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iBarangay: A Responsive Web Application to Digitize Barangay Services

Jared Cariaso[1], Neil Ardrey Laza[2], and Lance Jefferson Uy[3]
[1]National University, Philippines, [2]National University, Philippines[3]National University, Philippines,
Lance Jefferson Uy: uylij@students.nu-baliwag.edu.ph

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Abstract: Philippine barangays, like San Rafael, Bulacan, struggle with inefficient manual systems for services such as blotter recording, resident management, and document issuance. To address this, "iBarangay," a responsive web application, was developed to digitize these services, automate resident information, and provide online document requests with real-time notifications. Using an iterative waterfall methodology and evaluated against ISO/IEC 25010 standards, the system received positive feedback from 10 participants (residents, officials, IT professionals), with an overall weighted mean of 4.43 ("Agree"), indicating satisfaction with its functionality, reliability, usability, performance, and security. The study concludes that iBarangay successfully streamlines services, reduces delays, and enhances transparency. Future recommendations include SMS integration, offline capabilities, and blotter module expansion.

Keywords: e-governance; barangay; information system; digital services; ISO/IEC 25010

1. INTRODUCTION

In today's digital age, local governance is steadily shifting toward modernization to meet the rising expectations of citizens for faster and more reliable public services. Across the Philippines, digital transformation efforts have expanded, with government initiatives such as the Department of Science and Technology's BeST (Barangay e-System and Tools) Program aiming to improve barangay-level administration through information technology (Philippine Information Agency, 2025). This trend shows a growing national focus on strengthening e-governance and using web-based tools to make community services more efficient, transparent, and responsive.

Many barangays, especially in semi-urban and rural towns like San Rafael, Bulacan, still rely on manual, paper-based systems for handling blotter records, managing resident information, and processing certificate requests. These outdated practices often result in delays, human error, and lost documents, issues that directly affect the quality-of-service delivery and citizen satisfaction (Gallera &

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Salvador, 2023; Antonio, 2020). As communities become more aware of their rights to accessible and efficient services, the lack of digital systems in barangay offices becomes a growing concern.

While there have been efforts to introduce information systems at a local level, many existing solutions only focus on specific modules, such as civil registries or health record keeping, and fail to integrate all essential barangay functions into a single platform (Melendres & Aranda, 2024; Bondoc, 2019). As a result, residents and barangay officials still experience fragmented services, duplicated work, and poor coordination. There is a clear gap in implementation when it comes to all-in-one, citizen-centered platforms that combine blotter tracking, resident data management, certificate requests, and service portals in a simple, user-friendly system.

To address these problems, this study aims to develop and evaluate iBarangay, an online platform designed to improve barangay administrative operations and public access to local services. The system will digitalize blotter documentation to reduce human error, automate the handling of resident profiles and certificate requests to make the process of daily tasks efficient, and provide a digital portal for residents to conveniently access services online. With these features, the application intends to lessen manual workload, promote transparency, and create a more responsive barangay administration.

Case studies like Docu-Go, a document request system that improved turnaround times and reduced errors in barangay transactions (Taruc et al., 2023), and eDali Deborok, a digital system implemented in Siquijor that enhanced communication and service availability (Siay et al., 2025), demonstrate the effectiveness of digital systems in local governance. Backed by prior research (Antonio, 2020; Melendres & Aranda, 2024; Gallera & Salvador, 2023), this project introduces a localized, practical, and replicable approach to modernize barangay operations. Ultimately, iBarangay aims to support more efficient, transparent, and people-centered governance at the community level.

1.1 Objectives of the Study

The researchers aim to develop a web-based management system specifically tailored to address the unique administrative needs of barangay offices. The proposed system will consist of several key features:

- A digital blotter management module will be designed to effectively track, organize, and monitor reported incidents within the community, allowing officials to record, manage, and retrieve blotter cases efficiently and securely.

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- An automated resident information management feature will systematically organize census-based data on local residents, enabling barangay personnel to easily update, access, and verify essential details such as residency status, household data, and issued documents.

