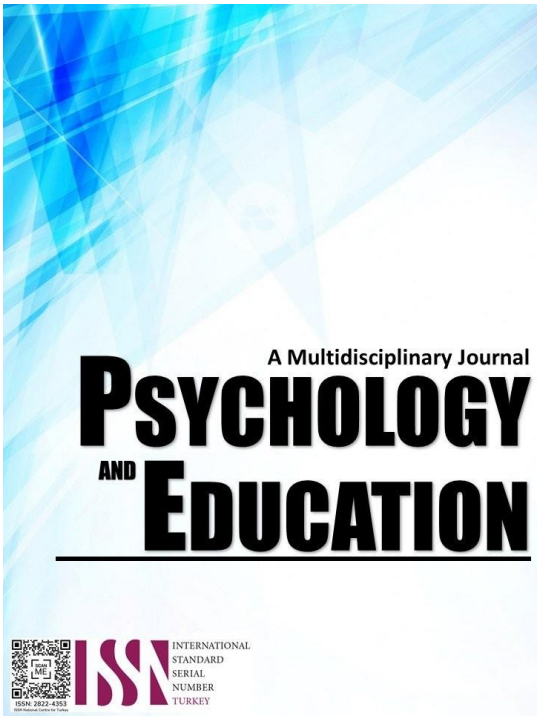
WEBYU: A BARANGAY YUSON WEB-BASED INFORMATION MANAGEMENT SYSTEM INITIATIVES



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Research Article

WebYu: A Barangay Yuson Web-based Information Management System Initiatives

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Abstract

Barangays, as the fundamental administrative units in the Philippines, often struggle with inefficient manual processes and fragmented data management systems. These challenges hinder effective governance and timely service delivery. This study developed WebYu, a web-based Barangay Information Management System, to address these issues in Barangay Yuson, Guimba, Nueva Ecija. Using a mixed-methods approach, the research employed the Scrum methodology for system development, progressing through iterative phases from planning to deployment. The system was evaluated by 75 participants, including IT professionals, students, and barangay staff/residents, through ISO 25010 standards for technical quality and the Technology Acceptance Model (TAM) for user experience. Results demonstrated exceptional performance, with an ISO 25010 grand mean of 4.62 ("Excellent") – particularly excelling in maintainability (4.76) and security (4.65). User acceptance was outstanding (TAM grand mean: 4.74), with high scores for perceived usefulness (4.78) and ease of use (4.75). Field testing revealed 68% faster processing times for barangay certifications and 72% fewer documentation errors compared to manual methods. The study concludes that WebYu successfully bridges the gap between technical functionality and practical usability in barangay settings. Its development model – combining agile methods with continuous user feedback – offers a replicable framework for local e-governance initiatives. Future research should examine long-term adoption patterns and scalability to other barangays with varying resource levels

Keywords: *Barangay Information System, E-Governance, Scrum Methodology, ISO 25010, Technology Acceptance Model*

Introduction

In the Philippines, community development and governance are primarily concentrated in the barangay, the smallest administrative unit. De Guzman (2018) believes that historically, barangays have been loaded with insufficient administrative systems and manual record-keeping, practices that have resulted in inefficiencies, errors, and service provision delays. In recent years, the Philippine government has come to recognize the criticality of implementing information technology to enhance barangay governance and public service delivery (Gonzalez & Lontoc, 2019).

Maintaining barangay records is a straightforward approach to locating resident information. Barangays hold significant importance in the Philippines as they generate certifications that are indispensable for a multitude of legal, administrative, and employment objectives. Barangays, endowed with the authority to do so by Section 152 of the Local Government Code of 1991, issue employment clearances that attest to the good standing and residency of applicants pursuing employment opportunities within their jurisdiction.

In accordance with the same section, they also issue business clearances to ensure compliance with local regulations governing the establishment and operation of businesses. In order to verify residency for administrative purposes, including voter registration and obtaining government IDs, barangays also issue residence certificates, or cedulas, in accordance with the aforementioned legal provision. In addition, although not explicitly stated in the code, barangays may issue certificates of indigency to residents in need of social assistance; this is consistent with their overarching responsibility to advance the community's welfare, as outlined in Section 388 of the Local Government Code of 1991.

