

**EMPOWERING COMMUNITIES WITH ELDERLINK: A COMPREHENSIVE
INFORMATION MANAGEMENT SYSTEM FOR COMMUNITY
ADMINISTRATION AND ENGAGEMENT AMONG SENIOR CITIZENS**

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CHAPTER I

INTRODUCTION

This chapter introduces the proposed project, providing an overview of its context, purpose and description, objectives, and scope. This part outlines the global and local situational analysis, highlights the advantages of the technology, discusses the background and problems faced by the client, and proposes solutions. Additionally, it shows the project's objectives, including the possible features of the system, presenting the scope of the project along with its limitations.

Project Context

According to the World Health Organization (WHO) (2020), community empowerment means helping communities to have more control over their own lives. Communities are groups of people who share things in common, like interests or concerns, even if they do not all live in the same place. These groups can be small, like in the neighborhood, or big, across the country, or even worldwide. Empowerment, on the other hand, refers to giving people the ability to get what they need and want, like the connection with others, support, and the ability to speak up for themselves. They also highlighted in the same study the critical role that the community plays in assisting individuals in achieving empowerment through cooperation, support, and direction.

In the societal landscape, community empowerment emerges as a strategic imperative, addressing the fundamental needs and aspirations of diverse groups within the community. “When individuals unite for a common purpose, they possess greater authority than they perceive. However, some groups or communities are more vulnerable

than others" (Kruahong et al., 2023). In a similar concern, Damiano (2019) has highlighted that older members of society are often marginalized as their roles as caregivers and providers gradually diminish. Consequently, they are frequently overlooked, tucked away, and their existence and presence seem to become unrecognized and underappreciated within their households and communities, including within *barangays* – the grassroots units of governance in the Philippines.

According to Scott (1997), the name "*barangay*" comes from the Malay word "balangai," which describes the boats that the Malay ancestors used to travel to the Philippines. It became the smallest political unit in Tagalog society over time, usually made up of a few families or homes. Moreover, Porio and Roque-Sarmiento (2019) also stated that the *barangay* is the smallest political administrative unit in the Philippine government system. Along with municipal and provincial administrations, the *barangay* forms the core of the Philippine national government. The core of these communities lies in their diverse membership, which is composed of individuals with a wide range of ages, backgrounds, and experiences. However, in the middle of this patchwork of social components, the welfare of elderly Filipinos is occasionally disregarded within the *barangay* structure, despite their significant contributions.

Elderly people frequently complain about being denied fair treatment by their relatives and from the community (Small, 2018). This oversight contradicts the principle of inclusivity fundamental to community welfare and diminishes the *barangay*'s cohesion and collective strength. To rectify this oversight, a significant initiative has been undertaken: the establishment of the Office of the Senior Citizens Affairs (OSCA), which aimed at providing support and assistance to elderly residents within barangays; and the

Senior Citizen Act, also known as Republic Act 7432 (1992) that was enacted to maximize the contribution of senior citizens to nation-building, grant benefits and special privileges, and for other purposes. However, despite the presence of OSCA, challenges still persist in ensuring adequate care and attention for senior citizens. Some of these challenges have been addressed in a similar study by Carandang et al. (2019) concerning OSCA, which highlights the complex needs of senior citizens, including disabilities, physical illnesses, and social requirements. The gap between the intended support provided by OSCA and the reality of senior citizens' experiences within barangays emphasizes the pressing need to bridge this disparity and develop comprehensive solutions to address the welfare concerns of Filipino senior citizens effectively.

In an era dominated by ever-changing technological advancements, innovative solutions are essential to bridge the gap between the intended support for senior citizens and the actual delivery of services within *barangays*. Administrators are vital to the smooth running of local communities since they handle vital data such as financial records, project details, citizen data, and community information. Administrators help ensure that the community runs well by supervising these positions. According to Kong (2020), "Technology by itself is not a panacea and will not — on its own — empower hard-hit communities." It must be used in conjunction with initiatives that center on fostering relationships and increasing the ability of the community to meet needs. Thus, the implementation of Elderlink, a Barangay Information Management System designed for community administration and engagement among senior citizens offers a promising solution to this pressing issue. This technology-driven platform revolutionizes the management and delivery of services for elderly residents within *barangays* by providing

efficient data management, streamlined communication channels, and targeted service delivery.

Elderlink is a web-based system that makes it easier to accurately assess the requirements of senior adults, provides prompt access to resources and services, and encourages community participation and active engagement through efficient administration. By utilizing digital tools and capabilities, *barangays* can improve their ability to effectively handle the welfare concerns of elderly Filipino residents and ensure their inclusion, dignity, and well-being in the community by leveraging digital tools and skills. As a result, Barangay Mojon, which is located in the City of Malolos, is essential to the application of this proposed project. This *barangay* serves as a link between the desired support for elderly residents and the actual provision of services within the community, making it a tiny but crucial unit of government in the nation.

“It is essential to explore the actual needs and preferences of senior citizens to identify which assistance and services to provide that will improve their quality of life” (Carandang et. al., 2019). Through this system, senior citizens can receive assistance and support in various ways. Initially, it simplifies access to healthcare for them. The provision of healthcare for senior citizens poses a significant challenge, particularly concerning assistance and support. A comparable article by Gamboa (2019) emphasized the need for additional government support, specifically for healthcare expenses faced by senior citizens. While free medical services are available at the *barangay* level, they often fall short of addressing the comprehensive healthcare needs of the elderly. With this system, *barangay* officials can effectively monitor and attend to the medical needs of senior citizens, including medical appointments and medications, ensuring timely

assistance when required, thereby enhancing the overall healthcare experience for elderly residents.

Furthermore, Elderlink assists in managing and maintaining important records for senior citizens, particularly those related to pensions and benefits. According to Paña (2020), senior citizens who are beneficiaries of the social pension programs often rely on assistance. This reliance underscores the importance of securely storing their personal information and financial records, ensuring that seniors' entitlements are accurately tracked and managed. This includes pension payments, social security benefits, and other forms of assistance they may be eligible for. With this comprehensive record-keeping functionality, seniors can have peace of mind knowing that their financial affairs are in order and that they are receiving the support they are entitled to.

Elderlink aims to enhance the well-being of senior citizens by promoting both their health and their sense of community connection. In empowering communities, the pressing need to address the welfare concerns of senior citizens within *barangays* emerged as a crucial matter. Therefore, to develop the system, the participation of Barangay Mojon is necessary for implementing a Barangay Information Management System tailored specifically for the community administration and engagement of senior citizens.

Purpose and Description

This study aims to create and deploy a comprehensive information management system that specifically targets community administration and engagement among senior citizens in Barangay Mojon, Malolos, Bulacan. Acknowledging the need to address

senior citizens' welfare concerns within *barangays* can help close the gap between the intended support for them and the actual delivery of services within the community. The following beneficiaries are:

Senior Citizens. The study will provide technology-driven support to senior citizens by making it easier to access healthcare services, such as scheduling medical appointments and medication management. Furthermore, it will help with document management including pensions and benefits, ensuring accurate monitoring and timely distribution of entitlements. By improving their access to services and encouraging involvement in the community, senior citizens will experience an improved quality of life and a stronger sense of well-being.

Barangay Administrators. The study will provide *barangay* administrators with a simplified platform for effective data management, communication, and service delivery. Administrators will be able to effectively assess the needs of senior citizens and promote community involvement. By utilizing this system and their skills, administrators will improve their ability to effectively handle senior citizens' welfare concerns, building community cohesion and resilience.

Family Members. The study will also benefit family members of senior citizens by facilitating easier access to information regarding their relatives' needs and important documents like pensions and benefits. With this system, families can feel reassured knowing they can provide timely assistance to meet their elderly loved one's needs, ensuring that they belong and receive the necessary support. Moreover, it encourages

families to actively engage in the care and support of seniors within the community, fostering stronger bonds and a sense of collective responsibility.

Researchers in the Field of Information Technology. The study may serve as a reference to researchers wanting to develop the same system. Documenting the design, execution, and outcome of this project will provide significant insights and best practices for future research and development activities. Researchers may use the results of this study as a guide for future research, improve information management systems, and enhance the welfare of senior citizens in local communities worldwide.

Project Objectives

General Objective

The main objective of the study is to design and develop a Barangay Information Management System for community administration and engagement among senior citizens. Through this, senior citizens can receive better care and support tailored to their specific needs, while Barangay Administrators can streamline their processes and provide more targeted assistance and services to elderly residents within their community.

Specific Objectives

Specifically, the researchers aim to consider the following objectives:

1. To identify the day-to-day operations of Barangay Mojon regarding managing information related to senior citizens.

2. To design and develop a comprehensive Barangay Information Management System for Community Administration and Engagement Among Senior Citizens that will integrate the following features:

- 2.1. Member Management;
- 2.2. Data Profiling;
- 2.3. Record-Keeping;
- 2.4. SMS Notifications;
- 2.5. Financial Assistance;
- 2.6. Online Forms and Applications;
- 2.7. Report Generation; and
- 2.8. Event Management

3. To integrate interactive community engagement and participation features for senior citizens into the system/application; and

4. To determine the acceptability of the system using the ISO/IEC 25010:2023 software quality evaluation criteria as perceived by the respondents on the following:

- 4.1. Functional Suitability;
- 4.2. Performance Efficiency;
- 4.3 Compatibility;
- 4.4. Interaction Capability;
- 4.5. Reliability;
- 4.6. Security;

- 4.7. Maintainability;
- 4.8. Flexibility; and
- 4.9. Safety.

Scope and Limitations

The researchers aim to develop Elderlink, a Barangay Information Management System enhancing the involvement of senior citizens through community administrators. Elderlink features Member Management for managing senior citizens' membership data and status, Data Profiling to organize crucial information about them, and Record-Keeping to maintain accurate records of their activities. Additionally, SMS Notifications alert seniors of important events, while Pension and Benefits Management tracks their entitlements. Online Forms and Applications simplify benefit applications, and Report Generation summarizes relevant data for decision-making and evaluation.

Within the project's scope are essential components like User Authentication for added security and user access, Data Input and Storage System for entering and storing information, Search and Retrieval Functionality for retrieving specific information, Access Control and Permissions for maintaining data security, and Reporting Module for Generating Analytics. Additionally, targeted users of the said system are the Barangay Administrators who manage the information of elderly individuals in the community of Barangay Mojon. The anticipated timeline for the development and deployment of the Barangay Information Management System will occur over six to seven months from the project start date.

The Barangay Information Management System has several limitations that should be considered for a better understanding of the system's functionalities. Firstly, the system does not handle financial transactions as it focuses exclusively on membership-related activities. Financial transactions like payments, are handled through another system. Moreover, the system relies heavily on *barangay* administrators for data input, management, and system maintenance. If administrators are unavailable or lack sufficient training, it could affect the system's effectiveness and usability. Additionally, the system's effectiveness may be hindered by factors such as technological limitations or infrastructure constraints. Additionally, the system may not work well if the *barangay* does not have a good internet connection. This could make it hard for administrators to use the system properly.

CHAPTER II

REVIEW OF RELATED LITERATURE/SYSTEMS

This chapter presents a comprehensive review of related literature and systems relevant to the study. It explores existing literature, discusses related systems, and presents a conceptual framework depicting the study's flow. This part contextualizes the research within existing knowledge and technology, setting the stage for further analysis.

Related Literature

Day-to-Day Operations within Communities Related To Senior Citizens

Altura et al. (2023) stated that *barangays* currently store health-related data about the members of the community using manual, paper-based approaches. This implies that all the information is being kept in tangible files by *barangay* officials. However, there are drawbacks to this manual technique, such as the possibility of data loss, ineffectiveness in retrieving data, and difficulty in maintaining physical records. As a result, they proposed that the *barangay*, a tiny local government entity, would help manage its resources more effectively if it had a single digital platform instead. Additionally, it would also facilitate the *barangay's* straightforward and open communication of information with the community.

A study conducted by Castro and Romano (2022) highlighted that senior citizens are considered one of the most vulnerable members of society, therefore, every country wants to make sure that senior citizens have a good quality of life and get the support they need. In the Philippines, there is a growing number of older people, so the

government is focusing on improving services and support tailored to the needs of older adults. However, this study also revealed an irony in the current situation: despite efforts to enhance support for seniors, data showed that 25% of profiled elderly individuals are not registered in PhilHealth, and 85% do not receive pensions. These findings suggest that there are elderly citizens who are entitled to benefits mandated by law but are not receiving them.

The Philippine government is challenged with enhancing health and social services to accommodate the needs of both the expanding elderly and young populations (Carandang et al., 2019). This challenge is compounded by issues such as the rising cost of basic commodities, education, healthcare, and recreation, which directly or indirectly affect the welfare of Filipino senior citizens. Despite their pressing needs, these individuals often find themselves overlooked within households, where priority is often given to younger or employed members. To address these concerns, two major laws were enacted: Republic Act 7876 mandates the establishment of the Office of the Senior Citizens Affairs (OSCA) in all Local Government Units (LGUs), while Republic Act 9994 provides for a 20% discount on basic food and medicine purchases.

Additionally, Tan et al. (2019) clarified that the global population of older adults is growing rapidly, a trend that is seen not only in Singapore but also globally. Due to a lack of healthcare personnel and limited availability of institutionalized care facilities, this demographic transition presents issues. Consequently, there is a pressing need for seniors to be able to age in their own homes, safely and within the comfort of their familiar neighborhoods. Furthermore, Tan et al. (2019) pointed out that an increasing number of seniors live alone due to changes in family dynamics, such as an increase in

divorces and a shift in living arrangements. This emphasizes how crucial it is to make sure they get the assistance of community services and programs to remain safe and healthy at home.

Zaragosa et al. (2022) stated that the Senior Citizen's Office of Batad, Iloilo relies on a traditional manual system for all its transactions, particularly in managing member information. However, this approach has led to various challenges, including difficulties in locating individual records, instances of data loss, and issues with record misplacement and retrieval. Additionally, senior citizens may not always receive important information, such as notifications about meetings or the release of quarterly allowances, due to the manual nature of the system. Recognizing these shortcomings, there is a need for the development of a computer-based system to streamline office operations and address these challenges effectively.

The day-to-day operations within communities related to senior citizens present significant challenges and opportunities for improvement. Currently, some *barangays* rely on manual paper-based methods to store health information, posing risks such as data loss and inefficiencies in record management. The vulnerability of senior citizens also indicated the gaps in accessing entitled benefits despite government efforts to enhance support. Additionally, there is a burden faced by the Philippine government in improving health and social services for both the elderly and young populations, amidst rising costs and prioritization challenges. The global trend of rapid aging also emerged, urging for the facilitation of aging in place while addressing changing family dynamics. Moreover, the limitations of manual systems in the Senior Citizen's Office of Batad, Iloilo were discussed, emphasizing the need for digital solutions to streamline operations and ensure

effective communication with senior citizens. Overall, these studies emphasized the importance of addressing the evolving needs of senior citizens through efficient information management and tailored support services within *barangays*.

Exploring Features for Enhanced Community Engagement and Administration Among Senior Citizens

As stated by Abedjan (2016), data profiling involves understanding the structure, content, and quality of the dataset, which is essential for tasks such as membership management, record-keeping, pension and benefits management, and report generation within a Barangay Information Management System (BIMS). By systematically analyzing data, profiling enables the extraction of valuable insights and statistics, which are essential for effective decision-making and system development. Integrating data profiling capabilities into information management systems enhances their functionality and usability, ensuring that data related to senior citizens in the *barangay* is accurately recorded and readily accessible for administrative and engagement purposes.

In a related study regarding data profiling, Lacasandile et al. (2020) included the possibility of using information and communication technology (ICT) to profile every family in the community, with the goal of achieving good governance with E-government as its central component. Essential information can be obtained by utilizing profile data, which offers statistics on a range of topics such as labor and employment, family income and expenses, demography (population and age), water and sanitation, housing type, and education. The community's ability to make well-informed decisions and allocate resources is based on this thorough profiling technique.

On the other hand, Batitis et al. (2019) addressed the importance of implementing SMS notification systems in order to address the urgent need for modernization in *barangay* operations. Technological innovations are drastically altering the way that services are provided, so *barangays* must quickly adapt and incorporate new technologies in order to increase their efficacy and efficiency. According to this survey, a lot of *barangays*, including Barangay Labas, still process paperwork by hand and provide information to their inhabitants, which can be a laborious and ineffective process. By utilizing Short Message Service (SMS) technology, the proposed system aims to streamline document processing and information delivery, enabling the *barangay* to provide faster and more convenient services to its residents.

Pension administration is another important element that has been implemented to the system. The significance of pension management was highlighted by Javier et al. (2019) in relation to aging-related issues such retirement and deteriorating health. They emphasized the necessity of improved retirement social support and financial planning. The financial components of good aging, particularly the significance of retirement planning, must be understood by employees and organizations. There is also a drive for the establishment of a social pension that is available to everybody and for enhancements to the insurance system. Individuals who have had financial difficulties as a result of a handicap, serious sickness, or missed career chances in the past should be given priority for this pension.

In an article discussing online forms, Efe (2023) stated that these are helpful tools that make it easier for senior citizens to stay in touch with businesses and organizations. However, as more and more companies, financial institutions, and governmental

organizations move to digital platforms, elderly persons must be assisted in adjusting to these new systems using straightforward and user-friendly solutions. To overcome this, it is essential to provide user-friendly interfaces, give them clear instructions on how to resolve any issues, and make sure they actively use the online apps and forms that are an element of an information management system.

Integrating data profiling capabilities into the Barangay Information Management System (BIMS) provides important insights into the structure and quality of datasets related to senior citizens, facilitating more effective decision making and system development. In addition, the use of information and communication technology (ICT) enables the informed allocation and management of resources in comprehensive household profiles. In addition, the introduction of SMS notification systems will modernize *barangay* operations, streamline document processing and improve service delivery to residents. In addition, pension management is critical to responding to the challenges of aging and promoting better financial planning and support for the elderly. Finally, user-friendly solutions are needed for the transition of pensioners to digital platforms, especially for the use of online forms and applications in the information management system. Based on these insights, a comprehensive system will be developed to improve community management and senior participation.

Senior Citizen Engagement Through Interactive Technologies

Baez et al. (2020) emphasized the importance of social participation in promoting the health and well-being of older adults. They highlighted the various benefits, including slowing down age-related declines, reducing loneliness and social isolation, and even

decreasing mortality rates in old age. However, they also acknowledged the existence of barriers that hindered older adults from engaging in social activities regularly. In their study, they explored how technology could help overcome these barriers and promote social participation among older adults. Specifically, they discussed two research threads and designs aimed at supporting co-located and virtual participation: an application that motivated virtual participation in group training programs, and a location-based game that facilitated co-located intergenerational ICT training classes. Their exploration assessed the effectiveness and limitations of different design choices in these use cases, offering valuable insights for promoting social engagement among older adults.

