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Technological Innovations and Future Prospect for the Resident Information Management System for Local Barangay in Surigao City

Jovie Micayas Gallera
Faculty, College of Engineering and Information Technology,
Surigao Del Norte State University, Surigao City, Philippines
jgallera@ssct.edu.ph

Abstract: *The paper presents the significance of Resident Information Management System (RIMS) in local barangays for efficient resident data management. Recent technological innovations have revolutionized information handling, offering opportunities to enhance system effectiveness. Investigating RIMS in local barangays, the research focuses on usability, functionality, efficiency, and maintainability. A user-friendly interface empowers barangay staff, streamlined data retrieval meets diverse needs, and centralized data enables faster responses. Maintaining a robust system ensures reliability. Technological innovations offer potential to transform RIMS, empowering officials, enhancing engagement, and providing efficient services. Ongoing collaboration and a forward-looking approach are vital for successful integration and development. Embracing future technological trends contributes to overall development in barangay administration.*

Keywords: RIMS, evaluation, innovations, local barangays, technology

I. INTRODUCTION

In today's rapidly evolving digital landscape, technological innovations have become integral to transforming traditional systems and enhancing governance at the grassroots level. As local communities embrace the digital era, one crucial aspect that has seen significant advancement is the Resident Information Management System (RIMS)[1][2]. This system plays a pivotal role in efficiently organizing and storing essential data about residents within local barangays, paving the way for streamlined administrative processes and improved service delivery.

The focus of this research is to delve into the study of technological innovations. With the aim of exploring cutting-edge technologies and potential advancements, this study seeks to shed light on the transformational impact of modernizing resident information management in the context of barangays.

The existing resident information management systems in barangays form the bedrock of community governance, facilitating the collection and storage of vital resident data, such as demographics, addresses, civil status, and services availed [3][4][5]. As technology continues to evolve, this research will investigate how local barangays in Surigao City can leverage emerging innovations, such as cloud computing, data analytics, artificial intelligence, and mobile applications, to revolutionize their information management practices.

The research will encompass a multifaceted approach, beginning with an in-depth analysis of the current state of resident information management systems within Surigao City's barangays. Understanding the strengths, weaknesses, opportunities, and challenges of the existing systems will provide a solid foundation for proposing feasible technological enhancements.

Moreover, this study will explore successful case studies from other regions or countries that have adopted advanced systems. By examining their implementation strategies, challenges faced, and outcomes achieved, valuable insights can be drawn to tailor solutions that align with the unique needs of Surigao City's local barangays.

Furthermore, the research will conduct surveys and interviews with key stakeholders, including barangay officials, residents, and technology experts. Gathering their perspectives on the current system's functionality and future

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expectations will provide invaluable input in designing a technologically robust and user-friendly Resident Information Management System.

The anticipated outcomes of this research endeavor include identifying technology-driven solutions that optimize data accuracy, accessibility, and security while streamlining administrative processes within local barangays. By harnessing technological innovations, barangays can create a more efficient, transparent, and citizen-centric system that fosters community growth and engagement.

The study is poised to contribute significantly to the advancement of administrative practices at the grassroots level. Embracing technology's potential will not only elevate information management but also lay the groundwork for future-proof and sustainable governance solutions, benefiting both barangay officials and residents alike..

II. BACKGROUND STUDY OF RESIDENT INFORMATION SYSTEM

The study forms an integral part of local governance, providing a comprehensive database that houses crucial information about residents within barangays. Traditionally, paper-based records and manual data processing were prevalent in local administration. However, the advent of technology has catalyzed significant transformations in information management systems, offering opportunities for local barangays to enhance efficiency, accuracy, and service delivery. This background study delves into the evolution of resident information system, the role of technological innovations, and the future prospects it holds for local barangays.

Evolution of Resident Information Management Systems: Resident Information Management Systems have been vital tools for local governance for decades, facilitating the collection, organization, and storage of resident data[6][7][8]. In the past, these systems relied on paper-based forms, physical files, and manual record-keeping, which posed challenges in data retrieval, updates, and security. As technology progressed, early computerized systems emerged, enabling digital storage and basic data management. However, these systems often lacked integration, limiting their overall effectiveness.

