

Enhancing Service Efficiency and Accessibility for Persons with Disabilities: An Information Management System with SMS Notification in Libertad, Antique

Nemesio P. Regidor¹, Mark Dennis C. Cabrera², Queenelyn B. Salibio³,
Aina Shane B. Bugarin⁴, Jairus Cesar R. Mateo⁵, Arianne Mae A. Gallardo^{6*}

Abstract: This research evaluates the effectiveness of a Persons with Disabilities (PWD) Information Management System with SMS notification implemented in Libertad, Antique, Philippines. The system aims to improve service accessibility and efficiency for PWD by providing a centralized platform for information dissemination and service delivery. The study utilizes the ISO/IEC 25010 Software Quality Model and McCall's Software Quality Model to assess the system's user experience and technical aspects, respectively. The findings reveal a generally positive assessment of the system's quality, with high ratings for functional suitability, performance efficiency, compatibility, usability, and reliability. However, areas for improvement include security, maintainability, and portability. The paper concludes by discussing the benefits of the system for both the PWD population and the PWD office, highlighting the need for further development to enhance user profiling, real-time support, and data-driven enhancements. The study demonstrates the transformative potential of technology in promoting inclusion and improving the lives of individuals with disabilities.

Keywords: Persons with Disabilities, Information Management System, SMS Notification, Accessibility, Service Efficiency

¹ College of Computer Studies, University of Antique Libertad Campus, Libertad, Antique, Philippines
Email: nemesio.regidor@antiquespride.edu.ph

² College of Computer Studies, University of Antique Libertad Campus, Libertad, Antique, Philippines
Email: markdennis.cabrera@antiquespride.edu.ph

³ College of Computer Studies, University of Antique Libertad Campus, Libertad, Antique, Philippines
Email: queenelyn.salibio@antiquespride.edu.ph

⁴ College of Computer Studies, University of Antique Libertad Campus, Libertad, Antique, Philippines
Email: ainashane.bugarin@antiquespride.edu.ph

⁵ College of Computer Studies, University of Antique Libertad Campus, Libertad, Antique, Philippines
Email: jairuscesar.mateo@antiquespride.edu.ph

^{6*} College of Computer Studies, University of Antique Libertad Campus, Libertad, Antique, Philippines
Email: ariannemae.gallardo@antiquespride.edu.ph (Corresponding Author)

Received [May 6, 2024]; Revised [July 31, 2024]; Accepted [August 10, 2024]



© 2024 The Authors.

This is an open access article licensed under the Creative Commons Attribution-NonCommercial 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc/4.0/>.

Published by InnoCon Publishing
ISSN 2704-4440

1. Introduction

The challenges faced by individuals with disabilities in accessing essential services and information are a global concern [1]. These challenges are often rooted in societal attitudes, inadequate infrastructure, and limited access to technology. For many, navigating bureaucratic systems [2], accessing healthcare [3], and finding employment opportunities [4] can be daunting, leading to social exclusion and economic hardship [5].

The need for technological solutions to bridge this gap is increasingly recognized. The implementation of a PWD Information Management System with SMS notification in Libertad, Antique, Philippines, represents a promising step towards a more inclusive society [6]. This system, designed to empower PWD and enhance their access to vital information and services, is a testament to the transformative potential of technology [7].

While the system is a positive development, it is important to acknowledge that technology alone cannot solve all the challenges faced by PWD. True inclusion requires a multi-faceted approach that addresses systemic barriers, promotes awareness, and fosters empathy. This system, however, provides a critical foundation for building a more inclusive and equitable society.

This research focuses on the implementation of the PWD Information Management System in Libertad, Antique. The study will analyze the system's effectiveness in enhancing service efficiency and accessibility for PWD, examining its strengths, limitations, and potential for further development. The findings will provide valuable insights into the role of technology in promoting inclusion and improving the lives of individuals with disabilities.

2. Literature Review

Many studies show that we need better systems for people with disabilities to get information and services. These studies show how important technology is to help people with disabilities be part of society [6]. Sending text messages (SMS) has been shown to be a good way to get information to different groups of people, including those who don't have easy access to traditional communication methods [7].