In addition, Heins et al. (2021) stressed that social isolation poses a significant health challenge among the elderly population. This isolation negatively impacts mental and physical health and overall well-being. It can make them feel sad, affect their physical health, and even make them more likely to pass away. People who do not socialize much are also at higher risk of getting dementia. But for those with dementia, it is even harder to join in social activities because they have trouble understanding emotions, and their moods can change a lot. Sometimes they feel embarrassed or ashamed, so they avoid being around others, and that makes them feel even more lonely. Therefore, understanding these challenges is crucial for addressing them effectively and promoting social inclusion among community-dwelling older adults. By identifying barriers to social participation and finding ways to overcome them, people can create more supportive environments that enhance the well-being of older individuals.

Digital technology offers the potential to make life better for older people and help them live independently at home as they age (Mannheim et al, 2019). With this,

older adults can stay connected, access information, manage health, and control home appliances remotely, thereby improving their quality of life and independence. However, there is a difference between the digital technologies that are made and what older adults want and need because digital technologies are often created without considering the specific needs and preferences of older adults. People often think that getting older is a big problem, and they see older adults as weak and unable to do things. This is why a lot of technology for older people focuses on taking care of them. But because of these ideas, older adults are often left out of making technology, even though they could help make it better.

A recent article from Trappett (2023) explained that online community engagement has changed how we connect and share information. Nowadays, older adults are starting to use technology more too. This helps them stay connected and share their experiences. Even though there are still some challenges, being part of online communities can make older adults feel more involved and happy. During COVID-19, older adults quickly adopted technology, particularly in healthcare, using digital health solutions like telehealth and smartphone apps to access care, stay in touch with healthcare providers, and manage their health conditions more effectively. The shift towards online community engagement offers older adults opportunities for enhanced social interaction and well-being, facilitating meaningful connections and access to valuable resources.

Another related study by Huang and Chen (2022) expounded that as individuals age, their physical abilities decline, often leading to limited mobility. Consequently, community engagement becomes vital for older adults to connect with others and the outside world. Taking part in community activities does not just keep older adults

physically fit; it also makes them feel valuable and emotionally fulfilled. As life gets better, older people want to find more meaning in being part of their community. Using the Internet as a bridge helps older adults connect with others despite distance, making them feel more socially connected and tackling the difficulties of getting older. As older adults engage in community activities and utilize the Internet, they also gain access to valuable resources and support networks that contribute to their overall well-being. By fostering a sense of belonging and enabling them to stay connected with others, these activities and technologies play a crucial role in enhancing the quality of life for older adults.

Various studies have highlighted the importance of social participation for senior citizens and the challenges they face in engaging in social activities regularly. The benefits of social participation in promoting health and well-being have been emphasized, along with the significant health challenges posed by social isolation among the elderly population. While digital technology has the potential to improve the lives of older adults, there is often a mismatch between technology development and their needs. The evolving landscape of online community engagement among older adults, particularly during the COVID-19 pandemic, has been discussed, emphasizing its potential benefits. Overall, these studies underscore the importance of addressing barriers to social participation and leveraging technology to enhance the quality of life for older adults.

Assessing System Acceptability through ISO/IEC 25010:2023 Quality Criteria

The adoption of ISO/IEC 25010:2023 standards is increasingly pivotal in evaluating system quality today. This review examines the acceptability of systems in the

context of these comprehensive quality criteria, which include functional suitability, performance efficiency, and other vital attributes. By integrating these standards into the system's evaluation framework, the researchers aim to provide a nuanced understanding of user perceptions and system performance, thereby contributing to the enhancement of software quality and reliability in the professional field.

Furthermore, Haque & Ahmad (2021) addressed the limitations of traditional Software Reliability Growth Models (SRGMs) by proposing a logistic growth model that accounts for uncertainties often overlooked in standard approaches. Their method enhances the accuracy of reliability predictions by systematically analyzing and incorporating the effects of uncertainties on fault detection rates, validated through comparison with established models using real datasets. This work offers significant insights into improving software reliability assessments, which demand high reliability for effective senior citizen engagement.

In addition, maintaining software quality is crucial for the system's longevity. Schnappinger et al. (2020) addressed the challenge of assessing maintainability, noting the reliance on manual expert reviews and the limitations of current automatic methods. The study pioneers a methodology using judgments from a larger expert group, creating a strong dataset for assessment. In a survey involving 70 professionals evaluating code from 9 Java projects, totaling 1.4 million lines, the researchers identified understandability as key to maintainability. This insight aligns with our goal of creating easily comprehensible and modifiable code for community engagement, particularly among senior citizens.

Ensuring the security of information management systems is crucial in contemporary technological landscapes, especially concerning the protection of sensitive data among senior citizens, who may be more vulnerable to cyber threats. Cunha (2022) stresses the significance of proactively protecting web applications from cyber threats and attacks. The research underscores the need for web developers to be knowledgeable about common cybersecurity threats in order to safeguard web applications and user data. Additionally, the paper recommends that web developers can ensure the security and integrity of their web applications by implementing security protocols and taking preventive measures.

Similarly, flexibility in software development is crucial for adapting to changing requirements while maximizing cost-effectiveness. Akron & Gelbard (2020) introduced a decision support tool designed for project managers looking to evaluate the economic feasibility of implementing flexible code development. The tool promotes a thorough decision-making process that takes into account factors such as the limited lifespan of technology and the potential for organizational restructuring to maximize profitability. By presenting an analytical model and conducting comparative statics, the paper provides valuable insights into the relationship between a technology's life cycle duration and the profitability threshold for reusable code.

Likewise, software security is critical for ensuring the integrity, confidentiality, and availability of code, data, and services. Khan et al. (2022) stressed the importance of integrating security measures throughout the Software Development Life Cycle (SDLC) to mitigate security threats effectively. Through a systematic literature review, the researchers identified security risks and best practices, providing insights into managing

security across the SDLC. The study recommended specific security activities for each SDLC phase to minimize effort, time, and budget while delivering secure software applications. By emphasizing secure SDLC practices, Khan et al. contribute to raising awareness among software development organizations about the necessity of incorporating security into their processes. The findings serve as a valuable resource for improving the security level of software products and enhancing overall security efficiency.

Overall, these studies offer valuable insights into various areas of system acceptability, highlighting the interconnectedness of sustainability, efficiency, interoperability, reliability, security, maintainability, and flexibility in creating a robust and user-centric information management system for senior citizen engagement.

Related Systems

Senior Citizen Information Management System

Zaragosa et al. (2022) have conducted a study about the Senior Citizen Information System aimed at creating a computer-based platform for real-time information dissemination among senior citizen members in the Municipality of Batad, Iloilo. This system focuses on providing updates regarding membership status and monitoring monetary assistance. Employing the Rapid Application Development model as the Software Development Life Cycle (SDLC), and utilizing a three-tier architecture, the system aimed for efficient development and robust functionality. The evaluation involved 120 senior citizens as user respondents and five IT experts. A researchers-made survey instrument was used to assess usability and performance. Findings revealed that

the system was perceived as highly usable and performed well, indicating its effectiveness in meeting the intended objectives.

They have developed a computer-based system to help senior citizens in Batad, Iloilo, with their membership and financial assistance. Similarly, Elderlink is a system that aims to assist senior citizens in Barangay Mojon, Malolos, Bulacan, with their community engagement and administration. While they focused on real-time information dissemination and monitoring of monetary assistance, the researchers' system focuses on improving community administration and engagement among senior citizens. In general, both studies utilize computer-based platforms and aim to enhance the well-being and support of senior citizens in their respective communities.

Enhancing Support for Senior Citizens: Development and Evaluation of the OSCA Information Management System with Agile Methodology and ISO/IEC 25010 Compliance

Vasquez et al. (2022) have conducted a study about the OSCA Information Management System with Agile Methodology and ISO/IEC 25010 Compliance. Their study focuses on providing support and assistance to senior citizens, a vulnerable group in society. By designing and developing the System Application Office of the Senior Citizen Affairs Information Management System with Analytics (OSCA-IMSA), they aimed to create a usable, performance-efficient, and functional system tailored to the needs of the Office of the Senior Citizen Affairs (OSCA) in Cabanatuan City.

Utilizing the Agile System Development Life Cycle (SDLC) Model, their approach ensured quality and efficient development through various phases and

subphases. The system's evaluation, based on ISO/IEC 25010 criteria, assessed its usability, reliability, performance efficiency, functional suitability, security, portability, maintainability, and compatibility. The study involved gathering data from two sets of respondents: System Users and IT Experts, using a self-made survey questionnaire. The OSCA-IMSA was evaluated positively by respondents, demonstrating high functionality, efficiency, portability, maintainability, compatibility, security, reliability, and usability. This outcome indicates compliance with the ISO/IEC 25010 Software Product Quality Standard, recommending the system for deployment at the research locale.

One Barangay: A Mobile And Web Barangay Management System

Jamis et al. (2022) devised a Mobile and Web Barangay Management System to help *barangays* tackle the challenges they face in managing data efficiently. According to the authors, *barangays* encounter difficulties organizing and managing incoming and outgoing data due to the absence of a system. They also pointed out that community members often rely on manual data processing using MS Word and Excel without any database to ensure security.

As a result, Jamis et al. (2022) have proposed a sustainable solution called One Barangay: A Mobile and Web Barangay Management System to tackle a persistent issue. This study aims to assist Barangay 407 Manila, Philippines in managing their community members' data and files more systematically and securely. With this system, the *barangay* can offer better services and ensure the safety of sensitive information.

Barangay Profiling System with Analytics

Jacobe (2021) has also developed a similar study titled Barangay Profiling System with Analytics. This study aims to develop a Barangay Profiling System with Analytics for Barangay Pallua Sur, Tuguegarao City, to provide a systematic profiling system that enables authorized users to easily manage residents' profiles, generate statistical reports, and update records. Utilizing a qualitative approach and descriptive research design, along with systems development methodology, the researchers collected and analyzed data for the design and development of the system. The study concluded that the developed system automates the profiling of all residents in the *barangay*, storing data electronically for better organization and providing access to necessary information for *barangay* officials. Additionally, the system facilitates the generation of reports with statistical analysis, enhancing the efficiency of *barangay* operations.

Similar to the researchers' system, Jacobe (2021) aimed to create a system for Barangay Pallua Sur in Tuguegarao City that helps manage information about people living there. This system makes it easy for authorized users to keep track of residents, create reports with data, and update records. Additionally, this is used in a special way of studying and designing the system, collecting and analyzing data to make it work well. The study found that the system they made helps automate keeping records of everyone in the *barangay*, storing information electronically to keep it organized. It also helps *barangay* officials access important information and make reports quickly, making *barangay* operations run more smoothly.

Health Information Systems for Older Persons in Select Government Tertiary Hospitals and Health Centers in the Philippines: Cross-sectional Study

Garcia et al. (2022) have developed a study about Health Information Systems for Older People. Health Information Systems are digital tools used by healthcare providers to manage patient information and improve the delivery of healthcare services. The study aimed to provide insights into the status of Health Information Systems (HISs) for older persons (OPs) in select government tertiary hospitals and health centers in the Philippines. Utilizing data from the Focused Interventions for Frail Older Adults Research and Development Project (FITforFrail), a facility-based listing of services and human resources specific to geriatric patients was conducted in 27 tertiary government hospitals and 16 health centers across all regions of the country. Additionally, existing policies and guidelines related to HISs for OPs were reviewed to assess the proportion of facilities with health information specific to OPs and to identify challenges related to HIS implementation.

These systems are like digital folders used by doctors and nurses to keep track of older patients' health information. The study looked at how well these systems work in certain hospitals and health centers in the Philippines. They checked if these places had the right information and tools to care for older patients. They also looked at the rules and instructions that guide how these systems should be used. Overall, they wanted to see how well these systems help older people get the care they need.

Personal Health Information Management Among Older Adults

Kolotylo-Kulkarni et al. (2021) have developed a study focusing on Personal Health Information Management (PHIM) systems tailored for older adults. Their study addresses the growing healthcare needs of this demographic by investigating the needs, challenges, processes, and tools used in PHIM among older adults. By conducting a scoping review of literature from 1998 to 2020, they comprehensively reviewed existing knowledge on PHIM by older adults, establishing the status quo of research and identifying research gaps. Their findings, which considered personal-level factors, PHIM tasks, tools used, physical settings of PHIM activities, and socio-organizational aspects, contribute valuable insights to the development of supportive PHIM tools for older adults.

In this study, Kolotylo-Kulkarni et al. (2021) showed how older adults manage their health information, this includes looking at what older adults need and the challenges they face when organizing their health information. They have also reviewed lots of research done on this topic to understand what is already known and what still needs to be studied. Hence, they found out about personal factors, tasks people do to manage their health info, tools they use, where they do these tasks, and how organizations can help. Their findings help create better tools to help older adults manage their health information.

Development of Smart Elderly Care Mobile Application for Health Management System

Yueh et al. (2022) created a Health Management System for Older Adults known as Geri-FORCE. This case management system is designed to enhance the quality of care for adults by providing a comprehensive and continuous approach to healthcare. Geri-FORCE integrates multiple disciplines to deliver high-quality care to older adults while streamlining communication and collaboration among healthcare providers. Yueh et al. (2022) emphasized that Geri-FORCE is committed to ensuring that each senior citizen receives the utmost care they need. developed a Health Management System for Older Adults and it is called the Geri-FORCE. The Geri-FORCE case management system primarily aims to improve the quality of care for adults. The system offers a comprehensive and continuous approach to healthcare, integrating multiple disciplines to deliver high-quality care to older adults. Yueh et al. (2022) also added that Geri-FORCE streamlines communication and collaboration among healthcare providers, ensuring that each senior citizen receives the utmost care they need.

According to Yueh et al. (2022), the Geri-FORCE system employs a case management framework to provide comprehensive care that is tailored to the individual needs of elderly patients. This approach effectively identifies and addresses prevalent health concerns, resulting in optimal patient outcomes. Moreover, the use of the Geri-FORCE system has been shown to enhance the quality of care, while simultaneously reducing care-related expenses and burdens.

Development of a Healthcare Information System for Community Care of Older Adults and Evaluation of Its Acceptance and Usability

Choi et al. (2022) have also developed a study titled Healthcare Information System for Community Care of Older Adults and Evaluation of Its Acceptance and Usability. The objective of the study was to address the increasing need for health and social care among community-dwelling elderly individuals by proposing an information system tailored to their needs. The system aimed to facilitate comprehensive care delivery by digitizing and managing various data types generated during care provision. Methods involved the design and implementation of the information system in elderly care centers, followed by a 6-month evaluation of its acceptance and usability.

Similar to the researchers' study, Choi et al. (2022) worked on a study about a Healthcare Information System for helping older adults in communities get better care. They wanted to make a system that could handle different kinds of information about their health and well-being. They tested this system for six months to see if people liked using it and if it was helpful. Both studies seek to address the specific needs of elderly individuals by providing digital solutions to improve their care and well-being. While Choi et al. focused on healthcare management, the researchers' study aims to enhance overall community administration and engagement among senior citizens through technology.

Construction and Design of Dynamic Community Management System for the Elderly

Wang et al. (2022) have conducted a study on a Dynamic Community Management System for the Elderly to address the inefficiency of current pension institutions in managing information and providing services to the elderly. The system, designed for community managers and members, consists of five modules: membership management, housing management, check-in management, entertainment venue management, and user management. By employing a combination of file operation and structured arrays, the system achieves clarity and completeness in its structure. Moreover, the use of array functions in realizing sub-functions reduces the complexity of the code, enhancing the system's usability and ease of identification of key functions.

This system helps community managers and members better handle information and services for the elderly. It has five main parts: managing who is a member, managing housing, checking people in, managing entertainment places, and managing users. They made the system organized and easy to use by using certain techniques. For example, they used a combination of file operations and structured arrays to make the system clear and complete. They also used array functions to make the code less complicated, which makes it easier to understand and use the important parts of the system.

Precision Health Care for Older Adults: The Geri-FORCE Case Management System

Yueh et al. (2022) created a Health Management System for Older Adults known as Geri-FORCE. This case management system is designed to enhance the quality of care for adults by providing a comprehensive and continuous approach to healthcare. Geri-FORCE integrates multiple disciplines to deliver high-quality care to older adults while streamlining communication and collaboration among healthcare providers. Yueh et al. (2022) emphasized that Geri-FORCE is committed to ensuring that each senior citizen receives the utmost care they need. developed a Health Management System for Older Adults and it is called the Geri-FORCE. The Geri-FORCE case management system primarily aims to improve the quality of care for adults. The system offers a comprehensive and continuous approach to healthcare, integrating multiple disciplines to deliver high-quality care to older adults. Yueh et al. (2022) also added that Geri-FORCE streamlines communication and collaboration among healthcare providers, ensuring that each senior citizen receives the utmost care they need.

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Conceptual Framework

The study's conceptual framework, which explains the study and system flow, is shown in Figure 1. The four main components of the composition are the stages of input, process, output, and feedback.

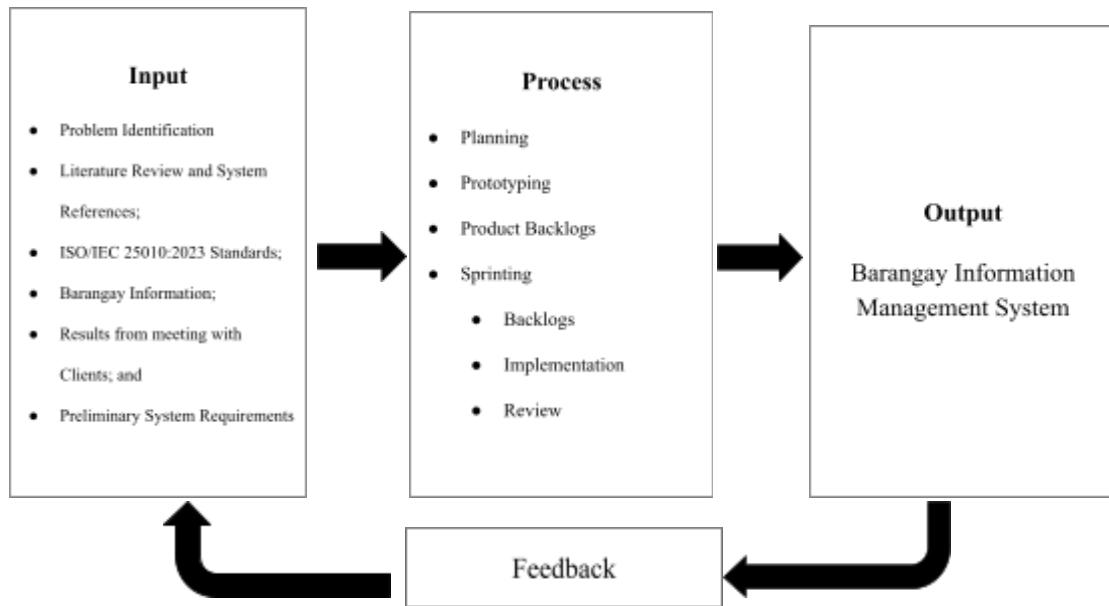


Figure 1. Conceptual Framework of the Barangay Information Management System

The conceptual framework of this Barangay Information Management System (BIMS) tailored for community administration and senior citizen involvement encompasses various stages and components aimed at addressing community needs efficiently. Beginning with the input phase, the system identifies key problems related to community administration and engagement among senior citizens through literature review and consultation with stakeholders, aligning with ISO/IEC 25010:2023 standards to ensure quality and effectiveness. This phase also involves gathering *barangay*-specific information and requirements, as well as insights from meetings with clients to tailor the

system to their needs. Moving to the process phase, planning is crucial, followed by prototyping to visualize system functionalities and gather feedback iteratively. The product backlog is then established, outlining features and tasks for implementation during sprinting cycles, which involve continuous backlogs, implementation, and review. Finally, the output phase culminates in the development and deployment of the Barangay Information Management System, providing a comprehensive solution to streamline community administration and enhance engagement among senior citizens.

