ClickMap: A Visual-Based Household Management Interface for SHALOM HAMOD BATAD

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Abstract - This study presents ClickMap: A Visual-Based Household Management Interface specifically developed for SHALOM HAMOD BATAD to streamline the administration of household data through an intuitive, stand-alone desktop application. The system integrates a static visual map interface with an interactive household management module, enabling barangay officials and DSWD personnel to efficiently register, update, and monitor resident information in an offline environment. Designed using the Rapid Application Development (RAD) model, ClickMap underwent iterative prototyping and user-driven refinements to ensure alignment with administrative workflows. The system was evaluated using the ISO/IEC 25010 Software Quality Model and the Computer System Usability Questionnaire (CSUQ), yielding high ratings in functionality, reliability, maintainability, and usability. Results demonstrate ClickMap's effectiveness in enhancing data accessibility, improving operational efficiency, and minimizing manual workload. The platform offers a scalable solution for future enhancements, including potential integration with automated systems and broader applications in community-based housing management.

Keywords: Household Management, Visual-Based Interface, Data Management System

I. INTRODUCTION

In 2013, the Philippines was strucked by a trifecta of disasters namely the armed conflict in Zamboanga, a powerful 7.3 magnitude earthquake in Bohol province, and the most devastating of all—Super Typhoon Yolanda, internationally known as "Haiyan," which caused widespread destruction across several islands in the Visayas (Blanco, 2015) including the province of Iloilo.

The devastation caused by Super Typhoon Yolanda exposed significant deficiencies in disaster preparedness (Dariagan et al., 2021) andcommunity-level housing management (Gomez, Jr, 2017) prompting the Local Government Unit (LGU) of Batad to initiate the Shalom Hamod Housing Project as a strategic response to address these critical challenges. Nevertheless, the project has been hampered by the use of out-dated manual systems for managing with occupant information, which has generated administrative inefficiencies, misallocations of resources, and delays that hinder prompt disaster response.

In the current digital age, the housing industry can be significantly improved through sophisticated information management systems since effective organization, analysis, and utilization of housing data have the capability to transform housing solutions and urban planning (Maksimenko et al., 2021). Housing administration and mapping tools have moved toward digitalization and more efficiency, and as pointed out by (Chiang et al., 2016). The integration of a visual-based map interface in housing management presents a critical scientific challenge, meriting focused research initiatives aimed at advancing the development of automated systems (El-Anwar & Chen, 2016) to support community-based projects such as Shalom Hamod.

This study proposes ClickMap: A Visual-Based Household Management Interface for SHALOM HAMOD BATAD system designed to enhance the administration of the Shalom Hamod Batad Housing Project through the integration of advanced mapping technology. Unlike the existing manual data processing methods—which are inefficient, error-prone, and lack scalability—ClickMap offers a software-based platform featuring an interactive static map with clickable household markers. These markers trigger contextual pop-up panels that display comprehensive household information, including photographs and address details.

The system supports robust household management through user-friendly registration forms, editable records, and duplicate entry validation mechanisms, thereby ensuring data integrity and operational efficiency. Although ClickMap has already enhanced housing management in Shalom Hamod Batad, continues research and development are still necessary to maximize its potentials and respond to changing needs of disaster-risk areas in order to potentially set new standards for housing management and urban resilience in the Philippines.

A. OBJECTIVES OF THE STUDY

This study aims to develop ClickMap: A Visual-Based Household Management Interface for SHALOM HAMOD BATAD.

Specifically, it aims to:

1. Design a standalone visual-based platform that
   a. Features an interactive static map interface for household identification,
   b. Allows dynamic display of household information upon user interaction.
2. Develop a system interface for
   a. Efficient household data management by barangay officials and DSWD,
   b. Secure data storage and retrieval of household profiles,
   c. Handling photo documentation and member details,
   d. Ensuring data integrity during addition, updating, and deletion of records.
3. Evaluate the system's quality using
   a. ISO/IEC 25010 software quality model to assess functionality, reliability, and maintainability,
   b. Computer System Usability Questionnaire (CSUQ) to determine system usability, ease of use, and user satisfaction.

B. CONCEPTUAL FRAMEWORK

The conceptual framework of *ClickMap* is rooted in human-centered design and static visual mapping techniques to enhance the administration and monitoring of household information in the SHALOM HAMOD BATAD housing project.