There are many challenges that people with disabilities face, like problems with seeing, moving around, and communicating. Computer vision technology is very promising for helping people with these challenges [8]. This technology can help people with disabilities get around, get information, and interact with others in ways they couldn't before [9].

New learning technologies have changed how education works because of big improvements in information and communication technology (ICT). When these technologies are available, affordable, and easy to use, they can do more than just change how education works for people with disabilities; they can give them real opportunities to get a good education and overcome the challenges they faced in traditional schools [10].

While advancements in technology offer significant promise, concerns regarding privacy, security, and usability remain. Participants in a study expressed concerns about the privacy and security of self-service devices, the protection of personal information, and the consistency and usability of devices [11]. These concerns highlight the importance of designing accessible technologies that are not only functional but also secure and user-friendly.

3. Methodology

This study employed a mixed-methods approach, guided by the Waterfall model [12], to evaluate the PWD Information Management System in Libertad, Antique. The Waterfall model, a structured software development approach, provided a framework for the evaluation process, ensuring a systematic and sequential progression through distinct phases.

The researchers began by gathering and analyzing requirements for the evaluation. This involved identifying the key stakeholders, their needs, and the specific aspects of the system to be evaluated. Initial interviews were conducted with PWD beneficiaries, PWD focal persons, and local government officials to understand their perspectives on the system's usability, accessibility, and impact on service delivery.

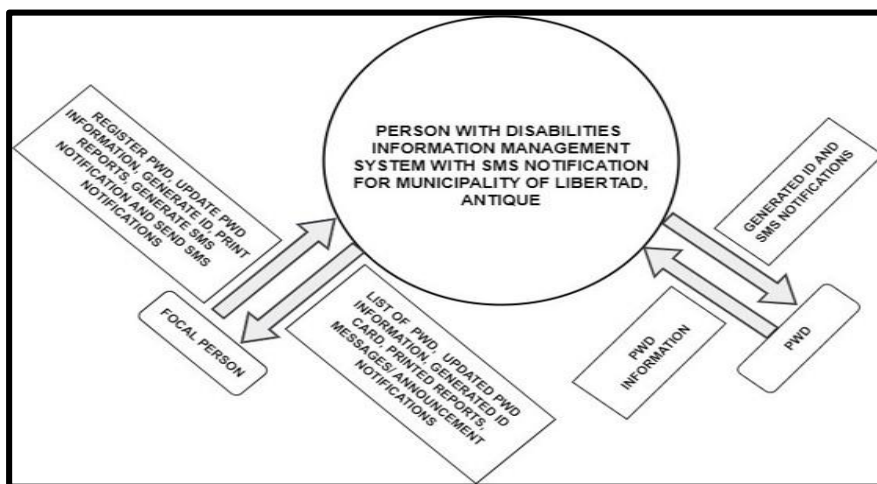


Figure 1. Context Diagram

Figure 1 illustrates the external entities interacting with the PWD Information Management System. It shows how the system interacts with the surrounding environment, including the focal person, the PWD office, and the PWD beneficiaries. This diagram helps to define the system's boundaries and identify the key actors involved in its operation.

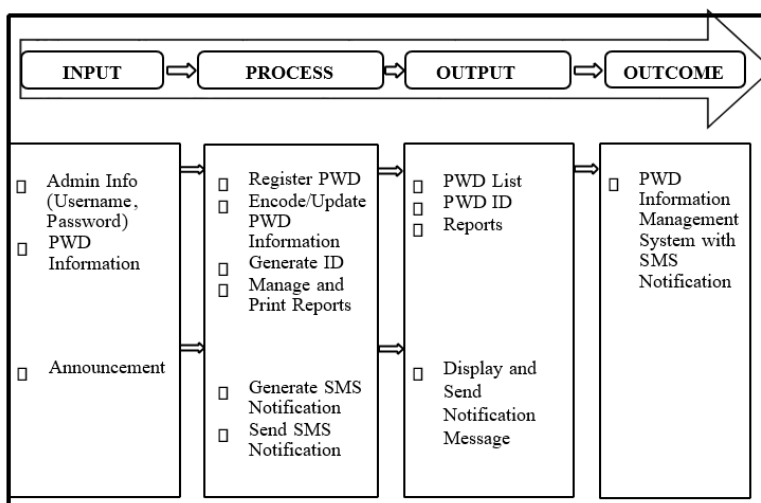


Figure 2. Input-Process-Output Model for PWD Information Management System with SMS Notification