CHAPTER III

TECHNICAL BACKGROUND

This chapter provides a comprehensive overview of various technical aspects essential for the development and evaluation of the system. This part covers the research methodology, software development methodology, requirements analysis, design of software, systems, products, and/or processes, testing, and description of the prototype.

Research Methodology

In accomplishing the objectives of the study, this study adopts exploratory-sequential research and mixed-methods, incorporating both quantitative and qualitative techniques. According to Gogo and Musonda (2022), exploratory-sequential technique is a method where researchers initially gather quantitative data, like numbers and statistics, and then add qualitative data, which includes descriptions and insights. Moreover, it is a step-by-step approach to learn more about a topic, starting with numbers and then digging deeper with detailed explanations. On the other hand, George (2021) stated that the mixed-methods is used to provide a more comprehensive understanding of a research question. Quantitative method research allows finding patterns and relationships between variables and emphasizing a characteristic among them to come up with a generalized conclusion among the same population. Meanwhile, the qualitative method tackles the depth of understanding individual experiences, motivations, and perceptions, exploring how an individual acts towards phenomena.

By integrating these approaches, researchers can check their findings from different angles, confirm their results, and get a complete picture of the research question.

Together, these methods enhance the quality, depth, and comprehensiveness of the study's findings.

Software Development Methodology

The Software Development Life Cycle (SDLC) encompasses various methodologies that guide the process of designing, developing, and maintaining software systems. The researchers have chosen the Agile Scrum as their methodology. Peek (2022) explained that the Agile Scrum methodology is a way of managing projects by breaking them into small parts called sprints, typically lasting two to four weeks, or even more. In each sprint, the team focuses on building the most important features of the project to create a potentially usable product. Agile Scrum is a popular approach because it allows for flexibility and collaboration among team members, leading to faster development cycles and the ability to adapt to changing requirements more effectively. Additionally, this approach breaks down the project into smaller increments called sprints, allowing for continuous feedback and adaptation throughout the development process.

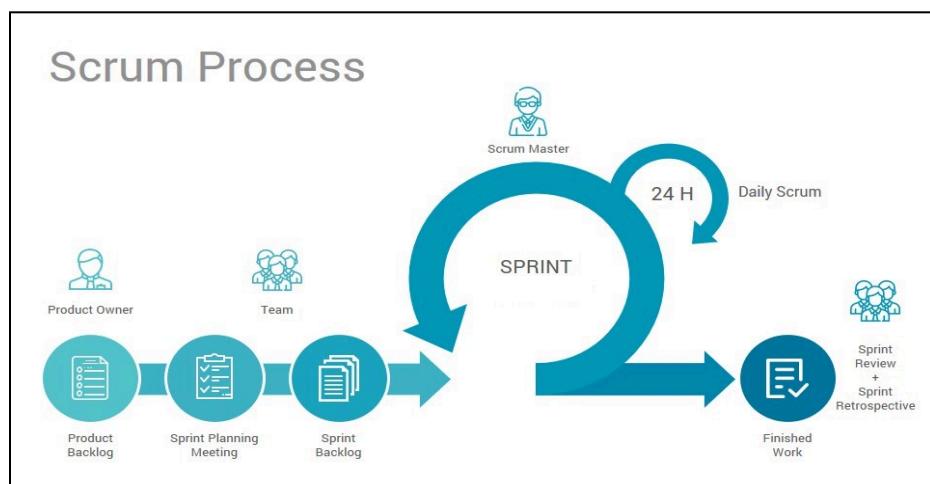


Figure 2. Agile Model Scrum Framework

Product Backlog Creation. The team worked together to make a list of everything they should include in the project. They have collected ideas from people who are involved in the project, studied what users need, and decided which things are most important and possible to do. After that, they wrote down all these ideas in a list called the product backlog, making sure each item is clear and detailed so they can plan and work on them effectively later on.

Sprint Planning. The team selected some backlog items from the list to work on for the next succeeding weeks. They have decided which items are most important, how much work each one needs, and what they can realistically finish in that time. During sprint planning, they have also decided on a goal for the sprint and divided the chosen items into smaller tasks.

Sprint Backlog Creation. The team will choose what to work on from the list. Then, they make a detailed plan called the sprint backlog. This plan breaks down the chosen items into smaller tasks and assigns them to team members. It helps everyone know exactly what they need to do to reach the goal for the sprint.

Sprint Execution. Every day, the team will be going to meet briefly to talk about how things are going and if there are any problems. They will be working closely together to build and test parts of the project, making sure that they are making progress toward their goal.

Sprint Review. The team will show the progress they have made to the stakeholders and will ask for feedback. They will present what they have built and ask if

it meets the stakeholders' needs. Depending on the feedback, they might change their plans for future work.

Sprint Retrospective. The team will conduct a sprint retrospective meeting to reflect on their process and identify opportunities for improvement. They will also discuss what went well during the sprint, what could have been done better, and any obstacles encountered. In this phase, the team will collaborate to identify actionable items for improvement and commit to implementing changes in future sprints.

Requirements Analysis and Documentation

To develop Elderlink, a Barangay Information Management System, the researchers require specific resources for effective implementation. Table 1-3 outlines the essential requirements for the study, encompassing both software and hardware prerequisites during system development, as well as operational necessities for sustained functionality.

Table 1
Hardware Requirements upon Developing the System

Hardware Component	Minimum Requirements	Ideal Requirements
Processor	Intel Core i3 or AMD Ryzen 3	Intel Core i7 or AMD Ryzen 7
RAM	8GB DDR4	16GB DDR4
Storage	256GB SSD	512GB SSD
Graphics	Integrated Graphics	Dedicated GPU
CPU Architecture	64-bit	64-bit
Internet Bandwidth	5 Mbps	20 Mbps

Table 1 shows the hardware requirements for the system's development, the researchers need a good computer setup, including a fast processor, enough RAM, and plenty of storage space. Graphics are also important for showing things clearly on the screen. The type of CPU affects how fast things get done. Furthermore, they also need a stable internet connection for using online tools and working with others.

Table 2
Software Requirements upon Developing the System

Software	Minimum Requirements	Ideal Requirements
Operating System	Windows 10	Windows 11
Web Browser	Chrome, Firefox, Edge	Chrome
Database Management System	SQLite	MySQL
Development Environment	Visual Studio Code	
Version Control System	Git	
Web Technologies	HTML, CSS, JavaScript	
Design Tool	Figma	

Table 2 shows the software requirements needed to develop the system. This includes robust software tools such as a database system for efficient data management and design tools for creating appealing interfaces. Additionally, web technologies and programming languages like HTML, CSS, and JavaScript will be utilized to develop the system's website, while PHP programming language connected with MySQL will be used for the database management.

Table 3
Operational Requirements of the System

Operational	Minimum Requirements	Ideal Requirements
Internet Connectivity	Stable internet connection	High-speed internet connection
System Maintenance	Regular backups and updates	Automated backup systems
User Support	Basic user manuals and guides	24/7 technical support

In terms of operation, users require a reliable internet connection specifically for accessing the system through the web-based platforms. In addition, the researchers need a safe place to store the system's data and enough storage to keep everything running smoothly. It is important to keep the data safe and secure from any threats, so regular backups and security measures are a must. Lastly, the researchers will provide support and guidance for users to understand and use the system effectively.

Design of Software, Systems, Products, and/or Processes

Enderlink utilizes several diagrams to illustrate the software design process shown in Figures 3-8. These diagrams were created during the software development methodology's design phase. Specifically, the study employs a context diagram (level 0 data flow diagram), a level 1 data flow diagram, an enhanced entity-relationship diagram, flowcharts, and visual table of contents.

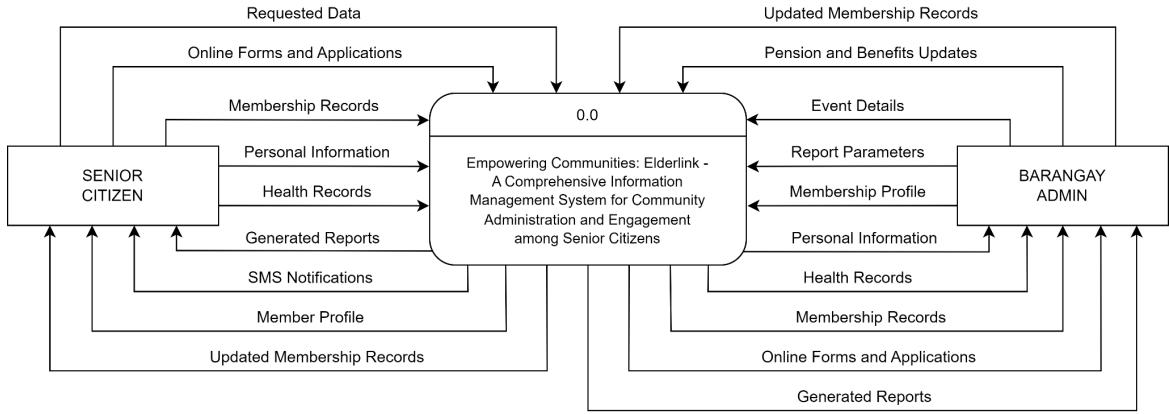


Figure 3. Context Diagram (Level 0 Data Flow Diagram)

Context diagrams depict a system's interactions with external entities that influence its operation (University of Waterloo, 2023). Figure 3 presents the context diagram for Elderlink. It highlights the flow of information that enables the system to function as a central hub for managing information related to senior citizens. By facilitating interactions with various external entities and managing data flow, Elderlink empowers community administration and engagement among senior citizens.

Figure 3 illustrates the data flow between Elderlink and its external entities—Senior Citizens and Barangay Administrators. Data enters the system from various sources, including online applications and forms submitted by users for registration or service requests. Additionally, health records from external databases are integrated, providing a holistic view of a senior citizen's health status. Membership data from external sources, such as senior citizen associations or government agencies, is also incorporated into the system. Furthermore, the diagram depicts requests for reports or specific information generated by users.

Data also flows outwards from Elderlink to the external entities. The system updates membership records within itself to maintain accuracy and currency. Additionally, Elderlink disseminates information on pension and benefits, keeping senior citizens informed about crucial details. The context diagram might depict a flow of details about upcoming events relevant to the senior citizen community. Furthermore, the system can generate customized reports based on user-defined parameters, enabling focused analysis of data. Finally, SMS notifications sent to users for important updates or reminders represent another potential outflow of data.

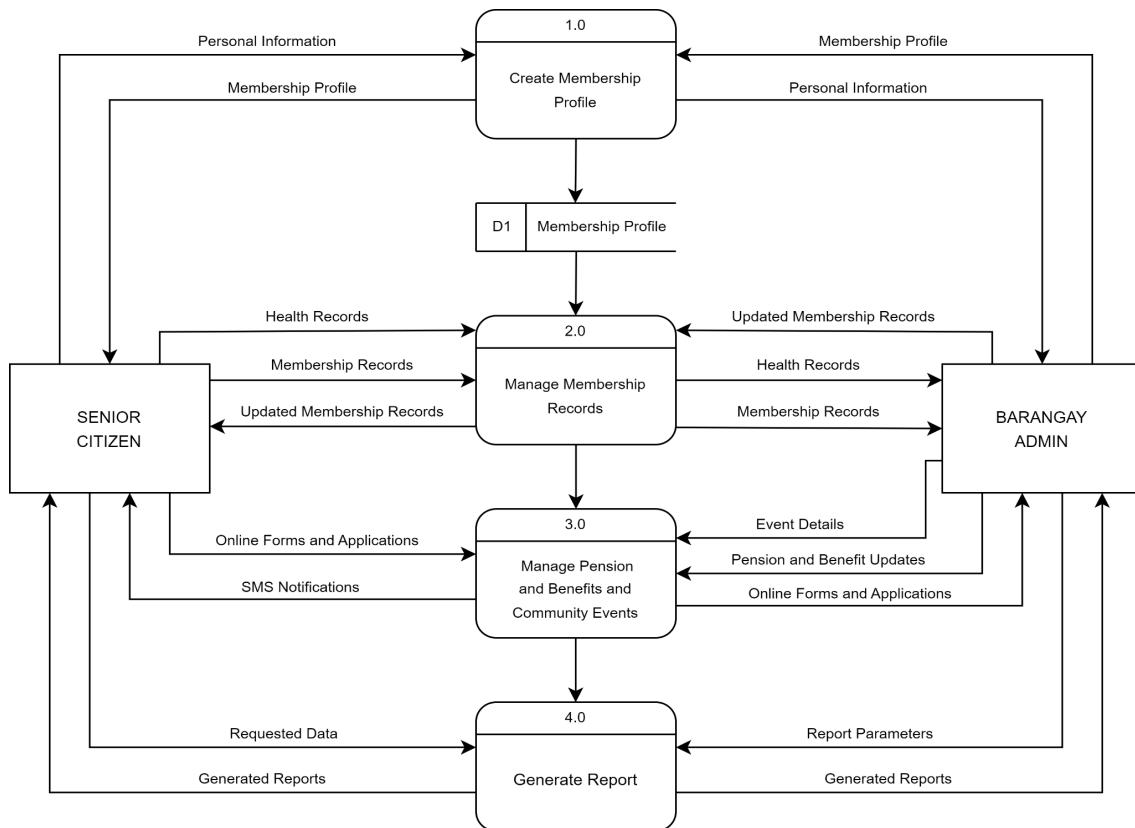


Figure 4. Level 1 Data Flow Diagram

Orakzai (2023) discussed that Level 1 Data Flow Diagrams (DFDs) provide more detailed views of a system or process compared to Level 0 diagrams. They highlight the

primary functions and break down the main process into smaller subprocesses, giving a closer look at how the system works. Moreover, the Level 1 DFD provides a detailed representation of the data flow within Elderlink and its interaction with external entities.

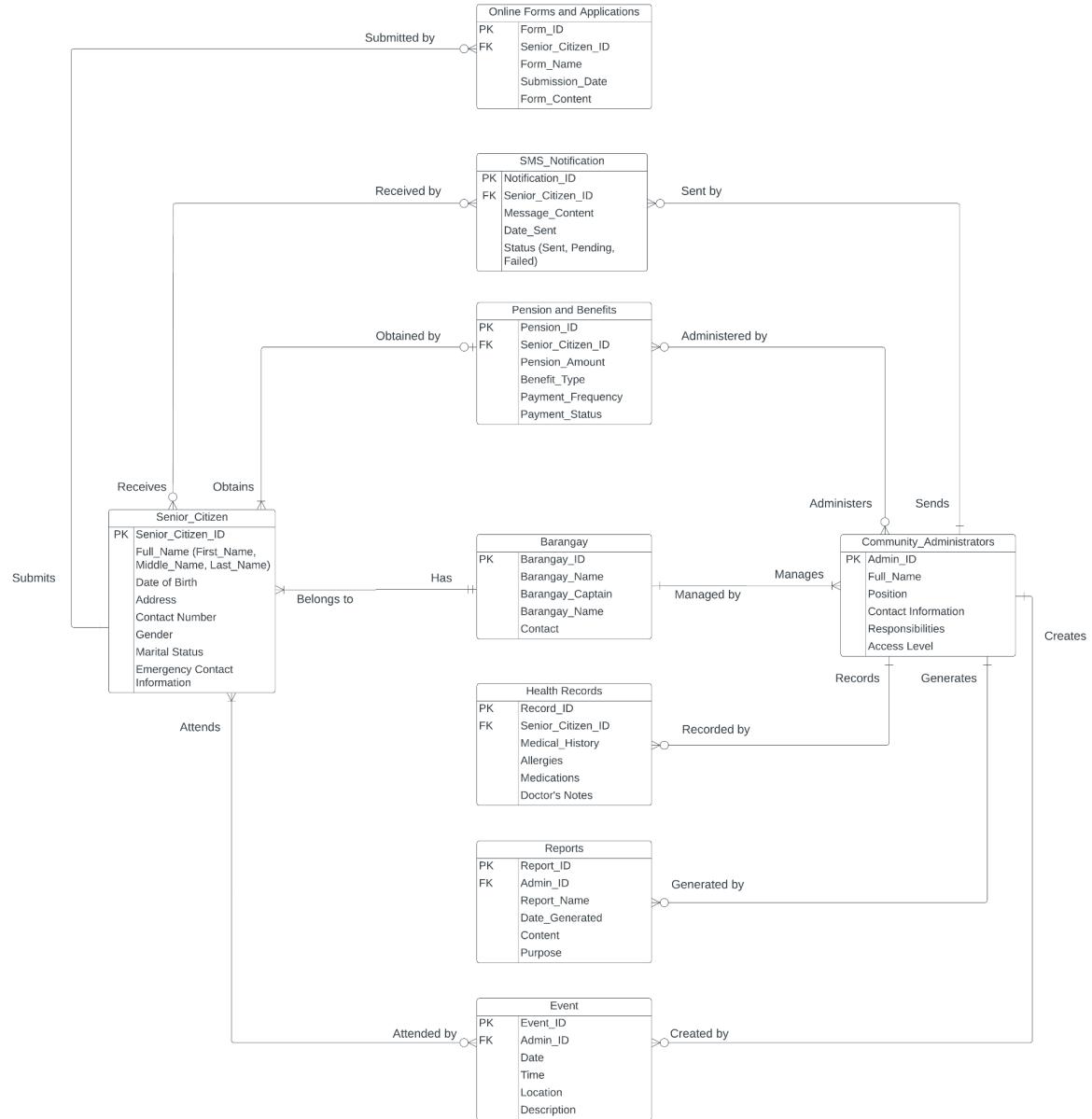


Figure 5. Entity Relationship Diagram (ERD)

Ravikiran (2023) stated that an Entity Relationship Diagram (ERD) shows how different things in a database are related to each other. It is similar to a map that helps organize information. This diagram serves as a visual representation of the entities, attributes, and relationships within your system. It provides a structured overview of how different components of your system interact with each other and the external environment.