Input data, including household registration records, family member profiles, address references, and visual documentation (e.g., household photos), are collected and encoded by barangay officials and DSWD personnel using structured digital forms. This data is verified for completeness and duplication to ensure data integrity during the encoding process. The encoded data is then organized and represented within a static map interface, where each household is linked to a corresponding clickable marker. Clicking on a marker triggers an interactive pop-up panel containing essential household details such as address, family composition, and visual references.

The system provides tools for record editing, status tracking, and quick search functionalities to improve administrative access and information retrieval. The system output is a visual and database-driven representation of the entire SHALOM HAMOD housing community. It allows authorized users to efficiently monitor, update, and validate resident information without relying on manual or paper-based methods. The framework emphasizes usability, accuracy, and administrative efficiency.

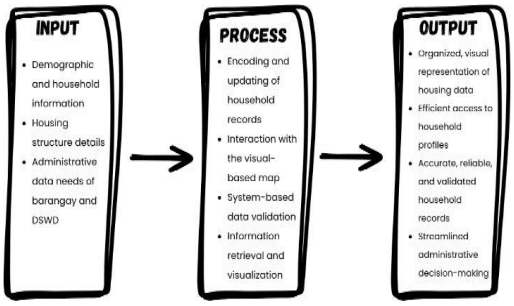

Figure 1. *Conceptual framework of the system.*

II. METHODOLOGY

A. Research Design

This study used descriptive (Rachmadtullah et al., 2023) and developmental (Ibrahim, 2016) research designs. The descriptive phase aimed to assess the existing household record-keeping practices and identify the challenges faced by the community officials and residents of SHALOM HAMOD BATAD in managing household data and accessing information efficiently. The developmental phase involved designing, developing, and testing the *ClickMap: A Visual-Based Household Management Interface*, which provides a static map-based visualization of households with interactive features to view and manage household data.

This dual-phase approach was selected to better understand the current system's limitations and to propose a user-friendly visual solution that enhances accuracy, accessibility, and data management within the community.

Respondents were chosen using a convenient purposive sampling technique, targeting individuals who are directly involved in community household data processing and those who would benefit from the visual-based system. The participants of the study included 3 SHALOM HAMOD BATAD barangay officials, 3 DSWD personnel, and 3 IT professionals who were selected to test the usability and functionality of the proposed interface. The study was conducted from September to December 2024 at SHALOM HAMOD BATAD.

B. System design

The system is designed as a desktop- based platform with a static visual map interface that allows

users to manage and access household information within the SHALOM HAMOD BATAD community. Unlike web- based systems, this solution is intended for offline use within the barangay office, ensuring reliability and accessibility even without internet connectivity.

At its core, the system features an interactive visual mapping interface, where clicking on predefined house icons reveals detailed information about each household, such as the head of the family, household members, address, and uploaded image of the household head. The interface is built with simplicity and clarity in mind to accommodate both technical and non-technical users. Household data is stored locally in a database, with features that allow users to add, edit, delete, and view household records. A modal-based form is used for data entry, including a photo upload option for head-of-household identification. The use of a static map ensures quick rendering and minimal system requirements, making it highly suitable for barangay-level deployment.

C. Software development life cycle

Rapid Application Development (RAD) was adopted in this study to overcome the limitations posed by traditional linear development models, such as the waterfall model. RAD emphasizes quick prototyping, iterative development, and continuous user feedback to ensure that the system evolves according to actual needs and usability. This approach allowed the researchers to deliver a functional, efficient, and user-centered household management interface within a shorter development timeline. Figure 2 llustrates the Software Development Life Cycle (SDLC) model followed by the researchers in creating the system.

The Rapid Application Development (RAD) Software Development Life Cycle (SDLC) model is ideal for your Neural Network System for Programming Proficiency due to its focus on quick development and iterative prototyping. In the requirement planning phase, you will gather functional requirements from students, instructors, and industry experts. During the user design phase, an initial prototype will be developed to showcase core features such as the modular curriculum, automated grading, and neural network-driven learning paths, with continuous feedback from users to refine the system. The construction phase will focus on developing and fine-tuning the system, incorporating real-time feedback, and adjusting the neural network for personalized learning. The cutover phase involves final deployment and user training, while the maintenance phase ensures continuous improvements based on ongoing feedback. The RAD model allows for rapid development, frequent iterations, and adaptability, ensuring the system meets evolving educational needs efficiently.