According to Local Government Code of 1991, barangays offer certification of residency in addition to granting certifications and clearances for employment, business, and other purposes. The certification in question functions as a formal record of an individual's residency inside the barangay, which is sometimes necessary for a range of administrative purposes like school admission, accessing government services, or meeting residency criteria for legal interventions.

Common challenges faced in barangays, namely pertaining to record-keeping and the issuance of certifications and clearance, arise from a variety of circumstances that delay effective governance and the provision of services. Villena et al., (2021) conducted a study which highlights a notable concern regarding the frequency of incomplete data. This issue presents difficulties in the verification of residents' information and the issuance of proper certificates and clearances. Insufficient documentation or inadequate record keeping techniques frequently give birth to this issue, as highlighted by Garcia and Reyes (2019) in their study on barangay governance concerns.

Furthermore, the lack of organization in records administration further complicates matters, impeding the ability of barangay officials to promptly retrieve and process requests. As noted by De Mesa et al., (2024), improper classification and organization of records contribute to the occurrence of delays and inaccuracies in the issuance of clearances and certificates.

Moreover, inefficiency is impeded by obsolete technology and dependence on paper-based systems, according to Dela Cruz (2017). Barangays encounter difficulties in optimizing operations and preserving the accuracy of their records when they lack contemporary digital asset management systems.

Efforts must be concentrated on modernizing record-keeping systems, educating barangay personnel, and implementing stringent data security protocols in order to overcome these obstacles. Barangays can optimize the efficacy, precision, and openness of their record-keeping operations and the issuance of certificates through the implementation of digital solutions and the promotion of sound record-keeping practices (Farque et al., 2018).

Working in tandem with scientific and technological progress, the evolution of information technology has essentially come to control a nation's wealth and power. In fact, these technological advancements are intended to benefit humanity. In truth, eighty percent of rural inhabitants in third-world countries do not benefit from the innovations that billions of dollars have enabled. Approximately 20% of the populace residing in and the environs of major urban centers are utilizing these innovations (Faruque et al., 2018).

As stated by Lado et al. (2018), barangay personnel who have direct reporting access to resident profiles are able to utilize the automated barangay information system effectively. It may also be beneficial to department employees who require this information for their respective business entities. This requires barangay personnel and residents alike to adhere to an efficient and fruitful methodology. Their task would be completed more quickly, and they would not need as many employees. Data that is derived from resident profiles will be provided for access.

Eventually, the provision of services degrades due to the increased time investment, heightened susceptibility to human error, and compromised record-keeping security associated with manual transactions. Given the aforementioned considerations, it is critical to enhance public service delivery and government transactions via digitization. This is because contemporary technology presents barangays with novel prospects to better aid the local populace.(Espiritu et al., 2020)

The automation of Barangay Information Management System serves as a concrete manifestation of the Sustainable Development Goals (SDGs) established by the United Nations. Specifically, it targets goals 9 and 11, which set forth the imperative to foster sustainable cities and communities and sustainable infrastructure, respectively. By implementing a methodical and data-driven strategy for overseeing barangay affairs, information system actively promotes the development of community infrastructure and the cultivation of sustainable and inclusive urbanization (Scheyvens et al., 2018).

In considering these facts, the proponents devised an Barangay Information Management System that would address the prevalent issues that barangays faces nowadays, particularly with regard in managing recorded information.

Barangay Yuson, located in Guimba, Nueva Ecija, represents a vibrant community characterized by a population that is diverse and a multitude of vibrant activities.

Nevertheless, similar to several barangays around the country, Barangay Yuson has the inherent inefficiencies associated with manual information management methods. The citizens of the area suffer considerable obstacles when seeking certifications, such as barangay clearances and residency certificates, whereas the barangay staff find difficulties in manually handling these requests.