Figure 2 illustrates the input-process-output (IPO) model of the PWD Information Management System. This system is designed to improve service efficiency and accessibility for people with disabilities. It receives input like personal information, announcements, and administrative details. The system then processes this data by registering new users, updating information, generating IDs, creating reports, and sending SMS notifications. The output includes lists of registered individuals, ID numbers, reports, and sent notification messages. The overall outcome is to manage information about people with disabilities, improve service efficiency, and make services more accessible for PWD beneficiaries.

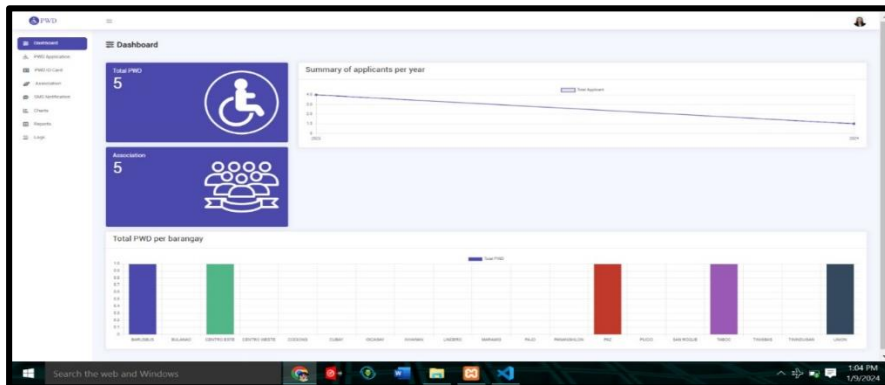


Figure 3. Admin Panel

Figure 3 shows the administrative panel of the PWD Information Management System. The dashboard provides a quick overview of key data points, including the total number of registered PWD individuals and associations. It also includes a line graph summarizing the number of applicants per year, suggesting a slight decrease in applications over time. The bar graph displays the total number of PWD individuals per barangay, highlighting potential areas with higher concentrations of PWD individuals. This admin panel offers valuable insights into the system's usage and allows for efficient monitoring and management of PWD data.

