Development and Evaluation of Community Affairs Management Information System for Municipality of Torrijos
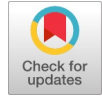
Randell R. Reginio, Loriebenn B. Madrino, Jeremie R. Robles

Abstract: *The Municipality of Torrijos understands the necessity for a comprehensive Community Affairs Management Information System (CAMIS) combined with strong data analytics capabilities in an era of increased digitization and community participation. The objective of this study aims to design and implement a user-friendly CAMIS platform tailored to the specific needs and requirements of the Municipality of Torrijos; incorporate data analytics functionalities to extract insights from community-related data and support evidence-based decision-making; utilize data analytics to identify community needs, prioritize initiatives, and allocate resources efficiently to maximize impact; and, conduct rigorous evaluation and assessment to measure the functionality, reliability, usability, efficiency, maintainability, and portability of CAMIS the on community relations and governance. The development and evaluation of CAMIS using data analytics for the Municipality of Torrijos is presented in this paper.*

Keywords: *Community Affairs Management Information System, Data Analytics, Information System, ISO 9126, Programs and Projects*

I. INTRODUCTION

The importance of technology in community affairs is more than ever in a time of changing community demands, growing stakeholder engagement, and the need for open and effective government services. Torrijos is a coastal municipality in the province of Marinduque. It is a third-class municipality in the province and makes up 18.78% of Marinduque's overall area with a land area of 178.92 square kilometers, or 69.08 square miles. It is composed of twenty-five (25) barangays.

Fishing and farming are the main sources of income for the population [1]. In the 2020 Census, the population was about 30,476. This represented 12.74% of the total population of Marinduque and 0.94% of the overall population of the Mindoro, Marinduque, Romblon, and Palawan (MIMAROPA) Region. Based on these figures, the number of households is 7,554, and an average household size of 4 [2].

The Community Affairs Office in Torrijos aims to implement information campaigns and technical assistance for essential programs and projects requiring local government support. It focuses on building community relations through information dissemination and partnerships with organizations. Programs and projects are offered, particularly to low-income families, providing financial assistance in exchange for their services. The office also offers Department of Labor and Employment-Tulong Panghanapbuhay sa Ating Disadvantaged/Displaced Workers (DOLE-TUPAD), Livelihood, Scholarships Program, and a Special Program for Employment of Students (SPES).

The Community Affairs Office in the Municipality of Torrijos is having difficulty identifying the beneficiaries who already became recipients of the programs and are eligible to be a beneficiary. There is no system in place at the office to determine whether the applicant has previously been designated as a beneficiary for that year or whether they have a household member who has been designated as a beneficiary. The staff find it difficult to determine who qualifies for aid and who is a beneficiary. The office faces challenges in file management due to overwhelming paperwork, manual auditing, and misfiling, resulting in delayed document retrieval.

Further, one of the problems is the distribution of benefits to every household. The staff rely only on their printed document as their reference of the list of beneficiaries and members of every household for tracking and identifying the beneficiaries. With this problem, many issues arise when it comes to equal distribution of opportunities to people. The developed system identifies and verifies the list of beneficiaries, records, and updates data of different beneficiaries or recipients of the program and manages the programs of the community affairs office to address the existing problems and give equal services to its constituents.

Randell R. Reginio*, Assistant Professor III in Marinduque State College – Santa Cruz Campus, Philippines. Email: randell_reginio@yahoo.com 0000-0001-6223-5241

Loriebenn B. Madriño, Currently the Program Head of the Bachelor of Science in Information Systems in Marinduque State College – Santa Cruz Campus, Philippines. Email: aben.banez@gmail.com

Jeremie R. Robles, Instructor I in Marinduque State College – Santa Cruz Campus, Philippines. Email: jeremieregencia@gmail.com

Also, the system has a data analytics features which will help the organization in determining the total number of households and the beneficiaries or recipients of programs being implemented by the Local Government Unit (LGU) in the different barangays of the Municipality of Torrijos [5][6][7][8][9].

II. AIM OF PAPER

This paper aims to develop and evaluate the Community Affairs Management Information System that helps the community affairs office to do their work efficiently and effectively to provide better services to people. Furthermore, this will also explore the evaluation of the system based on the International Organization for Standardization (ISO)9126 as to its functionality, reliability, usability, efficiency, maintainability, and portability.

III. RESEARCH DESIGN

The purpose of the study is to develop and evaluate CAMIS that will help the Community Affairs Office in the Municipality of Torrijos become more adept in maintaining and evaluating records and managing the four (4) programs such as DOLE-TUPAD, SPES, Livelihood, and Scholarship programs. The study employed descriptive and developmental research design. The study tested the software quality of the systems as determined by the experts through testing using a score assessment sheet based on ISO 9126.