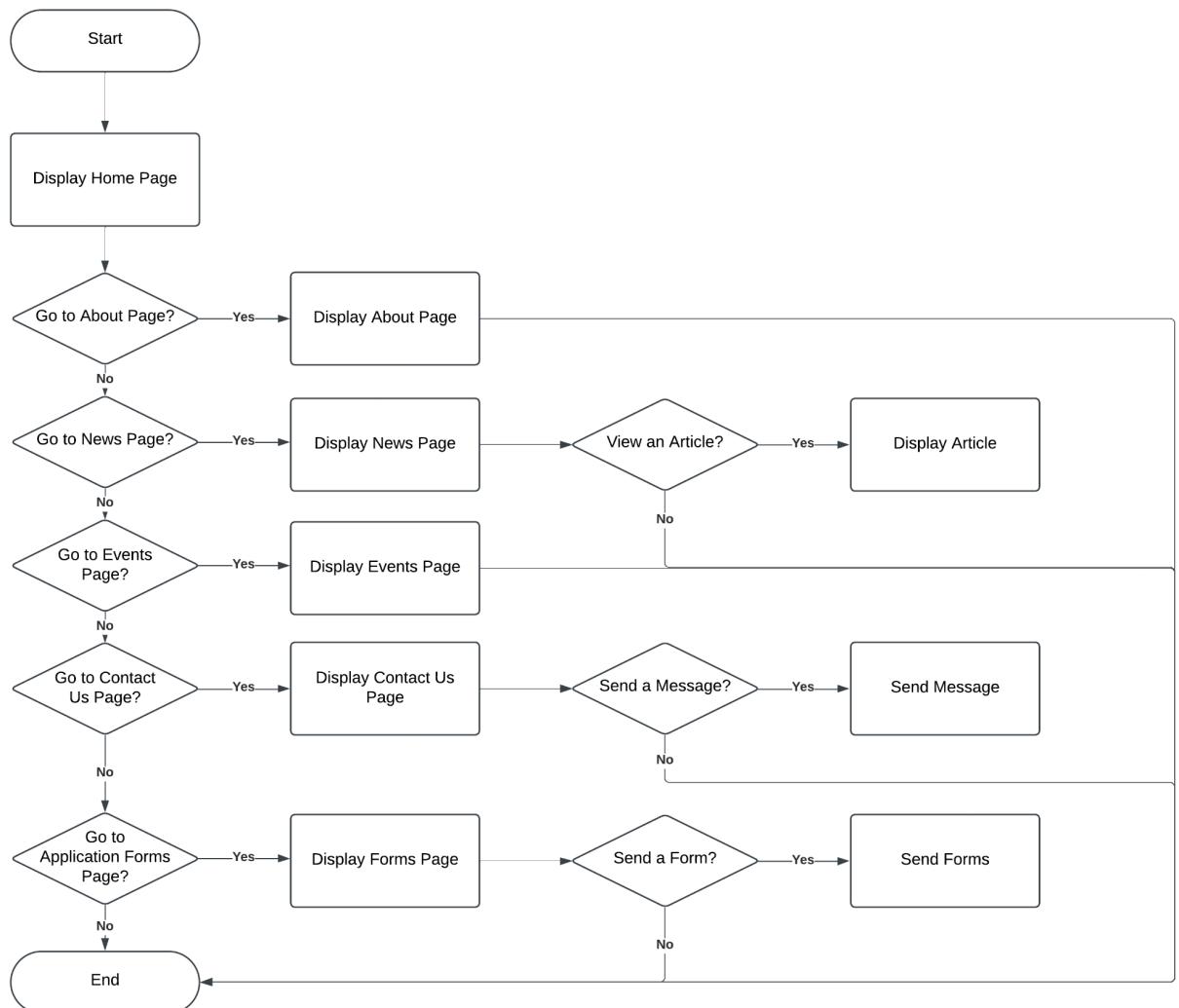


Figure 6. Flowchart (Member Side)

Figure 6 depicts a flowchart representing the user's interaction with the system. In this flowchart, each shape represents a specific action or decision, connected by arrows to show the flow of steps. Members start at the beginning of the flowchart and follow the arrows through each step until they reach the end. The flowchart outlines the sequence of actions users take when interacting with the system, providing a clear visual guide for understanding the process.

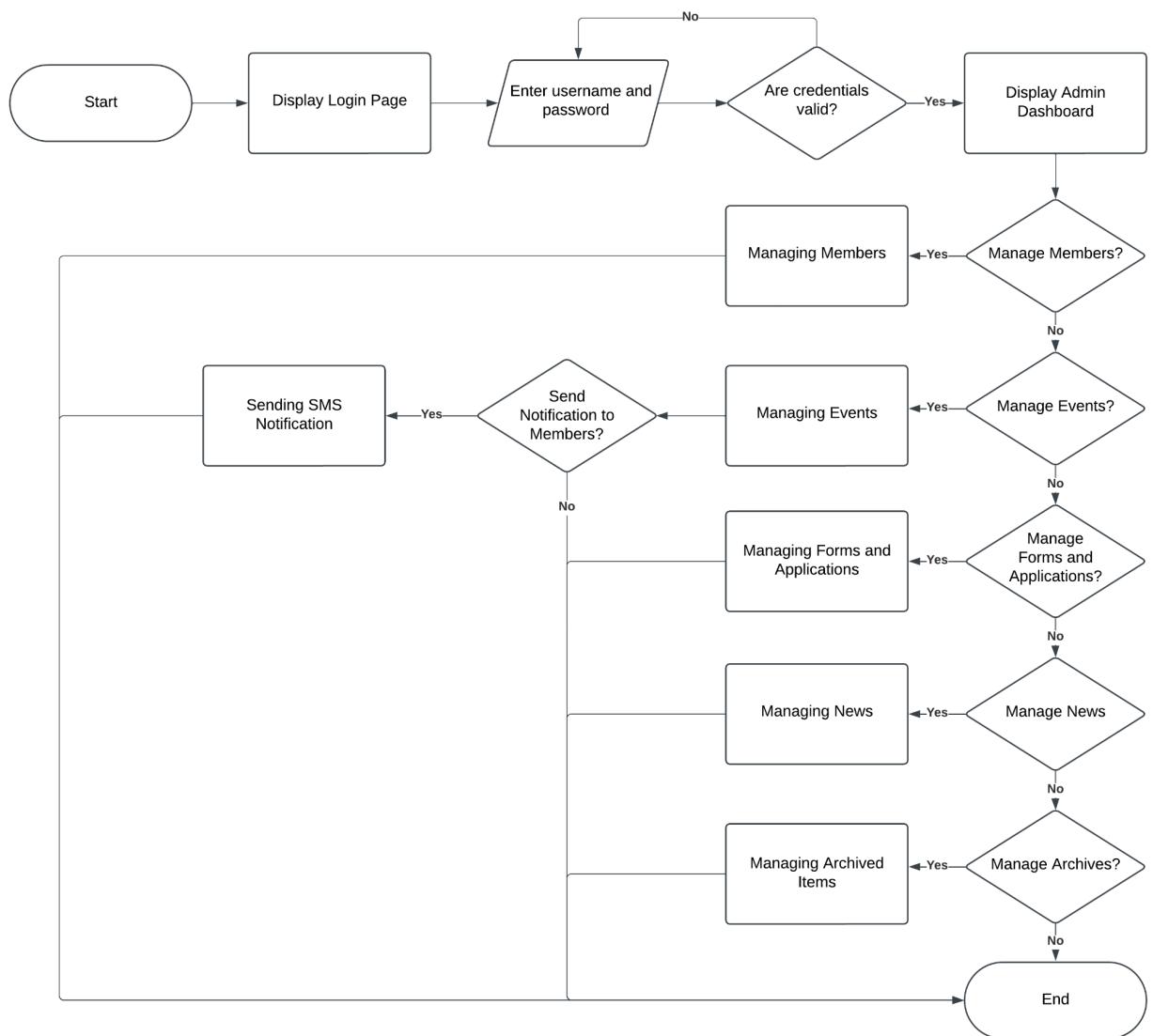


Figure 7. Flowchart (Admin Side)

Figure 7 illustrates a flowchart representing the administrative side of the system. Administrators begin at the starting point and follow the arrows through each step until they reach the end of the process. This flowchart serves as a visual guide for understanding the administrative procedures within the system, facilitating efficient and organized task management for administrators.

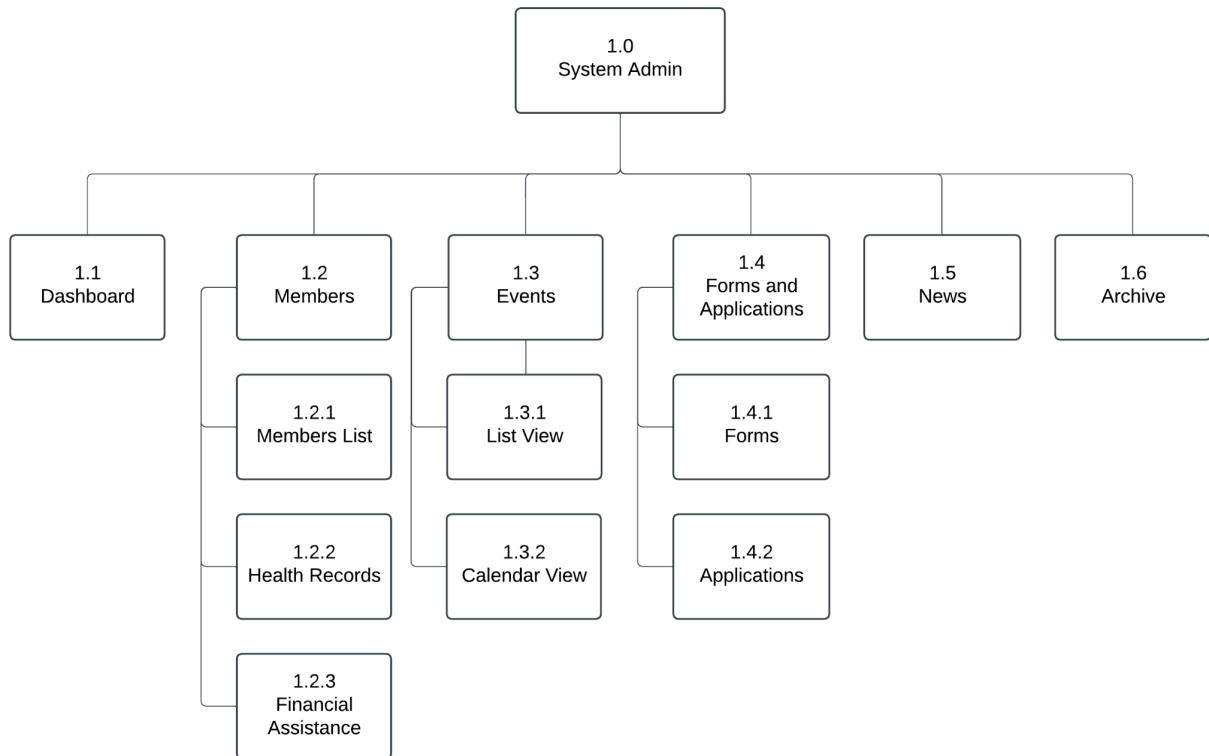


Figure 8. Visual Table of Contents (VTOC)

Figure 8 presents the Visual Table of Contents (VTOC) for the system, providing an organized overview of its various features and functionalities. Similar to a traditional table of contents, the VTOC lists different sections or modules of the system. This visual representation helps users quickly navigate through the system and locate specific features or information they need. By presenting information in a structured and visually

appealing manner, the VTOC enhances user experience and usability, improving overall system accessibility and efficiency.

Testing

For evaluating the system, the researchers will utilize the ISO/IEC 25010:2023 standard, which provides a framework for assessing software quality characteristics. This standard defines various criteria and characteristics that are essential for evaluating the quality of software systems. The criteria include functional suitability, performance efficiency, compatibility, interaction capability, reliability, security, maintainability, flexibility, and safety. Each criterion has specific characteristics that help measure the system's performance in that aspect.

In terms of sampling technique, the researchers will use purposive sampling, targeting individuals who are directly involved in the system's use and administration: the beneficiaries or the senior citizens, the heads of units or the community administrators, and IT experts. Table 4 shows the respondents, their frequency, and percentage for the study.

Table 4
Respondents of the Study

Respondents	Frequency (N)	Percentage (%)
Community Admins	2	4
IT Experts	10	20
Senior Citizens	8	16
Companions	30	60
Total	50	100

Table 4 presents the breakdown of respondents involved in the study. The respondents include community administrators, IT experts, senior citizens, and companions of the seniors. Community administrators represent those responsible for managing the system at the local level, while IT experts contribute their expertise in software quality assessment. The largest group of respondents consists of companions of the senior citizens, which are mostly the ones that support the senior citizens in every task that they do. The table demonstrates the distribution of respondents across the different stakeholder groups, highlighting the diversity of perspectives considered in the study.

For the evaluation of the system's effectiveness and user satisfaction, a four-point Likert scale will be employed. The Likert scale measures respondents' agreement or disagreement with statements related to system performance, usability, and overall satisfaction. The following descriptive ratings will be used for interpreting the responses:

Table 5
Four-point Likert Scale

Scale	Range	Descriptive Rating
4	3.50 – 4.00	Very Good
3	2.50 – 3.49	Good
2	1.50 – 2.49	Poor
1	1.00 – 1.49	Very Poor

For our Barangay Information Management System, the researchers will use both blackbox and whitebox testing.

Blackbox Testing. Here, the researchers will check if the system works correctly from a user's viewpoint. Additionally, this testing will check how the system responds to different actions, like clicking buttons or entering data. It helps them make sure that the system does what it is supposed to do without worrying about how it is built inside.

Whitebox Testing. While here, the researchers will look inside the system to see how it is built. They will test the actual code to find any mistakes or problems within this testing. This will help them make sure the system is well-built and does not have any hidden issues.

By using both types of testing, the researchers can make sure that their system works well for users and is built correctly.

Description of the Prototype

Figure 9-14 shows the website application of the system that users can visit. The website contains information about the system and its purpose, the latest local news, and the contact us button that allows the user to connect with the community admins. The website also contains a forms tab where users can view and answer existing forms.



Figure 9. Elderlink Users' Landing Page Home Section

About Elderlink

Elderlink is designed to streamline processes and organize information about elderly individuals, enabling Barangay Administrators to deliver personalized care and assistance tailored to their specific needs. By centralizing data management, Elderlink helps administrators provide targeted services and support to elderly residents, ensuring they receive the attention and resources they require.

Figure 10. Elderlink Users' Landing Page About Section

Latest News

- SEPTEMBER 21, 2019
Newly-Formed Commission for Elders in the Philippines
Posted by: Admin
- AUGUST 30, 2017
Gov't asks for 'small sacrifice' from senior citizens
Posted by: Admin
- AUGUST 5, 2017
Who are eligible for the DSWD senior citizen social...
Posted by: Admin
- JULY 13, 2017
DSWD Soc Program fo...
Posted by: Admin

Figure 12. Elderlink Users' Landing Page News Section

The screenshot shows the Elderlink website's 'Forms' section. At the top, there is a navigation bar with links for Home, About, News, Events, Forms, and Contact Us. The 'Forms' link is highlighted with a teal background. Below the navigation bar, the page title 'Application Forms' is displayed in a large, bold, teal font. Underneath the title, there are two main sections: 'Office of the Senior Citizens Affairs (OSCA) Forms' and 'Senior Citizen Services and Support Forms'. Each section contains several application form links.

- Office of the Senior Citizens Affairs (OSCA) Forms**
 - Senior Citizen's Identification Card (ID) Application Form
 - Death Benefit Application Form
 - Social Pension Intake Application Form
 - Citizen's Charter Application Form
 - Replacement Application Form
- Senior Citizen Services and Support Forms**
 - Senior Citizen's Discount Card Application Form
 - Healthcare Assistance Application Form
 - Financial Aid Application Form

Figure 13. Elderlink Users' Landing Page Forms Section

The screenshot shows the Elderlink website's 'Contact Us' section. At the top, there is a navigation bar with links for Home, About, News, Events, Forms, and Contact Us. The 'Contact Us' link is highlighted with a teal background. Below the navigation bar, the page title 'Contact Us' is displayed in a large, bold, teal font. A sub-instruction 'Use the below form to send us an e-mail with your question.' is present. The contact form includes fields for Name, Contact Number, and Question, followed by a 'Send Message' button.

Figure 14. Elderlink Users' Landing Page Contact Us Section

Figure 15-26 also shows the visual representation of the website application from the community admins' perspective. It contains the following navigation: Admin Dashboard, Members, Events, Forms and Applications, News, and Archive.

The Admin Dashboard showcases the analytical report of data that the system gathered from Total Website Visits, Total Senior Citizen Members of the Barangay, Upcoming Events, and Recent Transactions. The Admin Dashboard also contains the admin logs which can be useful for tracking recent activities made by the admin. This is the first page that the community admin will encounter after successfully logging into the system. It is the overview of key metrics and activities within the system.

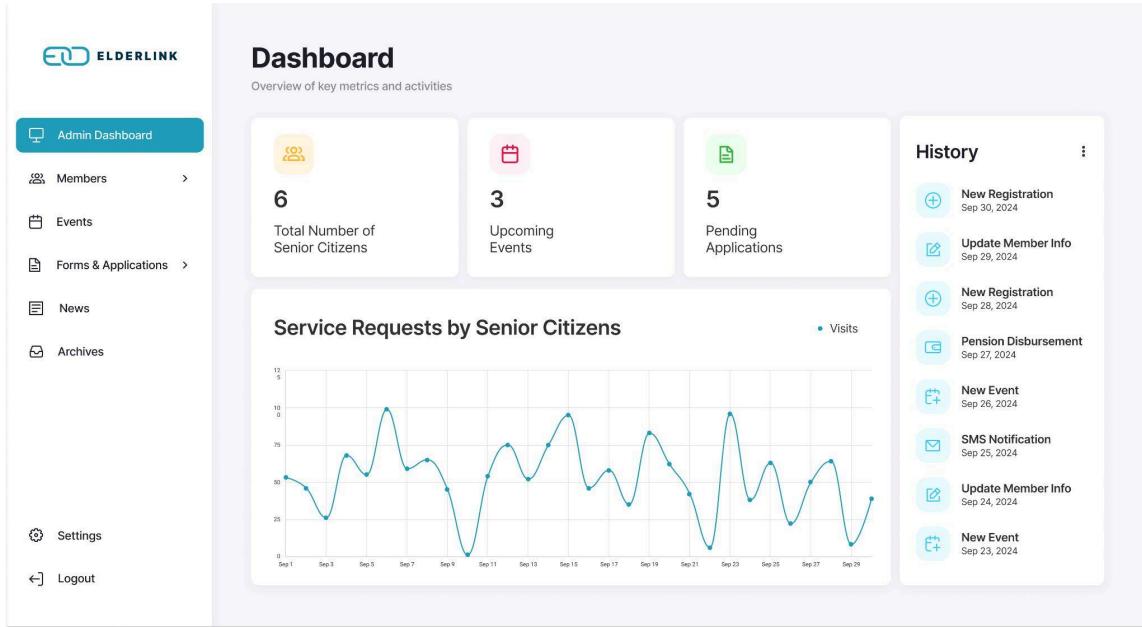


Figure 15. Elderlink Admins' Dashboard

In the next navigation, The Members tab, there are three sections: Members List, Health Records, and Financial Assistance. In the Members List section, the admin can find information about senior citizen members of the barangay. They can update, delete, add new members, and download a .csv file containing the members list.

