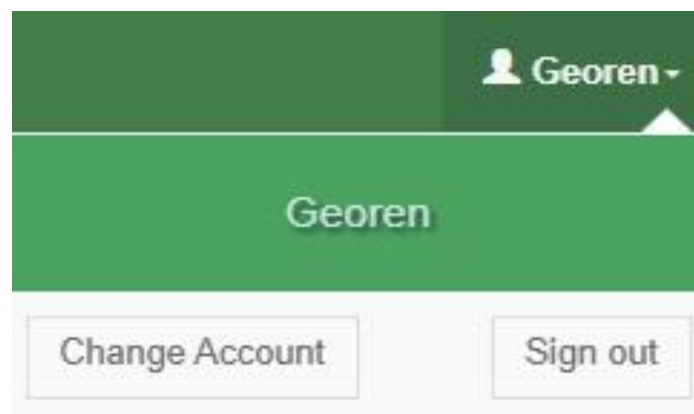


Figure 25. Resident Page - Side Navigation Menu

Figure 25 shows the side navigation menu where the admin can access the dashboard, announcements, permit, blotter, clearance, and activity logs.

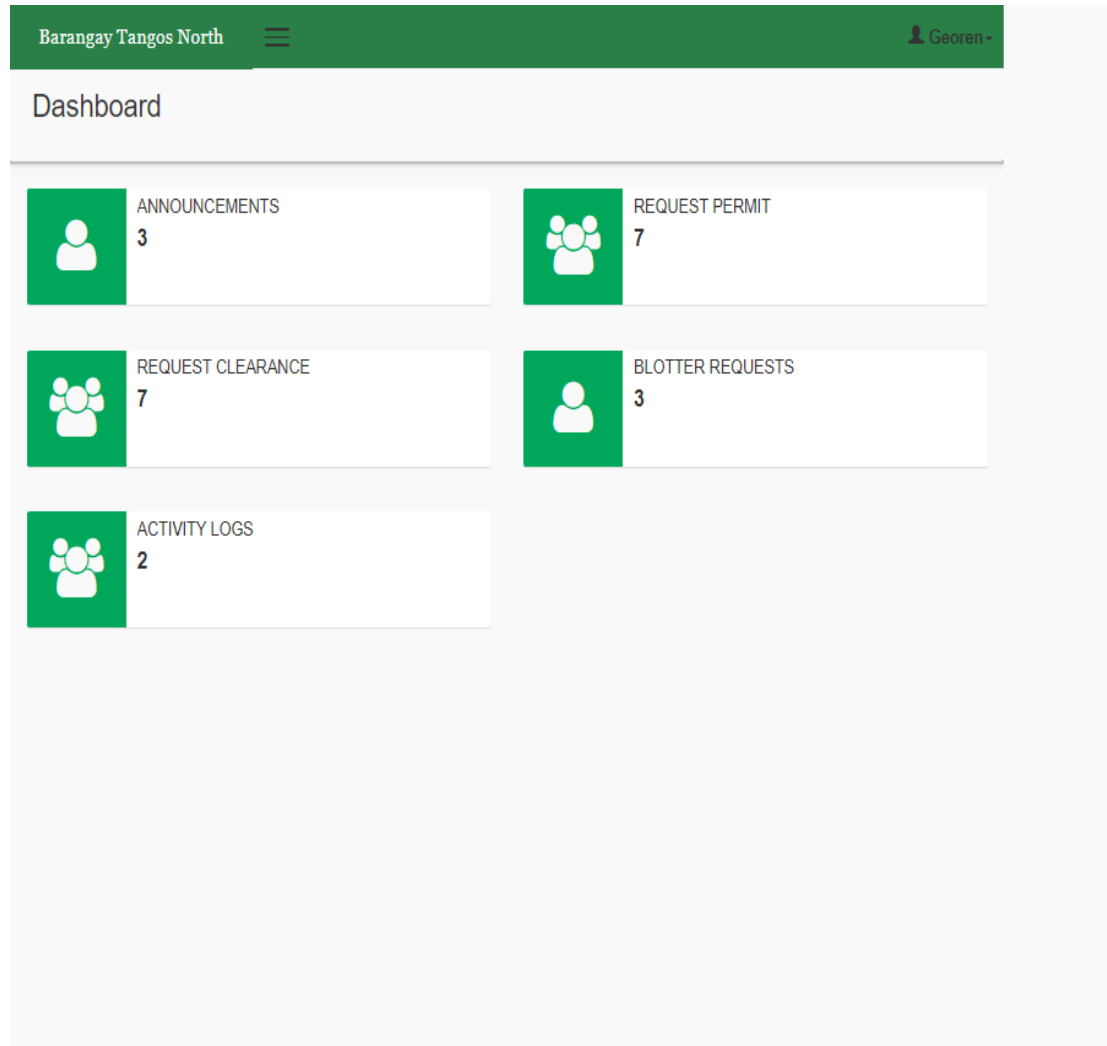


Figure 26. Resident Page - Dashboard

Figure 26 shows the dashboard of the resident, where the announcements, permit requests, clearance requests, blotter requests, and activity logs can be seen.

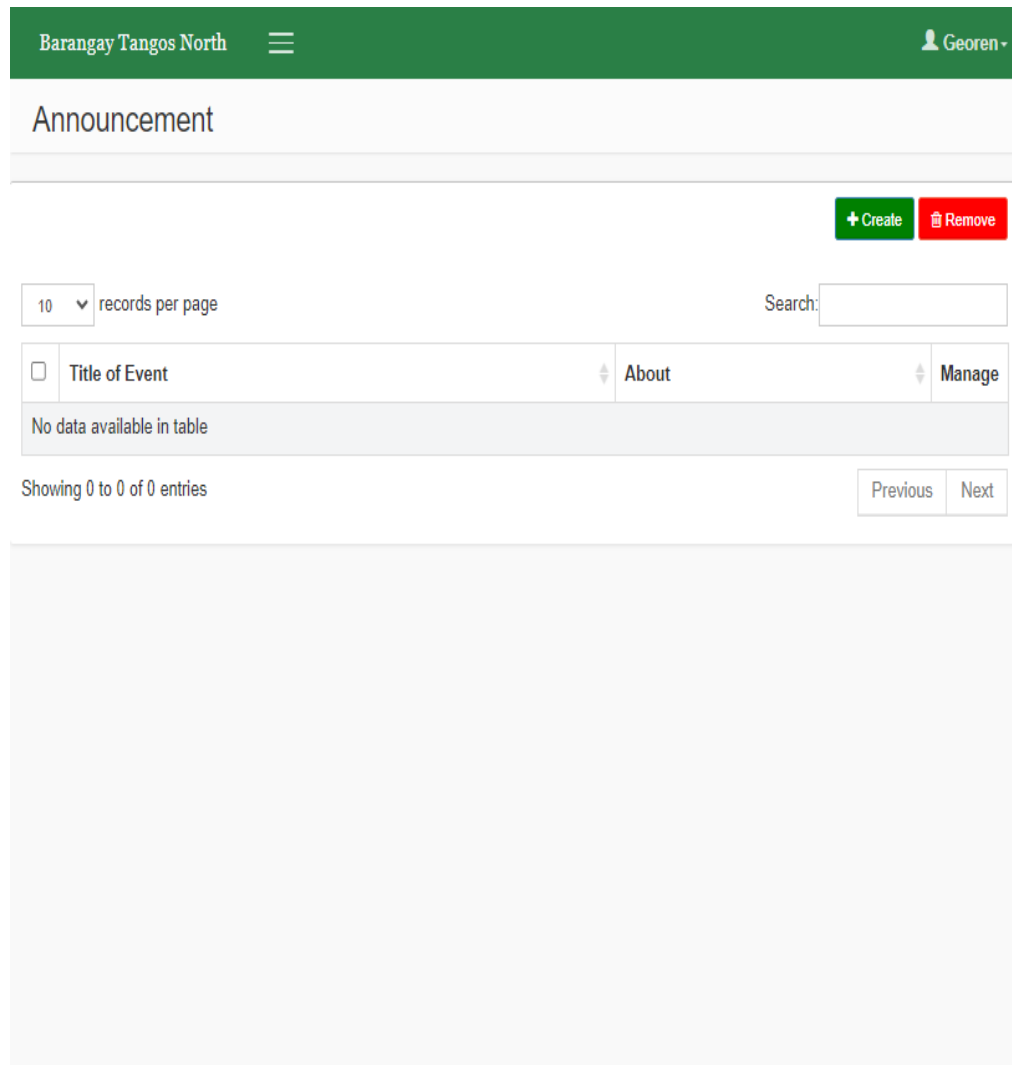





Figure 27. Resident Page - Announcement

Figure 27 shows the announcement page where the residents can see the announcements or the events in the barangay.