Impact of Technological Innovations: The rapid advancement of technology, particularly in the areas of cloud computing, data analytics, artificial intelligence, and mobile applications, has brought revolutionary changes to information management systems[9][10]. Cloud-based solutions allow seamless data storage, access, and collaboration, eliminating the constraints of physical infrastructure[11]. Data analytics enable insights into resident demographics, service preferences, and trends, empowering local barangays to make data-driven decisions for better resource allocation and service planning. Artificial intelligence enhances data processing, automating routine tasks and improving accuracy[12]. Mobile applications offer convenient channels for residents to access services, submit requests, and engage with barangay authorities.

Benefits and Challenges of Adopting Technological Innovations: The integration of technological innovations into RIMS offers numerous benefits for local barangays. Efficiency and productivity are enhanced as digital systems streamline data entry, retrieval, and processing, reducing manual effort and human errors. Access to real-time and accurate information enables faster decision-making and improved response to residents' needs[13][14][15]. Data security measures protect sensitive resident information, safeguarding privacy and compliance with data protection regulations. Moreover, technological advancements foster greater transparency, accountability, and citizen engagement[16][17].

However, challenges exist in implementing and sustaining technology-driven RIMS. These may include initial setup costs, staff training, and potential resistance to change from stakeholders accustomed to traditional methods. Ensuring data security and privacy remains a priority, considering the sensitivity of resident information. Interoperability between different systems and integration with existing government databases may present technical hurdles[18][19].

Future Prospects and Opportunities: The future prospects of RIMS lie in embracing emerging technologies and continuously evolving to meet changing demands. Artificial intelligence and machine learning can further automate data processing, making RIMS even more efficient and responsive. Blockchain technology may offer enhanced data security and integrity, building trust in the system[20][21]. The Internet of Things (IoT) can connect devices and infrastructure, enabling smart applications for citizen services.

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Moreover, user-centric design and mobile applications can enhance citizen engagement, encouraging residents to actively participate in community affairs and avail themselves of services. Augmented reality and virtual reality may provide immersive experiences for residents in engaging with the barangay's activities and events[22][23].

The background study highlights the evolution of Resident Information Management Systems and the significant impact of technological innovations on local barangays' administrative practices. Embracing technological advancements presents an array of opportunities for improved efficiency, accuracy, transparency, and citizen engagement. While challenges exist, strategic planning and implementation can ensure the successful adoption of technology-driven RIMS. The future prospects of RIMS are promising, paving the way for sustainable, citizen-centric governance at the barangay level.

III. DESIGN OF RESIDENT INFORMATION MANAGEMENT SYSTEMS

The study is a comprehensive software solution that streamlines the management of resident data at the barangay level. The components mentioned below will work together to ensure efficient data entry, retrieval, and security while enabling residents to access services and communicate with barangay officials effectively.

- *User Interface (UI)*: It is the front-end component of the Resident Information Management System (RIMS) that allows users, such as barangay officials and administrators, to interact with the system. It includes screens for data entry, search functionalities, reports generation, and user management.
- *Database:* It is a critical component that stores all resident-related information, such as demographics, addresses, contact details, and service requests. It ensures data integrity, security, and efficient data retrieval for various modules within the RIMS.
- *Authentication and Access Control:* The Authentication and Access Control component is responsible for user authentication, authorization, and access management. It ensures that only authorized users can access and modify resident data, enhancing data security and privacy.
- *Data Entry and Management:* The Data Entry and Management module enable authorized users to add, update, and delete resident information. It includes validation checks to maintain data accuracy and consistency.
- *Search and Retrieval:* The Search and Retrieval component allows users to query resident information based on different criteria, such as name, address, and demographics. It provides fast and efficient data retrieval for quick access to resident records.
- *Reporting and Analytics:* The Reporting and Analytics module generates various reports, such as resident demographics, service requests, and trends. It facilitates data-driven decision-making and provides valuable insights to barangay officials.
- *Service Requests and Notifications:* The Service Requests and Notifications component enables residents to submit service requests, such as requests for documents or assistance. It also allows barangay officials to send notifications or updates to residents through the system.
- *Data Security and Privacy:* The Data Security and Privacy component ensures that resident data is protected from unauthorized access, manipulation, or disclosure. It includes encryption, secure data transmission, and compliance with data protection regulations.
- *Integration:* The Integration module allows seamless integration with other government systems or databases, ensuring the exchange of relevant information between different government entities.
- *Backup and Recovery:* The Backup and Recovery component ensures the regular backup of resident data to prevent data loss in case of system failure or unforeseen events. It enables quick data recovery to maintain system continuity.
- *User Management and Administration:* The User Management and Administration module enable administrators to manage user accounts, roles, and permissions. It ensures proper access control and security within the RIMS.
- *Audit Trail and Logging*: The Audit Trail and Logging component record user activities and system events, providing an audit trail for security monitoring and troubleshooting purposes.

