System Architecture and Design of E-Poblacion: A Web-Based Record Management System for Barangay Poblacion, Bani, Pangasinan

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ABSTRACT

Barangay offices maintain resident, household, and administrative records to support local governance and public services. In Barangay Poblacion, Bani, Pangasinan, record keeping combines paper-based documentation and digital encoding, which can make updating, searching, and retrieving information time-consuming. This study presents the system architecture and prototype design of e-Poblacion, a web-based record management system intended to centralize these records. A developmental research approach was used, with interviews and observations to identify existing procedures, operational challenges, and system requirements. Agile methodology guides the iterative development process, while a Three-Tier Architecture separates the system into the Presentation Tier, Application Tier, and Data Tier. The Presentation Tier provides role-based interfaces for authorized barangay personnel; the Application Tier, developed using Laravel and PHP, processes authentication, validation, business rules, and module operations; and the Data Tier, using MySQL, stores resident and household profiles, documents, incident records, relief vouchers, verification records, and activity logs, with sensitive personal fields protected by column-level encryption. The architecture supports resident and household management, zone-based organization of Records of Barangay Inhabitants (RBI), barangay document processing, blotter and incident recording, QR-coded relief voucher generation and verification, and an administrative dashboard. A local barangay server is proposed to support selected operations during internet interruptions, with synchronization to the online database when connectivity returns. Security and resilience measures aligned with the Data Privacy Act of 2012 (Republic Act No. 10173) include encrypted sensitive fields, server-side role-based authorization, database backup and replication, and a queued offline-to-online synchronization process. User acceptability will be assessed by barangay officials, residents, and Information Technology experts using software-quality characteristics from ISO/IEC 25010. Since user evaluation has not yet been conducted, no evaluation results are claimed.

Keywords: E-Poblacion, System Architecture, Three-Tier Architecture, Web-Based Record Management System, Agile Methodology

INTRODUCTION

Digital technologies provide public offices with ways to organize, store, update, and retrieve records. Accurate and accessible records support daily operations, planning, and service delivery. In the Philippines, barangays maintain resident information and administrative records as part of their responsibilities under Republic Act No. 7160, or the Local Government Code of 1991. Because these records contain personal information, their collection and handling must also consider the safeguards required by Republic Act No. 10173, or the Data Privacy Act of 2012. Barangay Poblacion, Bani, Pangasinan, maintains resident and household records through paper-based materials and digital encoding. Based on interviews with Barangay Health Workers conducted every six months and the proponents' observations at the barangay hall, Barangay Health Workers collect Records of Barangay Inhabitants (RBI) data by zone and submit the information to the Barangay Secretary for encoding. Household records are also organized by zone. Updating is performed periodically, and staff may need to search existing files to retrieve specific information. These procedures can increase workload and make it difficult to keep records complete and current. Although duplicate copies are maintained, misplaced hard copies and

damaged computers remain possible risks. Similar concerns, including manual processes, fragmented data management, and the absence of a centralized database, have been reported in other Philippine barangays (Ballaran et al., 2023; Tosper et al., 2025). These conditions establish the need for a system architecture that organizes the user interface, application processing, and data storage as separate but connected components.

The system modules covered are resident and household records, household mapping, barangay document processing, blotter and incident recording, QR-coded relief voucher generation and verification, an administrative dashboard. The project applies Agile methodology to support iterative development and refinement based on identified requirements and feedback (Manun-og, 2023; Renaudin, 2026). Three-Tier Architecture is used to separate the user-facing interfaces, application logic, and database responsibilities. In this study, zone-based mapping means that each household and resident record is assigned to a barangay zone so that records can be filtered, counted, and reported by zone. The system also includes a Household Map feature that displays household locations on a geographic street map, with a pin for each household and the barangay border. The intended contribution is an architecture that provides a structured basis for centralizing barangay records, organizing module responsibilities, and controlling access to sensitive information.

METHODOLOGY

The study employed a developmental research design focused on the system architecture and prototype of e-Poblacion. The descriptive component used interviews and observations to document existing record-management practices and operational challenges in Barangay Poblacion, Bani, Pangasinan. The developmental component translated the identified requirements into system processes, interface prototypes, database structures, and a Three-Tier Architecture. A user evaluation survey is planned to assess acceptability after the prototype has been developed and made available for evaluation; therefore, the methodology describes the intended evaluation procedure but does not report completed survey results. The locale was selected because barangay personnel currently use manual and semi-digital procedures to collect, encode, update, and retrieve resident and household records.

The proposed evaluation involves 60 purposively selected respondents, as shown in Table 1. Five barangay officials are included because they participate in barangay operations and record handling; they will perform tasks such as searching and adding a resident record, preparing a document, and generating a voucher before evaluating the system workflow. Fifty residents are included as recipients of barangay services. Since residents do not use the internal system, their feedback will be limited to service aspects they experience, such as the clarity of document and voucher processing and the printed documents and vouchers they receive. Five Information Technology experts are included because of their technical knowledge and will assess the technical characteristics and architecture of the system. Officials and staff are selected from personnel involved in handling records, residents from those who have transacted at the barangay hall, and IT experts from professionals with system-development experience. Results are intended to be reported separately according to each group's actual interaction with the system.

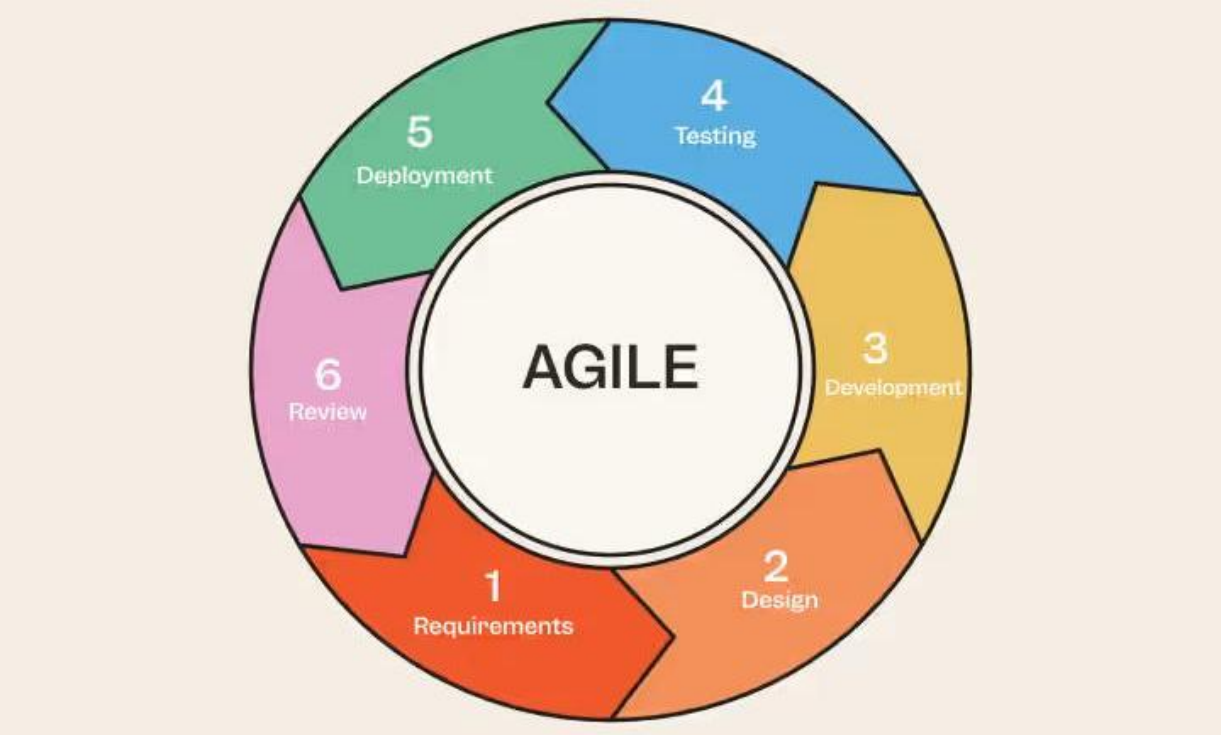
Table 1. Respondents of the Study

Respondents	**Number of Respondents**
Barangay Official	5
Residents	50
IT Experts	5
Total	**60**