Barangay Tangos North   Georen

Permit Clearance

 Request Permit

Request

Business Name	Business Address	Type of Business
No record found		

Figure 28. Resident Page - Permit

Figure 28 shows the permit page of the residents where they request a permit by providing their business name, business address, and the type of business. The residents shall wait if the barangay will approve or disapprove their request.

Barangay Tangos North

Georen

Blotter

Compose

Delete

<input type="checkbox"/>	Date	Name of Complainant	Person To Complain	Location of Incident	Complaint
<input type="checkbox"/>	2016-10-15	sda, as das		213asd	asdsa
<input type="checkbox"/>	2023-06-06	Cahilig, Georen Padre-e	Cahilig, Georen Padre-e	DIYAN LANG	BIDA BIDA
<input type="checkbox"/>	2023-06-07	Cahilig, Georen Padre-e	Cahilig, Georen Padre-e	MASYADONG BIDA BIDA	BIDA BIDA

Figure 29. Resident Page - Blotter

Figure 29 shows the blotter page of the residents where they can compose a blotter that includes the date, the name of the complainant, the person to complain, the location of the incident, and their complaint.

Barangay Tangos North

Georen

Clearance

[Request Clearance](#)

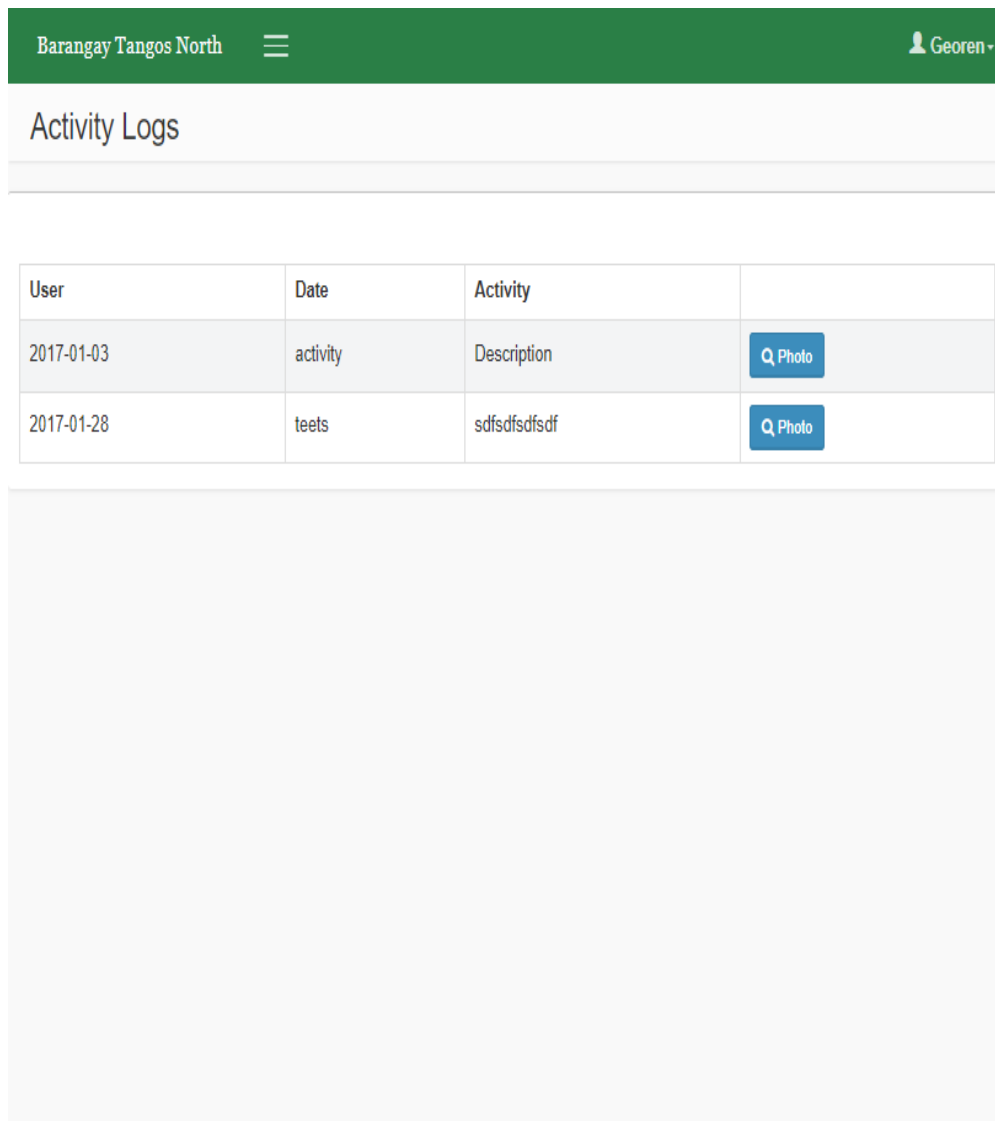
Request

Purpose

No record found

Figure 30. Resident Page - Clearance

Figure 30 shows the clearance page of the residents where they can request for a certificate providing its purpose.



User	Date	Activity	
2017-01-03	activity	Description	Photo
2017-01-28	teets	sdfsdfsdf	Photo

Figure 31. Resident Page - Activity Logs

Figure 31 shows the activity logs of the residents where they can see the date, and the activities they've done in that day.

Project Test Results

This section summarizes the test results executed and the data collected based on the functionality, reliability, portability, and usability testing.

Table 6.*List of Devices Used in Portability Test*

Manufacturer	Device	OS Version
Apple	Macbook Air	iOS 13.4
ASUS	X407	Windows 10
Toshiba	Z30-C	Windows 10
Lenovo	Ideapad 3	Windows 10

Table 6 shows the list of devices used in portability test. The system ran smoothly without any bugs or errors on different laptops running different versions of iOS or Windows.

Table 7.*Usability Testing Overall Results*

Principles	Mean Average	Descriptive Rating
Suitability for the task	3.73	Good
Self-descriptiveness	3.8	Good
Controllability	3.8	Good
Conformity with user expectations	3.87	Good
Error tolerance	3.87	Good
Suitability for individualization	3.87	Good
Suitability for learning	3.70	Good

Table 7 summarizes the usability testing results which show the test outcomes and the weighted mean per principle and its equivalent descriptive rating.

A. Suitability for the Task

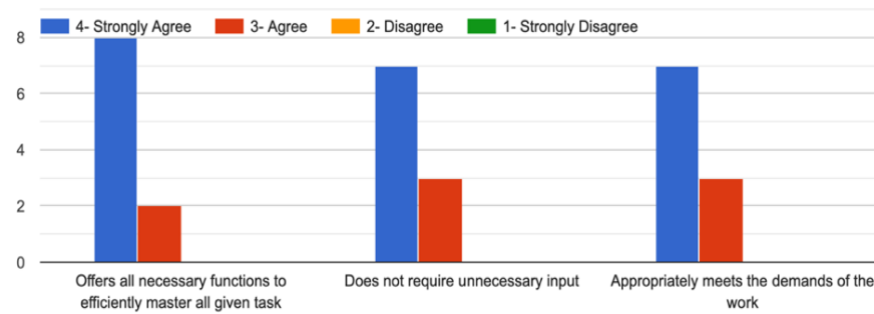


Figure 32. Suitability for the Task Evaluation Result

Figure 32 shows the graph for suitability for the task where it was graded overall good with the mean score of 3.73. This shows that users are supported effectively and efficiently in completing certain tasks.