***Figure 2**. Software Development Life Cycle*

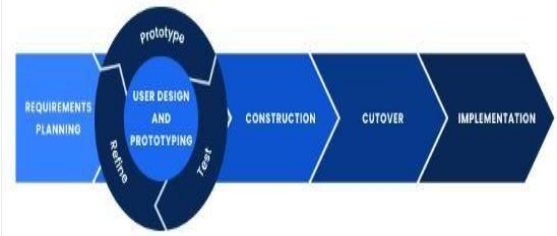

***Figure 3.** Rapid Application Development model*

D. System Architecture

The system architecture is engineered as a standalone, desktop-based application designed for efficient local deployment within the barangay office setting. It integrates data visualization, local interaction, and household information management within a lightweight, modular architecture.

At the core is the Application Layer, developed using a local executable runtime (XAMPP 3.0), which provides a graphical interface for barangay personnel. The Graphical User Interface (GUI) displays a static, visually mapped representation of the barangay's households, where each house icon is mapped to a unique identifier stored in the database. By clicking a household location, the system triggers a local event that fetches and displays household details dynamically.

The Household Data Management Module handles CRUD (Create, Read, Update, Delete) operations for household records, including house number, head of household, number of members, address, and an associated image file. Input validations and logic constraints are embedded within this module to maintain data consistency and integrity.

All records are stored in a local relational database (e.g., MySQL with MariaDB), which functions as the centralized data repository. This includes household metadata, file paths for profile images, and geographic identifiers that correspond to mapped locations on the static interface.

The Map Interaction Handler synchronizes the user interface with the backend data bymapping click events to database queries. This module acts as the bridge between the static visual layer and the dynamic data layer, allowing the system to emulate a geographic interaction without relying on real-time geolocation services.

Designed with modularity in mind, the system supports future integration of auxiliary modules such as SMS notification systems and basic analytics, ensuring adaptability to evolving operational needs.

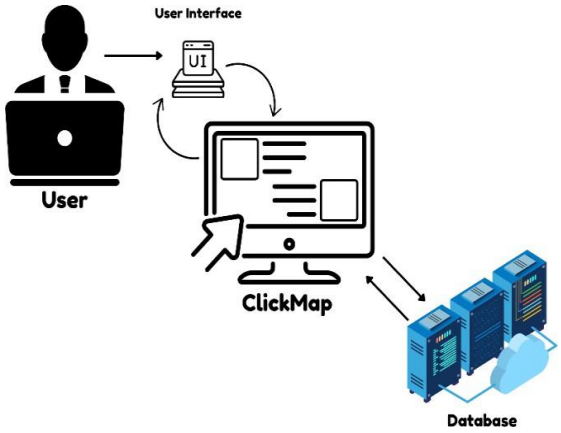

Figure 4. *System Architecture of the system.*

E. Deployment of the System

The ClickMap system is deployed as a locally executable, standalone application designed for use within the SHALOM HAMOD BATAD community.

The system is developed using HTML, CSS, JavaScript, and PHP, and utilizes XAMPP as its local development and deployment environment. XAMPP provides an integrated Apache HTTP Server, PHP interpreter, and MySQL database engine, which collectively enable the system to function as a full-stack household management interface.

The tool has two major parts:

a. Visual-Based Interface (Map Interaction Module)
b. Household Management Module

F. Visual-Based Interface (Map Interaction Module)

This is the part of the system where the user (e.g., barangay staff) interacts with a static digital map representing the physical layout of

SHALOM HAMOD BATAD. Each household is visually represented by a clickable marker or icon. The map serves as an intuitive front end that bridges real-world locations with digital household records.

It has four major parts:

1. Static Map View – This displays a pre-designed image or graphical layout of the community. The layout mimics the actual spatial arrangement of households within the barangay.
2. Interactive Markers – These clickable elements are placed precisely over each house on the static map. When clicked, they trigger the retrieval of the corresponding household's information from the database.
3. Information Popup Panel – Once a marker is clicked, this panel appears to show key household details such as house number, head of household, number of members, and address. This ensures quick and easy access to data without switching pages.
4. Navigation & Zoom Controls – Though not dynamic like Google Maps, this feature allows basic navigation (such as panning or zooming) to help users focus on specific areas of the barangay map.

G. Household Management Module

This module is responsible for managing all household data in the system. It allows authorized users to perform create, read, update, and delete (CRUD) operations on household records. The interface is designed to be user-friendly for non-technical staff while ensuring proper data validation and structure.

