International Journal of Research in Education Humanities and Commerce

Volume 04, Issue 04 "July - August 2023"

ISSN 2583-0333

IMPLEMENTATION OF BARANGAY MANAGEMENT SYSTEM: AN EXTENSION SERVICE OF CvSU-TANZA CAMPUS

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https://doi.org/10.37602/IJREHC.2023.4421

ABSTRACT

The study was conducted to implement a comprehensive management system for the barangay that serves the officials and the citizens. Specifically, it aimed to provide the features starting from its simple transactions such as posting news and announcements, presenting barangay projects and achievements, promoting business and other commercial establishments within the barangay, up to its complex service of managing barangay citizen's complaints, providing barangay certifications and other necessary transactions forms efficiently, and a comprehensive view of the barangay transactions and services through a dashboard that displays its transaction logs and reports.

The barangay management system used the agile development model, depicting iterative development phases. It ensured that the program was improved after each testing procedure, which enabled simultaneous production and execution in an overall planned setting. The system was developed using web development tools such as HTML, CSS, JavaScript, PHP, and MySQL. Consequently, the developed system was tested and evaluated using the ISO 25010 evaluation instrument.

Ten selected IT experts tested the barangay management in terms of functional suitability, usability, reliability, security, maintainability, portability, and performance efficiency with a weighted mean of 4.59, interpreted as excellent. Furthermore, its usability was evaluated by 70 users, particularly the officials and residents of the barangay, in terms of appropriateness recognizability, learnability, operability, user error protection, user interface aesthetics, and accessibility, with a weighted mean of 4.73, also interpreted as excellent.

Keywords: management system, extension service, barangay

1.0 INTRODUCTION

As the fundamental political entity, the barangay serves as the primary planning and executing unit of government policies, strategies, programs, projects, and group events and as a forum where people's collective opinions can be expressed, solidified, considered and where differences can be settled peacefully. Barangay represents the government at the grass root level. They are considered the epitome of what the government can offer and are the court of first help of the general populace. Thompson (2016) stated that governments are successful, consistent, accessible, and up-to-date. Remarkably, many sites lag far behind today's communication standards, lacking the primary goal of serving the public well.

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ISSN 2583-0333

Since a barangay should be concerned with showcasing different agenda in a unified view of various programs and more upcoming plans and activities, a management system is implemented for the barangay as an extension service provided by the Cavite State University

– Tanza Campus. It includes features from its simple transaction processing such as posting news and announcements, presenting barangay projects and achievements, promoting business and other commercial establishments within the barangay, up to its complex service of managing barangay citizen's complaints, providing barangay certifications and other necessary transactions forms efficiently, and a comprehensive view of the barangay transactions and services through a dashboard that displays its transaction logs and reports.

Generally, the study aimed to develop a comprehensive management system for the barangay. Specifically, it aimed to:

1. Design the system with the features:

a. provides a dashboard of barangay transactions and services;
b. generates barangay forms, reports, certificates, and other barangay documents;
c. manages brangay citizen's complaints;
d. posts news and announcements;
e. presents projects and achievements;
f. promotes business and other commercial establishments within the barangay;

2. Develop the system using web development tools such as HTML, CSS, JavaScript, PHP, and MySQL;

3. Test the system using the ISO 25010 evaluation instrument in terms of:

a. functional suitability
b. efficiency
c. usability
d. reliability
e. security
f. maintainability
g. portability

4. Evaluate the system's usability in terms of appropriateness recognizability, learnability, operability, user error protection, user interface aesthetics, and accessibility

2.0 METHODOLOGY

The study used the input-process-output (IPO) approach of developing the system. The input includes the knowledge relevant to the study, such as about the barangay, its services, and transactions. It also includes the ways and tips to successfully develop a barangay management system, the different hardware and software requirements for its development, and the evaluation instrument to be used during the implementation, specifically the ISO 25010 evaluation instrument. The software requirements are JavaScript and PHP for its general

functions, HTML to construct the system's skeleton, CSS for the design and animation, and MySQL for the database.

This development is based on the Agile process model, enabling simultaneous production and execution in an overall planned setting. Also, considering the complex services and transactions of the barangay, the researcher emphasized the testing phase as an essential part of development through iteration. The process started with meticulous planning to avoid major problems during the development stage. Requirement analysis was also conducted for a proper understanding of the needs of the barangay based on its transactions and services. The design phase considered the interaction between the system and the users, making it user- friendly yet appealing to the public. The building phase followed, where the major construction was applied from primary to its key functions. Lastly, testing and evaluation were repeatedly done until they met the expectations of the barangay before its final implementation and deployment as facilitated by the Cavite State University – Tanza Campus Department of Information Technology in collaboration with its Extension unit.