Next, the Health Records section shows a table list of Medical Health Records of the members of the community. They can also update, delete, and show a detailed view of the health information of the member.

Lastly, the Financial Assistance section presents a table showing the details of a member's financial benefits, with options for the admin to update, delete, and view additional information as needed.

The screenshot shows the 'Members List' section of the Elderlink Admins' interface. The top navigation bar includes the Elderlink logo, a search bar, and a '+ Add New Member' button. On the left, a sidebar lists various administrative tabs: Admin Dashboard, Members (selected), Members List (highlighted in blue), Health Records, Financial Assistance, Events, Forms & Applications, News, Archives, Settings, and Logout. The main content area is titled 'Members List' with the subtitle 'Access and update member profiles'. It displays three summary cards: '6 Total Senior Citizens', '2 Upcoming Birthdays', and '0 Newly Registered'. Below these is a table with columns: Name, Date of Birth, Age, Gender, Address, Phone Number, and Actions. The table contains six rows of member data. At the bottom are pagination controls (1, 2, 3, >>) and a 'Generate Report' button.

Name	Date of Birth	Age	Gender	Address	Phone Number	Actions
Juan Dela Cruz	01-05-1950	74	Male	123 Main Street, Manila	+63 912 345 6789	
Maria Santos	03-20-1948	76	Female	456 Elm Avenue, Quezon City	+63 922 987 6543	
Pedro Gonzales	10-10-1945	78	Male	789 Oak Street, Makati	+63 933 111 2222	
Luz Reyes	10-25-1942	81	Female	101 Pine Road, Pasig	+63 944 333 4444	
Antonio Rodriguez	02-28-1947	77	Male	222 Maple Lane, Taguig	+63 955 555 6666	
Rosa Lim	10-08-1944	79	Female	222 Maple Lane, Taguig	+63 966 777 8888	

Figure 16. Elderlink Admins' Members Tab (Members List Section)

The screenshot shows the Elderlink Admins' Members Tab. On the left is a sidebar with navigation links: Admin Dashboard, Members (selected), Health Records, Financial Assistance, Events, Forms & Applications, News, Archives, Settings, and Logout. The main area is titled "Members List" with a subtitle "Access and update member profiles". It displays three cards: "6 Total", "2 Priority Care", and "0 Newly Registered". Below these is a table with columns "Phone Number" and "Actions". A modal window titled "Add New Member" is open, prompting for "First Name *" (Juan), "Last Name *" (Dela Cruz), "Date of Birth *", "Gender *", "Address *" (123 Main St.), "Phone Number *" (+63 912 345 6789), and "Email Address" (example@email.com). There are "Import .CSV File", "Cancel", and "Add" buttons. At the bottom of the page are navigation arrows and a "Generate Report" button.

Figure 17. Elderlink Admins' Members Tab (Members List Section: Add New Member)

The screenshot shows the Elderlink Admins' Members Tab. The sidebar is identical to Figure 17. The main area is titled "Health Records" with a subtitle "Maintain comprehensive health records". It displays three cards: "6 Total Health Records", "2 Priority Care", and "15 Recent Updates". Below these is a table with columns "Name", "Medical Conditions", "Medications", "Guardian", "Relationship", "Emergency Contact", and "Actions". The table lists six members with their respective health details. At the bottom are navigation arrows and a "Generate Report" button.

Figure 18. Elderlink Admins' Members Tab (Health Records Section)

The screenshot shows the Elderlink Admins' Members Tab with the Health Records section active. A modal dialog titled "Add New Record" is open, prompting for "Search Name" (with a placeholder "Search by name"), "Medical Conditions" (with a placeholder "Enter any medical conditions"), "Medications" (with a placeholder "Enter medications"), and "Guardian" (with a placeholder "Enter guardian's full name"). Below these fields are "Relationship" and "Emergency Contact" fields, both with placeholders ("Enter relationship" and "Enter contact number"). At the bottom of the modal are "Cancel" and "Add" buttons. In the background, there is a summary card showing "6 Total" members and a "Recent Updates" card showing "15 Recent Updates". The main list of members includes names like Juan Dela Cruz, Maria Santos, Pedro Gonzales, Luz Reyes, Antonio Cruz, and Miguel Reyes. A footer navigation bar shows pages 1 through 3.

Figure 19. Elderlink Admins' Members Tab (Health Records Section: Add New Record)

The screenshot shows the Elderlink Admins' Members Tab with the Financial Assistance section active. It displays three summary cards: "5 Total Beneficiaries", "5 Monthly Total Payouts", and "Oct 15 Upcoming Payouts". The main table lists five beneficiaries: Maria Santos, Pedro Gonzales, Luz Reyes, Antonio Cruz, and Miguel Reyes. Each row includes columns for Name, Latest Claimed Benefit, Latest Date of Claim, Status, Claimer, Relationship, and Actions. The "Status" column shows values like "Claimed" and "Unclaimed". The "Actions" column contains icons for edit, view, and delete. A footer navigation bar shows pages 1 through 3.

Figure 20. Elderlink Admins' Members Tab (Pension & Benefits Section)

Proceeding to the next navigation, The Events tab. This tab shows all community-held events. Admins can add new events and notify members about event schedules and details via SMS. They can update, delete, or archive events, and switch to a calendar view for easier planning. The events are also filtered so community admins can distinguish ongoing and archived events. The name of the event can also be searched through the search box above for easier navigation. Through the Events tab community admins can organize, manage, and schedule events that can be useful to the empowerment of the community, especially the senior citizens.

Event Title	Date	Location	Organizer	Category	Actions
Pension Distribution	10-15-2024	City Plaza	City Social Welfare	Financial Aid	
Senior Workshop: Digital Literacy	10-20-2024	City Library	Senior Citizen's Group	Workshop	
Health Checkup	10-25-2024	Community Hall	City Health Department	Health/Seminar	
Senior Fitness Walk	11-01-2024	Malolos Capitol	City of Malolos	Fitness	
Year-End Party	12-20-2024	Mojon Community Center	Barangay Mojon	Social Gathering	
Heart-to-Heart (Hearts Day)	02-14-2025	Mojon Community Center	Barangay Mojon	Social Gathering	

Figure 21. Elderlink Admins' Events Tab

Onto the next navigation which is The Forms & Applications tab. This navigation has two sections: Forms and Application. In the Forms section, the admin can see the list of existing forms that members can view and fill out on the website's landing page. Admins create these forms using services like Google Forms or Microsoft Forms and can organize them into folders for better structure. While in the Application section, admins handle applications submitted by community members, with various options available depending on the type of application. The applications can also be filtered by Pending, Approved, Declined, and Incomplete Applications.

The screenshot shows the 'Form Library' section of the Elderlink Admins' interface. The left sidebar includes links for Admin Dashboard, Members, Events, Forms & Applications (selected), Forms (highlighted in blue), Applications, News, Archives, Settings, and Logout. The main content area features a search bar and three categories: Provincial Initiatives, City Initiatives, and Barangay Initiatives. Below these is a 'OSCA Initiatives' section. A 'Recent Forms' table lists five forms:

Form Title	Last Opened	Category	More
Senior Citizen Registration Form	2024-04-03 10:20 AM	OSCA Initiatives	⋮
Cleanliness Program Participation Form	2024-03-31 02:15 PM	Barangay Initiatives	⋮
Feedback Survey Form	2024-04-01 11:00 AM	Barangay Initiatives	⋮
Medical Assistance Application Form	2024-04-02 03:45 PM	Provincial Initiatives	⋮
Food Assistance Program Application Form	2024-03-29 09:00 AM	City Initiatives	⋮

Figure 22. Elderlink Admins' Forms & Applications Tab (Forms Section)

The screenshot shows the Elderlink Admins' interface. On the left is a sidebar with the following navigation items:

- Admin Dashboard
- Members
- Events
- Forms & Applications (selected)
- Forms
- Applications (selected)
- News
- Archives
- Settings
- Logout

The main content area is titled "Manage Applications" and has a subtitle "Streamline application processing and approval workflows". It features a search bar and a filter bar with tabs: All (selected), Pending, Approved, and Denied. A table lists applications with columns: Applicant Name, Date Submitted, Form Type, Status, and Actions. The data in the table is as follows:

Applicant Name	Date Submitted	Form Type	Status	Actions
Juan Dela Cruz	2024-03-25	Senior Citizen Registration	Pending	
Maria Santos	2024-03-25	Medical Assistance	Incomplete	
Pedro Gonzales	2024-04-01	Cleanliness Program Participation	Approved	
Luz Reyes	2024-04-01	Food Assistance	Pending	
Antonio Rodriguez	2024-04-02	Social Pension	Pending	
Rosa Lim	2024-04-02	Volunteer Sign-up	Approved	
Ernesto Cruz	2024-04-02	Feedback Survey	Submitted	
Teresa Reyes	2024-04-02	Community Event Registration	Pending	
Ricardo Santos	2024-04-02	Legal Aid Inquiry	Pending	
Roberto Bautista	2024-04-02	Food Assistance	Pending	

Figure 23. Elderlink Admins' Forms & Applications (Applications Section: Filtered by All Sections)

This screenshot is identical to Figure 23, except the "Pending" tab is selected in the filter bar instead of "All". The table data remains the same, showing pending applications for Juan Dela Cruz, Luz Reyes, Antonio Rodriguez, Teresa Reyes, Ricardo Santos, and Roberto Bautista.

Figure 24. Elderlink Admins' Forms & Applications (Applications Section: Filtered by Pending Applications)

The screenshot shows the Elderlink Admins' interface. On the left is a sidebar with the Elderlink logo and navigation links: Admin Dashboard, Members, Events, Forms & Applications (selected), Forms, Applications (selected), News, Archives, Settings, and Logout. The main content area is titled "Manage Applications" with the subtitle "Streamline application processing and approval workflows". A search bar is at the top right. Below it is a filter bar with tabs: All, Pending, Approved (selected), and Denied. A table lists three approved applications:

Applicant Name	Date Submitted	Form Type	Status	Actions
Juan Dela Cruz	2024-03-25	Senior Citizen Registration	Approved	
Pedro Gonzales	2024-04-01	Cleanliness Program Participation	Approved	
Rosa Lim	2024-04-02	Volunteer Sign-up	Approved	

Figure 25. Elderlink Admins' Forms & Applications (Applications Section: Filtered by Approved Applications)

The screenshot shows the Elderlink Admins' interface, identical to Figure 25 but with a different filter. The Applications tab is selected in the sidebar. The main content area is titled "Manage Applications" with the subtitle "Streamline application processing and approval workflows". A search bar is at the top right. Below it is a filter bar with tabs: All, Pending, Approved (disabled), and Denied (selected). A table lists one denied application:

Applicant Name	Date Submitted	Form Type	Reason	Actions
Luz Reyes	2024-04-01	Food Assistance	Incomplete	

Figure 26. Elderlink Admins' Forms & Applications (Applications Section: Filtered by Denied Applications)

On the next navigation, the News tab. This navigation offers the admin to create, update, and archive news that are uploaded to the landing page of the members. These news can also be filtered to show necessary news that the admins need.

News Headline	Date	Body	Actions
BMH NFC Wristband and O...	07-26-2024	Cebu City - July 24, 2024. The BMH Team, led by Rotary Club of San...	
BMH President Visits Cebu...	07-26-2024	Cebu City – On the afternoon of July 23, 2024, at 3:15 PM, Mr. Denis Re...	
Rotary Club of San Pablo C...	07-19-2024	Famy, Laguna - July 18, 2024. The Rotary Club of San Pablo City South...	
BHM Launches NFC Wrist...	07-18-2024	Siniloan, Laguna, July 18, 2024 - The "BHM Wristband Lifelines and Uni...	
Training of OSCA Heads in...	07-17-2024	On July 17, 2024, the Auditorium of the Municipal Hall of Sta. Cruz, Lag...	
BMH Wristband UDMSS M...	07-12-2024	On April 26, 2024, Bring Me Home Phil Corp. (BMH) and the Municipali...	
Newly-Formed Commissi...	09-21-2019	President Rodrigo Duterte has approved the creation of the National Co...	

Figure 27. Elderlink Admins' News Tab

The last navigation that the Elderlink admin side offers is the Archive tab. This tab contains all the archived records that the admin had made. It is filtered through members, health, finance, events, news, and forms. These archives can be reverted back by the admin to their respective tabs.

The screenshot shows the 'Archives' tab of the Elderlink Admins' interface. The left sidebar includes links for Admin Dashboard, Members, Events, Forms & Applications, News, and Archives (which is highlighted with a blue background). The main content area has a header 'Archives' and a sub-header 'Inactive records of Elderlink'. A search bar is at the top right. Below is a table with columns: Name, Date of Birth, Age, Gender, Address, Phone Number, Status, and Action. Two rows of data are shown:

Name	Date of Birth	Age	Gender	Address	Phone Number	Status	Action
Luz Reyes	12-15-1942	81	Female	101 Pine Road, Pasig	+63 944 333 4444	Deceased	Undo
Antonio Rodriguez	02-28-1947	77	Male	222 Maple Lane, Taguig	+63 955 555 6666	Relocated	Undo

Figure 28. Elderlink Admins' Archives Tab

CHAPTER IV

RESULTS AND DISCUSSION

This chapter presents the findings of the study in relation to the project objectives. Each result is discussed based on the project goals to see if the objectives are met. The data collected through observations, interviews, and survey questionnaires are used to make conclusions. Any issues encountered that affected the result are also examined in this chapter.

1. To identify the day-to-day operations of Barangay Mojon regarding managing information related to senior citizens.

Understanding the daily operations of Barangay Mojon is important for designing a system that effectively addresses the needs of its community, especially for the community administrators and senior citizens. The researchers first gathered data through conducting an interview with the barangay assistant secretary, Patricia Umali.

In the interview, the researchers discovered that there is no official OSCA organization in Barangay Mojon, instead, a group of people willing to serve the elders of their community and a few official OSCA officers has combined to create an association that manages registrations, events, and transactions relating to the senior citizens of Barangay Mojon. This association is named ‘Association of Senior Citizen Mojon Chapter’. The few official OSCA officers are the ones that facilitate the events, they are also the one that manages registrations and other transactions that the senior citizens might need. Meanwhile, the other remaining members of this organization support the officers to accomplish events like the distribution of free medicine given by their local councilor.

Regarding the financial assistance distribution, there are two types of organizations that handle it. The barangay association and a local government organization. When the financial assistance is a Social Pension, the barangay organization facilitates it. However, when it comes to other financial assistance, especially when organizations like the Department of Social Welfare and Development (DSWD) are included, communication between the barangay association and the local government organization is crucial. The DSWD sends a list of members that are eligible to obtain the financial assistance after that the association then confirms the list, sending it back to the DSWD. The DSWD then comes to Barangay Mojon to facilitate the distribution of financial assistance following the list that are confirmed by both parties. Only people at the list are given assistance by the facilitators of the event. In a closing statement, Ma'am Patricia highlighted that although the transaction is complicated because the local government organizations have a different office, data still needs to be transferred to both parties which is an important factor to both sides.

The way Barangay Mojon's senior citizens' association works with local government organizations shows that managing services for seniors, like events and financial assistance, involves teamwork, showing an importance of storing data, and sharing this data between different verified local government groups to ensure everything runs smoothly.

2. To design and develop a comprehensive Barangay Information Management System for Community Administration and Engagement Among Senior Citizens

2.1. Member Management

Figure 29-34 presents the modals in the members list, health records, and financial assistance page. These modals contain input fields for adding, updating, and archiving the necessary members' data relating to their general, medical, and financial information. The modal also includes action buttons to cancel and confirm the information filled in by the admin and an import CSV file button to allow importing of data through external files.

Figure 29 shows the Add New Member modal, where administrators can input key member information, including First Name, Last Name, Senior Citizen ID Number, Gender (selectable via a dropdown), Date of Birth (with a calendar input), Phone Number, Address, and the option to upload documentation files. The modal includes two action buttons: Cancel to discard the data and Add to confirm and save the member details.

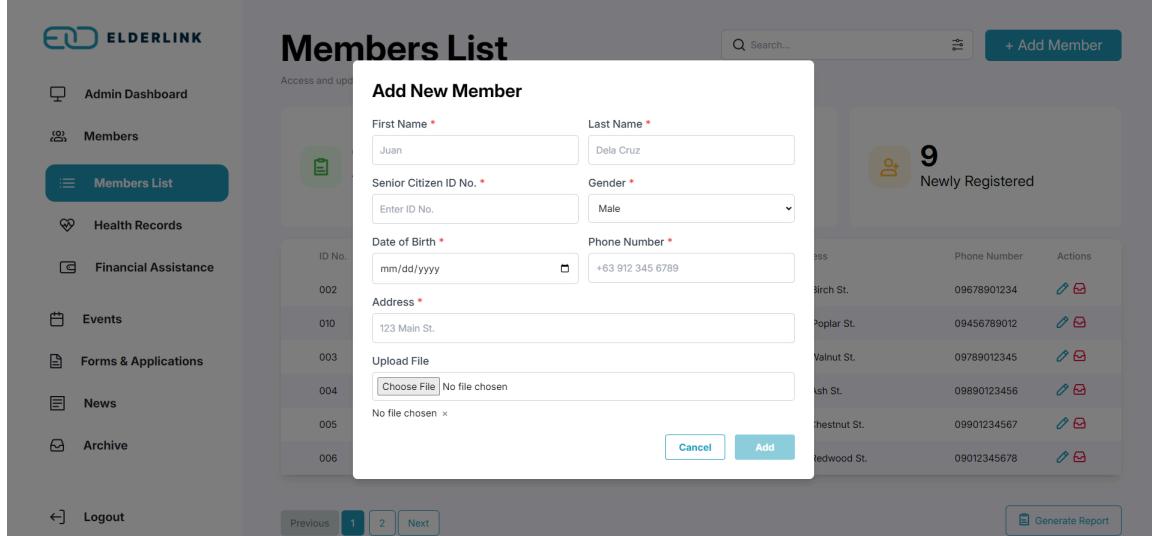


Figure 29. Adding New Member Record Modal

Figure 30 displays the Edit Member modal, which allows for modifications to an existing member's details. The editable fields include First Name, Last Name, Senior Citizen ID Number, Gender, Date of Birth, Phone Number, and Address. Action buttons at the bottom provide the options to Cancel the changes or Save the updates.