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Proper implementation and integration of these components will result in a robust and user-friendly RIMS, enhancing local governance and citizen services.

VI. RESULT AND DISCUSSION

4.1 Design and Development

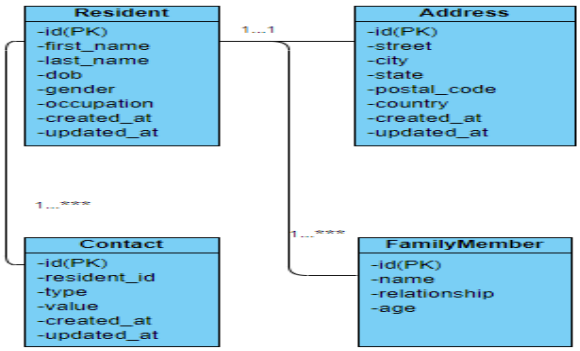

Fig. 1. Class diagram of the system

In this database class diagram, we have four main entities: Resident, Address, Contact, and FamilyMember.

- The Resident entity represents the residents or individuals in the system. It contains attributes such as id (primary key), first_name, last_name, date of birth (dob), gender, occupation, created_at, and updated_at.
- The Address entity represents the addresses associated with each resident. It contains attributes such as id (primary key), street, city, state, postal_code, country, created_at, and updated_at. It has a foreign key resident_id referencing the Resident entity to establish a one-to-many relationship (each resident can have multiple addresses).
- The Contact entity represents the contact information (phone number, email, etc.) associated with each resident. It contains attributes such as id (primary key), type (e.g., phone, email), value (phone number, email address), resident_id (foreign key referencing the Resident entity), created_at, and updated_at. It also has a one-to-many relationship with the Resident entity (each resident can have multiple contact information).
- The FamilyMember entity represents the family members of each resident. It contains attributes such as id (primary key), name, relationship to the resident, age, created_at, and updated_at. It also has a foreign key resident_id referencing the Resident entity to establish a one-to-many relationship (each resident can have multiple family members).

The relationships between the entities are as follows:

- A Resident entity can have multiple addresses, so there is a one-to-many relationship between Resident and Address.
- A Resident entity can have multiple contact information, so there is a one-to-many relationship between Resident and Contact.
- A Resident entity can have multiple family members, so there is a one-to-many relationship between Resident and FamilyMember.
- These relationships are established through the use of foreign key references in the Address, Contact, and FamilyMember entities, linking them to the corresponding Resident entity.

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4.2 Screenshot of the System

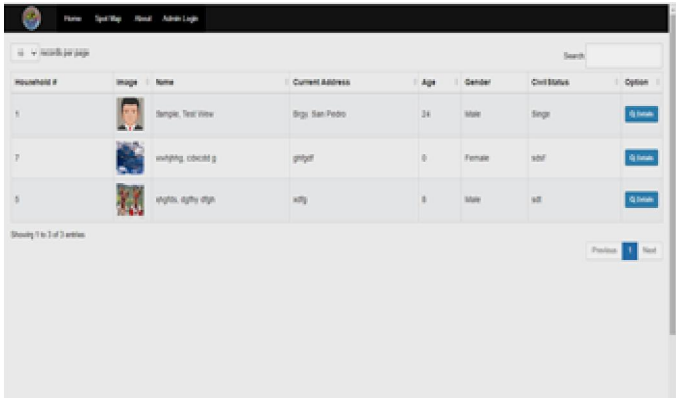

Fig.2. Home Page

Figure 2 shows the homepage and list of data inputted to the system by the administrator.