Agile methodology guides the project through requirements gathering, design, development, testing, deployment, and review (Renaudin, 2026). During requirements gathering, the proponents identify and prioritize the barangay’s needs. In the design stage, these requirements are translated into process flowcharts, an Entity

Relationship Diagram, database structures, tier responsibilities, and interface prototypes. Development proceeds iteratively so that modules can be demonstrated to barangay personnel, tested, and refined. Testing is planned at module and integration levels, followed by user acceptance testing with selected respondents. Module-level test cases include logging in with valid and invalid credentials, saving a resident record with a missing required field, identifying a possible duplicate resident, generating a document, and scanning valid, expired, cancelled, already-claimed, copied, or invalid voucher codes. Each test case records the task, expected result, and actual result. Errors are corrected and the test is repeated. Deployment and review are intended to support user orientation, feedback collection, and subsequent architectural or interface improvements.

Figure 1. Agile Methodology



Source: Slite, (2026) Agile Methodology: values, principles & frameworks guide

System Prototype And Tier Interfaces

The initial e-Poblacion prototype was designed in Figma from the requirements identified for Barangay Poblacion, Bani, Pangasinan. It presents the planned navigation, interfaces, and module interactions before full system deployment. Figures 2 to 8 are prototype designs, not evidence that the finished system has passed operational testing. They illustrate the planned login page, dashboard, resident directory, resident-entry form, document processing, and QR-coded relief voucher functions. The prototype serves as a visual reference for the Presentation Tier and a means of checking whether the proposed interfaces correspond to the application functions and data required by each module. The records shown in the figures are sample data and do not represent actual residents.

Carousel Login Page

The Login Feature is the entry point for authorized barangay officials and personnel. The login panel is displayed beside a carousel of Barangay Poblacion images. Individual user accounts provide access to the system, while assigned roles determine which modules and actions each account can use. Passwords are stored in hashed form rather than as plain text. Repeated failed login attempts temporarily block further attempts for the account, and a session ends when the user logs out or after a period of inactivity. In the Three-Tier Architecture, the login interface belongs to the Presentation Tier, credential checking and session handling belong to the Application Tier, and account and role information are stored in the Data Tier.

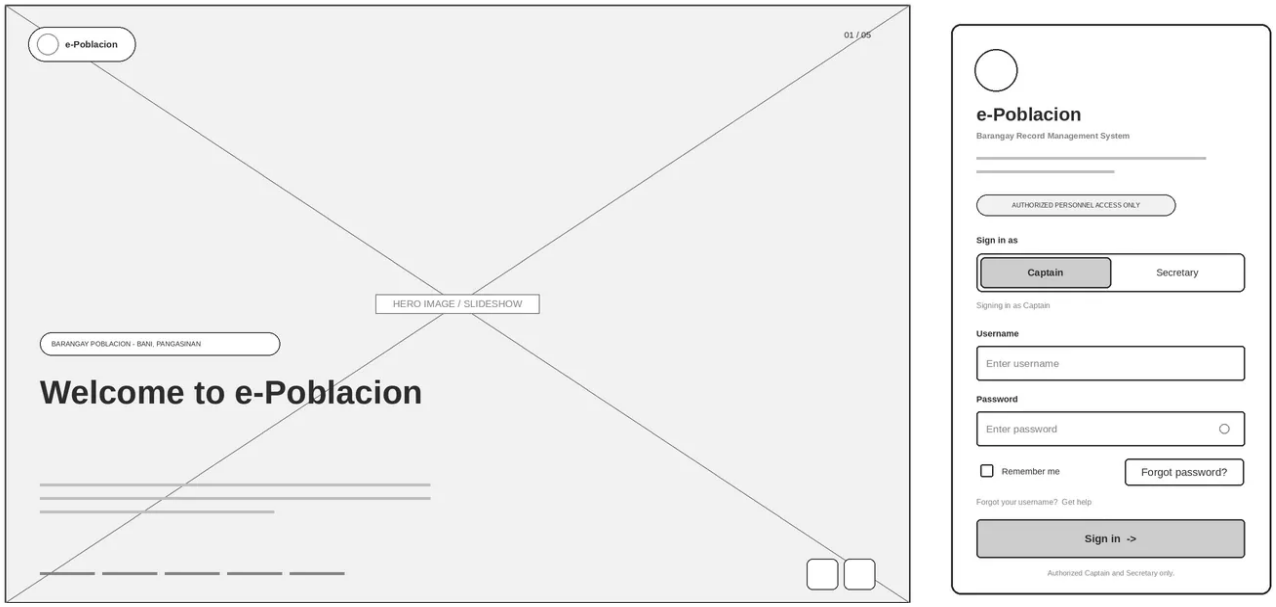


Figure 2. Login Page

Main Administrative Dashboard

The Main Administrative Dashboard is the central overview for everyday barangay operations. It displays summary figures for total registered individuals, active households, and pending document applications. Total registered individuals refers to active resident records and excludes residents marked as transferred or deceased. An active household is a household with at least one active resident. A document application remains pending from the time staff encode the request until it is approved and released. The dashboard presents these values in the Presentation Tier; the Application Tier applies the counting rules to the stored records; and the Data Tier supplies the resident, household, and document information used in the summaries.