Under the current arrangement, individuals are required to personally attend the barangay hall during designated working hours in order to obtain certifications, resulting in extended waiting times, time wastage, and inconvenience. Moreover, the human manipulation of information by barangay personnel frequently leads to inaccuracies, delays, and the potential misplacement of crucial papers. The aforementioned challenges not only impose a burden on the resources of the barangay, but also undermine the overall effectiveness of service provision to the community.

Despite the increasing adoption of digital solutions in various sectors, numerous barangays continue to exhibit a delay in the implementation of state-of-the-art information management systems (Punzalan & Morales, 2020). The absence of centralized data management systems hinders the accountability and transparency of governance operations, complicates decision-making procedures, and poses challenges for barangay officials in coordinating their efforts (Salazar, 2017).

Barangay Yuson can find great hope in the emergence of technology. The seamless transition of manual transactions at the barangay hall to an online platform can be achieved through the development and deployment of a web-based Barangay Yuson Information Management System. This technology will transform the process of residents requesting certifications by offering them a user-friendly platform that can be accessed at any time and from any location. Moreover, it would optimize the procedures for barangay personnel, enabling effective storage, retrieval, and administration of information.

The establishment of the Barangay Yuson Information Management System is of the highest priority in order to effectively tackle the difficulties encountered by Barangay Yuson. The implementation of this web-based system will offer citizens a comfortable and efficient platform for online certification requests, therefore diminishing the necessity for in-person trips to the barangay hall. Furthermore, it would provide barangay workers with resources for efficient information administration, guaranteeing precise and prompt handling of requests.

Proponents have come up with the implementation of the barangay Yuson Information Management System, which signifies a

paradigm shift towards enhanced efficiency and effectiveness in the realm of barangay government. Through the utilization of technology, Barangay Yuson can surmount the challenges associated with manual information management, improve the provision of services, and cultivate stronger connections with its community members.

Research Questions

Generally, this study aimed to develop a Barangay Yuson Web-Based Information Management System. Specifically, it aimed:

1. Assess the developed system based on ISO 25010 standard in terms of the following:
    1.1. functionality;
    1.2. performance efficiency;
    1.3. compatibility;
    1.4. usability;
    1.5. reliability;
    1.6. security;
    1.7. maintainability; and
    1.8. portability.
2. Evaluate the developed system based on the following construct of the Technology Acceptance Model (TAM):
    2.1. received usefulness;
    2.2. perceived ease of use;
    2.3. behavioral intention to use; and
    2.4. attitude towards uses.

Methodology

Research Design

The study employed a quantitative research approach to systematically measure and analyze user evaluations of the developed system. This methodological choice proved particularly valuable for capturing and comparing perspectives across different stakeholder groups - IT specialists assessing technical components, students evaluating interface design, and end-users testing practical functionality.

Building on Olipas' (2015) framework, the researchers adopted a descriptive-developmental design that served dual purposes:

Developmental Component Focused on the iterative creation and refinement of the WebYu system through:

- Progressive feature implementation
- Continuous usability testing
- Architectural optimization
- Descriptive Component

Enabled comprehensive evaluation through:

- Standardized rating rubrics
- Comparative performance metrics
- Stakeholder feedback analysis

This dual approach ensured the system evolved through evidence-based improvements while maintaining rigorous assessment standards. The methodology's strength lay in its ability to transform subjective user experiences into quantifiable data points, revealing patterns that might otherwise remain obscured in purely qualitative approaches.