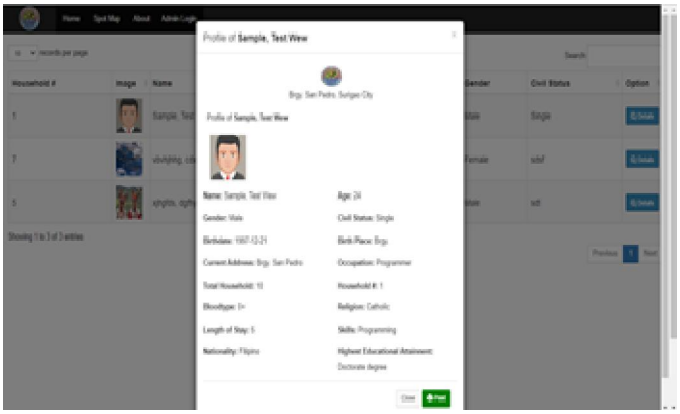

Fig. 3. View details of residents

Figure 3. Viewing of details of resident information and also can print by the administrator.

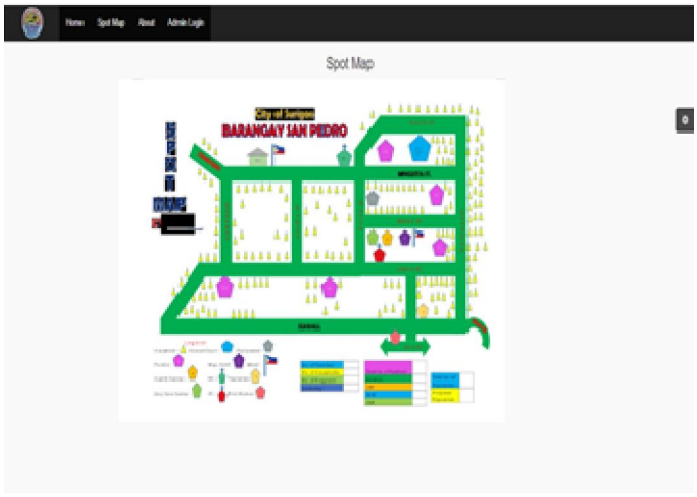

Fig. 4. Spot map

Figure 4 shows the spot map of the whole resident scope for the system.

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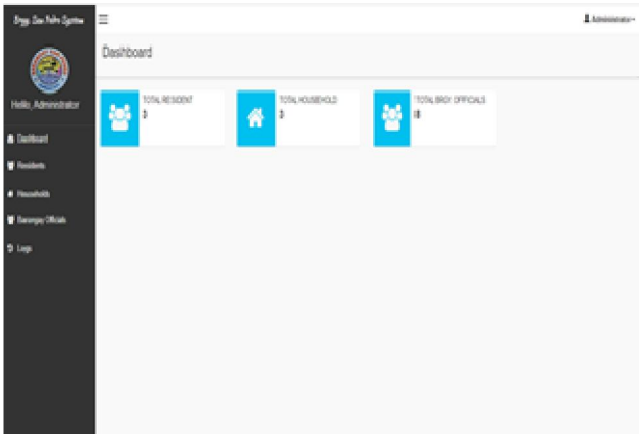

Fig. 5. Administrator page

Figure 5. shows the whole information for the admin side.