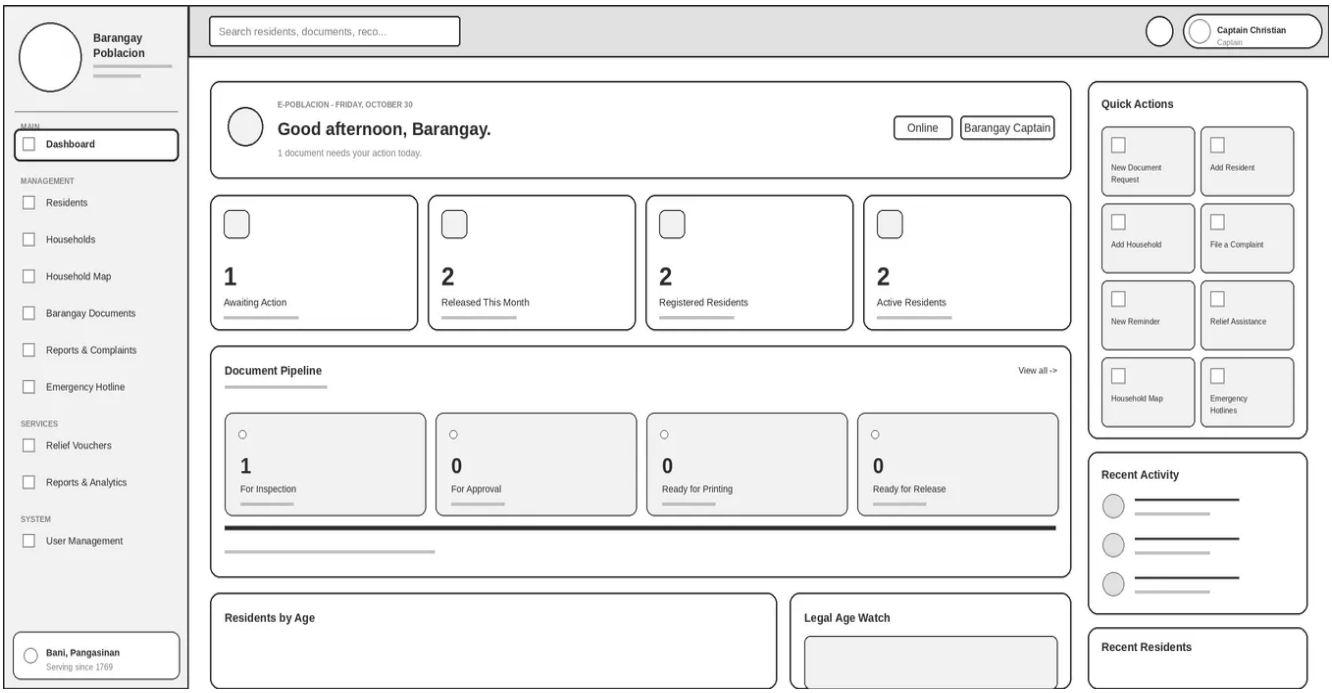


Figure 3. Main Dashboard

Resident Directory Feature

The Resident Directory allows authorized staff to manage registered residents through a searchable table. Each row shows the resident's ID, name, address, and basic details, and selecting a record opens the resident's profile and document-request history. The system gives each resident a unique ID, checks for duplicates using name

and birthdate, and links the resident to a household and zone. Residents who have transferred or died are archived with that status, so their history is kept but they are not counted as active. Role permissions control who can view, add, edit, archive, or export records, and important changes are logged with the user, date, and time. The directory belongs to the Presentation Tier, validation, duplicate checking, status rules, and permission checks belong to the Application Tier, and resident, household, and activity records are stored in the Data Tier. Figure 4 uses sample data.

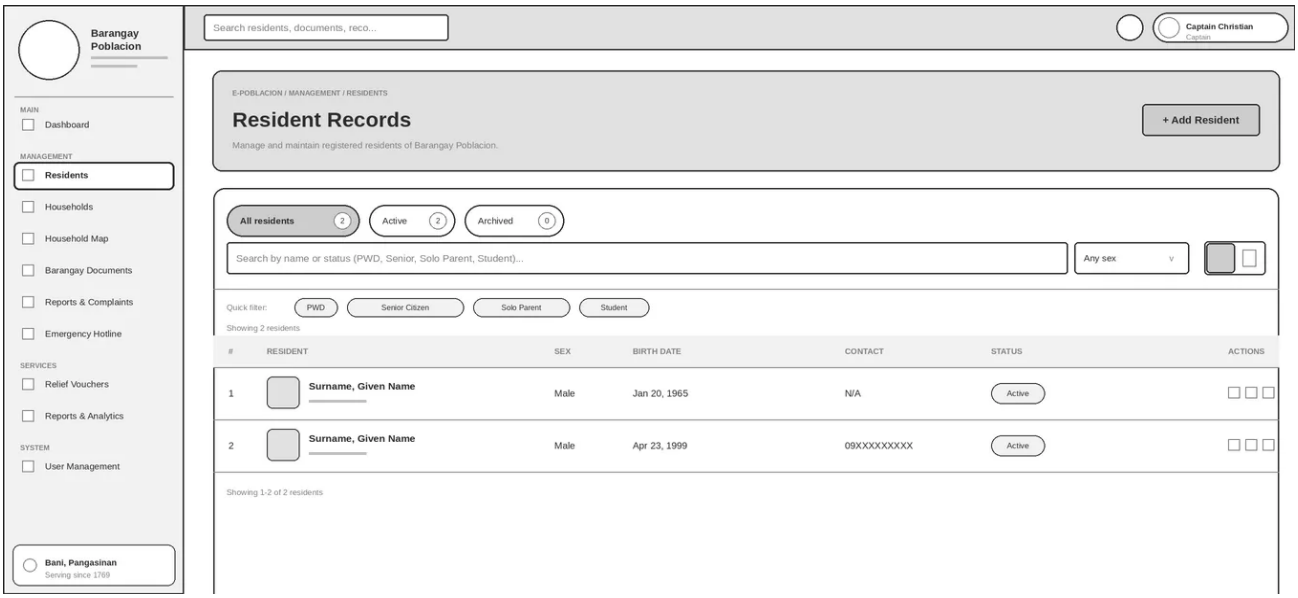


Figure 4. Residents Directory

Barangay Document Request

The New Document Request feature allows authorized staff to file a request for a registered resident. Staff first search for the resident by name or address, then choose one document type, such as Barangay Clearance, Certificate of Indigency, or Solo Parent. A summary panel shows the choices, and every new request starts as Pending. The Create Request button stays disabled until both choices are made, and a reminder prompts staff to check the resident's ID in person. The form belongs to the Presentation Tier, validation and the Pending-by-default rule belong to the Application Tier, and the request record is stored in the Data Tier.

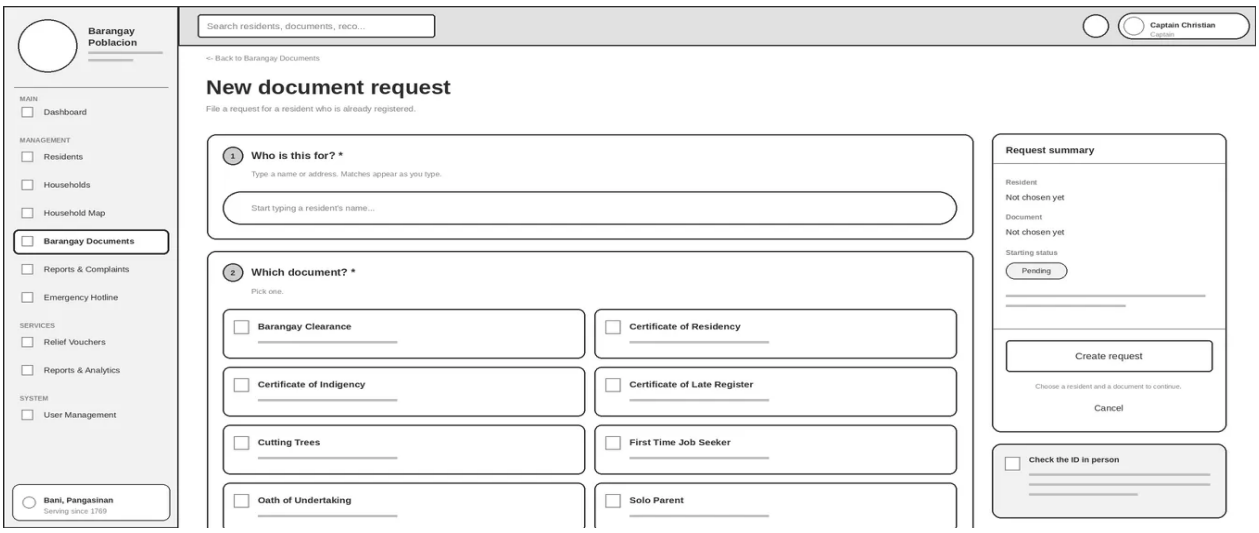


Figure 5. New Document Request

Barangay Documents Print Preview and Release Feature

The Document Print Preview and Release feature supports the barangay document workflow. A resident requests a document in person at the barangay hall, and staff encode the request in e-Poblacion. Authorized officials

review the request, and once it is approved, the system shows the document on the official template with the resident's information for final checking. Staff then print and release it and update the request status. Each document gets a system-generated number, and every print or reprint is logged with the user, date, and time. The print-preview screen belongs to the Presentation Tier, request processing, approval status, document numbering, and logging belong to the Application Tier, and resident and document records are stored in the Data Tier.