Descriptive Research Design and Developmental Research Design were used in the study. Descriptive research is a methodological approach that seeks to depict the characteristics of a phenomenon or subject under investigation [3].

Developmental research as a systemic study of designing, developing, and evaluating instructional programs, processes, and products that must meet the criteria of internal consistency and effectiveness [4].

Agile Methodology was used as the model to develop the concept of the system and it involves procedures such as requirement analysis, design, development, testing, deployment, and review.

A. Requirements Analysis

A communication letter was sent to the Community Affairs Office in the Municipality of Torrijos asking permission to conduct an interview with the process owners of the said office. During the face-to-face interview with the Community Affairs Officer I, detailed information was asked on how the different processes of the organization delivered to their clients, forms being used by the organization was also requested, and all information given were analyzed and used in the process of developing the system.

B. Development and Testing Procedures

The researchers considered the needs of the organization by determining the exact source of the problem being solved and what the organization expects to achieve using the system.

During the design phase, the system was created by creating a graphical user interface that was easy to use for the users. The system was developed using the C# programming language and Visual Studio. The database was created using Cross-Platform, Apache, My Structured Query Language (MySQL), Hypertext Preprocessor (PHP), and Perl (XAMPP). These development tools were useful for system design and development.

To ensure the developed system's reliability, functionality, usability, and end-user acceptability, testing methods such as Alpha, Stress, and Beta testing were employed. The system has undergone testing to ensure that it satisfies end users' expectations based on their requirements, to look for areas for further improvement, and to eliminate any mistakes that may occur during use.

C. Evaluation Procedure

In the evaluation procedure, ISO9126 was used as an evaluation tool to determine the functionality, reliability, usability, efficiency, maintainability, and portability of developed the system. The developed system was deployed to the organization for two (2) weeks to let the end-users test the product. The end-users evaluated the performance and capability of the system and listed down issues encountered while using the system.

With the primary goal of the evaluation to test the performance of the project based on the perception of the prospective users such as the personnel of the organization, IT Experts, and the non-IT experts of the Marinduque State College – Santa Cruz Campus, the system's functionality was explained and demonstrated. The evaluation instruments were distributed to the respondents and requested them to rate based on the specified scale of 1 to 5, with 5 the highest score and 1 the lowest. The following indicators were used to interpret the evaluation's results:

Table 1. Likert's Scale

Numerical Rating	Equivalent
4.51 – 5.00	Highly acceptable
3.51 – 4.50	Moderately acceptable
2.51 – 3.50	Acceptable
1.51 – 2.50	Fairly acceptable
1.00 – 1.50	Not acceptable

IV. RESULTS AND DISCUSSION

The Development of Computerized Community Affairs Management Information System for the Municipality of Torrijos aims to address the problems encountered by the organization's present practices. The developed system could assist the Community Affairs Office in becoming more adept in maintaining and evaluating the records and managing the four (4) programs such as DOLE-TUPAD, SPES, Livelihood and Scholarship.
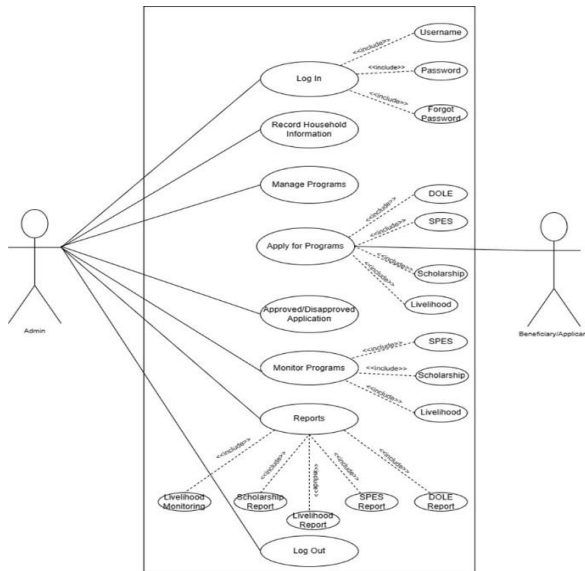
Figure 1. Use Case Diagram of the Community Affairs Management Information System

The new system designed to replace the manual system is now in place to enhance operations and eliminate problems. The Community Affairs Office manages four programs - DOLE, SPES, Livelihood, and Scholarship - using the new system. Each program has unique features that cater to office requirements, related operations, and problems.