- A real-time notification system will be integrated within the platform to promptly inform residents and barangay officials regarding community announcements, progress on document requests, or updates on incident resolutions through system notifications, and email alerts.

- An interactive dashboard for barangay officials will offer visual analytics on administrative tasks, incident reports and blotter statistics.

- A digital document request platform that will allow residents to conveniently apply for and track the status of their requested barangay certifications, clearances, and other official documents. To ensure proper document security, users will not be able to obtain a softcopy, even if it is unofficial or lacks the barangay seal. Instead, residents must request a certified document that includes the official seal or signature for official purposes. By minimizing manual processing while maintaining document integrity, the system significantly reduces turnaround time, making the entire process more efficient for both residents and local government staff.

1.2 Significance of the Study

The result of this study will help the residents of the community gain easier access to essential barangay services, accurate documentation, and timely updates regarding community concerns. The researchers believe that the findings and outcomes of this system will benefit the people, particularly the residents and officials of the barangay, by improving service delivery.

Residents. The system will provide residents of the barangay with a more convenient and transparent way to request documents, report issues, and stay informed about barangay activities. They will be empowered to monitor the progress of their requests directly with barangay officials.

Barangay Officials. The platform will give barangay officials a centralized system to manage records, monitor blotter cases, and handle resident data with greater accuracy and efficiency. It will reduce the workload of manual documentation and will support better decision-making through organized reports and insights.

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The Community. The initiative will foster digital transformation in local governance, making services more accessible and promoting a more united, informed, and responsive environment. Community members will be more likely to participate in programs, follow regulations, and support barangay initiatives.

IT Professionals. The system will provide a useful reference for IT professionals working on ICT-based solutions for local government units. It can serve as a framework or inspiration for building similar platforms aimed at improving local administrative operations and service delivery.

Future Researchers. This study offers a valuable foundation for future researchers interested in evaluating or creating e-governance systems. It contributes to literature on digital public service systems and supports future research in the areas of local government automation, system usability, and information management.

1.3 Scope and Limitations

The iBarangay system is designed as a responsive web application to digitize essential administrative services in barangays, focusing on simplifying core workflows such as incident reporting, resident data management, and document processing. Its scope includes a digital blotter module for recording and tracking community incidents, a centralized resident database to organize demographic information, and an automated platform for residents to request and monitor barangay certifications. Real-time notifications via email and system notification keep residents informed about request statuses and community updates, while an administrative dashboard provides barangay officials with visual insights into service trends, blotter cases, and transaction histories. The system's responsive web interface ensures accessibility across devices but does not support offline functionality or advanced features like GIS mapping or integrations with external databases such as government systems.

The study acknowledges several limitations, particularly its reliance on stable internet connectivity and its design tailored primarily to the administrative context of barangays in San Rafael, Bulacan. This may limit its adaptability to larger urban barangays or those with different operational structures. Additionally, the system does not currently support SMS notifications, automated issuance of barangay business clearance stickers or plates, or the importing of records using Excel files due to time and budget constraints during development. The lack of Excel import functionality can hinder efficient migration or bulk updating of resident and transaction data, especially for barangays transitioning from manual to digital systems. Furthermore, the blotter module is currently limited to filing a Certificate to File Action (CFA), which may restrict its functionality for more comprehensive case tracking and resolution. These constraints highlight

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opportunities for future enhancements, such as the integration of expanded notification features, automated clearance processing, Excel-based data import tools, and offline capabilities, while reaffirming the platform's role in improving transparency and efficiency in local governance.

2. METHODOLOGY

This section aims to provide an overview of the methodology that the researchers use to develop and design the website prototype, including how the data is gathered, the instruments utilized, and the analysis conducted to further the study.

2.1 Research Design

The researchers will adopt a quantitative research approach to objectively measure and collect structured data regarding the proposed iBarangay management system's functionality, usability, reliability, and security. A descriptive research method will be utilized to systematically observe, document, and analyze the system's functionalities, user interactions, and performance outcomes, directly addressing the research objectives. Additionally, the study employs a developmental research design, which is beneficial during system creation, refinement, and validation. This design allows the researchers to thoroughly test the system to ensure it effectively addresses identified administrative challenges and meets practical usability requirements.