B. Self-Descriptiveness

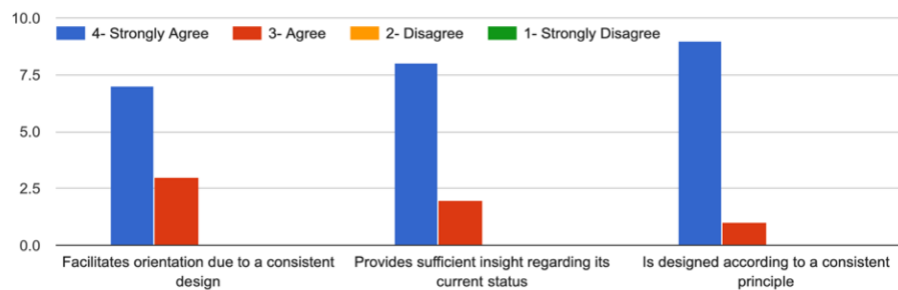


Figure 33. Self-Descriptiveness Evaluation Result

Figure 33 shows the graph for self-descriptiveness where it was graded overall good with the mean score of 3.8. This indicates that information is well explained to the users through comprehensible feedback.

C. Controllability

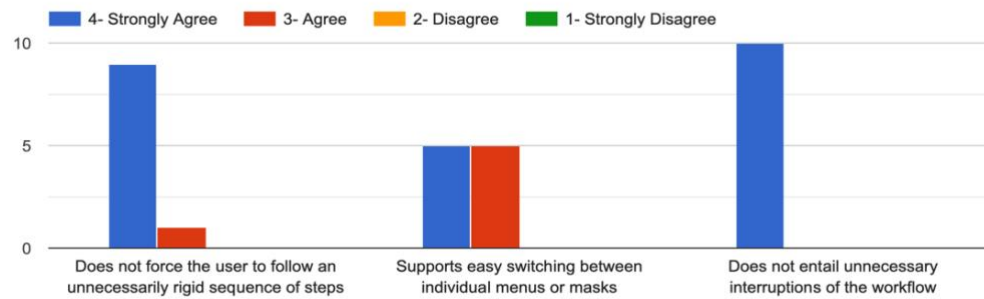


Figure 34. Controllability Evaluation Result

Figure 34 shows the graph for controllability where it was graded overall good with the mean score of 3.8. This implies that users are guided between each step of a task.

D. Conformity with User Expectations

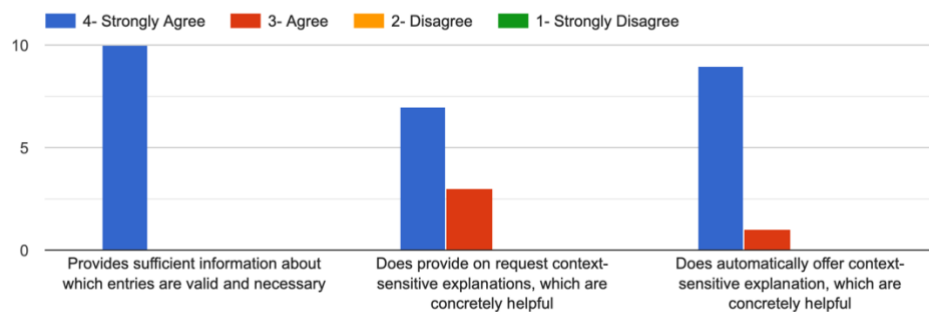


Figure 35. Conformity with User Expectations Evaluation Result

Figure 35 shows the conformity with user expectations where it was graded overall good with the mean score of 3.87. This denotes that the application corresponds to the users' common knowledge and experience.

E. Error Tolerance

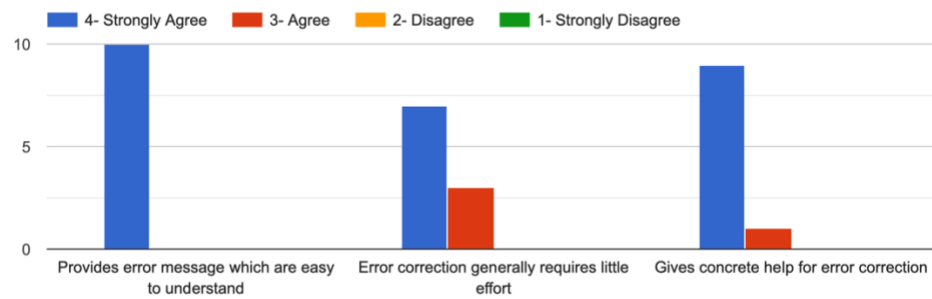


Figure 36. Error Tolerance Evaluation Result

Figure 36 shows the graph for error tolerance where it was graded overall good with the mean score of 3.87. This means the application provides help and suggestions on errors that a user may encounter.

F. Suitability for Individualization

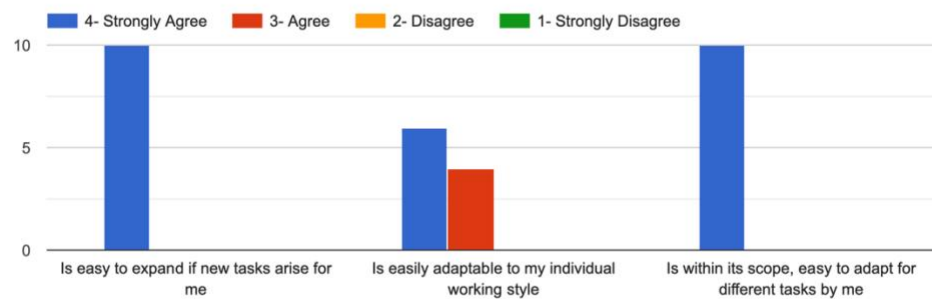


Figure 37. Suitability for Individualization Evaluation Result

Figure 37 shows the graph for suitability for individualization where it was graded overall good with the mean score of 3.87. This signifies that users can easily adapt to the use of the system.

G. Suitability for Learning

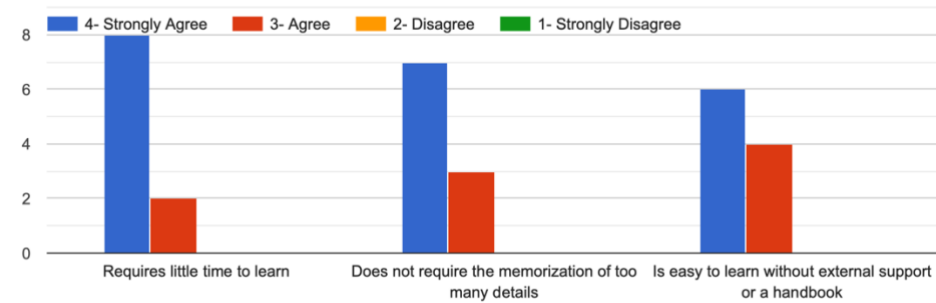
**Figure 38.** Suitability for Learning Evaluation Result

Figure 38 shows the graph for suitability for learning where it was graded overall good with the mean score of 3.7. This shows that users can easily learn and navigate the system.

Project Capabilities and Limitations

The following are the capabilities of the system:

1. The system allows users to request specific documents and update their records online.
2. The system can generate requested documents into pdf files.
3. The system allows administrators to manage resident's records
4. The system can determine the total population of the barangay.
5. The system can be used on both computer and mobile devices.

The following are the limitations of the system:

1. The system was built for Barangay Tangos, North residents.

2. The system requires a stable internet connection.
3. Only two administrators can manage the system.
4. The system requires valid id for verification purposes.
5. Only document requests that have been authorized will be exported.