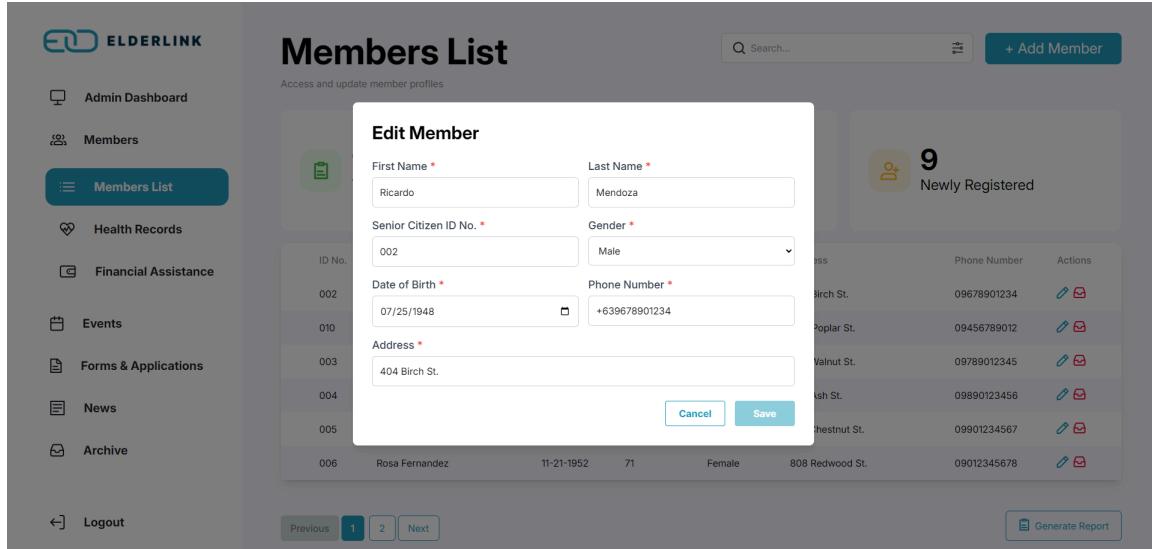


Figure 30. Editing Member Record Modal

Figure 31 illustrates the Add New Record modal for entering health-related data. The fields available include Search Member (searchable by name), Medical Conditions (supporting multiple entries separated by pressing Enter), Medications (also allowing multiple entries), Guardian Name, Relationship, and Emergency Contact details. The modal includes action buttons for Canceling the input or Saving the record.

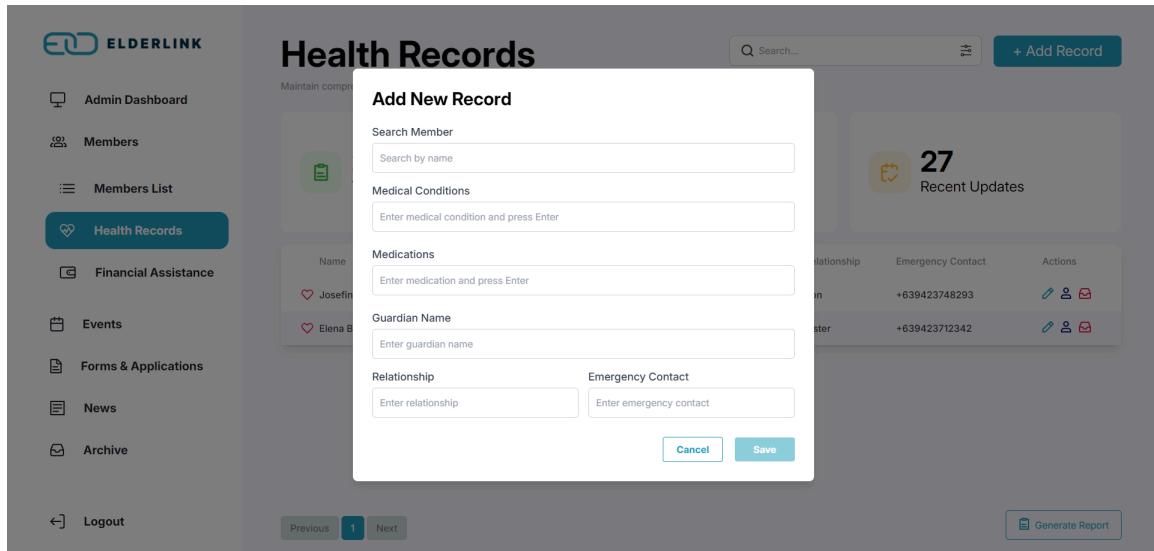


Figure 31. Adding New Health Record Modal

Figure 32 shows the Edit Record modal, which displays pre-filled information for a member's health record, such as Member Name, Medical Conditions (displayed as removable tags), Medications (also displayed as removable tags), Guardian Name, Relationship, and Emergency Contact. The modal includes action buttons to Cancel or Save the changes made.

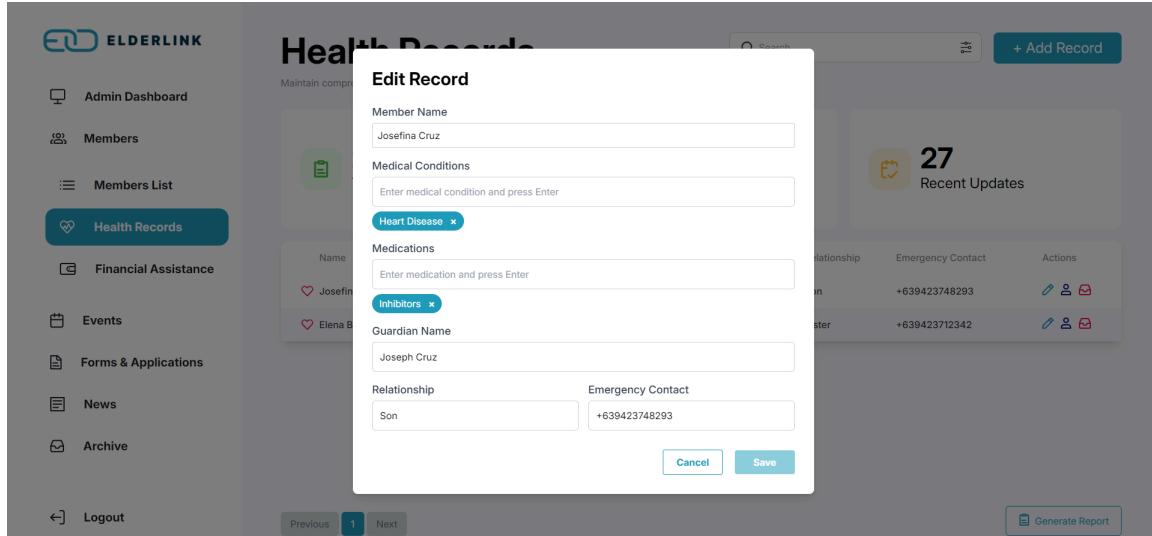


Figure 32. Editing Health Record Modal

Figure 33 presents the Add Financial Assistance Record modal, where administrators can enter details such as Member Name (searchable), Benefit Type (selectable via a dropdown), Date of Claim (editable via a calendar input), Benefit Status (selectable via a dropdown), Claimer's Name, and Relationship. The modal offers the options to Cancel the entry or Add the financial assistance record.

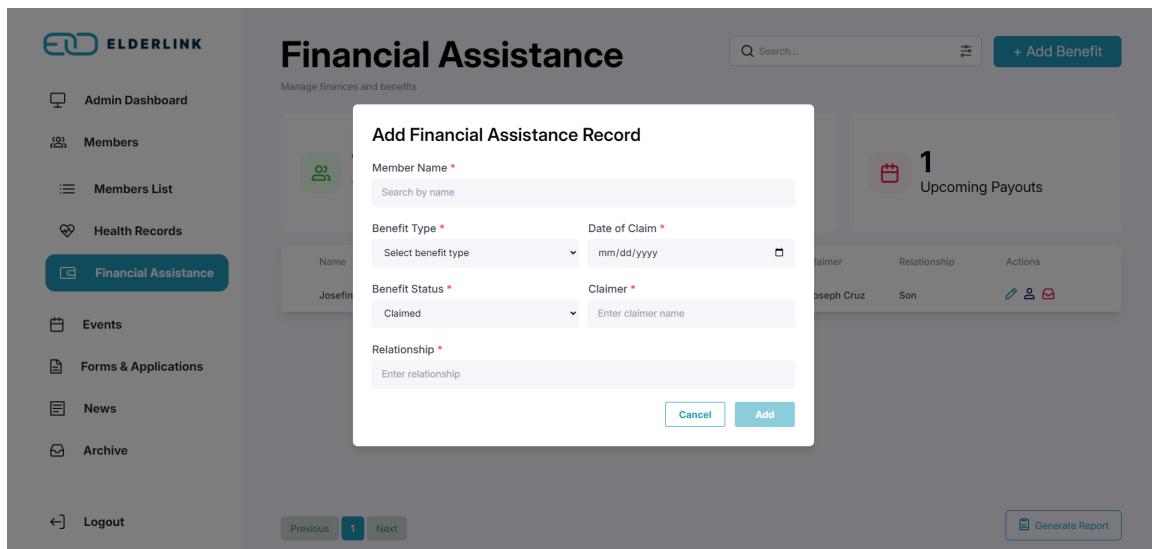


Figure 33. Adding New Financial Assistance Record Modal

Figure 34 illustrates the Edit Financial Assistance Record modal, which is pre-filled with existing data for a particular member. The editable fields include Member Name, Benefit Type, Date of Claim, Benefit Status, Claimer's Name, and Relationship. Action buttons allow for Canceling or Saving the updates to the financial assistance record.

The screenshot shows the ElderLink Admin Dashboard. On the left, there's a sidebar with various menu items: Admin Dashboard, Members, Members List, Health Records, **Financial Assistance** (which is highlighted in blue), Events, Forms & Applications, News, Archive, and Logout. The main content area has a title "Financial Assistance" and a sub-section "Manage finances and benefits". In the center, a modal window titled "Edit Financial Assistance Record" is open. It contains the following form fields:

- Member Name ***: Josefina Cruz
- Benefit Type ***: Social Pension
- Date of Claim ***: 11/21/2024
- Benefit Status ***: Claimed
- Claimer ***: Joseph Cruz
- Relationship ***: Son

At the bottom of the modal are two buttons: "Cancel" and "Save".

Figure 34. Editing Financial Assistance Record Modal

Effective member management is essential for organizations to maintain accurate, up-to-date records while reducing administrative overhead. As highlighted by Hafizuddin Hambali et al. (2024), a comprehensive membership management system offers significant advantages, such as automating manual tasks, centralizing data, and streamlining processes. In today's interconnected world, managing a growing membership base through traditional methods can become cumbersome and prone to errors. Automated systems such as the one described in the modal examples above ensure that administrative staff can efficiently manage member information, access personalized services, and maintain accurate health and financial records. The user-friendly interface

design, as demonstrated through the modal system, allows administrators to add, update, and archive member data with ease, ensuring smooth operations. According to usability testing conducted on the system, users reported high satisfaction, noting its ease of use and functional capabilities, further reinforcing the importance of well-designed membership management systems in enhancing both administrative efficiency and member engagement.

By simplifying these management tasks, the system supports organizations in focusing on their strategic objectives and fostering deeper engagement within their community. This capability is crucial for associations that aim to improve operational efficiency while ensuring members' needs are met with precision.

2.2. Data Profiling

Figure 35 displays the Add New Member modal within the Members List section of Elderlink. This modal window allows barangay administrators to input and register new OSCA members. Key fields include First Name, Last Name, Senior Citizen ID No., Gender, and Date of Birth. Additionally, the modal requires contact information through the Phone Number and Address fields. An Upload File option is provided, which allows administrators to import a CSV or Excel file for easy bulk data entry, streamlining the process of adding multiple members at once and enhancing data input efficiency.

The system includes validation measures to ensure data accuracy; As an example shown in Figure 35, the system verifies that the member's age is 60 years or older based on the entered date of birth. If the individual does not meet this age requirement, an error message is displayed, preventing registration. This eligibility check helps administrators ensure that only qualified senior citizens are registered. At the bottom, Cancel and Add

buttons provide options to either save the new member's data or exit without saving. This interface supports standardized data entry and improves the accuracy of information.

The screenshot shows the Elderlink application interface. On the left is a sidebar with navigation links: Admin Dashboard, Members (selected), Health Records, Financial Assistance, Events, Forms & Applications, News, and Archive. Below the sidebar is a 'Logout' button. The main area has a title 'Members List' and a sub-section 'Add New Member'. The 'Add New Member' form contains fields for First Name (Neil), Last Name (Zapanta), Senior Citizen ID No. (111), Gender (Male), Date of Birth (11/19/2024), Phone Number (+639123456789), Address (123 Main St.), and an Upload File field (Choose File). A note at the top of the form says 'Age must be 60 years or older.' Below the form is a table titled 'Newly Registered' showing 9 entries with columns for Address, Phone Number, and Actions. At the bottom of the modal are 'Cancel' and 'Add' buttons. The footer of the page includes 'Previous' and 'Next' buttons, a page number '1', and a 'Generate Report' button.

Figure 35. Add New Member Modal

The Data Profiling feature in the Elderlink system plays a key role in maintaining data quality by enforcing requirements and preventing the entry of incorrect or ineligible data. The age validation function, along with other required fields, promotes consistency and reduces the risk of errors. This feature helps the system maintain an accurate database by allowing only eligible senior citizens to be registered, which streamlines the registration process and supports reliable data management.

In the context of e-government systems, data profiling and validation contribute significantly to data quality management. According to Kook et al. (2019), data quality management is essential for ensuring reliable and consistent information, especially in systems that interact with multiple government entities. The Elderlink system's approach to data validation aligns with these principles, minimizing the risk of unreliable data and supporting efficient service delivery. By implementing these quality controls, the system

reinforces the accuracy and reliability of its data, enhancing its utility for administrators and contributing to effective management.

2.3. Record-Keeping

Figure 36 and 37 presents the Members List and Health Records pages in the Elderlink system. The Members List page shows basic details about senior citizen members, including their name, date of birth, age, gender, address, and phone number. This information allows barangay administrators to quickly access essential member details. In contrast, the Health Records page holds specific medical information, such as medical conditions, medications, allergies, and emergency contact details, which aids in managing health needs and preparing for emergencies. Together, these pages offer a well-organized overview of both general and health-specific information for each registered senior citizen.

The screenshot displays the 'Members List' page of the Elderlink system. At the top, there's a navigation bar with the Elderlink logo, a search bar, and a '+ Add Member' button. Below the navigation is a summary section with three cards: 'Total Senior Citizens' (9), 'Upcoming Birthdays' (4), and 'Newly Registered' (9). The main content area is a table listing member details:

ID No.	Name	Date of Birth	Age	Gender	Address	Phone Number	Actions
002	Ricardo Mendoza	07-25-1948	76	Male	404 Birch St.	09678901234	
010	Elena Bautista	05-05-1953	71	Female	1212 Poplar St.	09456789012	
003	Teresa Lopez	08-02-1951	73	Female	505 Walnut St.	09789012345	
004	Josefina Cruz	09-14-1949	75	Female	606 Ash St.	09890123456	
005	Antonio Vega	10-06-1941	83	Male	707 Chestnut St.	09901234567	
006	Rosa Fernandez	11-21-1952	71	Female	808 Redwood St.	09012345678	

At the bottom, there are navigation links for 'Previous', 'Next', and a 'Generate Report' button.

Figure 36. Members List Page

Name	Medical Conditions	Medications	Guardian	Relationship	Emergency Contact	Actions
Josefina Cruz	Heart Disease	Inhibitors	Joseph Cruz	Son	+639423748293	
Elena Bautista	Hypertension	Lisinopril	Eleonora Bautista	Sister	+639423712342	

Figure 37. Health Records Page

The record-keeping feature in Elderlink is valuable for effectively organizing and preserving member records. By integrating both general and medical data, the system enables administrators to manage records systematically and retrieve relevant information as needed. This organized approach to data management aligns with key e-government objectives, where electronic record-keeping contributes to operational efficiency, improved service quality, and reliable data storage. By centralizing member data electronically, Elderlink supports data accuracy and minimizes the risks of missing or incomplete records, creating a reliable tool for administrators and users alike.

Anugrah (2020) emphasizes that robust electronic record-keeping is essential for the effective implementation of e-government systems. Electronic archives created through e-government transactions play a critical role in maintaining the functionality and reliability of these systems. However, in many developing countries, record-keeping practices are often insufficiently prioritized, which can hinder the success of e-government initiatives. Implementing organized electronic record-keeping, as

demonstrated by Elderlink, enhances service quality by ensuring data is properly managed and easily accessible, ultimately contributing to the system's reliability and effectiveness.

2.4. SMS Notifications

Figure 38 displays the Manage Events page, specifically the SMS composition modal. The modal is designed to facilitate sending messages to selected recipients regarding OSCA-related events. It includes a Recipients field for searching names or selecting predefined groups, such as All Senior Citizens. Below, it lists Selected Recipients, displaying the chosen individuals, with an option to remove them. The Message Content section is a text box where barangay administrators can draft the SMS content to be sent out. At the bottom, the modal contains Send SMS and Cancel buttons, allowing barangay administrators to confirm or abort the message-sending process.

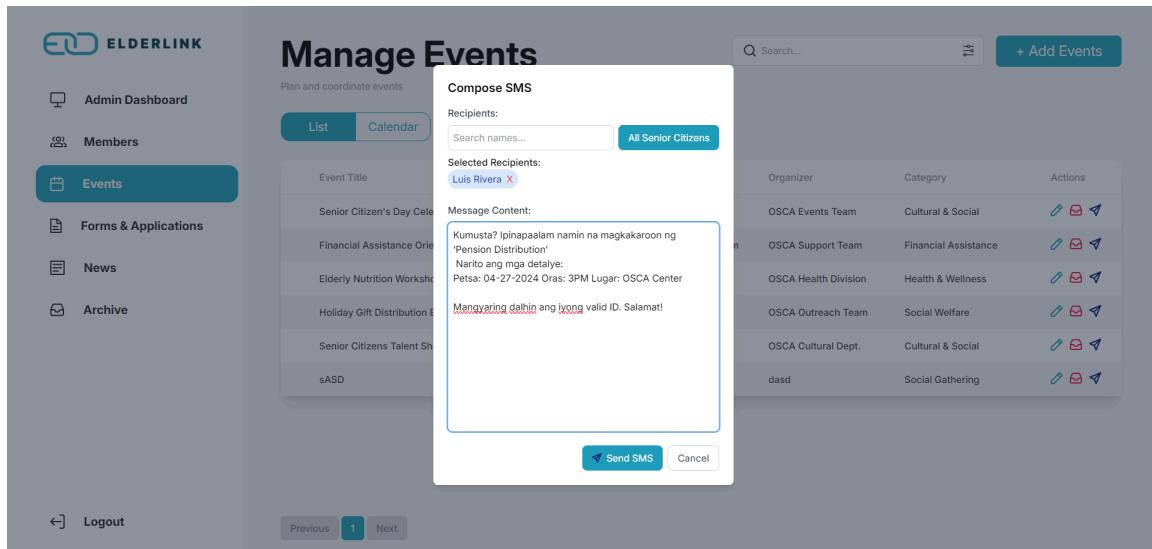


Figure 38. Compose SMS Modal

The SMS Notifications feature is important for ensuring effective communication regarding OSCA-related events. Similar to the SMS Notification system described by Batitis et al. (2019), this feature uses SMS technology to deliver information quickly and directly to recipients. In the context of OSCA events, this feature allows for efficient notification of senior citizens about upcoming activities, updates, or other relevant information, ensuring that messages are sent in a timely and organized manner.