The iterative waterfall methodology is a structured development model that follows a sequence of phases such as requirements analysis, system design, implementation, testing, deployment, and maintenance. Unlike the traditional version, it allows for revisions within each phase before moving to the next, making it suitable for projects that require regular feedback. In developing the iBarangay Web Application, this method provides clear direction while allowing necessary adjustments based on input from barangay officials. Although the model includes a deployment phase, the system will not be deployed for actual use. Instead, it will be treated as a demonstration stage where the system's features and functions are shown to intended users. It will be presented to residents, barangay officials, and IT professionals for evaluation. Their feedback will help guide improvements during the final maintenance phase.

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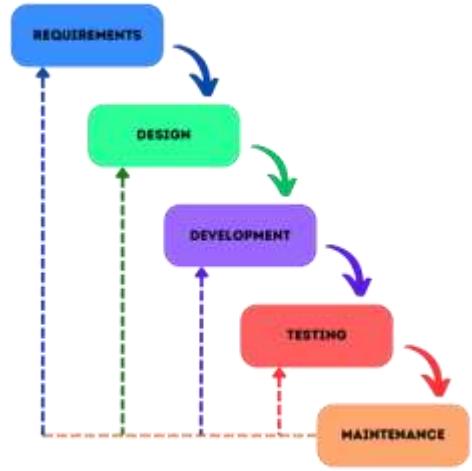

Figure 1. Iterative Waterfall Methodology Model

2.2 Population and Sample of the Study

To determine the sample size for this study, the researchers will use stratified purposive sampling to select participants who will be able to provide valuable insights, direct experience, and relevant knowledge essential to achieving the research objectives.

In total, 10 participants from three categories will be selected to evaluate iBarangay. Fifteen participants will be residents from various barangays in San Rafael, representing the target beneficiaries. Another fifteen participants will be barangay officials knowledgeable about barangay management processes. The remaining three participants will be IT professionals with experience in assessing systems.

Table 1. Population Group and Size of the Study

Respondents	**Frequency**	**Percentage**
Residents of San Rafael	5	50%
Barangay Officials	2	20%
IT Professionals	3	30%
Total	**10**	**100%**

2.3 Research Instrument

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ISO/IEC 25010 will be used by the researchers as their research instrument. ISO/IEC 25010 is a software quality standard that provides consistent terminology for specifying, measuring, and evaluating the system and software. The standard will provide definitions of several key quality characteristics that will be important for considering the overall quality of the iBarangay. These factors will be functionality, reliability, usability, and security, which will help assess several aspects of the software essential for figuring out exactly how effective it is. By following ISO/IEC 25010, the researchers will be able to assess the system quality of the iBarangay accurately and efficiently to ensure that it meets the intended user needs as per the standard.

3. RESULTS AND DISCUSSION

This section discusses the evaluation findings for the iBarangay system, covering its functionality, reliability, usability, performance efficiency, compatibility, security, and maintainability as assessed against the ISO/IEC 25010 standard, with quantitative data from residents, barangay officials, and IT professionals informing the analysis of its effectiveness in addressing administrative challenges and enhancing public service access in San Rafael, Bulacan.

3.1 Data Gathering Results

A total of 10 respondents, comprising 5 residents of San Rafael, 2 barangay officials, and 3 IT professionals, were chosen through stratified purposive sampling to evaluate the iBarangay system. Their feedback was gathered through a structured questionnaire adapted from the ISO/IEC 25010 software quality standard, focusing on key attributes such as functionality, reliability, usability, performance efficiency, compatibility, security, and maintainability.