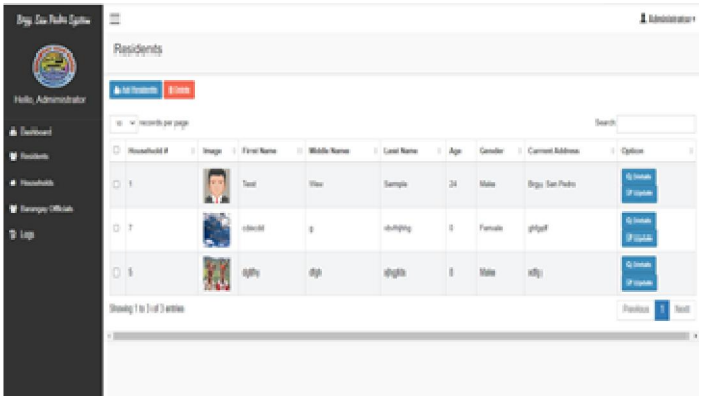

Fig.6 Residents page

Figure 6 Admin can see the whole information of the resident also admin can add residents, delete residents, view details of the resident and last can update the details of the residents.

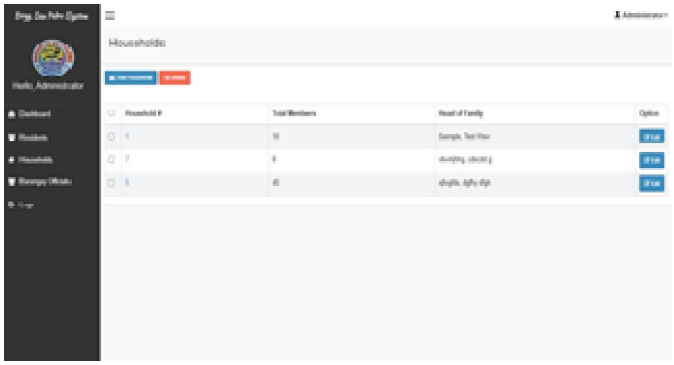

Fig. 8. Household page

Figure 8. Can see the total household of Barangay San Pedro, Surigao City admin can add household, delete and updated household.

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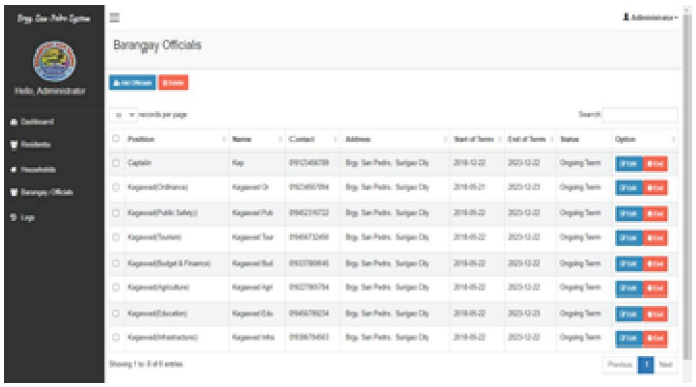

Fig. 10. Barangay officials page

Figure 16. Admin can add officials in the system, can delete officials also edit officials, and end officials if their term is already done.

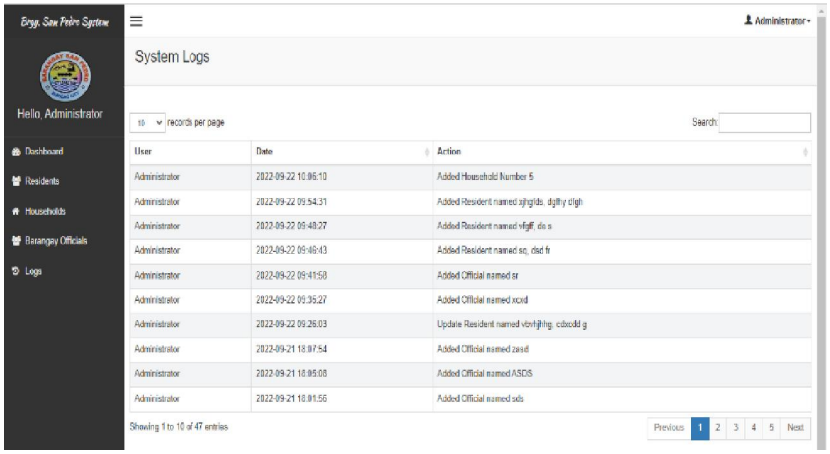

Fig.11. Logs page

Figure 11. Admin can see all logs that the admin created.