To gain access to the system, users must input their correct username and password. If the sign-in is successful, the dashboard page will appear. If not, users can use the "forgot password" feature to retrieve their password and access the system. Users can add members of the household head by entering all the necessary information for all Torrijos households. Using the system, administrators can now identify household members who are eligible and ineligible to apply for each program after household registration. There are specific restrictions on who is eligible to apply for each program. For instance, members of the same household cannot apply for the same batch of DOLE-TUPAD beneficiaries. Applicants must be 75 years old or younger and not employed by the government. For SPES, members of the same household, the head of the household, and those whose monthly income exceeds ₱10,000 cannot apply. The household head is also ineligible to apply for the Scholarship program, and recipients' monthly income should not exceed ₱10,000.00. Additionally, they must maintain a 2.5 GPA.

In the Livelihood program, members of the same household cannot apply, and their monthly income should not exceed ₱10,000. The system also allows users to record the information of the beneficiaries of the programs.

The system administrator is responsible for overseeing the registration of new beneficiaries for DOLE-TUPAD, SPES, Livelihood, and Scholarship programs. Each recipient must start by registering as a household, and the system allows users to monitor their progress throughout the program.

The administrator is responsible for keeping track of the status of beneficiaries for each program, whether they are still active or inactive. They will input the necessary information for data entry, save it for future reference, and view the list of beneficiaries for each program. If eligibility requirements are not met, then the application will be rejected by the system.

Additionally, the admin can monitor the academic performance of scholarship beneficiaries and the monthly income of livelihood program participants. Reports can be generated, and the admin can view and print master lists of beneficiaries for each program, as well as monthly income monitoring for Livelihood programs.

Finally, users can log out of the system when they are finished.

A. Requirements Specification

a. Functional Requirements

1. View the list of programs.
   a. The system views the list of the programs (DOLE, SPES, Livelihood, and Scholarship)
2. Add/Update, View, and Search Household
   a. The user of the system can add new records of household heads and members, DOLE-TUPAD beneficiary, SPES beneficiaries, Livelihood beneficiaries, and Scholarship Beneficiaries.
   b. The user can view the list of households, DOLE-TUPAD beneficiary, SPES beneficiaries, Livelihood beneficiaries, and Scholarship Beneficiaries.
   c. The user of the system can update the household record, DOLE-TUPAD beneficiary, SPES beneficiaries, Livelihood beneficiaries, and Scholarship Beneficiaries; and,
   d. The user can search through the list of households, DOLE-TUPAD beneficiary, SPES beneficiaries, Livelihood beneficiaries, and Scholarship Beneficiaries using the system.
3. Generate Reports
   a. The system allows the user to generate a yearly report of a list of beneficiaries for DOLE-TUPAD, SPES, Livelihood, Scholarship, and Livelihood Monthly Monitoring, and,
   b. The system allows the user to print reports.

b. Non-Functional Requirements

1. Monitoring Technology
   a. The system should have a monitoring system that monitors the status of each program.
2. Record Technology
   a. The system has a record system that allows the recording of the households and their members, a list of beneficiaries in DOLE-TUPAD, SPES, Livelihood, and Scholarship.
3. Performance
   a. The system should respond to the user's request.
4. Security
   a. The system should require a username and password to access the system.

B. Evaluation Results

User Acceptance Testing was also carried out. The developed system was tested by several IT and Non-IT experts from Marinduque State College – Santa Cruz Campus, the staff, and the head of the community affairs office were handed ISO 9126 instruments to collect their acceptance, opinions, and attribute ratings using the Likert scale. The results of the evaluators' ratings are summarized.

Table 2 shows the result of the systematic evaluation of the concerned beneficiaries. Based on the evaluation, the overall mean evaluation of the system obtained a 4.59 which means that the system is "Highly Acceptable". In usability, being the highest from the criteria got 4.69 which means that the system software was easy to use and easy to operate due to the software displays instructions that are easy to understand. On the other criteria the evaluators gave or rated the system in terms of Functionality (4.63), Portability (4.62), Maintainability (4.60), Efficiency (4.50), and Reliability (4.57).

Table 2. Summary of Mean Scores of the System Evaluation

Criteria	Mean (X)	Descriptive Rating
Functionality	4.63	Highly Acceptable
Reliability	4.47	Moderately acceptable
Usability	4.69	Highly Acceptable
Efficiency	4.50	Moderately acceptable
Maintainability	4.60	Highly Acceptable
Portability	4.62	Highly Acceptable
Overall Mean	4.59	Highly Acceptable

V. CONCLUSION

After the system has been completed and evaluation has been conducted, the following conclusions were derived for the study:

1. The developed system was designed to facilitate and collect data of beneficiaries of the LGU of Torrijos in terms of DOLE-TUPAD, SPES, Livelihood, and Scholarship programs, and to generate reports.
2. The developed system was designed in accordance with the user (Office of the Community Affairs) system requirements in terms of recording, monitoring, updating, and filtering data of the beneficiaries of each program.
3. Based on the overall weighted mean, the system was evaluated "Highly Acceptable", that the developed system is suggested to be implemented and used by the Local Government of Torrijos, to be specific, the Office of the Community Affairs, and continue to evaluate the performance of the system.