Project Evaluation

The evaluation procedure was conducted using the standard criterion of ISO 25010 for quality software. The evaluation process involved five information technology professionals, nine barangay officials, and 16 residents. The following are the results of the Electronic Barangay Management System evaluation.

Table 8.

ISO 25010 Overall Evaluation Results

Criteria	Mean Average	Qualitative Interpretation
Functional Suitability	3.56	Excellent
Performance Efficiency	3.42	Very Good
Compatibility	3.39	Very Good
Usability	3.57	Excellent
Reliability	3.57	Excellent
Security	3.61	Excellent
Portability	3.58	Excellent
Overall	3.53	Excellent

Table 8 summarizes the ISO 25010 overall evaluation results where it shows the weighted mean per criterion and its equivalent qualitative interpretation.

A. Functional Suitability

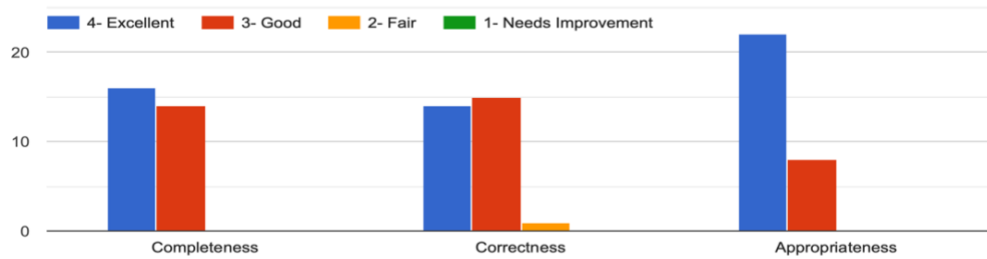
*Figure 39.* Functional Suitability

Figure 39 shows the graph for the evaluation results of functional suitability. The system was evaluated as excellent with a mean score of 3.56, which implies that the system meets the functions stated and needs to be implied under specification conditions.

B. Performance Efficiency

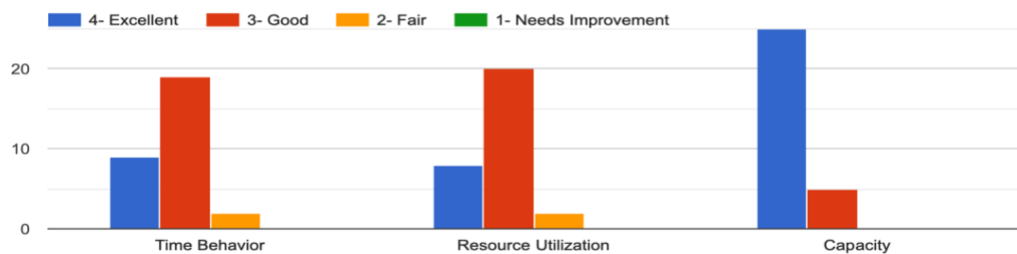
*Figure 40.* Performance Efficiency

Figure 40 shows the graph for performance efficiency. The system was evaluated very good, with a mean score of 3.42 which shows that the system quickly responds and executes its function within the acceptable response time.

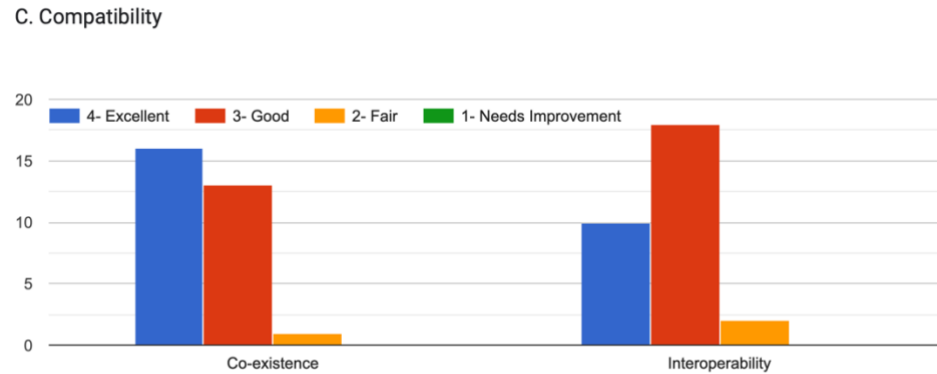


Figure 41. Compatibility

Figure 41 shows the graph for compatibility. The system was evaluated very good, with a mean score of 3.39 which indicates that information can be quickly exchanged and used among different users and devices.

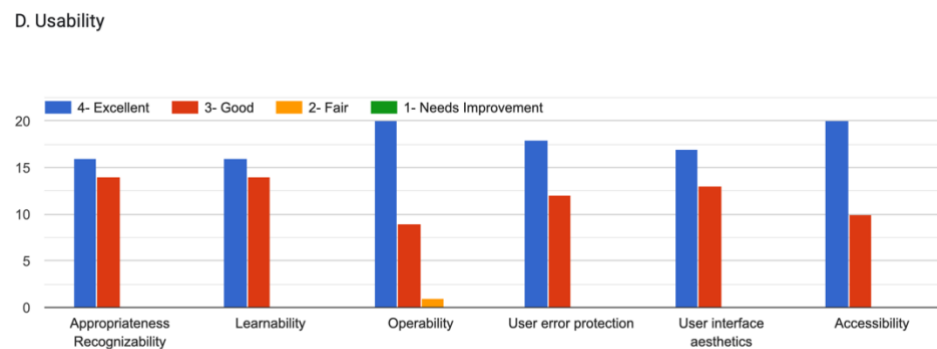


Figure 42. Usability

Figure 42 shows the graph for usability. The system was evaluated as excellent with a mean score of 3.57, which denotes that the system's design and interface are user-friendly and easy to use by any user.

E. Reliability

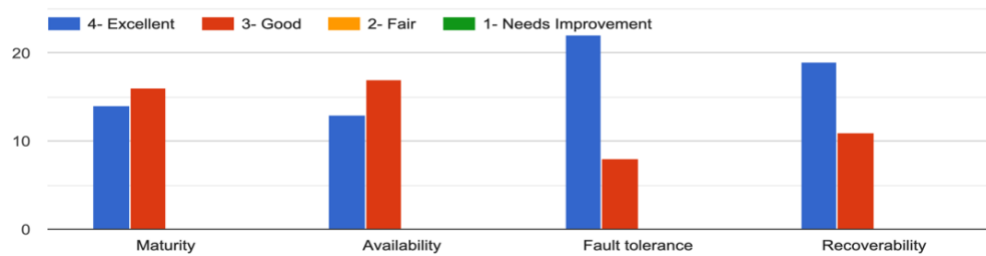


Figure 43. Reliability

Figure 43 shows the graph for reliability. The system was evaluated as excellent, with a mean score of 3.57, indicating that the application manages its errors and can still perform its specified functions.

F. Security

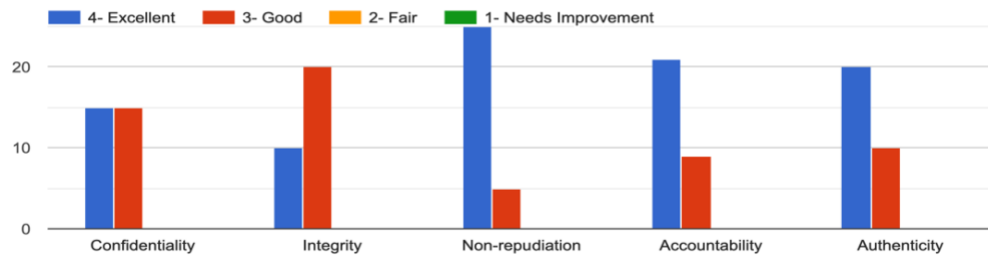


Figure 44. Security

Figure 44 shows the graph for security. The system was evaluated as excellent, with a mean score of 3.58, which means that information and data are securely protected through authentication and role-based access control.