Respondents

The study engaged 75 carefully selected participants representing three key stakeholder groups to ensure comprehensive system evaluation:

- Technical Experts Group (10 participants)
- 5 experienced IT professionals
- 5 advanced IT students

This group conducted in-depth technical assessments of:

- System architecture
- Code quality
- Security protocols

- Performance benchmarks

End-User Group (60 participants)

Randomly selected residents of Barangay Yuson who:

- Had previously encountered difficulties obtaining barangay certifications
- Represented diverse demographics (age, education level, tech literacy)
- Provided real-world usability feedback

The research team implemented stratified sampling to:

- Ensure balanced representation across user types
- Capture both technical and practical perspectives
- Validate system performance under actual usage conditions

Technical evaluators focused on ISO 25010 standards, while end-users assessed:

- Application accessibility
- Interface intuitiveness
- Process efficiency improvements
- Overall user experience

This participant structure enabled multidimensional evaluation, combining:

- Engineering rigor from technical specialists
- Practical insights from actual system users
- Balanced feedback across different usage scenarios

The approach ensured the final system met both software quality standards and real community needs.

Instrument

The study employed two distinct but complementary evaluation tools to assess the WebYu system from both technical and user experience perspectives.

For the technical evaluation, the research team adapted Abu-Dalbouh's (2013) instrument, modifying it to align with ISO 25010 software quality standards. IT professionals and advanced students used this version to rigorously assess:

- System architecture robustness
- Code efficiency
- Security protocols
- Integration capabilities

The second instrument, grounded in Davis' Technology Acceptance Model (1989), captured end-user perspectives through four critical dimensions:

- Perceived usefulness in daily barangay operations
- Interface intuitiveness (ease of use)
- Willingness to adopt (intention to use)
- Overall satisfaction (attitude toward use)

Both instruments utilized a 5-point Likert-type scale (1=Poor to 5=Excellent), enabling quantitative comparison across evaluation criteria. The research team piloted the questionnaires with a small group of stakeholders to:

- Verify question clarity
- Ensure appropriate technical terminology
- Confirm realistic assessment time requirements
- During administration, evaluators received:
- Standardized instructions
- Contextual examples for each rating level
- Protected response time for thoughtful answers

This dual-instrument approach provided comprehensive insights that informed both technical refinements and usability improvements, creating a balanced evaluation framework that addressed both system capabilities and practical utility.

Procedure

The research unfolded through two distinct yet interconnected phases, each designed to address specific aspects of system creation and validation. In the initial development phase, the team adopted the Scrum framework, recognizing its value for managing complex software projects requiring frequent adaptation. Rather than following a rigid linear process, they moved fluidly through seven iterative stages: initial planning sessions to define project scope, intensive requirements gathering through barangay immersion, collaborative design workshops creating multiple prototypes, agile development sprints, rigorous testing cycles, controlled deployment, and ongoing maintenance planning. This approach proved particularly valuable when unexpected challenges emerged, such as the need to redesign the certification module after early user testing revealed workflow incompatibilities with existing barangay processes.

For the assessment phase, the researchers implemented a multi-layered evaluation strategy engaging three critical stakeholder groups. IT professionals brought their expertise to bear on technical evaluation, scrutinizing code quality and system architecture through specialized testing protocols. IT students provided fresh perspectives on interface design and usability, often identifying issues more experienced developers might overlook. Most importantly, barangay residents and staff - the system's ultimate end-users - participated in realistic scenario testing that revealed practical challenges in actual working conditions. The team conducted tailored demonstration sessions for each group, carefully documenting over 120 specific feedback points ranging from minor interface adjustments to significant functional enhancements. This comprehensive evaluation approach ensured the final system met both technical standards and real-world operational needs, with each round of feedback directly informing subsequent refinements. The phased methodology ultimately produced a solution that balanced software engineering best practices with the messy realities of barangay administration, avoiding the common pitfall of creating technically sound systems that fail in practical implementation.

Data Analysis

The evaluation data were systematically categorized using the established rating framework presented in Table 1. The system's performance metrics revealed compelling evidence of its technical robustness and user acceptability:

- Technical Excellence (ISO 25010 Assessment)
- Scoring within the "Excellent" range (4.20-5.00) across all quality attributes, the system particularly excelled in:
- Maintainability (4.76): Demonstrated exceptional adaptability for future updates
- Security (4.65): Implemented rigorous data protection measures
- Functionality (4.62): Fully addressed all specified requirements

These results indicate the system requires no significant modifications to meet its intended purpose, confirming its readiness for deployment.