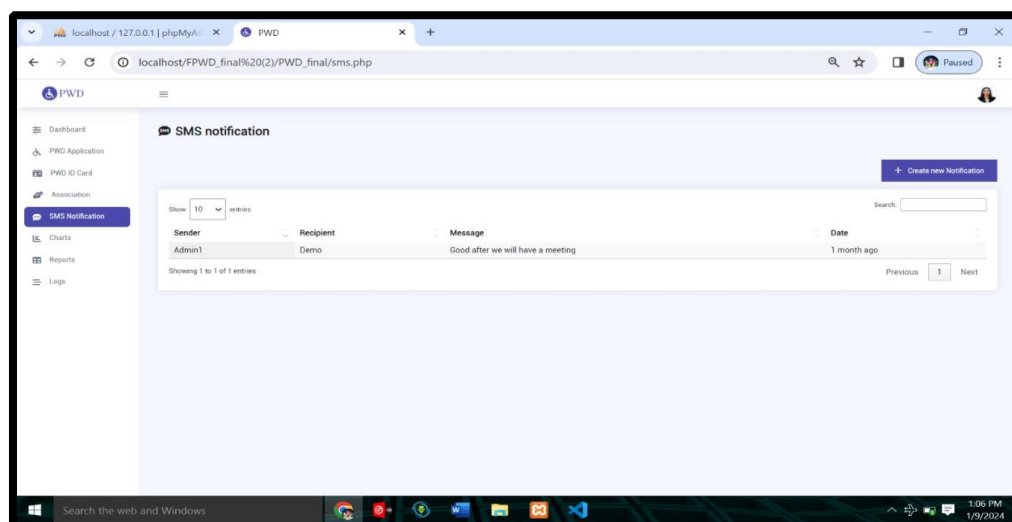


Figure 4. SMS Notification Module

Figure 4 showcases the SMS Notification module of the PWD Information Management System. This module allows for sending SMS messages to registered PWD beneficiaries. The interface displays a list of sent notifications, including the sender, recipient, message content, and date of sending. The module also provides a search function and pagination for easy navigation. The "Create New Notification" button enables administrators to compose and send new SMS messages to specific recipients. This module facilitates effective communication with PWD beneficiaries, ensuring they receive important updates and information.

Based on the gathered requirements, the researchers designed and developed evaluation instruments. These included semi-structured interview guides, focus group discussion guides, and evaluation criteria based on McCall's Software Quality Model and the ISO/IEC 25010 Software Quality Model.

The next phase involved data collection. The researchers conducted semi-structured interviews with key stakeholders and focus groups with PWD beneficiaries. They also collected quantitative data through software quality evaluation using McCall's Software Quality Model and user experience evaluation using the ISO/IEC 25010 Software Quality Model.

Finally, the researchers analyzed the collected data. Thematic analysis was used for qualitative data, and descriptive statistics were used for quantitative data to identify key themes, patterns, and areas for improvement.

4. Results and Discussion

To assess the user experience and technical aspects of the system, the researchers collected data from 25 participants (PWD beneficiaries, PWD office staff members, faculty members). The data was gathered through semi-structured interviews, focus group discussions, and software quality evaluations using McCall's Software Quality Model and the ISO/IEC 25010 Software Quality Model.

Table 1. McCall's Rating Scale

Rating Range	Description
4.21 – 5.00	Very Good
3.61 – 4.20	Good
2.61 – 3.60	Average
1.81 – 2.60	Fair
1.00 – 1.80	Poor

Table 1 presents McCall's Rating Scale, a tool used to evaluate the quality of software systems. This scale, used by five IT experts from the University of Antique Libertad Campus' College of Computer Studies, ranges from "Very Good" (4.21-5.00) to "Poor" (1.00-1.80), with each level corresponding to a specific numerical score. This scale provides a consistent and objective framework for assessing software quality, allowing for a structured evaluation of various aspects of the system by the IT experts.

The system's user experience was evaluated using the ISO/IEC 25010 Software Quality Model, which assesses aspects like functionality, usability, and reliability. The evaluation involved gathering data from 20 users, including the focal person and PWD beneficiaries.

Table 2 outlines the ISO/IEC 25010 Rating Scale, a standard framework used to assess the quality of software systems. This scale ranges from “Very High” (5) to “Very Low” (1), with each level representing a specific numerical score. This scale provides a structured approach for evaluating various aspects of software quality, allowing for a consistent and objective assessment of the system's performance and user experience.

Table 2. ISO/IEC 25010 Rating Scale

Rating	Description
5	Very High
4	High
3	Moderate
2	Low
1	Very Low

The evaluation of the PWD Information Management System involved two distinct assessments: one using McCall's Software Quality Model by IT experts and another using the ISO/IEC 25010 Model by PWD focal persons and beneficiaries. The results of these evaluations provide a comprehensive understanding of the system's strengths and weaknesses, both from a technical and user experience perspective.