As highlighted in the study by Batitis et al., manual processes can be inefficient for delivering information to communities. By integrating SMS technology, Elderlink facilitates the streamlined distribution of event-related details, reducing delays and ensuring that the intended recipients are promptly informed. This supports effective coordination and enhances communication between OSCA and its members.

2.5. Financial Assistance

Figure 39 shows the Financial Assistance dashboard that helps barangay administrators monitor and manage every beneficiary's information. The section above presents the key metrics, including the total number of beneficiaries, the total amount disbursed, and the next payout date. Along with this is a table consisting of the beneficiaries' list and their essential information such as age, benefit type, benefit status, last claimed date, claimant information and their relationship to the beneficiary, and action buttons for editing or archiving.

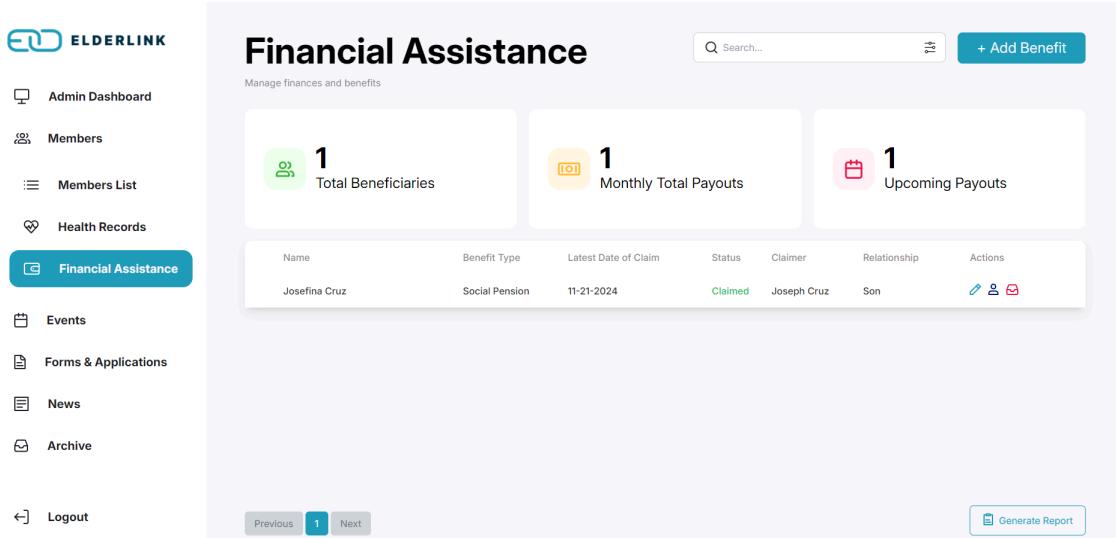


Figure 39. Financial Assistance Page

This feature provides a clear and efficient way for barangay administrators to manage financial aid distribution to beneficiaries by having a simplified presentation of data as shown in the given figure. It helps ensure that barangay administrators can easily monitor who has claimed their benefits and who still needs to receive them, allowing for better follow-up and timely disbursements. Additionally, this feature enables quick updates to beneficiary records, which ensures accuracy and minimizes errors in payouts.

This aligns with findings in the study by Macharia and Dominic (2019), which discusses the importance of efficient financial management systems, such as the Integrated Financial Management Information System (IFMIS), in improving transparency, tracking, and accountability in public financial management. Just as IFMIS enhances financial data management by providing clear records and better financial control, the dashboard for managing financial assistance ensures that administrators have an organized, real-time view of beneficiary information, reducing mismanagement and improving operational efficiency in the distribution of financial aid. The study

emphasizes the role of technology in improving processes such as accounting and budgeting, similar to how the dashboard can streamline the financial aid process at the barangay level.

2.6. Forms and Applications

Figure 40 shows the Form Library where forms aligned with OSCA members' needs and requirements are created or imported from external sources. The above section dedicated to folders helps barangay administrators to better organize various forms depending on their categorization or purpose. Underneath it, is the Recent Forms section, which shows a comprehensive table of recently opened files containing the form title, the date it was last opened, and the category or the folder to which it belongs.

Form Title	Date Created	Category	Actions
Osca Registration Form	11/11/2024, 7:09:32 PM	OSCA Initiatives	
Death Application Forms	11/16/2024, 3:22:10 PM	Provincial Initiatives	

Figure 40. Form Library

Figure 41 displays the Manage Application dashboard intended for more efficient processing and approval of OSCA members' applications. The process of approval is simplified with the help of the following action buttons on the right side of the table

along with the application information including the applicant name, the date when the application was submitted, the type of form or application, and its status which can also be viewed separately using the filter above the table.

Applicant Name	Date Submitted	Form Type	Status	Actions
Juan Dela Cruz	2024-03-25	Senior Citizen Registration	Pending	
Maria Santos	2024-03-25	Medical Assistance	Incomplete	
Pedro Gonzales	2024-04-01	Cleanliness Program Participation	Approved	
Antonio Rodriguez	2024-04-02	Social Pension	Pending	

Figure 41. Manage Applications Page

This feature is essentially helpful to barangay administrators as it improves workflow efficiency in creating and organizing both online and paper-based forms and applications submitted by OSCA members. It allows barangay administrators to save time in managing applications and ensuring that it is processed efficiently and transparently. Additionally, this feature provides a comprehensive way to view and manage all of the essential forms that are delivered on the senior citizens' end through the Landing Page.

Pysarenko et al. (2019) highlight the growing use of information technologies in public administration, particularly in the area of electronic document management. The study discusses how electronic systems for creating, transferring, and storing documents can improve efficiency and transparency in administrative processes. Similarly, the Form

and Application dashboard provide system administrators with a digital solution for organizing and managing forms and applications, which supports more efficient processing. This approach reduces reliance on paper documents and allows for more streamlined workflows in public administration.

2.7. Report Generation

Figure 42 shows a report generated through the system's report generation feature, which exports essential data into an Excel file. This report is an example of the data exported from the Members List tab. The report generation feature is accessible in the Members List, Health Records, and Financial Assistance sections of the system, allowing barangay administrators to export all necessary data from these areas into Excel files for further use. The process begins when system administrators click the "Generate Reports" button within any of these sections. The system compiles the stored data into a structured Excel file format and enables the admin to download it for review, sharing, or further analysis.

A	B	C	D	E	F	G	H	
1	ID No.	Name	Date of Birth	Age	Gender	Address	Phone Number	Status
2	001	Luzes Navarro	06-18-1942	82	Female	303 Maple St.	09567890123	Deceased
3	008	Carmen Valdez	01-15-1944	80	Female	1010 Sycamore St.	09234567890	Relocated
4	009	Luis Rivera	03-28-1950	74	Male	1111 Magnolia St.	09345678901	Relocated
5	002	Ricardo Mendoza	07-25-1948	76	Male	404 Birch St.	09678901234	Active
6	010	Elena Bautista	05-05-1953	71	Female	1212 Poplar St.	09456789012	Active
7	003	Teresa Lopez	08-02-1951	73	Female	505 Walnut St.	09789012345	Active
8	004	Josefina Cruz	09-14-1949	75	Female	606 Ash St.	09890123456	Active
9	005	Antonio Vega	10-06-1941	83	Male	707 Chestnut St.	09901234567	Active
10	006	Rosa Fernandez	11-21-1952	71	Female	808 Redwood St.	09012345678	Active
11	007	Manuel Herrera	12-09-1938	85	Male	909 Spruce St.	09123456789	Active
12	555	Biancas Santos	11-19-1940	83	Female	789 Oak St.	09123456789	Active

Figure 42. Members List Generated Report

The report generation feature is a key tool for efficient data management and decision-making. It automates the compilation and formatting of data from various

system sections, such as the Members List, Health Records, and Financial Assistance tabs, saving time and reducing the risk of human error. This ensures that administrators can access accurate and organized data without the need for manual processing.

As stated by S et al. (2022), report generation enhances resource management by providing a reliable way to organize and visualize data, aiding in decision-making processes. In Elderlink, this feature supports various administrative needs, such as tracking member demographics, monitoring health-related information, and managing financial assistance records. By consolidating essential data into a standardized format, it facilitates better planning, resource allocation, and service delivery.

3. To integrate interactive community engagement and participation features for senior citizens into the system/application

Integrating interactive community engagement and participation features is crucial for encouraging a feeling of community and active participation among senior citizens, as well as for improving the system's overall functionality and impact. The system will not only make information management easier but also give users the ability to stay interested and connected by integrating technologies that let the seniors interact with their community and take part in local events. Seniors will be able to contribute to their communities, form social bonds, and enhance their general well-being in a supportive setting thanks to these elements.

According to Targosz (2024), Landing pages are important because they provide relevant and concise information which enhances the user experience, directly influencing decision-making. Having a Landing page dedicated for senior citizen

members will help them keep informed on data relevant to their barangay especially when it has information on events that might happen and news on past events that correlates to their barangay. It can influence their decisions to interact with upcoming events and engage more with their local community. That is why the researchers decided to create a landing page for senior citizen members to foster community engagement.

In figure 43, the home section of the landing page for senior citizen members is displayed. This landing page contains several sections that can help the senior citizens be informed that are relevant to them. The following sections are: Home, About, News, Events, Forms, and Contact Us section.



Figure 43. Landing Page (Home Section)

The Home section of the landing page features a banner and a tagline that explain the importance of the system being developed for senior citizens. This section gives visitors an overview of how the system is designed to help senior citizens and improve their lives. The About section provides more details about the system, explaining how the

barangay uses it to manage the personal information of senior citizen members. It helps users understand how the system works to make things easier for both the community and the senior citizens. The News section shows the latest news and updates that are important or interesting to senior citizens. It keeps the community informed about relevant news and events that may benefit or interest them. The Events section offers two views: a list and a calendar of past and upcoming events. This makes it easy for senior citizens to see what activities are coming up, helping them stay involved in the community. The Forms section has all the forms related to the benefits senior citizens can access. This makes it simple for them to find and fill out the forms they need without having to go to their barangay office in person. Lastly, the Contact Us section has a form where users can send their questions or concerns to the system admin. This helps ensure that issues are addressed and that users can get the help they need.

According to Accruent (2023), by using event management software, event organizers can simplify their tasks and more efficiently manage logistics, communicate with participants, and analyze data to enhance future events. That is why the researchers decided to add an “Events” Feature that handles the creation, updating, and archiving of events that can be held in the barangay shown in figure 44. This feature also includes sending an SMS of the event created (shown in figure 45) to promote engagement and encourage senior citizens to participate in the upcoming event.

The screenshot shows the 'Manage Events' section of the ElderLink system. On the left, a sidebar menu includes 'Admin Dashboard', 'Members', 'Events' (which is selected and highlighted in blue), 'Forms & Applications', 'News', and 'Archive'. Below the sidebar is a 'Logout' button. The main area has a title 'Manage Events' and a subtitle 'Plan and coordinate events'. It features two tabs: 'List' (selected) and 'Calendar'. A search bar and a '+ Add Events' button are at the top right. The central part is a table with the following data:

Event Title	Date	Location	Organizer	Category	Actions
Senior Citizen's Day Celebration	December 5, 2024	Community Hall	OSCA Events Team	Cultural & Social	
Financial Assistance Orientation	November 15, 2024	OSCA Auditorium	OSCA Support Team	Financial Assistance	
Elderly Nutrition Workshop	November 22, 2024	OSCA Grounds	OSCA Health Division	Health & Wellness	
Holiday Gift Distribution Event	December 15, 2024	OSCA Center	OSCA Outreach Team	Social Welfare	
Senior Citizens Talent Show	December 10, 2024	OSCA Theater	OSCA Cultural Dept.	Cultural & Social	

Pagination at the bottom shows 'Previous' and 'Next' buttons, with '1' indicating the current page.

Figure 44. Manage Events Tab (List View)

This screenshot shows the 'Manage Events' interface with the 'Events' tab selected. A modal window titled 'Compose SMS' is open. The 'Recipients:' field shows 'All Senior Citizens'. The 'Message Content:' field contains the following text:

Kumusta? Pinapalaan namin na magkakaroon ng 'Pension Distribution'
Narito ang mga detalye:
Petsa: 04-27-2024 Oras: 3PM Lugar: OSCA Center
Mangyaring datin ang iyong valid ID. Salamat!

At the bottom of the modal are 'Send SMS' and 'Cancel' buttons. To the right of the modal, the event list is visible, showing the same five events as Figure 44. The table columns are 'Organizer', 'Category', and 'Actions'.

Figure 45. Manage Events (Sending an SMS Message of an Event)

Additionally, a “News” page is also added in the system to provide local news that admins can manage. These news are reflected in the Landing Page of the members which keeps them updated regarding the latest local news that are relevant to them and their community.

The screenshot shows the 'News' management section of the ElderLink Admin Dashboard. The left sidebar includes links for Admin Dashboard, Members, Events, Forms & Applications, News (which is highlighted in blue), and Archive. The main area has a search bar and a '+ Add News' button. The news list displays one item:

News Headline	Author	Date	Body	Photo	Actions
OSCA at mga Lokal na Ospital, Magpapatupad ng Health Discount Program	Admin	November 6, 2024	Bilang bahagi ng kanilang adhikain na mapabuti ang kalidad ng serbisyo pangkalusugan para sa mga senior citizen, ang Office of Senior Citizens Affairs (OSCA) ay nakipag-partner sa mga pangunahing ospital sa lungsod upang magpapatupad ng Health Discount Program. Sa ilalim ng programang ito, makakakuha ng hanggang 20% diskwento ang mga senior citizen sa mga piling serbisyo sa ospital, gaya ng laboratory tests, check-ups, at gamot. Ang bagong programa ay inaasahang makakatulong sa pagbawas ng gastusin sa kalusugan ng mga nakatanda at magbibigay sa kanila ng mas abot-kayang access sa pangangalagang medikal.		

Figure 46. News Management

As stated by VandenBrink, “Community Journalism matters because it might be the one bringing people together in a city.” The “News” feature will improve the engagement of the senior citizens to the community as this can serve as a bridge to keep them updated about the recent events that happen to their community.

The system aims to provide senior citizens with an easy-to-use platform that eases the access of information relevant to them. On the member side, a Landing Page that contains home, about, news, events, forms, and contact us section that allows them to stay informed and involved in their community with ease. On the admin side, an addition of the “Events” and “News” feature which simplifies the management of events and news that promotes community engagements between the senior citizens and the local barangay. Overall, this approach enhances the engagement between the senior citizens and the barangay and makes the system more impactful.

4. To determine the acceptability of the system using the ISO/IEC 25010:2023 software quality evaluation criteria

4.1. Functional Suitability

Table 6 displays the frequency distribution and descriptive measures of the respondents' ratings based on the system's Functional Suitability which are divided into three categories: Functional Completeness, Functional Correctness, and Functional Appropriateness.

Table 6

Frequency Distribution and Descriptive Measures of the Respondents' Ratings of the System in Terms of Functional Suitability

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
A. Functional Suitability						
Functional Completeness. The system provides a set of functions that covers all the specified tasks and intended users' objectives	3.85	0.36	Very Good	3.60	0.52	Very Good
Functional Correctness. The system provides accurate results when used by intended users.	3.83	0.38	Very Good	3.80	0.42	Very Good
Functional Appropriateness. The system provides functions that facilitate the accomplishment of specified tasks and objectives.	3.88	0.33	Very Good	3.90	0.32	Very Good
Total Mean	3.85	0.36	Very Good	3.77	0.42	Very Good

The mean scores for both respondent groups reflect a consistent evaluation of the system, interpreted as “Very Good” across all criteria. For the Intended End-users, the total mean is 3.85, while for the Technical Experts, it is 3.77, which is both interpreted as “Very Good” which means that the system delivers the expected features, performs the intended tasks, and addresses the needs of the users. Both groups rated Functional Appropriateness the highest, highlighting the system’s ability to facilitate the accomplishment of specified tasks and objectives. The lower standard deviation values from the Intended End-Users (0.36) indicates a greater agreement among this group compared to the Technical Experts (0.42). These results show that both groups agree that the system meets its functional requirements.

4.2 Performance Efficiency

Table 7 shows the frequency distribution and descriptive measures of the respondents’ ratings based on the Performance Efficiency of the system which are divided into three categories: Time Behavior, Resource Utilization, and Capacity.

Table 7

Frequency Distribution and Descriptive Measures of the Respondents’ Ratings of the System in Terms of Performance Efficiency

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
B. Performance Efficiency						
Time Behavior. The system performs its specified function under specified conditions so that the response time and throughout rates meet the requirements.	3.76	0.43	Very Good	3.60	0.70	Very Good

Resource Utilization. The system uses no more than the specified amount of resources to perform its function under specified conditions.	3.73	0.50	Very Good	3.70	0.67	Very Good
Capacity. The system meets requirements for the maximum limits of a product parameter.	3.80	0.40	Very Good	3.60	0.70	Very Good
Total Mean	3.76	0.45	Very Good	3.63	0.69	Very Good

The system is consistently assessed as "Very Good" across every factor, corresponding to the mean scores of the two responder groups. For the Intended End-users, the total mean is 3.76, while for the Technical Experts, it is 3.63, which is both interpreted as "Very Good" which means that the system is fast, responsive, and doesn't use unnecessary resources. The Intended End-Users rated Capacity the highest, showcasing the system's ability to remain efficient as the demand increases. While the Technical Experts rated Resource Utilization the highest, emphasizing that the system uses its resources in an optimal way without unnecessary waste. The higher standard deviation from the Technical Experts (0.69) reveals that their answers were more distributed compared to the Intended End-Users (0.45). According to these findings, both groups believe that the system makes use of its resources to carry out predetermined activities while still producing the intended outcome on schedule.