Table 1 presents the descriptive interpretation of the mean used for data analysis after implementing the system. The numerical scale of 4.51 – 5.00 is interpreted as excellent, 3.51–4.50 as very good, 2.51 – 3.50 as good, 1.51 – 2.50 as fair, and 1.00 – 1.50 as poor.

Table 1. Descriptive interpretation of the mean

NUMERICAL SCALE	INTERPRETATION
4.51 – 5.00	Excellent
3.51 – 4.50	Very Good
2.51 – 3.50	Good
1.51 – 2.50	Fair
1.00 – 1.50	Poor

3.0 TEST RESULTS

The barangay management system was tested for functional suitability, usability, reliability, security, maintainability, portability, and performance efficiency. The testing results were used as the foundation for future improvements by iteratively going through each process. Ten Information Technology (IT) experts/specialists were consulted and requested for further testing. It was also debugged to find any possible errors that might cause inconvenience on user experience upon its deployment and implementation. Using the ISO 25010 evaluation instrument, the test results were found in the following tables:

3.1 System's Functional Suitability Test

Table 2 presents the functional suitability test result. As presented, the measures were rated with a weighted mean ranging from 4.50 – 5.00. The highest weighted mean of 5.00 is observed in functional appropriateness, while the lowest weighted mean of 4.50 was observed in functional correctness. Overall, the IT experts found the system excellent in terms of functional suitability.

Table 2. Functional suitability test result

MEASURE FOR FUNCTIONAL SUITABILITY	RATING	INTERPRETATION
a) Functional Completeness	4.60	Excellent
b) Functional Correctness	4.50	Very Good
c) Functional Appropriateness	5.00	Excellent
OVERALL FUNCTIONAL SUITABILITY	**4.70**	**EXCELLENT**

3.2 System's Usability Test

Table 3 presents the usability test result. As presented, the measures were rated with a weighted mean ranging from 4.30 – 4.90. The highest weighted mean of 4.90 is observed in operability and accessibility, while the lowest of 4.30 was observed in user interface aesthetics. Overall, the IT experts found the system excellent in terms of usability.

Table 3. Usability test result

MEASURE FOR USABILITY	RATING	INTERPRETATION
a) Appropriateness recognizability	4.40	Very Good
b) Learnability	4.70	Excellent
c) Operability	4.90	Excellent
d) User error protection	4.50	Very Good
e) User interface aesthetics	4.30	Very Good
f) Accessibility	4.90	Excellent
OVERALL USABILITY	**4.61**	**Excellent**

3.3 System's Reliability Test

Table 4 presents the reliability test result. As presented, the measures were rated with a weighted mean ranging from 4.40 – 4.80. The highest weighted mean of 4.80 is observed in availability, while the lowest weighted mean of 4.40 was observed in recoverability. Overall, the IT experts found the system excellent in terms of reliability.

Table 4. Reliability test result

MEASURE FOR RELIABILITY	RATING	INTERPRETATION
a) Maturity	4.70	Excellent
b) Availability	4.80	Excellent

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c) Fault Tolerance	4.60	Excellent
d) Recoverability	4.40	Very Good
OVER-ALL RELIABILITY	**4.62**	**EXCELLENT**

3.4 System's Security Test

Table 5 presents the security test result. As presented, the measures were rated with a weighted mean ranging from 4.00 to 4.30. The highest weighted mean of 4.30 is observed in integrity and non-repudiation, while the lowest weighted mean of 4.00 was observed in authenticity. Overall, the IT experts found the system very good in terms of security.

Table 5. Security test result

MEASURE FOR SECURITY	RATING	INTERPRETATION
a) Confidentiality	4.10	Very Good
b) Integrity	4.30	Very Good
c) Non-repudiation	4.30	Very Good
d) Accountability	4.10	Very Good
e) Authenticity	4.00	Very Good
OVERALL SECURITY	**4.16**	**VERY GOOD**

3.5 System's Maintainability Test

Table 6 presents the maintainability test result. As presented, the measures were rated with a weighted mean ranging from 4.60 – 4.80. The highest weighted mean of 4.80 is observed in modifiability, while the lowest weighted mean of 4.60 was observed in modularity and testability. Overall, the IT experts found the system excellent in terms of security.