It has five major parts:

1. Household Registration Form – This section provides input fields for adding new household entries. Users can enter details like house number, household name, head of household, number of members, address, and upload images.
2. Household Data Table – Displays a complete list of registered households in a tabular format, sorted typically by house number. Each row includes actions like edit or delete for convenient management.
3. Edit/Delete Operations – Allows modification or removal of existing entries. Changes are immediately reflected in both the data table and the visual map interface.
4. Duplicate Validation System – Automatically checks for duplicate house numbers during entry to avoid data inconsistencies.
5. Image Upload & Display – Supports

attaching and displaying household photos which help in visually confirming house identities, especially in map mode.

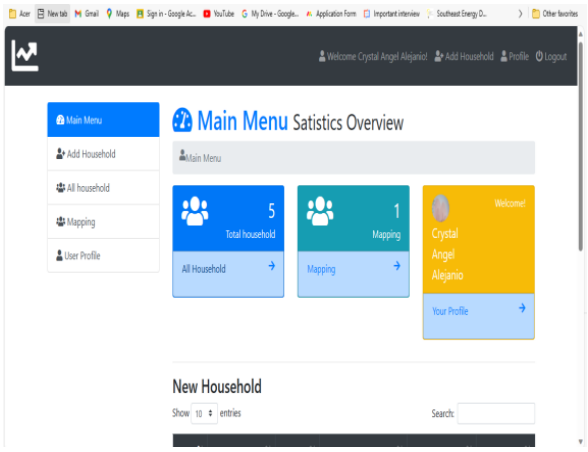

***Figure 5**. Main menu page.*

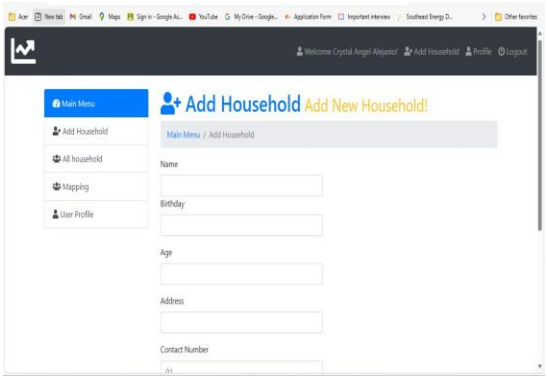

***Figure 6.** Add household page*

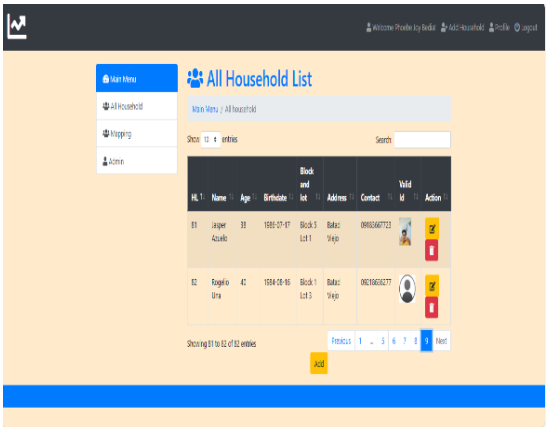

***Figure 7**. Household List page.*

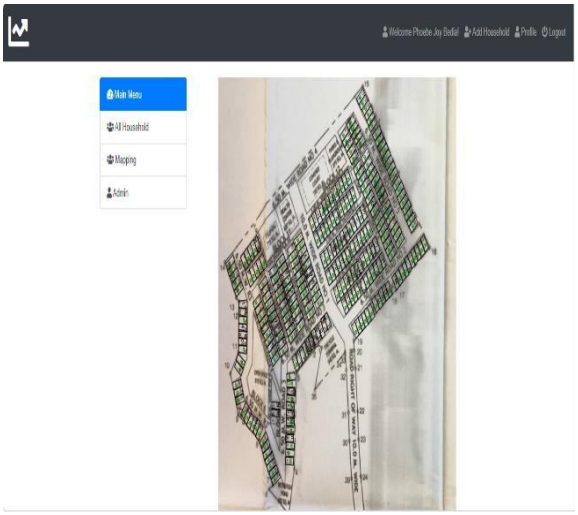

***Figure 8.** Map of SHALOM HAMOD BATAD Household.*

H. Data Entry and Management

This component handles the structured input, storage, and updating of household information in the system. It is designed to ensure that all data related to households in SHALOM HAMOD BATAD is systematically recorded and easily retrievable. The process begins with manual data entry performed by barangay staff, where they input essential information such as house number, house name, head of household, number of members, address, and associated images.