4.3 Compatibility

Table 8 illustrates the frequency distribution and descriptive measures of the respondents' ratings based on the system's Compatibility which are divided into two categories: Co-existence and Interoperability

Table 8

Frequency Distribution and Descriptive Measures of the Respondents' Ratings of the System in Terms of Compatibility

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
C. Compatibility						
Co-existence. The system performs its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.	3.83	0.38	Very Good	3.90	0.32	Very Good
Interoperability. The system can exchange information with other products and mutually use the information that has been exchanged.	3.76	0.43	Very Good	3.30	0.82	Good
Total Mean	3.79	0.41	Very Good	3.60	0.57	Very Good

The system is consistently rated as "Very Good" across all parameters, according to the mean scores of the two responder groups. For the Intended End-Users, the total mean is 3.79, while for the Technical Experts, it is 3.60, which is both interpreted as "Very Good" which means that the components of the system functions properly with

other components without causing errors, malfunctions, or performance problems. Both groups rated Co-existence the highest, drawing attention to the system's ability of each component to work together without issues. There is more agreement among the Intended End-Users (0.36) than among the Technical Experts (0.42), as indicated by the lower standard deviation values from the End-Users group. According to these findings, both groups believe that the system makes use of its resources to carry out predetermined activities while still producing the intended outcome on schedule.

4.4 Interaction Capability

Table 9 presents the frequency distribution and descriptive measures of the respondents' ratings based on the Interaction Capability of the system which are divided into eight categories: Appropriateness Recognizability, Learnability, Operability, User Error Protection, User Engagement, Inclusivity, User Assistance, and Self-Descriptiveness.

Table 9

Frequency Distribution and Descriptive Measures of the Respondents' Ratings of the System in Terms of Interaction Capability

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
D. Interaction Capability						
Appropriateness Recognizability. The system can be recognized by users as appropriate for their needs.	3.88	0.33	Very Good	3.30	0.82	Good

Learnability. The system can have specified users learn to use specified product functions within a specified amount of time.	3.88	0.33	Very Good	3.90	0.32	Very Good
Operability. The system has functions and attributes that make it easy to operate and control.	3.83	0.38	Very Good	3.70	0.48	Very Good
User Error Protection. The system can prevent operation errors.	3.73	0.50	Very Good	3.90	0.32	Very Good
User Engagement. The system presents functions and information in an inviting and motivating manner encouraging continued interaction.	3.83	0.38	Very Good	3.40	0.84	Good
Inclusivity. The system can be utilized by people of various backgrounds.	3.88	0.33	Very Good	3.90	0.32	Very Good
User Assistance. The system can be used by people with the widest range of characteristics and capabilities to achieve specified goals in a specified context of use.	3.80	0.40	Very Good	3.80	0.42	Very Good

Self-Descriptiveness. The system can present appropriate information, where needed by the user, to make its capabilities and use immediately obvious to the user without excessive interactions with a product or other resources.	3.88	0.40	Very Good	3.90	0.32	Very Good
Total Mean	3.84	0.38	Very Good	3.73	0.48	Very Good

The Intended End-Users' mean shows that the system was consistently rated as "Very Good" across all criteria. Nearly every criterion was scored as "Very Good" for the Technical Experts, with the exception of User Engagement and Appropriateness Recognizability, which were rated as "Good", indicating room for improvement. The overall mean score for the Technical Experts is 3.60 and for the Intended End-Users is 3.79. Both scores are regarded as "Very Good," indicating that the system enables meaningful interaction and communication with users. The lower standard deviation values from the End-Users group show that there is greater agreement among the Intended End-Users (0.38) than among the Technical Experts (0.48). These results show that both groups think the system is responsive, intuitive, and easy to use, satisfying user needs while offering a smooth and effective experience.

4.5 Reliability

Table 10 shows the frequency distribution and descriptive measures of the respondents' ratings based on the system's Reliability which are divided into four categories: Faultlessness, Availability, Fault Tolerance, and Recoverability.

Table 10

Frequency Distribution and Descriptive Measures of the Respondents' Ratings of the System in Terms of Reliability

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
E. Reliability						
Faultlessness. The system performs specified function without fault under normal operation.	3.78	0.42	Very Good	3.70	0.67	Very Good
Availability. The system is operational and accessible when required for use.	3.73	0.45	Very Good	3.70	0.48	Very Good
Fault Tolerance. The system operates as intended despite the presence of hardware or software faults.	3.76	0.43	Very Good	3.60	0.70	Very Good
Recoverability. The system can recover the data directly affected and re-establish the desired state of the system.	3.78	0.42	Very Good	3.30	1.16	Good
Total Mean	3.76	0.43	Very Good	3.58	0.75	Very Good

According to the mean of the intended end users, the system was consistently evaluated as "Very Good" in every category. Nearly every criterion was scored as "Very Good" for the Technical Experts, with the exception of Recoverability, which were rated as "Good", indicating room for improvement. The overall mean score for the Technical Experts is 3.58 and for the Intended End-Users is 3.76. Both scores are regarded as "Very Good," indicating that the system ensures stability, dependability, and minimal interruptions, even in challenging circumstances. There is more agreement among the

Intended End-Users (0.43) than among the Technical Experts (0.75), as indicated by the lower standard deviation values from the End-Users group. These results show that both groups agree that the system ensures that it remains dependable, handles faults easily, and can recover from issues quickly.

4.6 Security

Table 11 displays the frequency distribution and descriptive measures of the respondents' ratings based on the Security of the system which are divided into three categories: Confidentiality, Integrity, Non-repudiation, Accountability, Authenticity, and Resistance.

Table 11

Frequency Distribution and Descriptive Measures of the Respondents' Ratings of the System in Terms of Security

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
F. Security						
Confidentiality. The system ensures that data are accessible only to those authorized to have access.	3.85	0.36	Very Good	3.40	0.97	Good
Integrity. The system ensures that its state and data are protected from unauthorized modification or deletion by malicious action or computer error.	3.80	0.40	Very Good	3.50	0.97	Very Good

Non-repudiation. The system can be proven to have taken place so that the events or actions cannot be repudiated later.	3.73	0.45	Very Good	3.00	1.05	Good
Accountability. The system enables the actions of an entity to be traced uniquely to the entity.	3.80	0.40	Very Good	3.50	0.71	Very Good
Authenticity. The system can be prove that the identity of a subject or resource is the one claimed.	3.76	0.43	Very Good	3.70	0.95	Very Good
Resistance. The system sustains operations while under attack from a malicious actor.	3.76	0.43	Very Good	3.40	1.07	Good
Total Mean	3.78	0.41	Very Good	3.42	0.95	Good

The average rating of "Very Good" for the intended end users is constant across all criteria. The Technical Experts rated "Very Good" for almost all criteria, with the exception of resistance and non-repudiation, which received "Good" ratings, suggesting that those parts could improve more. The Technical Experts received a mean score of 3.42, while the Intended End-Users received a mean score of 3.78. The lower standard deviation values from the End-Users group show that there is a greater agreement among the Intended End-Users (0.41) than among the Technical Experts (0.95). These findings indicate that although the technical experts think there is room for improvement, the intended end users strongly believe that the system is secure.

4.7 Maintainability

Table 12 presents the frequency distribution and descriptive measures of the respondents' ratings based on the system's Maintainability which are divided into five categories: Modularity, Reusability, Analysability, Modifiability, and Testability.

Table 12

Frequency Distribution and Descriptive Measures of the Respondents' Ratings of the System in Terms of Maintainability

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
G. Maintainability						
Modularity. The system can limit changes to one component from affecting other components.	3.83	0.38	Very Good	3.00	1.05	Good
Reusability. The system can be used as assets in more than one system, or in building other assets.	3.78	0.42	Very Good	3.60	0.70	Very Good
Analysability. The system can be effectively and efficiently assessed regarding the impact of an intended change to one or more of its parts, to diagnose it for deficiencies or causes of failures, or to identify parts to be modified.	3.85	0.36	Very Good	3.90	0.32	Very Good

Modifiability. The system can be effectively and efficiently modified without introducing defects or degrading existing product quality.	3.80	0.40	Very Good	3.60	0.70	Very Good
Testability. The system can be enable an objective and feasible test to be designed and performed to determine whether a requirement is met.	3.90	0.30	Very Good	3.50	0.97	Very Good
Total Mean	3.83	0.37	Very Good	3.52	0.75	Very Good

The Intended End-Users' mean shows that the system was consistently rated as "Very Good" across all criteria. Nearly every criterion was scored as "Very Good" for the Technical Experts, with the exception of Modularity, which were rated as "Good", indicating room for improvement. The overall mean score for the Intended End-Users is 3.83 and for the Technical Experts is 3.52. Both scores are regarded as "Very Good," indicating that the system reduces the effort and time needed to make changes while ensuring smooth operation over its lifecycle. The lower standard deviation values from the End-Users group show that there is greater agreement among them (0.37) over the Technical Experts (0.75). These results show that both groups think the system can be efficiently analyzed, updated, and tested, allowing it to evolve and adapt while minimizing disruptions or resource use.

4.8 Flexibility

Table 13 illustrates the frequency distribution and descriptive measures of the respondents' ratings based on the Flexibility of the system which are divided into four categories: Adaptability, Scalability, Installability, and Replaceability.

Table 13

Frequency Distribution and Descriptive Measures of the Respondents' Ratings to the Information Management System in Terms of Flexibility

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
H. Flexibility						
Adaptability. The system can be effectively and efficiently adapted for or transferred to different hardware, software, or other operational or usage environments.	3.78	0.42	Very Good	3.90	0.32	Very Good
Scalability. The system can handle growing or shrinking workloads or adapt its capacity to handle variability.	3.80	0.40	Very Good	3.90	0.32	Very Good
Installability. The system can be effectively and efficiently installed successfully and/or uninstalled in a specified environment.	3.80	0.40	Very Good	3.50	0.71	Very Good

Replaceability. The system can replace another specified product for the same purpose in the same environment.	3.68	0.47	Very Good	3.90	0.32	Very Good
Total Mean	3.77	0.42	Very Good	3.80	0.41	Very Good

The system remains regarded as "Very Good" across every aspect, according to the mean scores of the two the respondent groups. For the Intended End-users, the total mean is 3.77, while for the Technical Experts, it is 3.80, that is both interpreted as "Very Good" which means that the system adapts to changes, grows with new demands, and integrates smoothly into different environments or configurations. The higher standard deviation values from the Intended End-Users (0.42) indicates that there is more agreement among the group of Technical Experts (0.41) compared to them. According to these findings, both groups agree that the system can adapt to new conditions, grow as needed, and integrate or evolve efficiently, supporting its sustainability and usability over time.

4.9 Safety

Table 14 shows the frequency distribution and descriptive measures of the respondents' ratings based on the system's Safety which are divided into five categories: Operational Constraint, Risk identification, Fail-safe, Hazard Warning, and Safe Integration.

Table 14

Frequency Distribution and Descriptive Measures of the Respondents' Ratings to the Information Management System in Terms of Safety

Item	Intended End-Users			Technical Experts		
	Mean	SD	DI	Mean	SD	DI
I. Safety						
Operational Constraint. The system can constrain its operation to within safe parameters or states when encountering operational hazards.	3.76	0.49	Very Good	3.90	0.32	Very Good
Risk identification. The system can identify a course of events or operations that can expose life, property, or environment to unacceptable risk.	3.66	0.57	Very Good	3.20	1.03	Good
Fail-Safe. The system can automatically place itself in a safe operating mode, or revert to a safe condition in the event of a failure.	3.63	0.49	Very Good	3.70	0.67	Very Good
Hazard Warning. The system can provide warnings of unacceptable risks to operations or internal controls so that they can react in sufficient time to sustain safe operations.	3.70	0.51	Very Good	3.20	1.03	Good

Safe Integration. The system can maintain safety during and after integration with one or more components.	3.66	0.57	Very Good	3.20	1.03	Good
Total Mean	3.68	0.53	Very Good	3.44	0.82	Good

The system was consistently scored as "Very Good" across every factor, according to the mean of the intended end users. Two factors have been rated "Very Good" by the Technical Experts which are Operational Constraint and Fail-safe. The remaining three factors: Risk Identification, Hazard Warning, and Safe Integration were rated as "Good", meaning that the system could minimally improve on identifying potential risks or hazards that could arise during its operation, providing alerts or warning to users when hazardous conditions are detected, and ensuring that it can interact with other components without creating unsafe conditions. The overall mean score for the Intended End-Users is 3.68 which is regarded as "Very Good" and for the Technical Experts 3.44 which is regarded as "Good". The lower standard deviation values from the End-Users group show that there is greater agreement among the Intended End-Users (0.53) than among the Technical Experts (0.82). These results show that although the Intended End-Users believes that the system is safe, the Technical Experts, on the other hand, argue that a little improvement could be made to make the system safer.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusions drawn from the system's development and evaluation. A summary of how the system met its goals are also shown here. In addition, this chapter provides essential recommendations for enhancing the system in accordance with study findings and user feedback. The purpose of these recommendations are to improve the system's overall usability and functionality for future improvements.

Summary of Findings

An overview of the main findings discovered throughout the system's development and assessment are provided in this section. These findings demonstrate the system's efficiency in data management of senior citizen members in Barangay Mojon.

1. To identify the day-to-day operations of Barangay Mojon regarding managing information related to senior citizens.

Barangay Mojon does not have an official OSCA organization. Instead, a group of people, including a few official OSCA officers, created the "Association of Senior Citizen Mojon Chapter" to manage registrations, events, and transactions for senior citizens. The officers facilitate events and manage registrations, while the remaining members support the officers in activities like distributing free medicine. For financial assistance, the barangay association handles Social Pension, while other financial assistance involves coordination with local government organizations like the Department of Social Welfare and Development (DSWD). The DSWD sends a list of eligible recipients, which the association confirms before returning it. The DSWD then comes to

Barangay Mojon to distribute assistance to those on the confirmed list. Overall, managing services for senior citizens in Barangay Mojon requires the help of the “Association of Senior Citizen Mojon Chapter”. To ensure smooth operations, data transfer between different local government organizations is also important.

2. To design and develop a comprehensive Barangay Information Management System for Community Administration and Engagement Among Senior Citizens

Keeping in mind the result from the interview made from the specific objective number 1, the researchers created a system that has the following features: Member Management for effective, accurate, and up-to-date records; Data Profiling for reliable and consistent information; Record-Keeping to ensure properly managed and easily accessed data; SMS Notifications to ensure recipients are promptly informed; Financial Assistance to improve transparency, tracking, and accountability in public financial management; Forms and Application for a reduce reliance on paper documents and allows for more streamlined workflows in public administration; Report Generation for a reliable way to organize and visualize data, helping in decision-making process. These features streamline information management for community administrators while fostering stronger engagement with senior citizens.

3. To integrate interactive community engagement and participation features for senior citizens into the system/application

Integrating interactive features in the system is essential for encouraging senior citizens' participation and fostering a sense of community, making information management easier while helping seniors stay connected and engaged with local events.

A dedicated landing page for senior citizens will keep them informed about events and news related to their barangay, influencing their decisions to participate in activities. The landing page includes sections like Home, About, News, Events, Forms, and Contact Us, with each section offering specific information such as system benefits, personal information management, updates on relevant events, and access to necessary forms. For administrators, the system features an "Events" tool to manage and promote events, allowing organizers to create, update, and archive activities, while also sending SMS notifications to encourage senior citizens' participation. Overall, the system enhances community engagement by providing easy access to information and opportunities for involvement, while simplifying event management for administrators.

4. To determine the acceptability of the system using the ISO/IEC 25010:2023 software quality evaluation criteria

The system was evaluated by two groups: Intended End-Users and Technical Experts. End-Users rated the system "Very Good" overall, while Technical Experts gave a mix of "Very Good" and "Good" ratings. The Functional Suitability received means of 3.85 (End-Users) and 3.77 (Experts), showing the system works as expected. Performance Efficiency was rated 3.76 (End-Users) and 3.63 (Experts), indicating speed and resource optimization. Compatibility scored 3.79 (End-Users) and 3.60 (Experts), reflecting seamless component integration. Interaction Capability means were 3.84 (End-Users) and 3.73 (Experts), showing ease of use. Reliability scored 3.76 (End-Users) and 3.58 (Experts), proving its dependability. Security was rated 3.78 (End-Users) and 3.42 (Experts), with some improvements suggested by Experts. Maintainability scored 3.83 (End-Users) and 3.52 (Experts), showing ease of updates. Flexibility scored 3.77

(End-Users) and 3.80 (Experts), highlighting adaptability. Safety received 3.64 (End-Users) and 3.44 (Experts), with minor improvements needed.

Conclusions

The absence of an official OSCA organization highlighted the importance of developing a comprehensive solution to aid the "Association of Senior Citizen Mojon Chapter" in their day-to-day operations. The capstone project successfully addresses the need for a streamlined and efficient information management system for Barangay Mojon, particularly in managing senior citizen-related data and activities which results in the creation of the Elderlink system. The web application system includes the following navigation for admins: Dashboard, Members List, Health Records, Financial Assistance, Forms and Application, and Archives. To encourage senior citizens to engage in activities regarding the community, the researchers created community engagement and participation features such as adding an Events and News page to the admin-side and landing page for members containing the following navigation: Home, About, News, Events, Forms, and Contact us section. Intended End-Users and Technical Experts evaluated the system with the general mean of 3.78 and 3.61 both with a descriptive interpretation of "Very Good"

Overall, the system's impact is profound, significantly enhancing administrative efficiency, improving transparency and accountability in financial assistance, and enabling senior citizens to stay connected and actively participate in their community. Furthermore, its scalable and adaptable design makes it a valuable model for other barangays, promoting inclusivity, fostering collaboration among stakeholders, and

strengthening community ties. Through these advancements, the system empowers both administrators and senior citizens, ensuring better resource management and a more engaged and informed community. The developed system meets its objectives by improving administrative processes and promoting active participation among senior citizens. It serves as a robust foundation for managing barangay operations and fostering a more engaged and connected community.

Recommendations

Based on the findings and the conclusion of the study, the following recommendations have been outlined, which may serve as a guide for future researchers in the field of Information Technology who aims to develop the same kind of study:

1. Enhance Security Features

Address the concerns raised by Technical Experts by integrating stronger security measures, such as implementing the OWASP Top 10, as suggested by one of the Technical Experts. This will ensure better data protection and bolster user confidence in the system.

2. Improve Safety Protocols

Focus on refining the safety features to minimize the risks of system errors or unintended consequences. Conduct regular testing and simulations to identify potential vulnerabilities and ensure the system operates reliably in various scenarios.

3. Super Admin Role

To further strengthen security, introduce a Super Admin role with exclusive privileges to oversee all aspects of the system. The Super Admin would have full access to system settings, user management, and sensitive data, while other roles (such as regular administrators or officers) would have restricted access to only the features necessary for their specific tasks. This ensures that critical system functions, such as configuration changes, data backup, and security settings, are closely monitored and controlled by a trusted individual.

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