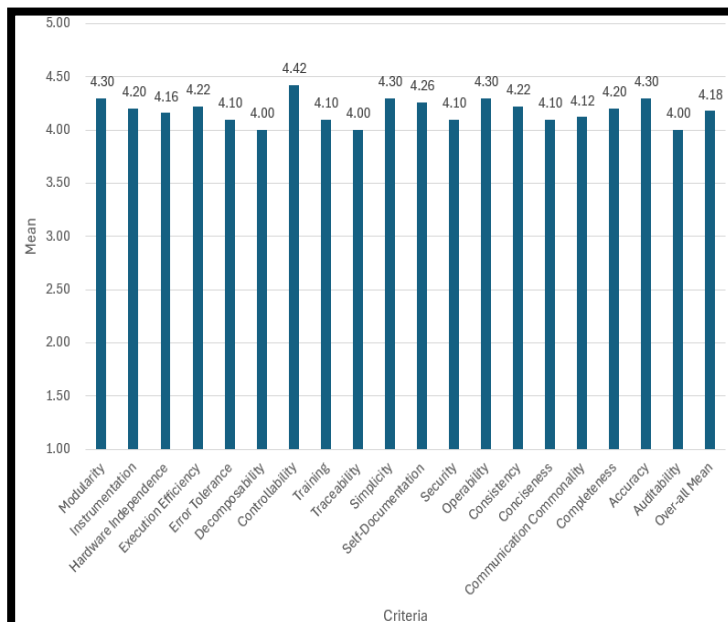


Figure 5. Summary of Result of Ratings by IT Experts using McCall’s Software Quality Model

Figure 5 presents the evaluation results of the PWD Information Management System using McCall's Software Quality Model. The figure displays the average scores for each quality criterion, ranging from

4.00 to 4.50, which translates to a "Very Good" rating according to McCall's Rating Scale. The system demonstrates strong performance in areas such as Modularity, Instrumentation, Hardware Independence, Execution Efficiency, Error Tolerance, Decomposability, Controllability, Training, Traceability, Simplicity, Self-Documentation, Security, Operability, Consistency, Conciseness, Communication Commonality, Completeness, Accuracy, and Auditability. The overall mean score of 4.18 further reinforces the positive assessment of the system's quality, falling within the "Very Good" range. These results suggest that the system meets high standards and performs well in various technical aspects.

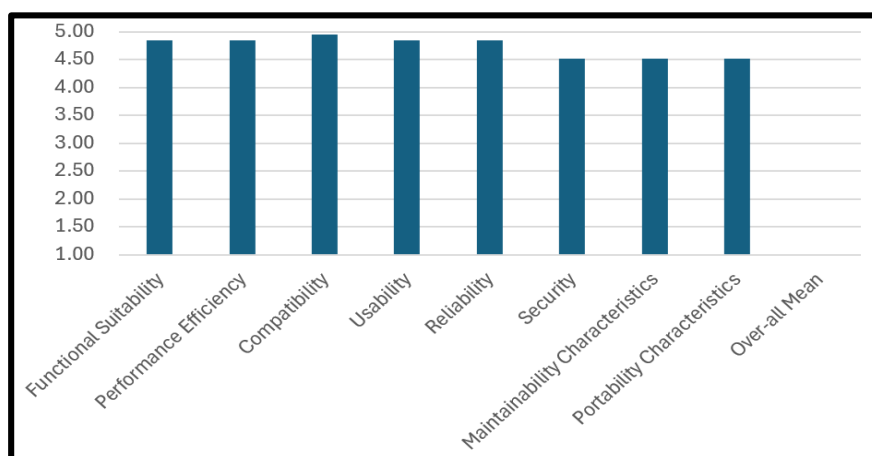


Figure 6. Summary of Result of Ratings by Alumni using ISO/IEC 25010 Model

Figure 6 presents the evaluation results of the PWD Information Management System using the ISO/IEC 25010 Model, based on the feedback from 20 PWD focal persons and beneficiaries. The figure showcases the "Average" scores for various quality characteristics, ranging from 4.50 to 4.00, indicating a generally "High" level of user satisfaction. The system demonstrates strong performance in areas such as Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability Characteristics, Portability Characteristics, and overall mean. These results suggest that the system effectively meets user needs, providing a positive and efficient experience for PWD beneficiaries and officers.

5. Conclusion and Recommendations

In conclusion, the PWD Information Management System with SMS notification in Libertad, Antique, represents a significant step towards a more inclusive and accessible society for individuals with disabilities. The system's positive evaluation results, highlighting its effectiveness in meeting the needs of the PWD community, demonstrate the transformative potential of technology in bridging the gap between PWD and mainstream society. However, the study also underscores the need for continuous development and improvement to ensure the system's long-term success and maximize its impact.