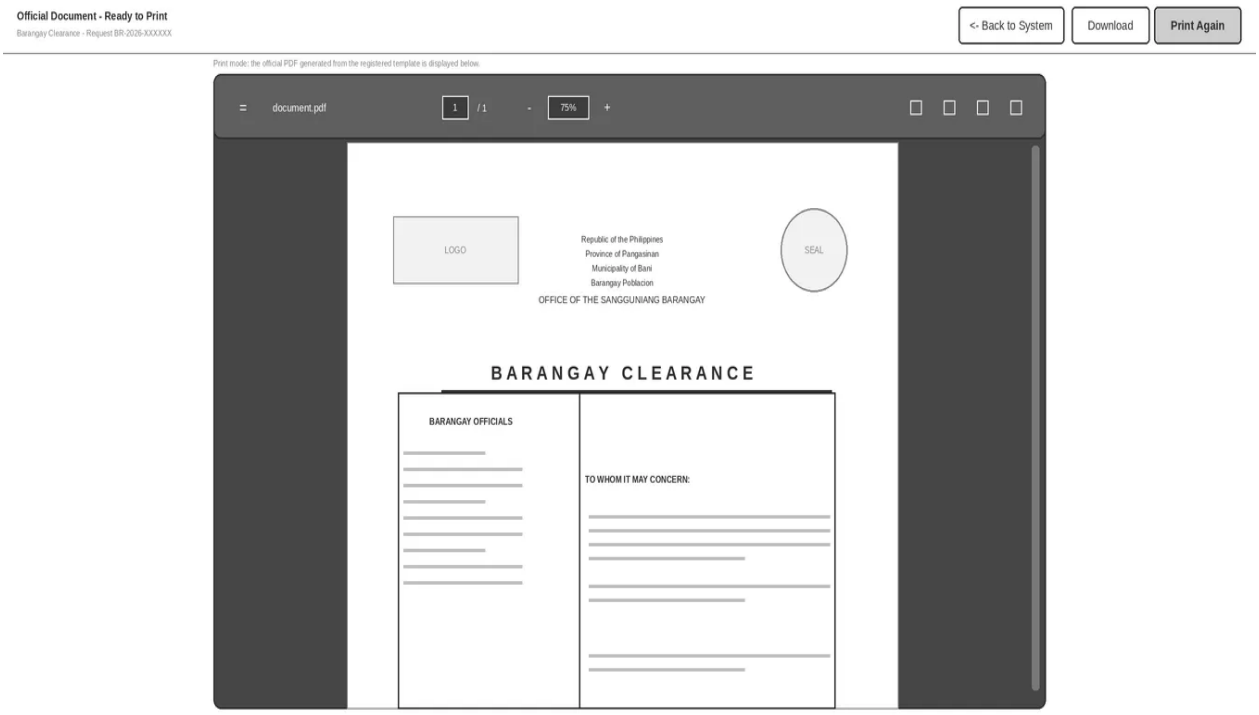


Figure 6. Print and Preview Documents

Barangay Documents (Document Request Tracking)

The Barangay Documents feature allows authorized staff to track each resident's document request from filing to release. The screen shows request counts by status (All, Pending, Approved, Released/Completed, and Dis-approved) and a search field for finding requests by resident name, request code, or document type. Each request lists its code, the resident, the document type, the date requested, and a status badge, and a Preview button opens the request for review. The listing and search interface belongs to the Presentation Tier, status rules and request code generation belong to the Application Tier, and request records and status history are stored in the Data Tier.

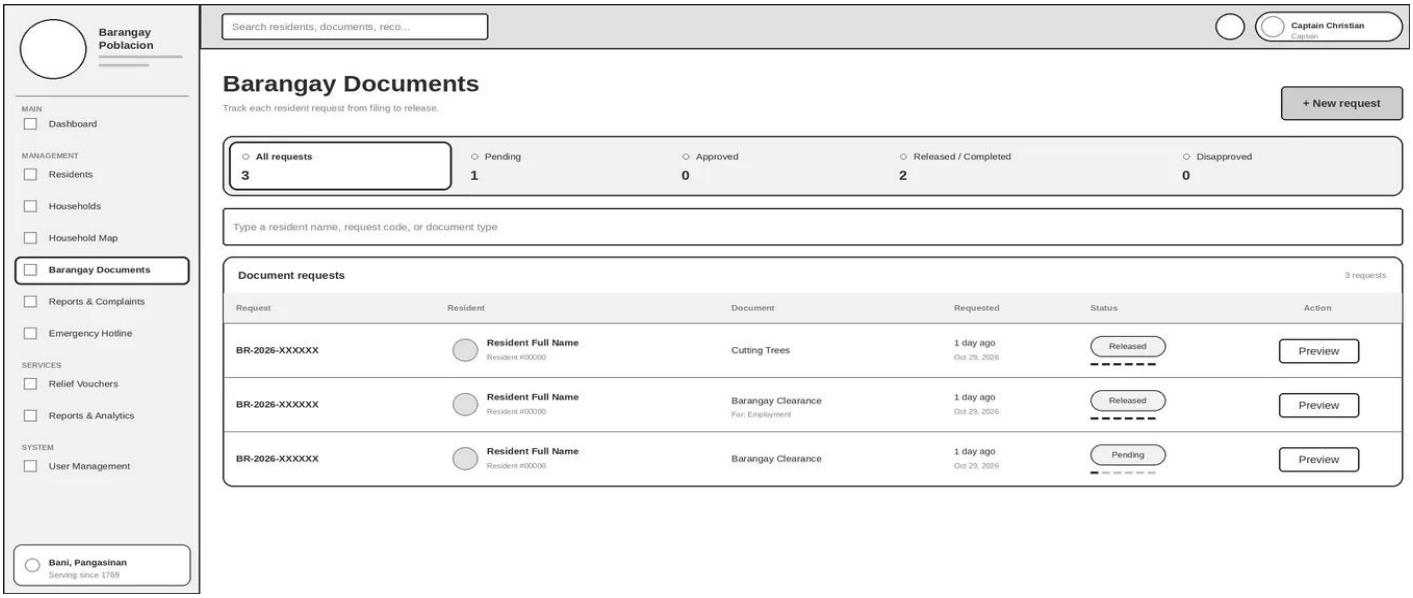


Figure 7. Barangay Documents

Reports and Complaints

The Reports & Complaints feature allows authorized staff to record and follow community reports and complaints against persons. Summary cards show total, pending, active, and resolved cases, and staff can filter by type, status, category, or search by code, title, resident, or location. Each record shows its code, title, location, complainant, status, and date filed, and staff can View it or mark it resolved with Resolve Case. The listing and filters belong to the Presentation Tier, case code generation and status rules belong to the Application Tier, and case records and status are stored in the Data Tier.