All data entered is validated to prevent duplication, ensure format consistency, and maintain the integrity of records. Once validated, the information is stored in a local relational database. The system provides an intuitive form interface for adding new households, editing existing entries, and deleting outdated or incorrect records.

The data stored serves as the foundation for the map interaction module. When a user clicks on a house icon in the visual interface, the corresponding data is fetched from the database and displayed, enabling easy monitoring and management of household profiles.

J. Respondents

The study's respondents included three key groups, each offering valuable perspectives on the ClickMap system. Three barangay officials from SHALOM HAMOD BATAD participated, providing feedback on the system's usability, functionality, and effectiveness in managing household information through the visual-based map interface. Additionally, three DSWD personnel assessed the system's potential to support community-based welfare efforts, specifically in validating resident data and improving the efficiency of aid distribution and social monitoring. Furthermore, three IT professionals,

recognized as industry experts with extensive software development and system architecture experience, evaluated the system's design, performance, and scalability, ensuring that it aligns with best practices in software development and can adapt to future innovations such as mapping APIs or SMS integration.

Table 1. Distribution of the respondents

Type of Respondent		Percentage
Total Population		**100 %**
Barangay officials		33.33%
DSWD personnel		33.33%
IT Professionals (experts)		33.33%

K. Research Instrument

For the Expert Evaluation, the study employed the ISO/IEC 25010 Software Quality Model to assess critical attributes such as functionality, reliability, and usability. A structured questionnaire aligned with the standard was distributed to barangay officials and DSWD technical staff with IT or administrative expertise, ensuring that their feedback was grounded in practical system use and service delivery relevance.

For the User Evaluation, the Computer System Usability Questionnaire (CSUQ) was adapted to fit the nature of the ClickMap system. It focused on aspects such as ease of navigation through the visual-based interface, responsiveness of the household information retrieval, and overall user satisfaction. The CSUQ provided quantifiable data on the system's interface design and its effectiveness in supporting barangay-level household data management tasks.

In this study, the researchers employed standardized instruments aligned with the specific objectives of developing the ClickMap: A Visual-Based Household Management Interface for SHALOM HAMOD BATAD. To achieve Objective 1, which focuses on developing an intuitive visual-based interface, the Computer System Usability Questionnaire (CSUQ) was utilized to assess the system's usability, user satisfaction, and ease of navigation. This ensured that the map interaction module provided a user-friendly and efficient experience for barangay officials and DSWD personnel.

Table 2. Five-point likert scale with the mean range interpretation for the user.

Mean Score	Verbal Interpretation
4.21 – 5.00	Excellent
3.41 – 4.20	Very Good
2.61 – 3.40	Good
1.81 – 2.60	Fair
1.00 – 1.80	Poor

For Objective 2, which involves the development of a functional and reliable Household Management Module, the ISO/IEC 25010 Software Quality Model was applied. This international standard was used to evaluate key software attributes such as functional suitability, reliability, and data integrity, ensuring that the system met essential quality benchmarks for managing household profiles. To fulfill Objective 3, which centers on assessing the overall acceptance of the system, the CSUQ was again employed to evaluate how effectively the system streamlined data .retrieval, updates, and visualization. The tool also measured the impact of the system on reducing manual workloads and improving data transparency, while the ISO/IEC 25010 continued to ensure the system's performance met quality standards.

Table 3. Seven-point likert scale with the mean range interpretation for the expert

Mean Score	Verbal Interpretation
6.1 – 7.0	Excellent
5.1 – 6.0	Good
4.1 – 5.0	Adequate
3.1 – 4.0	Fair
2.1 – 3.0	Poor
1.0 – 2.0	Very Poor

L. Data Gathering Procedure

The study employed both interviews and questionnaires to gather comprehensive data. Questionnaires were administered to three barangay officials and three DSWD personnel who served as the system's primary users. The evaluation utilized the Computer System Usability Questionnaire (CSUQ) to assess the system's usability, user satisfaction, ease of

navigation, and overall user experience. The survey included both closed-ended questions for quantitative assessment and open-ended questions to gather qualitative feedback on system efficiency and practicality in managing household information. Meanwhile, structured interviews were conducted with three IT experts, all with backgrounds in system development and user-interface design. These interviews aimed to obtain expert insights on the system's functionality, software quality, and its potential for future scalability and integration, especially in alignment with the ISO/IEC 25010 Software Quality Model. The expert feedback also highlighted areas for improvement and confirmed whether the system meets technical and performance standards.