To further enhance the PWD Information Management System, several key areas require attention. Implementing advanced user profiling will allow for tailored settings and recommendations based on individual needs and preferences, enhancing the user experience. Including real-time support tools, such as live chat and virtual assistance, will provide prompt assistance to users, addressing their queries and concerns efficiently. Establishing a comprehensive system for monitoring and analyzing user interactions and feedback will facilitate data-driven enhancements, identifying areas for improvement,

and optimizing the system's performance. Strengthening security measures is crucial to protect sensitive data and ensure the system's confidentiality and integrity. Finally, investing in improving the system's maintainability and portability will ensure its adaptability across different platforms and ease of updates and maintenance. By addressing these recommendations, the PWD Information Management System can evolve into a robust and adaptable platform that empowers PWD, enhances their access to essential services, and contributes to a more inclusive and equitable society.

References

- [1] World Health Organization & World Bank, “*World Report on Disability*”, World Health Organization 2011, <https://iris.who.int/handle/10665/44575>.
- [2] M. Lazic, I. Domazet, V. Vukmirovic, J. Banović, “*Strategic Framework for Inclusion of Persons with Disabilities in Online (Platform) Work*”, 27th International Scientific Conference Strategic Management and Decision Support Systems in Strategic Management, June 2022, pp.397-404, https://doi.org/10.46541/978-86-7233-406-7_220.
- [3] World Health Organization, “*Disability and Health*”, <https://www.who.int/news-room/factsheets/detail/disability-and-health>.
- [4] D. M. Kadijevich, D. Masliković, B. M. Tomić, “*Dataset Regarding Access to Information for Persons with Disabilities in Serbia*”, Data in Brief, vol. 32, October 2020, <https://doi.org/10.1016/j.dib.2020.106309>.
- [5] A. Sen, “*The Idea of Justice*”, Harvard University Press: USA, 2009, ISBN 9780674054578.
- [6] World Bank Open Knowledge Repository, “*Disability Inclusion and Accountability Framework*”, <https://openknowledge.worldbank.org/entities/publication/cabff6b1-0027-5919-9cb0-398b3c8579b1>.
- [7] R. Lumauag, “*SENT SMS: School Event Notification Through SMS*”, Asia Pacific Journal of Multidisciplinary Research, vol. 4, May 2016, pp. 61-68, <https://doi.org/10.13140/RG.2.1.3520.6001>.
- [8] S. Sahoo and B. Choudhury, “*Exploring the Use of Computer Vision in Assistive Technologies for Individuals with Disabilities: A Review*”, Journal of Future Sustainability, vol. 4, no. 3, July 2023, pp.133-148, <https://doi.org/10.5267/j.jfs.2024.7.002>.
- [9] P. P. Morita, G. Bin Noon, L. U. Mazza, G. Morgan, “*New Technologies for Self-Service Devices and Their Impacts on Usability for Persons with Disabilities*”, Canadian Standards Association, Toronto, ON, September 2023, <https://www.csagroup.org/article/research/new-technologies-for-self-service-devices-and-their-impacts-on-usability-for-persons-with-disabilities/>.
- [10] M. Laabidi, M. Jemni, L. J. Ben Ayed, H. Ben Brahim, A. Ben Jemaa, “*Learning Technologies for People with Disabilities*”, Journal of King Saud University - Computer and Information Sciences, vol. 26, no. 1, January 2014, pp. 29-45, <https://doi.org/10.1016/j.jksuci.2013.10.005>.
- [11] S. Mitra, A. Posarac, B. Vick, “*Disability and Poverty in Developing Countries: A Multidimensional Study*”, World Development, vol. 41, no. 1, January 2013, pp. 1-18, <https://doi.org/10.1016/j.worlddev.2012.05.024>.
- [12] W. Royce, “*Managing the Development of Large Software Systems*”, in *Ideas That Created the Future: Classic Papers of Computer Science*, H. R. Lewis (Ed.), The MIT Press: Cambridge, Massachusetts, United States, 2021, <https://doi.org/10.7551/mitpress/12274.003.0035>.