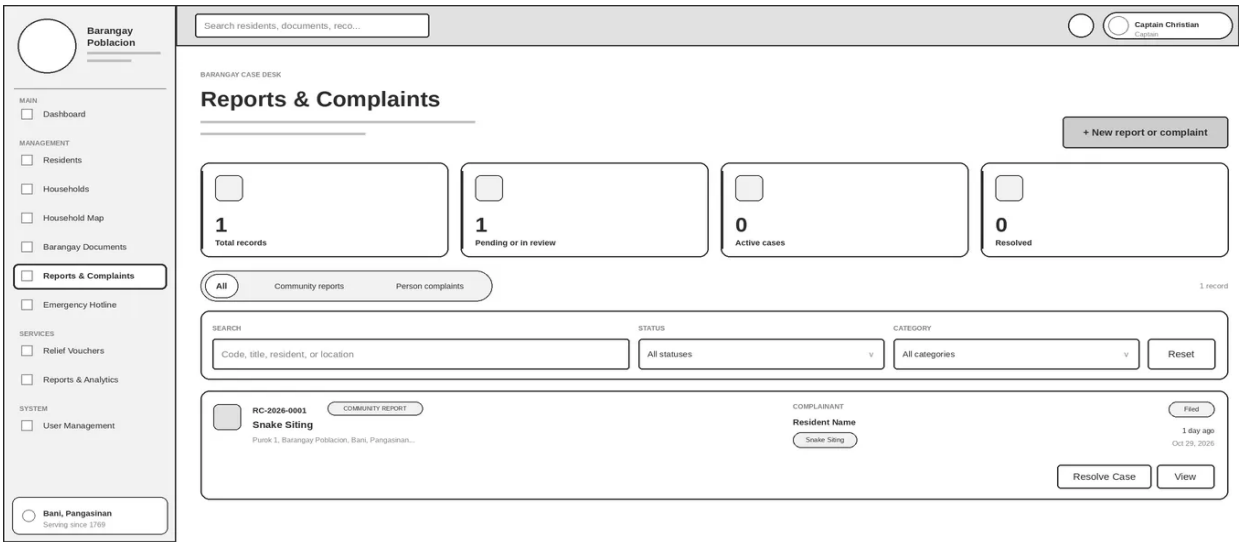


Figure 8. Reports and Complaints

Household Management

The Household Management feature allows authorized staff to manage household records, members, and masterlists. The screen has All, Active, and Archived tabs, a search field (by household ID, address, purok, or head), and a purok filter. Each household shows its ID, head, purok, address, number of members, and status, and staff can add a household or print a masterlist. The interface belongs to the Presentation Tier, filtering and masterlist generation belong to the Application Tier, and household and member records are stored in the Data Tier.

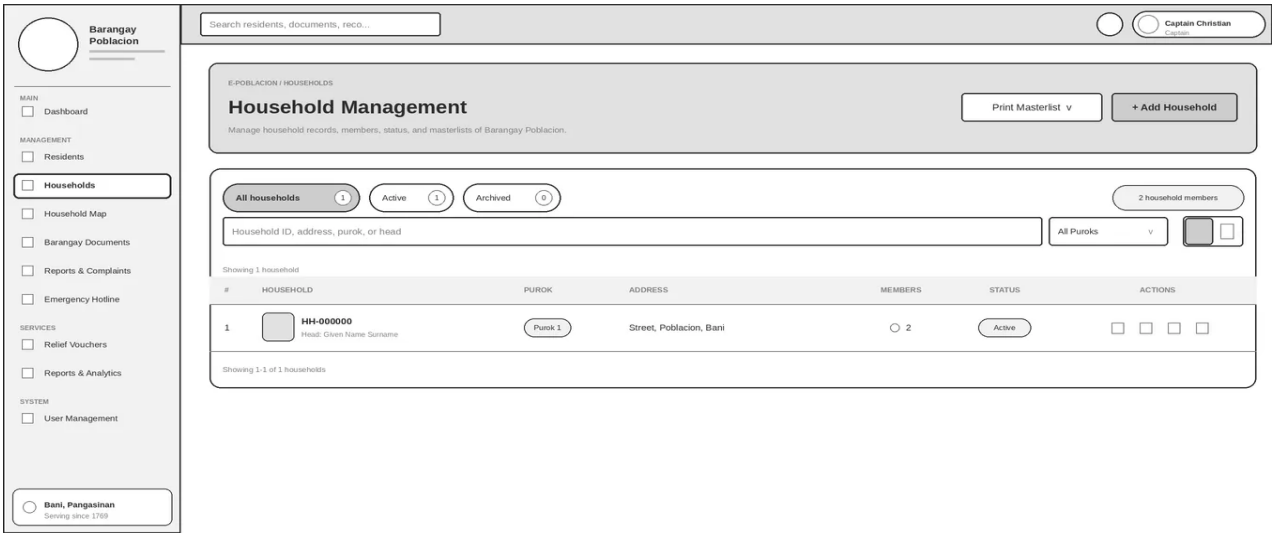


Figure 9. Managing household

Household Mapping

The Household Map feature allows authorized staff to see where households are located in the barangay. A summary panel shows the number of households, how many are on the map, how many are active, and how

many puroks are covered. A side panel lets staff search and filter by purok, while the street map shows a pin for each household and a dashed line marking the barangay border. The map and filters belong to the Presentation Tier, location filtering and purok grouping belong to the Application Tier, and household coordinates and addresses are stored in the Data Tier.

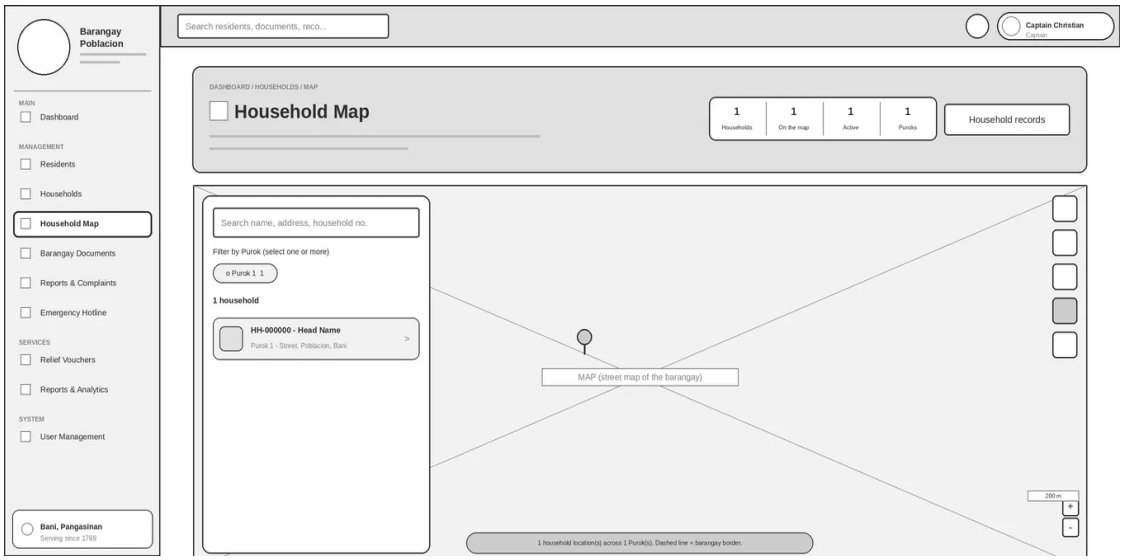


Figure 10. Household Map

Generate Barangay Voucher Feature

The Relief Operations and Vouchers feature allows authorized staff to manage a relief operation from start to finish in one place. The overview shows the number of operations (total, active, and completed), the total vouchers issued, and a progress bar for issued, claimed, waiting, and cancelled vouchers. A five-step guide (Create operation, Assess households, Encode beneficiaries, Generate vouchers, and Scan & claim) shows where the operation stands, and a Next Step card points staff to the next task. Staff can also start a new operation or switch to Scan QR to claim vouchers. The overview and step guide belong to the Presentation Tier, operation steps and voucher rules belong to the Application Tier, and operation, beneficiary, and voucher records are stored in the Data Tier.