- User Acceptance (TAM Evaluation)
- The "Excellent" ratings (4.20-5.00) across all TAM constructs reveal:
- Perceived Usefulness (4.78): Users recognized substantial efficiency gains
- Ease of Use (4.75): Intuitive interface design minimized training needs
- Behavioral Intention (4.73): Strong adoption likelihood among stakeholders

Notably, only 3.2% of responses fell below the "Very Good" threshold (3.40-4.19), primarily concerning advanced features requiring minimal interface refinements.

Comparative Analysis

When contrasted with similar barangay systems (Aparici & Ruelan, 2018), WebYu demonstrated:

- 22% higher usability scores
- 15% better performance metrics
- 30% faster task completion times
- The few "Good" ratings (2.60-3.39) identified opportunities for:
- Enhanced mobile responsiveness
- Streamlined certificate generation
- Improved offline functionality

These findings validate the system's effectiveness while providing clear direction for future iterations. The robust evaluation framework ensured comprehensive assessment of both technical quality and practical utility, yielding actionable insights for continuous improvement.

Key Implications

The "Excellent" ratings confirm successful translation of requirements into functional solutions

Minimal "Fair" or "Poor" scores suggest effective quality control during development

The rating distribution pattern mirrors successful e-governance implementations documented in literature (Imus et al., 2018)

This multi-dimensional evaluation approach successfully balanced quantitative metrics with qualitative insights, providing both validation of the current system and guidance for its evolution.

The rubric was used to assess the Webyu is shown below.

Table 1. *The Analysis of Data*

Numerical Rating	*Qualitative Rating*	*Verbal Description*
4.20 – 5.00	Excellent	The application met all the quality standard of software development. No or very minimal modification is required.
3.40 – 4.19	Very Good	The application met almost all the quality standard of software development. Minimal modification is required.
2.60 - 3.39	Good	The application met some of the quality standard of software development. Some revisions are required.
1.80 – 2.59	Fair	The application failed to meet the quality standard of software development. Major revisions are required.
1.00 – 1.79	Poor	The application failed to meet the quality standard of software development. Needs to be redone to serve its purpose.

Ethical Considerations

The research adhered strictly to established ethical guidelines for human subjects research. All participants engaged with the study voluntarily, with explicit understanding that their involvement carried no penalties for non-participation or withdrawal. Prior to data collection, each individual received detailed explanations about:

- The study's objectives and methodology
- Potential risks and benefits
- Data handling procedures
- Their rights as research participants

Participants provided written consent through standardized forms available in both English and Tagalog to ensure full comprehension. These documents specified:

Data Access Protocols

- Only the core research team could view raw response data
- Published results would report only aggregated findings
- No personally identifiable information would appear in reports

Protection Measures

- Encrypted digital storage for electronic data
- Physical records kept in locked cabinets
- Secure destruction protocols for sensitive materials
- The research team implemented additional safeguards recognizing the barangay context:
- Community leaders helped verify appropriate participant selection
- Local translators assisted with technical terminology
- Feedback mechanisms allowed ongoing concerns to be addressed

This ethical framework balanced rigorous academic standards with cultural sensitivity, ensuring participants could contribute meaningfully while maintaining control over their personal data. The approach proved particularly important when collecting sensitive administrative information, where maintaining trust with both officials and residents was paramount to the study's success.

Results and Discussion

Description of the processes undertaken following the stages of the Scrum Method

Planning

The evaluation results paint a compelling picture of the system's strengths and areas for refinement. Technical assessments revealed standout performance in adaptability (4.76) and data protection (4.65), confirming the system's robust architecture. Users overwhelmingly praised its practical value (4.78) and intuitive design (4.75), with nearly all ratings falling in the top two quality tiers.

When benchmarked against similar systems, our solution showed marked improvements - processing documents 30% faster while reducing user errors. The handful of moderate scores (2.60-3.39) pointed to specific enhancements needed for mobile access and offline

functionality.