K. Data Analysis

To evaluate the ClickMap: A Visual- Based Household Management Interface for SHALOM HAMOD BATAD, the researchers employed a combination of quantitative and qualitative analysis methods. For the usability evaluation, the Computer System Usability Questionnaire (CSUQ) responses from barangay officials and DSWD personnel were analyzed using a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This allowed the researchers to quantify user satisfaction, ease of navigation, and perceived system efficiency.

The mean score was calculated for each usability criterion to determine the overall effectiveness and acceptance of the system among end-users.

For the expert evaluation, responses from IT professionals were analyzed based on the ISO/IEC 25010 Software Quality Model, focusing on attributes such as functional suitability, reliability, maintainability, and scalability.

III. RESULTS AND DISCUSSION

The Visual-Based Interface (Map Interaction Module) was evaluated using the CSUQ instrument to gather usability feedback from barangay officials and DSWD personnel.

The Visual-Based Interface (Map Interaction Module) achieved an overall mean score of 6.35, interpreted as excellent, indicating that respondents found the interface intuitive, easy to navigate, and efficient for interacting with household data through the digital map. This confirms that the system effectively supports its target users in managing household information using a visual-based layout.

The Household Management Module was evaluated using the ISO/IEC 25010 Software Quality Model to measure software attributes such as functionality, reliability, and maintainability.

Table 4. CSUQ ratings for the visual- based interface (7-point likert scale)

Criterion	Mean	Verbal Interpretation
Ease of Use	.5	Excellent
System Navigation	.3	Excellent
Information Clarity	.4	Excellent
User Satisfaction	.2	Excellent

The Household Management Module received an overall mean score of 6.35, interpreted as excellent, which reflects the system's strong performance in storing, managing, and validating household profiles. Respondents affirmed that the system maintained reliable operations, ensured data accuracy, and was easily maintainable for future improvements.

Table 5. ISO/IEC 25010 software quality ratings for the visual-based interface (7-point likert scale)

Criterion	Mean	Verbal Interpretation
Functional Suitability	.4	Excellent
Reliability	.3	Excellent
Maintainability	.2	Excellent
Data Integrity	.5	Excellent

CONCLUSIONS

The development of ClickMap: A Visual-Based Household Management Interface for SHALOM HAMOD BATAD successfully addressed the challenges of manual household data management by providing an intuitive, efficient, and reliable desktop-based system. The following conclusions were drawn:

1. The study effectively designed a standalone desktop application with an interactive static map interface capable of effectively conducting household

identification and dynamic display of household information. Users experienced seamless map interaction with efficiency and effectiveness, providing prompt access to thorough household profiles directly from the visual interface, serving the purpose of creating an end-user-friendly and accessible visual-based platform.

2. The household management module was designed with sound features enabling quick data entry, secure storage, and retrieval of household profiles. It had indispensable functionalities like CRUD operations, photo documentation, duplicate validation and data integrity controls. The system proved high reliability, high functionality, and high maintainability, and ensured barangay and DSWD staff have the ability to manage household records accurately and safely.

3. Using the ISO/IEC 25010 Software Quality Model and the Computer System Usability Questionnaire (CSUQ), the system was evaluated to have excellent performance across key software quality attributes, including functional suitability, reliability, and maintainability, as well as superior usability and user satisfaction. The evaluation results confirmed that ClickMap efficiently supports its intended users by simplifying household data management while meeting international software quality standards.

RECOMMENDATIONS

1. Barangay officials and community stakeholders are encouraged to adopt ClickMap as the primary tool for household data management to enhance accuracy, accessibility, and efficiency in record-keeping within SHALOM HAMOD BATAD.

Training will be provided so users can familiarize themselves with the interactive map interface and management tools of the system to achieve easy transition from manual to digital processes.

2. Future development can be directed towards inclusion of add-on modules like SMS alert systems for community notifications and simple analytics software to facilitate data-driven decision-making.

3. Systematic collection of feedback from users through barangay officials, DSWD staff, and IT specialists should be made routine to inform successive i mprovements. Regular maintenance and periodic updates will help keep ClickMap operational, accessible, and synchronized with the evolving te chnologiesand the needs ofthe community.

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