Table 2. Mean range interpretation scale

Scale	Description	Range
5	Strongly Agree	4.51-5.00
4	Agree	3.51-4.50
3	Neutral	2.51-3.50
2	Disagree	1.51-2.50
1	Strongly Disagree	1.00-1.50

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Table 3. Functionality Table Results

Indicators	Mean	Interpretation
A. Functionality		
1. The system provides all the necessary functions to complete its intended tasks.	4.37	Agree
2. The system produces accurate and reliable results.	4.60	Strongly Agree
3. Users can easily create, update, and manage their accounts or profiles as needed.	4.38	Agree
4. The system provides timely notifications or alerts relevant to users	4.30	Agree
B. Performance		
1. The system responds quickly to user commands and requests..	4.69	Strongly Agree
2. It performs well even when many users are using it at the same time.	4.02	Agree
3. The system uses computing resources like memory and processing power efficiently.	4.24	Agree
4. The system can handle increased workload or data without slowing down.	4.23	Agree
C. Compatibility		
1. The system works well with other related software and external systems.	4.42	Agree
2. It can exchange and use data in common, standard formats.	4.50	Agree
3. The system runs properly on different devices, browsers, and operating systems.	4.20	Agree
4. It integrates smoothly with required hardware or external tools.	4.54	Agree
D. Usability		
1. The system is easy for all users to learn and navigate.	4.20	Agree
2. Help information, guides, or tutorials are easy to find and understand.	4.43	Agree
3. Users can complete common tasks without difficulty or confusion.	4.30	Agree
4. The system provides clear feedback or error messages when something goes wrong.	4.48	Agree
E. Reliability		
1. The system rarely crashes or stops working unexpectedly.	4.2	Agree
2. Data is saved securely and can be recovered if issues occur.	4.37	Agree
3. The system continues to operate smoothly during maintenance or updates.	4.3	Agree
4. It handles user mistakes or invalid inputs without failure.	4.58	Strongly Agree
F. Security		

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1. Only authorized users can access the system.	4.37	Agree
2. The system protects sensitive user data and information.	4.26	Agree
3. Communication between users and the system is secure from unauthorized access.	4.19	Agree
4. The system keeps logs of user activities to detect and prevent misuse.	4.13	Agree
G. Maintainability		
1. The system is designed so it can be fixed and updated easily.	4.26	Agree
2. Authorized staff can configure or customize the system when needed.	4.67	Strongly Agree
3. Problems or bugs are found and resolved quickly.	4.29	Agree
4. The system supports tools that monitor and check for issues automatically.	4.09	Agree
H. Portability		
1. The system can be installed or deployed on different devices or platforms without major changes.	4.09	Agree
2. Data can be transferred or migrated easily between systems.	4.37	Agree
3. The system works on various devices commonly used by users and staff.	4.26	Agree
4. It adapts well to different network environments, such as local or remote access.	4.32	Agree
Overall	4.33	Agree

The overall mean score of 4.43 falls within the "Agree" range, indicating that users are generally satisfied with the system's performance across all evaluated quality indicators. This suggests that the system effectively meets user expectations in terms of functionality, usability, reliability, and other essential aspects, making it a well-rounded and dependable solution for its intended purpose.

4. CONCLUSIONS

4.1 Summary of Findings

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The study evaluated the "iBarangay: A Responsive Web Application to Digitize Barangay Services" system with feedback from ten (10) respondents composed of barangay officials, residents, and IT professionals. The evaluation was conducted based on the ISO/IEC 25010:2011 quality model, focusing on several software quality characteristics such as functionality, reliability, performance efficiency, compatibility, usability, security, and maintainability.

The findings provided insight into how well the system performed based on these standards and how it addressed the needs of barangay administration and service delivery.

In terms of functionality, the system was deemed effective in fulfilling its intended purposes such as digital blotter management, real-time notifications, automated resident information handling, and document requests. Respondents agreed that these features were responsive, accurate, and relevant to barangay operations.

Performance efficiency was adequate but not exceptional. The system generally loaded within acceptable time frames and handled requests with minimal delays under typical conditions. However, performance varied depending on internet speed and device type, indicating room for improvement in optimizing responsiveness and consistency. While it did not significantly hinder user experience, it also did not stand out as a strong point of the system.