4.3 System Evaluation

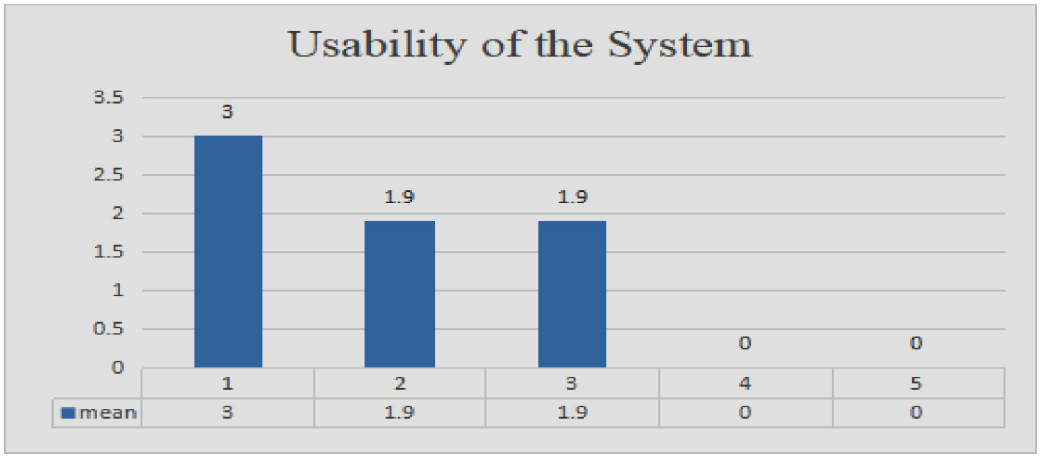

Fig.11: Usability of the System

In order to roll out and evaluate the system, the international standards association (ISO) regulatory standards were employed. It specifically used the usefulness testing essentials to examine. The usability is displayed in Figure 11. Users rated the system's usability a "Strongly Agree (very high)" rating under Part 1 with a mean score of 3; "Agree (high)" with a mean score of 1.9; and a mean score of "Fair" of 1.9. No Brgy. council and staff rated the system's

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usability a "disagree" or "strongly disagree" rating. With a mean attributive score of 3, functionality, Strongly Agree (Very High), is rated as the most important accredit.