G. Portability

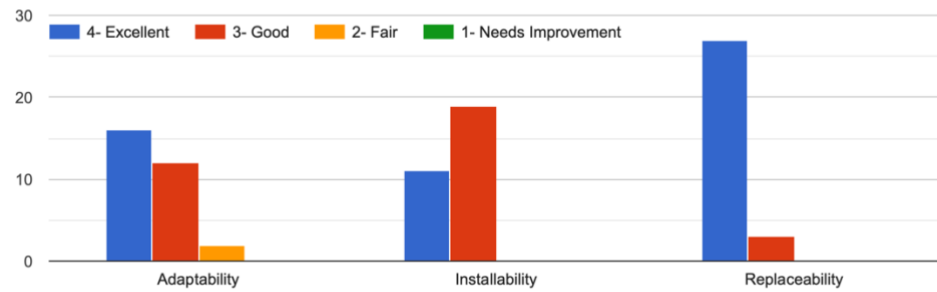


Figure 45. Portability

Figure 45 shows the graph for portability. The system was evaluated as excellent, with a mean score of 3.58, which indicates the system can run on desktops or computers.

Chapter 5

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter summarizes the evaluation's findings, conclusions, and recommendations, as determined by the evaluation's outcomes, remarks, and suggestions.

Summary of Findings

Based on the tests and evaluations conducted on the performance capability of the application, the following were the findings of the study:

The system was developed according to the planned design and specifications. The system enables residents to request certificates from the barangay (Business Permit, Barangay Clearance, Barangay Indigency, and Barangay ID) and allows administrators to receive the requests and generate the documents. The system also records the number of residents in the barangay and the number of residents residing in every household. The system also underwent testing and passed using the criteria or principles of ISO 9241. This implies that any user can easily use and adapt the application.

Based on the data gathered during the project evaluation, the study got an overall rating of 3.53 with an adjectival rating of good. Mainly, the study obtained:

- Regarding functionality suitability, the system was rated good, which means that the objectives had been accomplished to their intended purpose and function.
- In terms of performance efficiency, the system was rated good, which proves that the application quickly responds and executes its function within an acceptable response time.
- Regarding compatibility, the system was rated good, which indicates that information can be quickly exchanged and used among different users and devices.

- In terms of usability, the system was rated good, proving that the application's design and interface are user-friendly and easy to use.
- Regarding reliability, the system was rated good, which indicates that the application manages its errors and can still perform its specified functions.
- In terms of security, the system was rated good, which means that information and data are securely protected through authentications and role base access control.
- The system's high rating for portability indicates that the application can be deployed and operated on iOS and Android devices.

Conclusions

In consideration of the objectives of the study and the results of the testing and evaluation undertaken, the following conclusions were derived:

1. The Electronic Barangay Management System was successfully designed with the following features:

a.) The system summarizes the population and the total number of requested documents.

b.) The system can generate various kinds of documents into PDF files.

c.) The system allows users to request documents and file a blotter complaint.

d.) The system can determine the total number of requests per day.

2. The system was created using PHP, MySQL, Bootstrap, jQuery, HTML, CSS, Visual Studio Code, GitHub, and AWS.

3. The system's functionality, reliability, portability, and usability were tested and successfully improved.

4. The system performance was evaluated entirely using ISO 25010 criteria and yielded an overall mean of 3.53.

Recommendations

Considering the findings and conclusions made in the study, the following recommendations for the improvement of the application are presented for future enhancement:

1. Enhancement or additional system features or functions.
2. Improvisation of the graphics and design interface.
3. Additional verification process that could strengthen the security of system.
4. Button enlargement and design.
5. Design interface for the calendar in announcement page.

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Appendix A

SAMPLE EVALUATION INSTRUMENT

DEVELOPMENT OF A WEB-BASED ELECTRONIC BARANGAY
MANAGEMENT SYSTEM

SOFTWARE EVALUATION INSTRUMENT OF ISO 25010

Name: _____

Instruction: Please evaluate the software material by using the given scale and placing a checkmark (✓) under the corresponding numerical rating:

Numerical Rating and Equivalent

4 - Very Good 3 – Good 2 – Fair 1 - Needs Improvement

A. Functional Suitability					
Indicators		4	3	2	1
Functional Completeness	The set of functions covers all the specified tasks and user objectives.				
Functional Correctness	The software provides the correct results with the needed degree of precision.				
Functional Appropriateness	The functions facilitate the accomplishment of specified tasks and objectives.				

B. Performance Efficiency					
Indicators		4	3	2	1
Time Behavior	The response and processing times and				

	throughput rates of the software, when performing its functions, meet requirements.				
Resource Utilization	The amounts and types of resources used by the software, when performing its functions, meet requirements.				
Capacity	The maximum limits of the software parameter meet requirements.				

C. Compatibility					
Indicators		4	3	2	1
Co-existence	The software can perform its required functions efficiently while sharing a common environment and resources with other software, without detrimental impact on any other software.				
Interoperability	The software can exchange information and use the information that has been exchanged.				

D. Usability					
Indicators		4	3	2	1
Appropriateness Recognizability	The users can recognize that the software is appropriate for their needs.				
Learnability	The software can be used by specified users to achieve specified goals of learning to use the software with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.				
Operability	The software has attributes that make it easy to operate and control.				
User error protection	The software protects users against making errors.				

User interface aesthetics	The user interface enables pleasing and satisfying interaction for the user.				
Accessibility	The software can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.				

E. Reliability					
Indicators		4	3	2	1
Maturity	The software meets needs for reliability under normal operation.				
Availability	The software is operational and accessible when required for use.				
Fault tolerance	The software operates as intended despite the presence of hardware or software faults.				
Recoverability	The software can recover the data directly affected and re-establish the desired state of the system in the event of an interruption or a failure.				

F. Security					
Indicators		4	3	2	1
Confidentiality	The software ensures that data is accessible only to those authorized to have access.				
Integrity	The software prevents unauthorized access to, or modification of, computer programs or data.				
Non-repudiation	Actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later.				

Accountability	Actions of an entity can be traced uniquely to the entity.				
----------------	--	--	--	--	--