The system also performed well in terms of reliability. It was found to be stable during testing, maintaining accurate and secure data storage even under multiple user interactions. Respondents observed minimal downtime and smooth transitions when switching between modules, contributing to a dependable user experience.

Compatibility results showed that the system worked effectively across various browsers and devices, ensuring accessibility regardless of the user's platform. It could be accessed using laptops, desktops, tablets, and smartphones with consistent performance.

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Regarding usability, the interface was considered intuitive and user-friendly. Respondents highlighted the clear layout, easy-to-understand navigation, and minimal learning curve as major advantages. These attributes made the system usable even for non-tech-savvy individuals in the community.

The system also demonstrated strong security features. It implemented user authentication, session control, and secure storage of sensitive data such as resident information and barangay documents. Respondents agreed that these features enhanced trust and protected data privacy.

The system demonstrated basic security features such as user authentication, session control, and secure storage of sensitive data like resident information and barangay documents. However, there were minor gaps or areas for improvement that suggest the security measures were sufficient but not comprehensive. While respondents generally felt that data privacy was respected, some aspects could be strengthened to further enhance trust and protection.

Maintainability was rated highly as well. The system architecture supports future upgrades, and the modular design allows for easy debugging and addition of new features. The documentation provided was sufficient for basic troubleshooting and guided both users and developers in managing the system effectively.

Overall, the iBarangay system received a general weighted mean of 4.43, indicating that the respondents "Agree" that the system met their expectations across the various ISO/IEC 25010 quality attributes. This suggests that the system is effective, efficient, and ready for real-world deployment in a barangay setting.

4.2 Conclusion

In consideration of the objectives of the study and the development of the iBarangay system, the following conclusions were reached after system testing and evaluation were completed:

1. The iBarangay system successfully digitized several barangay services, replacing traditional manual and paper-based processes. The platform allowed residents to request documents, file blotters, and receive real-time updates

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efficiently, which contributed to more organized and effective public service delivery.

2. Compared to traditional methods, the system significantly reduced errors, waiting time, and operational delays. It introduced a more organized and traceable way of managing resident information and barangay transactions, resulting in increased transparency and accountability.

3. The system's design accommodates both the needs of barangay officials and residents by providing a responsive interface and role–based access. This promotes inclusivity and ensures that the platform is adaptable to a range of user capabilities.

4. The evaluation showed that the iBarangay system aligns well with several aspects of the ISO/IEC 25010 software quality standards, particularly in performance, maintainability, and usability. However, the presence of specific recommendations and identified limitations indicates that the system is not yet fully ready for wider adoption and implementation in other barangays. Further improvements are needed to ensure its effectiveness in broader contexts.

4.3 Recommendations

Based on the evaluation results and conclusions drawn from the study, the following recommendations are proposed for the future development and deployment of the iBarangay system:

1. Implement SMS notification functionality to supplement real-time web notifications. This would benefit users in areas with limited internet access and improve the system's reach and responsiveness.

2. Develop offline capabilities to allow users and barangay staff to access core functions of the system even during internet downtimes. This would ensure continuity of service and minimize disruption in remote or disaster-prone areas.

3. Expand the blotter module to include additional features such as case tracking, status updates, and resolution monitoring to better support the barangay justice system.

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4. Integrate GIS mapping and link the system to existing government databases (e.g., national ID registry, local health records) to improve data interoperability and enable a more comprehensive service network.

5. Conduct continuous user training and gather periodic feedback to ensure that the system evolves in alignment with community needs and technological advancements.

6. Promote collaboration with other barangays and local government units for pilot implementation, encouraging regional adaptation and providing opportunities for further refinement and scaling.

7. Strengthen system security through multi-layered authentication and data encryption. This includes implementing two-factor authentication (2FA) for both residents and administrators, encrypting all sensitive resident and transaction data at rest and in transit, and regularly conducting vulnerability assessments to identify and patch security risks. These improvements will ensure the system remains resilient against emerging threats and continues to safeguard user privacy and information integrity.

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