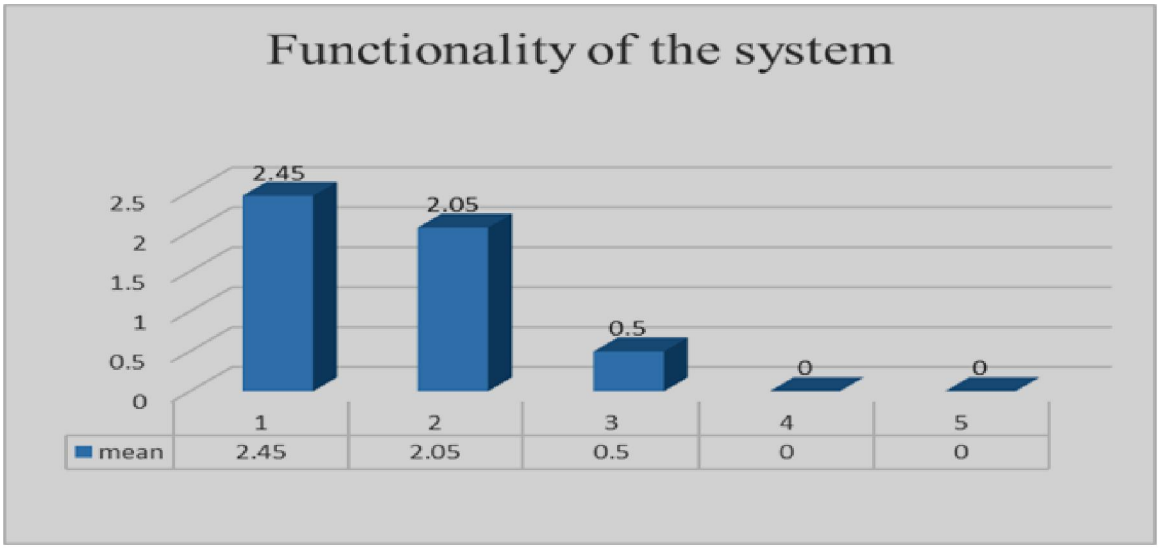

Fig.12: Functionality of the System

The meticulously designed buttons and instructions satisfy a certain use scenario. Moreover, because of other Brgy. Captain, Brgy. Councils, Brgy. Staff, Midwife/Nurse, and Brgy. Health Workers needed to familiarize themselves with the full process of using the System. Demonstrates the variety of the System's capabilities and features. The rates are that the System executes essential and appropriate duties. Figure 12 revealed the weighted mean from the item's score for functionality with 2.45 [Strongly Agree (Very High)].2.05 [Agree](High).No Brgy. Councils and staff rated the system's functionality a "fair", "disagree" or "strongly agree" rating. With an attributive score of 2.45, functionality, strongly agree (Very High), is rated as the most important accredit.

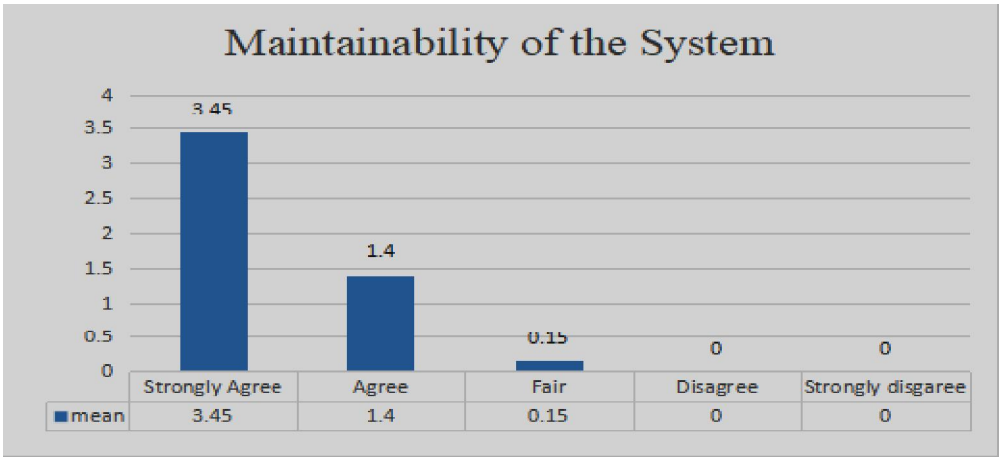

Fig. 13: Maintainability of the System

In a maintainability, the large number of the Brgy. Councils and Brgy. Staff rated high on "Strongly Agree (Very High)" with a mean of 3.45 "Agree (High)" with a mean score of 1.4 and a mean score of "Fair" of 0.15. No Brgy. Councils and staff rated the system's functionality a "fair", "disagree" or "agree" rating. With an attributive score of 2.45, functionality, strongly agree (Very High), is rated as the most important accredit.

In a Efficiency the large number of the Brgy. Councils and Brgy. Staff rated high on "Strongly Agree (Very High)" with a mean of 2.05 "Agree (High)" with a mean score of 2.1 and a mean score of "Fair" of 0.85. No Brgy. Councils and staff rated the system's functionality a "fair", "disagree" or "agree" rating. With an attributive score of 2.45, Efficiency, strongly agree (Very High), is rated as the most important accredit.