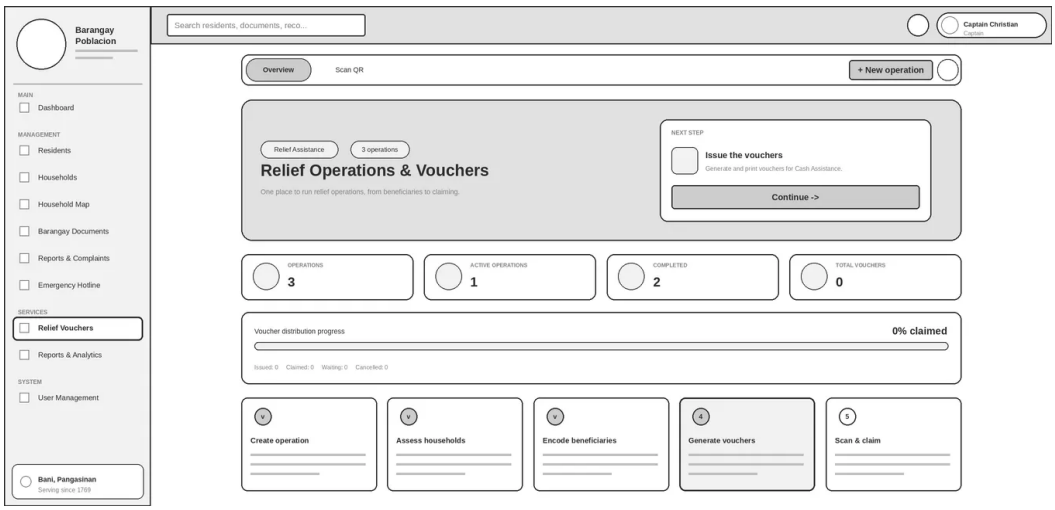


Figure 11. Generate Barangay Voucher

Relief Voucher Scanner

The Voucher Scanner feature allows authorized staff to verify and claim relief vouchers at distribution. Staff hold the voucher's QR code to the camera, and the system checks it and marks it as claimed automatically. If

the QR is damaged or the camera is unavailable, staff can type the voucher code instead. Counters show claimed and rejected vouchers, and a session list shows recent scans. Since the QR contains only the code, voucher details are retrieved from the database, so expired or cancelled vouchers are rejected. The scanner interface belongs to the Presentation Tier, verification and claim rules belong to the Application Tier, and voucher details and status are stored in the Data Tier.