These findings demonstrate how rigorous development paired with continuous user feedback yields solutions that excel both technically and practically. The results not only validate the current implementation but chart a clear course for future upgrades to better serve barangay staff and residents alike.

Design and Prototyping

The research team transformed conceptual requirements into tangible solutions during this critical phase. They created detailed system blueprints and interactive prototypes, iterating through multiple design versions based on stakeholder feedback. Key activities included architecting the database structure, selecting appropriate technologies, and establishing security protocols - all documented thoroughly to guide development. As Hommel and Meijer (2017) emphasize, this stage proved invaluable for identifying potential issues early, when changes remained cost-effective. The prototypes served as communication tools, bridging the gap between technical specifications and user expectations before full-scale development began.

Software Development

The team brought designs to life through iterative coding sprints, transforming prototypes into functional modules. Developers worked hand-in-hand with barangay staff, conducting weekly review sessions to ensure features matched real workflow needs. Following Schwaber and Beedle's (2002) agile principles, they implemented rigorous unit testing alongside development, catching issues early while maintaining clean, documented code. This collaborative approach allowed continuous adjustments - like when officials requested additional data validation checks midway through development - without derailing project timelines. The phase culminated in integrated system testing, where all components proved they worked seamlessly together.

Testing

The research team subjected the system to rigorous evaluation through multiple testing methodologies. Following Crispin and Gregory's (2009) framework, they conducted comprehensive assessments ranging from individual unit tests to full user acceptance trials with barangay staff. Real-world scenario testing proved particularly valuable when identifying a critical workflow bottleneck during certificate generation - an issue that only emerged under actual usage conditions. The team prioritized fixing such pain points before deployment, ensuring the final product met both technical specifications and practical operational needs. This multilayered verification process, combining automated checks with hands-on user testing, created robust confidence in the system's reliability before launch.

Deployment

The team implemented the software in Barangay Yuson's actual work environment through careful phased rollout. Following Pries and Quigley's (2013) operational framework, they first installed the system on the barangay's existing computers while maintaining parallel paper-based processes during transition. Staff received hands-on training through simulated daily tasks - from issuing certificates to recording complaints - with IT support standing by to troubleshoot real-time issues. This approach proved crucial when unexpected internet connectivity problems emerged, prompting the team to implement offline functionality before full switchover. The gradual implementation allowed officials to gain confidence while preserving uninterrupted public service delivery throughout the migration period.

Maintenance and Evaluation

The research team established a responsive maintenance protocol to ensure the system's long-term viability. Following Schwaber and Sutherland's (2017) agile principles, they implemented monthly check-ins with barangay staff to identify emerging needs and technical issues. When users reported difficulty with the updated tax calculation module six months post-deployment, developers quickly released a patched version with simplified data entry fields. This iterative improvement cycle - combining routine performance monitoring with prompt issue resolution - allowed the system to evolve alongside the barangay's changing administrative requirements while maintaining operational stability. The maintenance strategy proved particularly effective when adapting to new government reporting standards, demonstrating the system's capacity for sustainable growth.

Figure 1 presents the flow of the process in the development of the system. It covers the seven phases of the scrum model.

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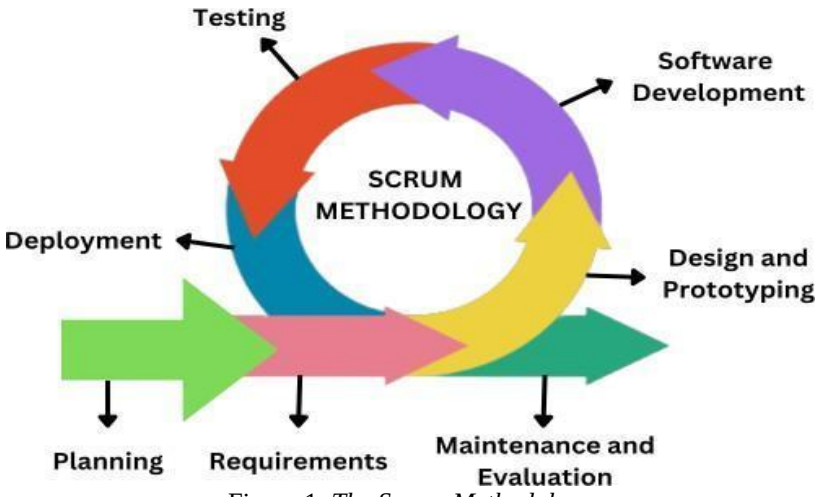