Authenticity	The identity of a subject or resource can be proved to be the one claimed.				
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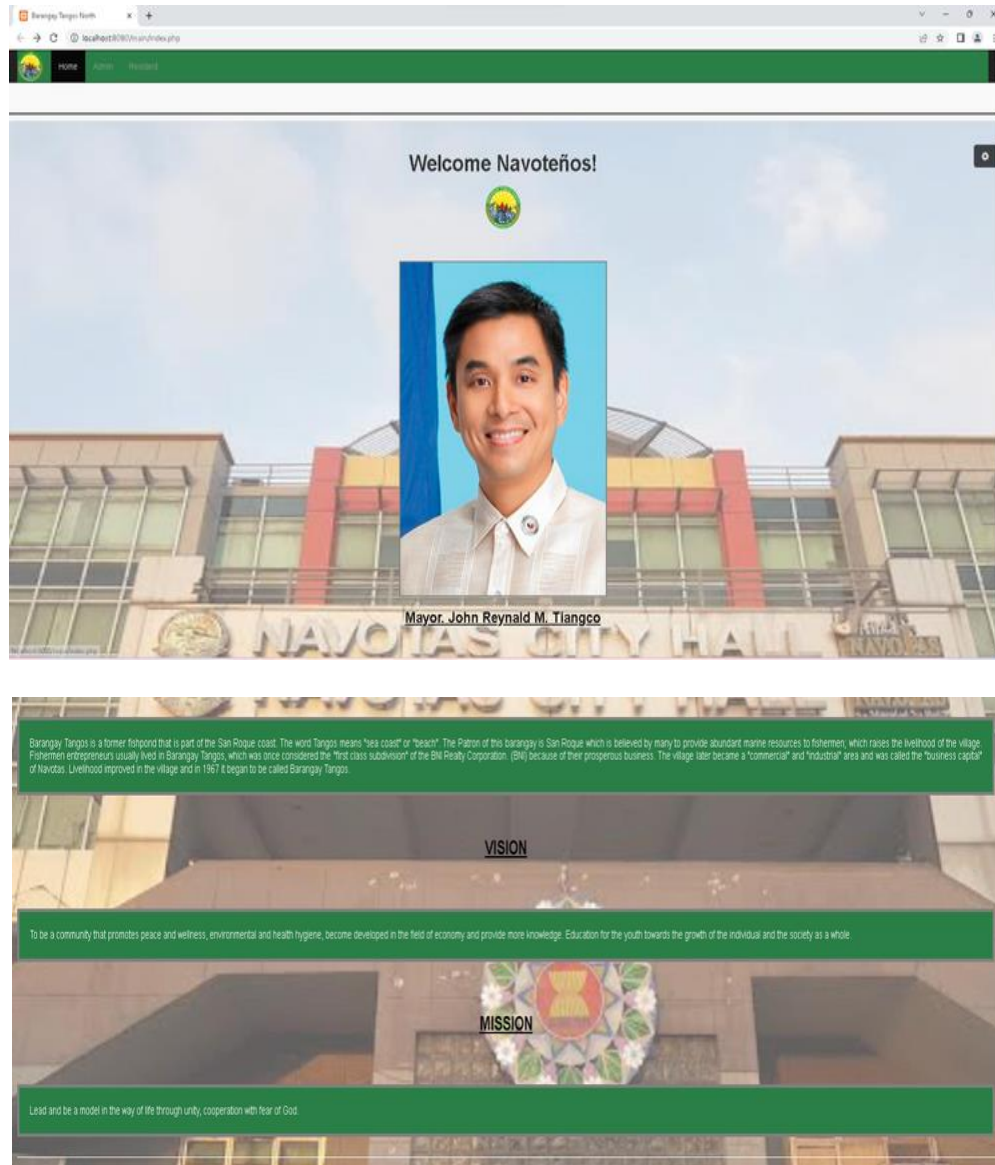
G. Portability					
Indicators		4	3	2	1
Adaptability	The software can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.				
Installability	The effectiveness and efficiency with				

Comments / Suggestions:

Signature of Respondent

Appendix B

E-BARANGAY WEBSITE FOR EVALUATORS' INFORMATION



Appendix C

SURVEY QUESTIONNAIRE AND RESULTS SHEETS

E-Barangay Management System

SOFTWARE EVALUATION INSTRUMENT OF ISO 25010

brentmijares090901@gmail.com [Switch account](#)

Not shared

* Indicates required question

FULL NAME *

Your answer

POSITION *

☐ Barangay Official

☐ I.T. Professional

☐ Resident

FUNCTIONAL SUITABILITY

Functionality ensures that software systems deliver the desired functionality and meet user expectations.

- Functional Completeness-** The set of functions covers all the specified tasks and user objectives.
- Functional Correctness-** The software provides the correct results with the needed degree of precision.
- Functional Appropriateness-** The functions facilitate the accomplishment of specified tasks and objectives.

Numerical Rating and Equivalent

4- Excellent

3- Good

2- Fair

1- Needs Improvement

A. Functional Suitability *

	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Completeness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Correctness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Appropriateness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PERFORMANCE EFFICIENCY**PERFORMANCE EFFICIENCY**

Performance efficiency focuses on how well a software system utilizes its resources to deliver its intended functionality with optimal response times, throughput, scalability, and resource utilization.

- **Time Behavior**- The response and processing times and throughput rates of the software, when performing its functions, meet requirements.
- **Resource Utilization**- The amounts and types of resources used by the software, when performing its functions, meet requirements.
- **Capacity**- The maximum limits of the software parameter meet requirements.

Numerical Rating and Equivalent

4- Excellent

3- Good

2- Fair

1- Needs Improvement

B. Performance Efficiency *

	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Time Behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resource Utilization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Capacity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

COMPATIBILITY

Compatibility is the ability of software, hardware, or systems to work together effectively, exchange data, and integrate seamlessly without conflicts or issues. It ensures interoperability, data consistency, and a smooth user experience across different platforms, environments, and software components.

- **Co-existence**- The software can perform its required functions efficiently while sharing a common environment and resources with other software, without detrimental impact on any other software.
- **Interoperability**- The software can exchange information and use the information that has been exchanged.

Numerical Rating and Equivalent

4- Excellent

3- Good

2- Fair

1- Needs Improvement

C. Compatibility *

	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Co-existence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interoperability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- **Learnability**- The software can be used by specified users to achieve specified goals of learning to use the software with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.
- **Operability**- The software has attributes that make it easy to operate and control.
- **User error protection**- The software protects users against making errors.
- **User interface aesthetics**- The user interface enables pleasing and satisfying interaction for the user.
- **Accessibility**- The software can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use.

Numerical Rating and Equivalent

4- Excellent

3- Good

2- Fair

1- Needs Improvement

D. Usability *

	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Appropriateness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recognizability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Learnability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User error protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User interface aesthetics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accessibility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RELIABILITY

Reliability is the ability of a system or component to consistently perform its intended function without failures or errors.

- **Maturity**- The software meets needs for reliability under normal operation.
- **Availability**- The software is operational and accessible when required for use.
- **Fault tolerance**- The software operates as intended despite the presence of hardware or software faults.
- **Recoverability**- The software can recover the data directly affected and re-establish the desired state of the system in the event of an interruption or a failure.

Numerical Rating and Equivalent

4- Excellent

3- Good

2- Fair

1- Needs Improvement

E. Reliability *

	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Maturity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fault tolerance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recoverability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECURITY

Security encompasses measures and practices to protect systems, networks, data, and information from unauthorized access, use, disclosure, disruption, modification, or destruction.

- **Confidentiality**- The software ensures that data are accessible only to those authorized to have access.
- **Integrity**- The software prevents unauthorized access to, or modification of, computer programs or data.
- **Non-repudiation**- Actions or events can be proven to have taken place, so that the events or actions cannot be repudiated later.
- **Accountability**- Actions of an entity can be traced uniquely to the entity.
- **Authenticity**- The identity of a subject or resource can be proved to be the one claimed.

Numerical Rating and Equivalent

4- Excellent

3- Good

2- Fair

1- Needs Improvement

F. Security *

	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Confidentiality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-repudiation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accountability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Authenticity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PORTABILITY

Portability enables software to be easily transferred and adapted to various computing environments, enhancing its flexibility and usability.

- **Adaptability**- The software can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.
- **Installability**- The effectiveness and efficiency with which the software can be successfully installed and/or uninstalled in a specified environment.
- **Replaceability**- The software can replace another specified software product for the same purpose in the same environment.

Numerical Rating and Equivalent

4 - Excellent

3 - Good

2 - Fair

1 - Needs Improvement

G. Portability *

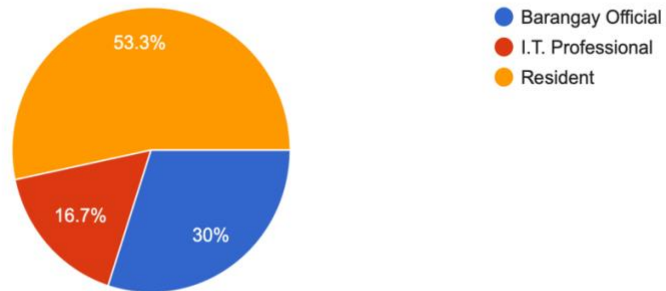
	4- Excellent	3- Good	2- Fair	1- Needs Improvement
Adaptability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Installability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Replaceability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