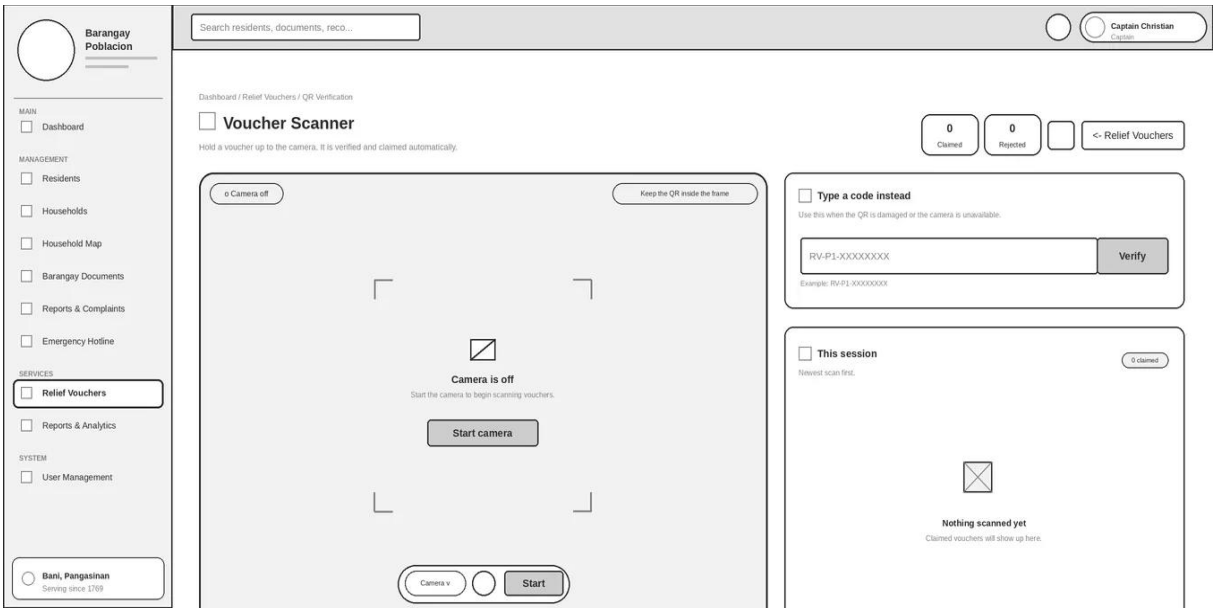


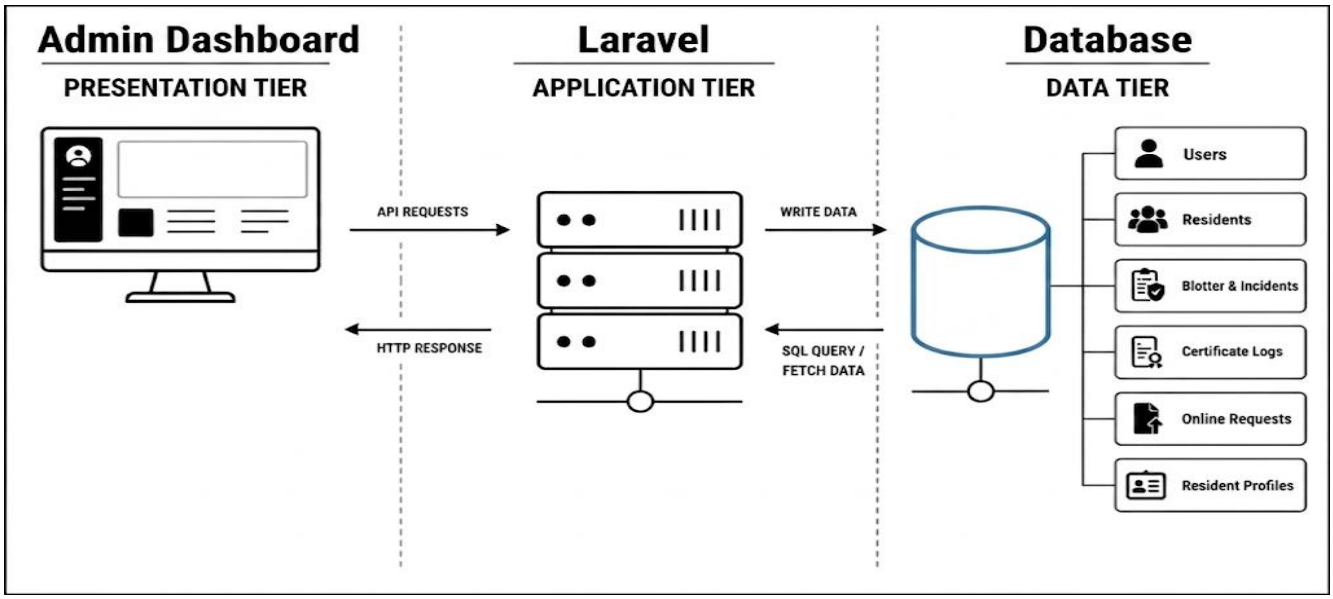
Figure 12. Voucher Scanner

System Architecture

The e-Poblacion system follows a Three-Tier Architecture composed of the Presentation Tier, Application Tier, and Data Tier. The tiers are separated according to their responsibilities but work together when an authorized user performs a system task. The Presentation Tier provides the web interface through which barangay officials and personnel access the system. It includes the login page, administrative dashboard, resident directory and entry forms, document-processing screens, blotter and incident forms, and voucher-generation and QR-verification interfaces. HTML, CSS, JavaScript, and Bootstrap are identified for the responsive web interface, while Figma is used to prepare the interface prototype. The Application Tier is the processing core, developed using Laravel and PHP. It handles authentication, role-based access, input validation, duplicate checking, resident and household rules, document request processing, incident recording, voucher generation and verification, dashboard computations, activity logging, and communication with the database. The Data Tier uses MySQL to store user accounts and roles, resident and household profiles, zone assignments, document requests and records, blotter and incident reports, relief vouchers, verification records, and system logs. Because the Data Tier holds sensitive identifiers such as National ID, PWD ID, and Solo Parent ID numbers, these columns are encrypted at the column level, and access to the database is limited to the Application Tier through restricted database accounts, in line with Republic Act No. 10173. Role-based access control is enforced on the server in the Application Tier, not only by hiding menu items in the interface: each request is checked against the user's role and permissions, so a staff account cannot call backend queries or open records that are reserved for the Punong Barangay or the Barangay Secretary. Access to sensitive fields is recorded in the activity log. This separation organizes the system functions and provides a basis for maintaining and extending individual components. Development tools include Visual Studio Code and Composer for writing and managing Laravel code, GitHub for version control and code sharing, XAMPP for the PHP and MySQL development environment, and Google Chrome for browser testing. To avoid a single point of failure in the centralized database, the online MySQL database is backed up on a schedule and replicated to the local barangay server, so records can be restored if either copy is lost or damaged. The Application Tier and Data Tier are kept on separate servers or services, so an update or fault in one does not take down the other. A local barangay server running the same Laravel and MySQL stack is proposed for selected offline operations. When internet access is unavailable, personnel may use the local network to log in with local accounts, search, add, and update resident records, and

process documents. Changes made offline are saved in a synchronization queue with timestamps and are sent to the online database automatically when connectivity returns, while changes made online are pulled to the local server on the same schedule so both copies stay close to current. If a record is changed in both locations, both versions are retained and flagged for staff review rather than automatically overwriting one another. Records are matched by resident ID during synchronization; failed synchronization attempts remain on the local server, are logged, and can be retried. Voucher claiming is excluded from offline operation because it requires access to the main database. This arrangement is considered in view of limited smartphone and internet access noted in humanitarian QR-code trials (Ramos, 2023).

Figure 13. Three-Tier Architecture



Source: Adapted by the Researcher from IBM (2024) and standard Three-Tier Architectural Frameworks.

Figure 13 shows how the three tiers work together and how the local server fits in. Staff enter requests through the Presentation Tier, which also displays the results. The Application Tier checks the request against the system's rules, then reads or updates records in the Data Tier and sends the response back to the screen. A local barangay server holds a copy of the application and database so selected functions can keep running during internet outages. The "Online Requests" label in the original architecture refers only to requests made in person and encoded by staff, since public online requests from residents are outside the study's scope.

Data Gathering and Analysis

Data is gathered and analyzed in five steps. First, interviews and observations are conducted, and the notes are grouped by recurring processes, problems, and system requirements. Second, a questionnaire based on software-quality characteristics is prepared and reviewed by the research adviser and IT experts. Third, respondents perform assigned tasks with the system. Fourth, they rate each statement from 5 (Excellent) to 1 (Poor). Fifth, respondent information is summarized with frequencies and percentages, and ratings are summarized with weighted means, which are interpreted using Table 2. User acceptability will be assessed using ISO/IEC 25010 quality characteristics, as in related barangay-system studies (Ballaran et al., 2023; Melendres & Aranda, 2024; Tosper et al., 2025). Staff will rate the functions and workflow they use, residents will rate the services they experience, and IT experts will assess the technical characteristics.

Table 2. Scale of Ordinal Measurement for User Acceptability Test

Scale	Statistical Limits	Rating	Descriptive Interpretation
5	4.21 - 5.00	Excellent	Requirements met; optimal functioning.
4	3.41 - 4.20	Very Good	Operational; acceptable functioning.

Scale	Statistical Limits	Rating	Descriptive Interpretation
3	2.61 - 3.40	Good	Operational; limited functionality.
2	1.81 - 2.60	Fair	Adequate; basic functioning.
1	1.00 - 1.80	Poor	Deficient or missing functionality

RESULTS AND DISCUSSION

The results and discussion are organized around the system requirements, the proposed Three-Tier Architecture, and the mapping of the e-Poblacion modules to the three tiers. The design responds to the existing record-management process in Barangay Poblacion, where Barangay Health Workers collect RBI information by zone and submit it to the Barangay Secretary for encoding. Paper-based files and separate digital records can make updating, searching, and retrieving information laborious. The identified need is therefore not only for additional digital forms but also for a system structure that centralizes records and assigns clear responsibilities to the interface, processing logic, and database. Table 3 summarizes how the existing operational concerns inform the proposed architecture and system functions.