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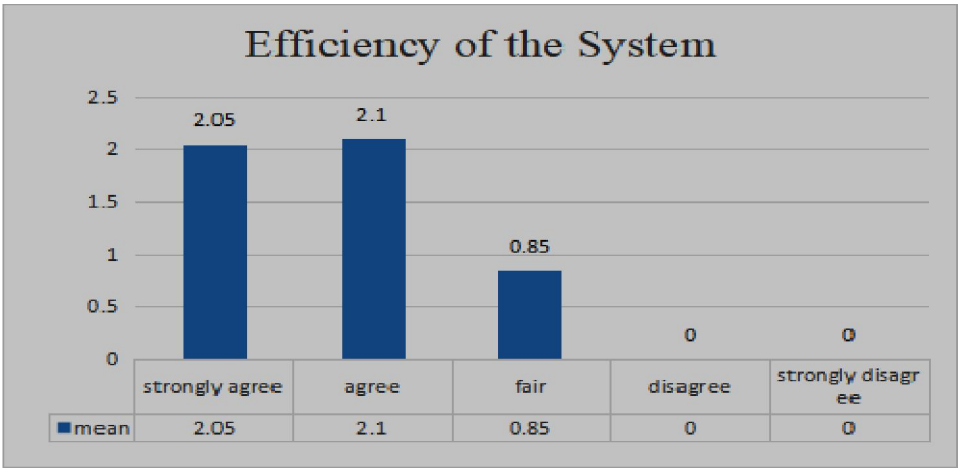

Fig. 14: Efficiency of the System

Table1 illustrates the System's overall mean, 3.0 from the mean of all identified components. Strongly Agree (Very High) is the linguistics explanation of the grand mean.

System Evaluation in terms of :	**Mean**	**Verbal Description**
Usability	3.0	Strongly Agree (Very High)
Functionality	2.45	Strongly Agree (Very High)
Maintainability	3.45	Strongly Agree (Very High)
Efficiency	2.05	Strongly Agree (Very High)
Grand Mean	**3.0**	**Strongly Agree (Very High)**

Table1: Summary of Table Evaluation

VIII. CONCLUSION

In conclusion, the study has shed light on the significance of leveraging modern technologies to enhance the management of resident information in local barangays. Throughout the research, several aspects of the system were evaluated, including usability, functionality, efficiency, and maintainability, to assess its potential impact on the local community.

Usability is a critical factor in any information management system, especially at the local barangay level, where users may have varying levels of technical expertise. The study reveals that the implementation of a user-friendly interface and intuitive navigation significantly improves the system's usability. By prioritizing accessibility and user-centered design, the Resident Information Management System becomes more approachable, empowering barangay staff to efficiently manage resident data and provide seamless services.

Functionality, another key aspect examined, plays a pivotal role in ensuring that the system meets the diverse needs of the barangay. The study finds that incorporating comprehensive features such as resident registration, address management, family member details, and contact information, among others, is crucial to fulfill the system's objectives effectively. Moreover, functionalities such as data search, filtering, and reporting were deemed essential for optimizing information retrieval and decision-making processes within the local barangay administration.

In terms of efficiency, the research demonstrates that a well-implemented Resident Information Management System can significantly streamline administrative tasks and reduce manual efforts. By centralizing and digitizing resident data,

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barangay officials can access information in real-time, leading to faster response times and improved service delivery. Furthermore, automation of routine processes, such as data updates and report generation, enables efficient resource utilization and minimizes human errors.

The maintainability aspect of the system was also examined in the study. A robust and scalable system architecture is essential to accommodate future growth and technological advancements. By adopting best practices and employing the Laravel framework, the system can achieve maintainability through modularity and code maintainability. Regular updates, security measures, and data backup protocols contribute to the system's longevity, ensuring it remains effective and reliable in the long run.

The study holds significant potential for transformative change. Through its usability, functionality, efficiency, and maintainability, the system can empower barangay officials to make informed decisions, enhance community engagement, and provide efficient services to residents. However, the success of the system lies not only in its technological innovation but also in stakeholder collaboration and user adoption. To ensure a seamless integration into the local governance structure, ongoing training, and feedback mechanisms should be employed to continuously improve the system based on user needs and requirements. As the technological landscape evolves, embracing future innovations and staying abreast of technological trends will be vital to maximizing the system's benefits and contributing to the overall development of Surigao City's barangay administration.

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