COMMENTS/ SUGGESTIONS

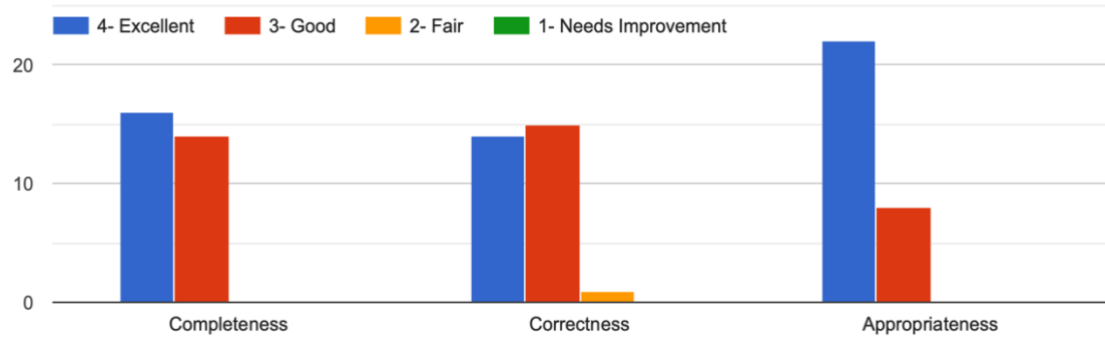
Your answer

POSITION

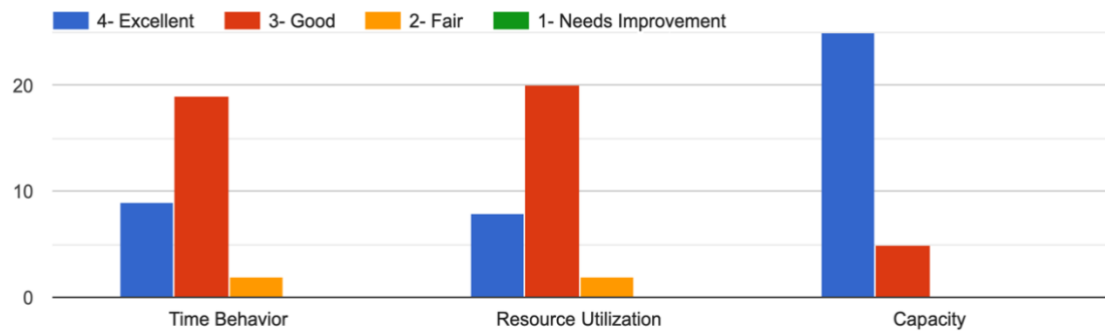
30 responses



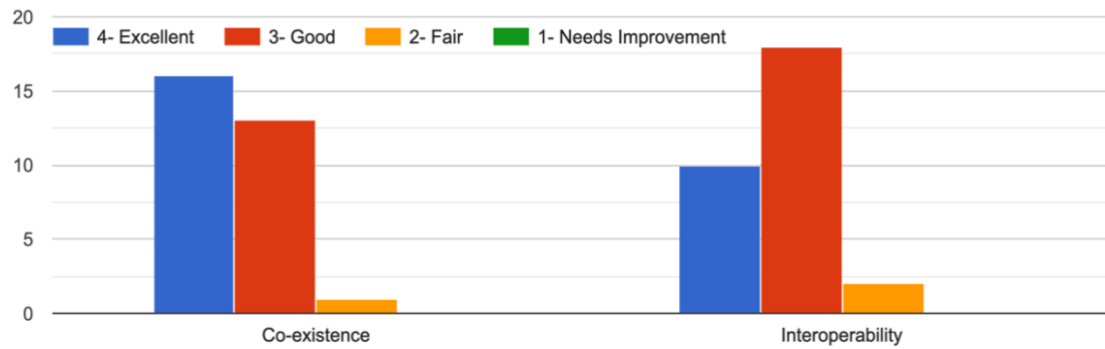
A. Functional Suitability



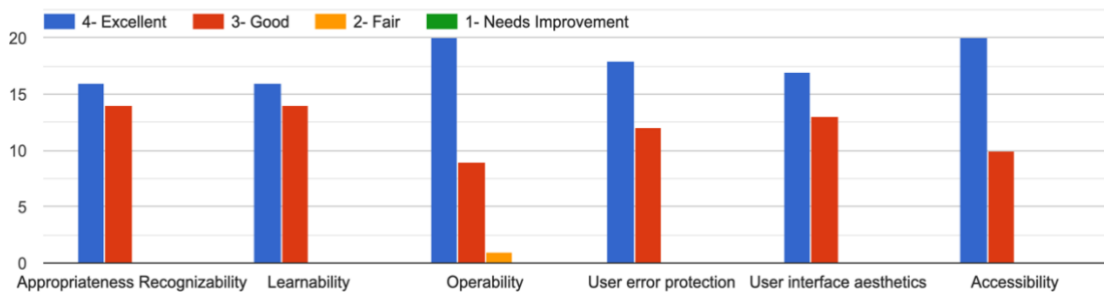
B. Performance Efficiency



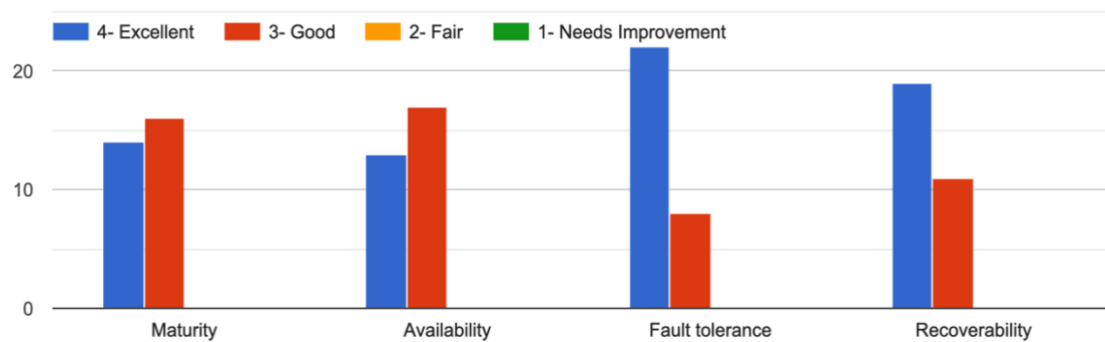
C. Compatibility



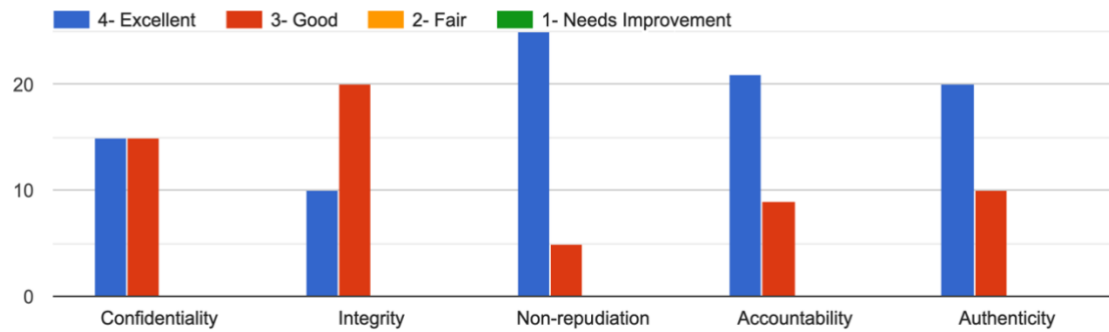
D. Usability



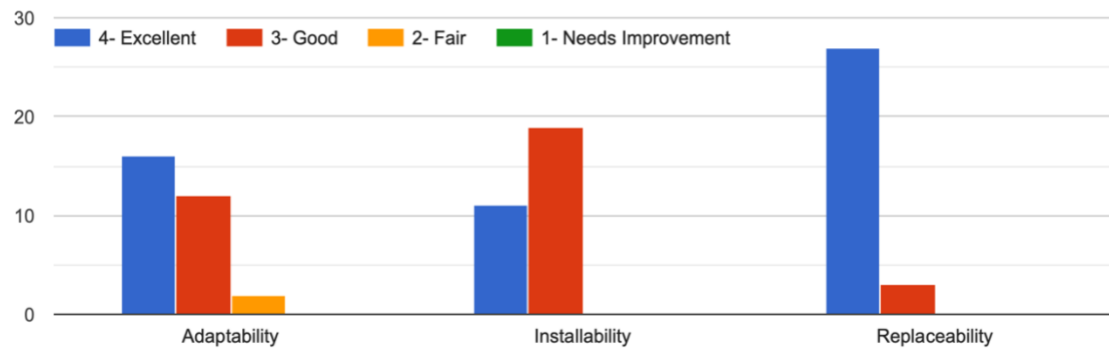
E. Reliability



F. Security



G. Portability



Appendix D

ACTUAL LIVE DEMO AT BARANGAY TANGOS NORTH



Barangay Tangos, North, Kagawad Romario V. Antonio (June 7, 2023)