Existing process or concern	Architectural response	Related system function
Paper files and separate digital encoding	Centralized Data Tier using MySQL	Resident and household records
Periodic updating and difficult record retrieval	Application Tier validation and record-search functions	Resident directory, resident entry, and zone filtering
Manual document request tracking	Application rules connected to stored document records	Document processing, approval status, printing, and release
Need to record community incidents	Role-controlled forms and persistent incident records	Blotter and incident recording
Need to monitor relief voucher status	QR-code lookup and database-controlled claim validation	Voucher generation, verification, and claim status
Need for administrative summaries	Application computations using centralized records	Administrative dashboard

Table 3. Relationship Between Identified Record-Management Concerns and the Proposed Architecture

System module	Presentation Tier	Application Tier	Data Tier
Login and user access	Login page	Authentication, session handling, role checks	User accounts, hashed passwords, roles, activity logs
Dashboard	Administrative dashboard	Summary calculations and status rules	Resident, household, and document records
Resident and household management	Directory, profile, and entry forms	Validation, duplicate checking, status handling, zone assignment	Resident profiles, household records, zone data
Barangay document processing	Request entry, preview, and print screens	Request workflow, approval status, document numbering, print logs	Resident and document records
Blotter and incident recording	Incident entry and retrieval screens	Access checks and incident processing	Incident and blotter records
Relief voucher management	Voucher generation, preview, scanner, status display	Code generation, QR lookup, validity and claim checks	Voucher details, status, and verification history

Offline operation and synchronization	Local-network access screens	Local processing, synchronization, conflict flagging, retry logging	Local database copy and online MySQL records
Security and access control	Role-restricted screens	Server-side role checks, field encryption, access logging	Encrypted sensitive columns, role tables, access logs

Table 4. Mapping of e-Poblacion Modules to the Three-Tier Architecture

The e-Poblacion system uses a three-tier design that keeps the interface, the rules, and the stored records separate. The Presentation Tier gives barangay personnel screens for login, the dashboard, resident records, document requests and printing, blotter and incident reports, and vouchers with QR verification; residents do not use the system directly and still submit requests in person at the barangay hall. The Application Tier, built with Laravel and PHP, handles login, role permissions, field validation, duplicate checking, document numbering, voucher codes, claim checking, activity logging, and syncing between the local and online systems. The Data Tier, built with MySQL, stores user accounts, resident and household records, documents, incident reports, vouchers, and activity logs. Access is controlled by role: the Barangay Secretary and designated administrators can add, edit, archive, and export records, and blotter records are limited to the Punong Barangay, the Barangay Secretary, and authorized staff. Passwords are hashed, activity logs record who did what and when, and regular backups are planned for recovery. Deployment should be coordinated with the municipal data protection officer, following DILG Memorandum Circulars 2024-135 and 2021-002. The system has limits: QR scanning checks only the voucher code and status, so staff must still verify the claimant's ID; a local server allows some tasks to continue during internet outages, but syncing needs a connection, and conflicting edits are kept and flagged for review; voucher claiming works online only to prevent double claims; and the system covers only internal record-keeping in Barangay Poblacion, with data quality depending on staff input. Because no user acceptability data has been collected yet, the study reports no measured improvements, and performance and reliability should be evaluated after deployment or controlled user testing.

The design also addresses weaknesses commonly found in local government record systems. For data privacy and governance, the system handles sensitive personal data such as National ID, PWD ID, and Solo Parent ID numbers, so these fields are encrypted at the column level, database accounts are restricted by purpose, and viewing or exporting sensitive fields is logged, which supports compliance with Republic Act No. 10173. For access control, authorization is enforced vertically on the server: roles such as Barangay Staff, Barangay Secretary, and Punong Barangay each have a defined set of permissions, every request is checked against them, and records intended only for the Punong Barangay, such as blotter and case details, are not reachable by lower roles even if a user alters a request. Role assignments are reviewed regularly, and failed access attempts are logged to help detect privilege-escalation attempts. For availability, scheduled backups and replication to the local server reduce the risk that a single database failure stops barangay operations. For connectivity, offline changes are queued and synchronized when the connection returns, with conflicting edits flagged for staff review. These measures are part of the design only and have not yet been tested, so a security review and penetration test are recommended before deployment.

CONCLUSION

This study presents the design of e-Poblacion, a web-based record management system for Barangay Poblacion, Bani, Pangasinan. It is based on the barangay's current procedures: collecting resident information by zone, updating it periodically, and keeping paper records that are later encoded digitally. The system would provide centralized resident and household records, document processing, blotter and incident recording, QR-coded relief vouchers, and an administrative dashboard. Its main contribution is a three-tier architecture that separates what staff see (Presentation Tier), the rules the system applies (Application Tier, built with Laravel and PHP, covering login, access control, and validation), and where records are kept (Data Tier, built with MySQL). Each module is assigned clear responsibilities across the three tiers. The design also responds to common weaknesses of local government systems by encrypting sensitive fields, enforcing role-based authorization on the server, backing up and replicating the database, and queueing offline changes for synchronization. Because user

evaluation and full testing have not been done, the study does not claim that the system improves speed, accuracy, or security. The system would be developed using Agile, refining the interfaces, functions, and data in repeated cycles. A local barangay server would let some resident and document tasks continue during internet outages, then sync with the online database once the connection returns, while voucher claiming needs the main database and does not work offline. Before implementation, a security review should be completed, and the barangay should confirm document templates and user roles, check the accuracy of existing records before encoding them, coordinate privacy responsibilities with the municipal data protection officer, and decide who will host the system and handle backups and maintenance. Staff training, technical testing, user evaluation, and a formal handover of the system, documentation, and administrator accounts are also recommended before the system is used in daily operations.

REFERENCES

1. Ballaran, M. J. G., Donaire, M. J. M., Singzon, R. M., Naz, S. M., Tanael, D. V., & Centeno, C. J. (2023). Development and evaluation of web-based barangay profiling and issuance system using regression analysis. World Journal of Advanced Research and Reviews, 20(3), 60–72. https://doi.org/10.30574/wjarr.2023.20.3.2404
2. Department of the Interior and Local Government. (2021). Reiteration of the provisions of Memorandum Circular No. 2018-36 dated March 19, 2018, "Designation of Data Protection Officers pursuant to Republic Act No. 10173, titled Data Privacy Act of 2012" (Memorandum Circular No. 2021-002).
3. Department of the Interior and Local Government. (2024). Amendments to the DILG Memorandum Circular (MC) No. 2018-36 relative to the appointment of Data Protection Officer (DPO), registration of Data Processing System (DPS), and display of the National Privacy Commission (NPC) Seal of Registration (SOR) by Local Government Units (LGUs) in compliance with the NPC Circular No. 2022-04 (Memorandum Circular No. 2024-135).
4. International Organization for Standardization & International Electrotechnical Commission. (2023). ISO/IEC 25010:2023 Systems and software engineering—Systems and software Quality Requirements and Evaluation (SQuaRE)—System and software quality models.
5. Manun-og, M. (2023). Development of registry of inhabitants record management system: A support tool for local governance. Journal of Engineering and Technology, 14(2). https://jet.utem.edu.my/jet/article/download/6418/4265/18715
6. Melendres, U. M., & Aranda, K. M. (2024). Development and evaluation of a web-based resident information management system. Journal of Computer, Software, and Program, 1(1), 14–22. https://doi.org/10.69739/jcsp.v1i1.50
7. Philstar.com. (2024, July 4). DSWD replicating Capitol's QR system. The Freeman. https://www.philstar.com/the-freeman/cebu-news/2024/07/04/2367682/dswd-replicating-capitols-qr-system
8. Ramos, R. (2023). Australia piloting QR codes on humanitarian supplies. Palladium. https://devwww.thepalladiumgroup.com/news/Australia-Piloting-QR-Codes-on-Humanitarian-Supplies
9. Renaudin, P. (2026). Agile methodology: Values, principles & frameworks guide. Slite. https://slite.com/learn/agile
10. Tosper, R. M., Jr., Mangalino, J. T., Obena, K. T., Simon, M. C., Tayag, M. A., Villano, K. J., & Reyes, D. A. (2025). WebYu: A Barangay Yuson web-based information management system initiatives. Psychology and Education: A Multidisciplinary Journal, 37(5), 432–442. https://doi.org/10.70838/pemj.370502