Table 6. Maintainability test result

MEASURE FOR MAINTAINABILITY	RATING	INTERPRETATION
a) Modularity	4.60	Excellent
b) Reusability	4.70	Excellent
c) Analysability	4.70	Excellent
d) Modifiability	4.80	Excellent
e) Testability	4.60	Excellent
OVERALL MAINTAINABILITY	**4.68**	**EXCELLENT**

3.6 System's Portability Test

Table 7 presents the portability test result. As presented, the measures were rated with a weighted mean ranging from 4.60 – 4.80. The highest weighted mean of 4.80 is observed in installability, while the lowest weighted mean of 4.60 was observed in adaptability. Overall, the IT experts found the system excellent in terms of portability.

Table 7. Portability test result

MEASURE FOR PORTABILITY	RATING	INTERPRETATION
a) Adaptability	4.60	Excellent
b) Installability	4.80	Excellent
c) Replaceability	4.70	Excellent
OVERALL PORTABILITY	**4.70**	**EXCELLENT**

3.7 System's Performance Efficiency Test

Table 8 presents the performance efficiency test result. As presented, the measures were rated with a weighted mean ranging from 4.60 – 4.70. The highest weighted mean of 4.70 is observed in resource utilization and capacity, while the lowest weighted mean of 4.60 was observed in time behavior. Overall, the IT experts found the system excellent in terms of performance efficiency.

Table 8. Performance efficiency test result

MEASURE FOR PERFORMANCE EFFICIENCY	RATING	INTERPRETATION
a) Time behavior	4.60	Excellent
b) Resource utilization	4.70	Excellent
c) Capacity	4.70	Excellent
OVERALL PERFORMANCE EFFICIENCY	**4.67**	**EXCELLENT**

3.8 Overall System Test Results

Table 9 presents the overall testing results. As presented, the measures were rated excellent and very good, with a weighted mean ranging from 4.16 – 4.70. The highest weighted mean of 4.70 was observed in functional suitability, followed by maintainability with a weighted mean of 4.68, performance efficiency with 4.67, 4.62 for reliability, 4.61 for usability,

4.60 for portability, and the lowest weighted mean of 4.16 was observed in security. The IT experts tested and rated the system as excellent, with an overall mean of 4.58.

Table 9. Overall test results

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MEASURE	RATING	INTERPRETATION
a) Functional Suitability	4.70	Excellent
b) Usability	4.61	Excellent
c) Reliability	4.62	Excellent
d) Security	4.16	Very Good
e) Maintainability	4.68	Excellent
f) Portability	4.60	Excellent
g) Performance Efficiency	4.67	Excellent
OVERALL TEST RESULT	**4.58**	**EXCELLENT**

4.0 EVALUATION RESULTS

The barangay management system was evaluated in terms of usability by 70 selected users, particularly the barangay officials and citizens. The usability was evaluated in terms of appropriateness recognizability, learnability, operability, user error protection, user interface aesthetics, and accessibility. The results are shown in the following table.

4.1 System Evaluation Results

Table 10 presents the usability evaluation result. As presented, the measures were rated excellent, with a weighted mean ranging from 4.70 – 4.74. The highest weighted mean of 4.74 was observed in appropriateness recognizability, user error protection, and accessibility, while the lowest weighted mean of 4.70 was observed in learnability. Overall, the users found the system excellent in terms of usability.

Table 10. Usability evaluation result

MEASURE FOR USABILITY	RATING	INTERPRETATION
a) Appropriateness recognizability	4.74	Excellent
b) Learnability	4.70	Excellent
c) Operability	4.72	Excellent
d) User error protection	4.74	Excellent
e) User interface aesthetics	4.72	Excellent
f) Accessibility	4.74	Excellent
OVERALL USABILITY	**4.73**	**EXCELLENT**

5.0 SUMMARY OF FINDINGS

In consideration of the objective of the study and the results of the project evaluation, the following conclusions were derived. The study was designed to provide a comprehensive management system for the barangay that serves the officials and the citizens. It was specifically developed to provide the simplest transaction, such as posting news and announcements, presenting barangay projects and achievements, promoting business and other commercial establishments within the barangay, up to its complex service of managing barangay citizen's complaints, providing barangay certifications and other necessary transactions forms efficiently, and a comprehensive view of the barangay transactions and services through a dashboard that displays its transaction logs and reports. The barangay management system was developed using web development tools such as HTML, CSS, JavaScript, PHP, and MySQL. Consequently, the developed system was tested and evaluated using the ISO 25010 evaluation instrument. The IT experts tested the barangay management in terms of functional suitability, usability, reliability, security, maintainability, portability, and performance efficiency with a weighted mean of 4.59, interpreted as excellent. Furthermore, its usability was evaluated, particularly by the officials and residents of the barangay, in terms of appropriateness recognizability, learnability, operability, user error protection, user interface aesthetics, and accessibility, with a weighted mean of 4.73, also interpreted as excellent.

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