Barangay Tangos, North, Kagawad Romario V. Antonio & Barangay Secretary

(June 7, 2023)

Appendix E**PROFILE OF RESPONDENTS**

Respondent No.	Name	Profession
1	Isabel Buenaventura	Resident
2	Chun mei	Resident
3	Katherine Reyes	Resident
4	Julie Ann Tenorio	I.T. Professional
5	Danica Limon	I.T. Professional
6	Nancy Diego	Resident
7	Pauline Abulencia	Resident
8	Katherine Pangilinan	Resident
9	Samantha Baltazar	Resident
10	Walter Huab	Resident
11	Rose Ann Mendoza	Resident
12	Melden Lopez	Resident
13	Mark Jerson Borres	Resident
14	Jessie Macahilig	Resident
15	Christine Joy Dimeren	Resident
16	Rogie Pancho	Resident
17	Khrisnelle Joyce Peñano	Resident
18	Alfonso Luis Alcoy	I.T. Professional
19	Stephen Nico Alonzo	I.T. Professional
20	Joven Pancho	I.T. Professional
21	Dennis Trangia	Barangay Official
22	Orlando Duque Jr.	Barangay Official
23	Divina Cordevilla	Barangay Official
24	Jackle Soyangco	Barangay Official
25	Romario Antonio	Barangay Official
26	Amado Libao	Barangay Official
27	Daniel Limbaro	Barangay Official
28	Ernesto Caranglan	Barangay Official
29	Margarita Limbaro	Barangay Official
30	Archie Peñalosa	Resident

Appendix F**SYSTEM USER GUIDE**

A step-by-step manual on the setup, functionals, and parts of the system.

Technical Setup

The system must be configured to use the user's wireless network. This is necessary for the system to operate and work.

User Setup

Before using the system, the administrator and residents should configure it such that the following equipment is included:

1. Administrator and residents should have stable internet connection.
2. Residents must ensure that they successfully create their accounts. Administrator was provided a default account that they could use to access and manage the system.
3. Once resident got validated. They can view and request certain documents.
4. Administrator will approve or deny the request. Once approve they could generate it, if not residents will be notified.
5. Residents can file a complaint using the blotter feature and set up a schedule.
6. Administrators can maintain and manage the system.

Appendix G

Thesis Grammarian Certification

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES Ayala Blvd., Ermita, Manila, 1000, Philippines Tel No. +632-5301-3001 local 608 Fax No. +632-8521-4063 Email: cos@tup.edu.ph Website: www.tup.edu.ph	Index No.	REF-COS-3.5-INT-TGC
		Revision No.	00
		Effectivity Date	06132022
VAA-COS	THESIS GRAMMARIAN CERTIFICATION	Page	1 / 1

This is to certify that the thesis entitled,

DEVELOPMENT OF A WEB-BASED ELECTRONIC BARANGAY MANAGEMENT SYSTEM

authored by

Cahilig, Georen P.
 Infante, Eunice Anrose C.
 Miranda, Kyle Brent M.
 Retes, Karla Nicole

has undergone editing and proofreading by the undersigned.

This Certification is being issued upon the request of Georen P. Cahilig, Eunice Anrose C. Infante, Kyle Brent M. Miranda, and Karla Nicole Retes for whatever purposes it may serve them.

Grammarian

Technological University of the Philippines

Date of Issuance

Transaction ID	
Signature	

Appendix H

CERTIFICATE OF SIMILARITY INDEX USING TURNITIN

Appendix I

CERTIFICATE OF SIMILARITY INDEX USING TURNITIN FROM URDS

RESEARCHER'S PROFILE**CAHILIG, GEOREN P.**

386 R. Domingo St. Tangos North Navotas City

+63-929-260-6987

georen.cahilig@tup.edu.ph



PERSONAL INFORMATION

Age: 22
Sex: Male
Birthday: February 10, 2001
Civil Status: Single
Citizenship: Filipino

COMPUTER PROGRAMMING SKILLS

- Microsoft Office Applications
- Google Workspace
- C, C++, CSS

EDUCATION

Tertiary	Technological University of the Philippines - Manila Bachelor of Science in Information System	2019-Present
Secondary	AMA Computer Colleges Caloocan Campus (Senior High School) Science, Technology, Mathematics and Engineering	2017 – 2019
	Tangos National High School (Junior High School) (Junior High School)	2013 - 2017
Primary	Marvin A. Rader School Inc.	2012 – 2013

INFANTE, EUNICE ANROSE C.

31 Victory Avenue Narra St. Brgy Tatalon, Quezon City

+63 956-250-6146

euniceanrose.infante @tup.edu.ph



PERSONAL INFORMATION

Age: 22
Sex: Female
Birthday: December 25, 2000
Civil Status: Single
Citizenship: Filipino

COMPUTER PROGRAMMING SKILLS

- Microsoft Office Applications
- Google Workspace
- CSS/ HTML

EDUCATION

Tertiary	Technological University of the Philippines - Manila Bachelor of Science in Information System	2019-Present
Secondary	Polytechnic University of the Philippines (Senior High School) Science, Technology, Mathematics and Engineering	2017 – 2019
	Carlos L. Albert High School (Junior High School)	2013 - 2017
Primary	Diosdado P. Macapagal Elementary School	2012 – 2013

MIRANDA, KYLE BRENT M.

44 West Riverside Corner Osmeña St., SFDM, Quezon City

+63-928-188-8613

kylebrent.miranda@tup.edu.ph



PERSONAL INFORMATION

Age: 21
Sex: Male
Birthday: September 09, 2001
Civil Status: Single
Citizenship: Filipino

COMPUTER PROGRAMMING SKILLS**MICROSOFT OFFICE**

- Microsoft WORD with speed typing skills (an average of 50 words per minute)
- Microsoft EXCEL with Visual Basic Application Programming (Macro Excel)
- Microsoft POWERPOINT for presentations

EDUCATION

Tertiary	Technological University of the Philippines - Manila Bachelor of Science in Information System	2019-Present
Secondary	Siena College, Quezon City (Senior High School) Science, Technology, Mathematics and Engineering	2017 – 2019
	Don Alejandro Roces Sr. Science Technology Highschool (Junior High School)	2013 - 2017
Primary	San Francisco Elementary School	2012 – 2013

RETES, KARLA NICOLE

1854 Tenorio St. Barangay 770 Sta Ana, Manila

+63-968-490-4635

karlanicole.retes@tup.edu.ph



PERSONAL INFORMATION

Age: 22
Sex: Female
Birthday: November 29, 2000
Civil Status: Single
Citizenship: Filipino

COMPUTER PROGRAMMING SKILLS

- **Technical:** HTML, C, C++, SQL
- **Familiar:** Python, CSS, GitHub, WordPress, PHP
- **Other Tools:** Proficient in using Microsoft office applications and Google Workspace.

EDUCATION

Tertiary	Technological University of the Philippines - Manila Bachelor of Science in Information System	2019-Present
Secondary	Philippine Christian University (Senior High School) Science, Technology, Mathematics and Engineering	2017 – 2019
	Ignacio Villamor Highschool (Junior High School)	2013 - 2017
Primary	Aniban Central School	2012 – 2013