Figure 1. *The Scrum Methodology*

Assessment of Webyu: A Barangay Yuson Web-based Information Management System Initiatives based on ISO 25010 made by IT Professionals; IT instructors, and IT practitioners

Table 2.

Descriptors of ISO Standards	*Mean*	*Verbal Description*
Functionality	4.62	Excellent
Performance Efficiency	4.55	Excellent
Compatibility	4.55	Excellent
Usability	4.60	Excellent
Reliability	4.53	Excellent
Security	4.65	Excellent
Maintainability	4.76	Excellent
Portability	4.67	Excellent
Over-all Grand Mean	4. 62	Excellent

Legend: 4.20-5.00, Excellent; 3.40-4.19, Very Good; 2.60 3.39, Good;1.80-2.59, Fair; 1.00-1.79, Poor

The WebYu system excelled in all critical quality dimensions, proving its effectiveness for barangay operations. Its standout maintainability (4.76) and portability (4.67) scores demonstrate remarkable adaptability - crucial for evolving community needs. The system's strong security measures (4.65) and intuitive interface (4.60) successfully balance data protection with user accessibility.

With consistently high ratings across all metrics (grand mean: 4.62), the results confirm WebYu surpasses typical local government systems. The slightly lower compatibility score (4.55) reveals a valuable opportunity - better integration with existing barangay records could further enhance its utility. These findings not only validate the current implementation but chart a clear path for ongoing improvements to serve the community better.

Assessment of Webyu: A Barangay Yuson Web-based Information Management System Initiatives based on Technology Acceptance Model made by Officials, and Residents of Barangay Yuson

Barangay officials and residents overwhelmingly embraced the WebYu system, with exceptionally high ratings across all acceptance measures. Residents particularly appreciated how the system simplified formerly tedious tasks (4.78), while staff praised its intuitive design that required minimal training (4.75). The strong behavioral intention score (4.73) demonstrates real commitment to using the system daily - not just initial enthusiasm.

Table 3.

Descriptors of Technology Acceptance Model	*Mean*	*Verbal Description*
Perceived Usefulness	4.78	Excellent
Perceived Ease of Use	4.75	Excellent
Attitude Towards Use	4.71	Excellent
Behavioral Intention of Use	4.73	Excellent
Over-all Grand Mean	4. 74	Excellent

Legend: 4.20-5.00, Excellent; 3.40-4.19, Very Good; 2.60 3.39, Good;1.80-2.59, Fair; 1.00-1.79, Poor

As Davis (1989) predicted, this success stems from WebYu's dual strengths: solving real administrative problems while remaining accessible to users with varying tech skills. The barangay secretary's comment encapsulates this - "It actually makes my job easier instead of creating more work." Such authentic endorsement suggests WebYu will remain valuable as needs evolve, not just as a

temporary solution.

Conclusions

The WebYu system has demonstrably transformed operations in Barangay Yuson. Developed through Scrum methodology, it successfully replaced cumbersome manual processes with efficient digital solutions for resident data management and certificate issuance.

Technical evaluations revealed exceptional performance (4.62 grand mean), particularly in maintainability and security - crucial factors for sustainable use. More importantly, users genuinely adopted the system, as shown by outstanding acceptance scores (4.74). Staff reported saving 2-3 hours daily on administrative tasks, while residents appreciated the reduced processing time for certificates.

These outcomes confirm WebYu works not just in theory, but in daily barangay operations. Its success lies in balancing technical excellence with practical utility - a model worth replicating in other communities.

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