DECLARATION OF STATEMENT

Funding	The research undertakings do not involve any Funding, Grants, or even financial support.
Conflicts of Interest	The research undertakings have no conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval and consent to participate with evidence.
Availability of Data and Material	Not relevant to the research undertaking.
Authors Contributions	All authors having equal contribution for this article.

REFERENCES

1. "Torrijos, Marinduque Profile – PhilAtlas," www.philatlas.com. https://www.philatlas.com/luzon/mimaropa/marinduque/torrijos.html [Accessed 15 February 2023].
2. "Municipality of Torrijos | Philippine Statistics Authority | Republic of the Philippines," Psa.gov.ph, Jan. 23, 2024. https://psa.gov.ph/classification/psgc/barangays/1704006000 [Accessed 15 February 2023].
3. S. Singh, "What is Descriptive Research? Definition, Methods, Types and Examples | Researcher.Life," Researcher.Life, Nov. 24, 2023. https://researcher.life/blog/article/what-is-descriptive-research-definition-methods-types-and-examples/
4. Seels BB, Richey RC. "Instructional technology: The definition and domains of the field." Washington DC: Association for Educational Communication Technology; 1994.
5. Khan, N. D., Younas, M., Khan, M. T., Duaa, & Zaman, A. (2021). The Role of Big Data Analytics in Healthcare. In International Journal of Soft Computing and Engineering (Vol. 11, Issue 1, pp. 1–7). https://doi.org/10.35940/ijsce.a3523.0911121
6. R, M. M., & Balamurugan, B., Dr. (2021). An Overview of Milestones of Big Data Analytics in Clinical and Medical Analysis. In Regular issue (Vol. 10, Issue 5, pp. 416–421). https://doi.org/10.35940/ijeat.e2899.0610521
7. Arya, A., & S, Dr. S. (2023). Overview of Big Data Analytics Technologies in Smart Grid. In International Journal of Recent Technology and Engineering (IJRTE) (Vol. 11, Issue 5, pp. 36–45). https://doi.org/10.35940/ijrte.e7388.0111523
8. Venkatesan, M., Kulkarni, Anju. V., Menon, R., & Ramakrishnan, V. (2020). A Comprehensive Big Data Analytics Based Framework for Premature Recognition of Breast Cancer. In International Journal of Innovative Technology and Exploring Engineering (Vol. 9, Issue 3, pp. 2188–2192). https://doi.org/10.35940/ijitee.c8793.019320
9. Jain, V. (2023). An Overview on Data Mining and Data Fusion. In Indian Journal of Data Mining (Vol. 3, Issue 1, pp. 1–5). https://doi.org/10.54105/ijdm.a1624.053123

AUTHOR'S PROFILE

Randell R. Reginio finished his Bachelor of Science in Information Management in Marinduque State College – Boac Campus and his Master of Information Techology and Doctor of Technology in Technological University of the Philippines – Manila. He became the Associate Dean of the School of Information and Computing Sciences (2019) and also became the Campus Director of Marinduque State College – Santa Cruz Campus (2017-2019 and 2021-2023). He was designated as Study Leader for the Project Development of Native Pig Breed Information System (2017). He has been a member of the different Associations and Organizations such as the Philippine Network of Educators on Environment (PNEE), Philippine Association of Industrial Technology Educators (PAITE), Philippine Association of Extension Program Implementors (PAEPI) Inc., Accrediting Agency of Chartered Colleges and Universities in the Philippines (AACCUP), Philippine Society of Information Technology Educators, Leadership. In Education, Academy and Development (LEAD), Institute for Engineering Research and Publication (IFERP), Philippine Higher Education Research Consortium - Manila, Inc. (PHERC), Professional organization of Researchers and Educators of the Philippines, Inc. (POREP), Center for Scholarly Researches of Educators (CeSREP), Philippine Institute of 21st Century Educators Inc. Currently, he is an Assistant Professor III at Marinduque State College – College of Information and Computing Sciences, Sanat Cruz Campus and also the Municipal Gender and Development Focal Point System, Gender and Development Monitoring and Evaluation Team, and Technical Working Group of the Municipal Gender and Development Focal Point System in the Municipality of Santa Cruz, Marinduque. Awarded as the Best Scientific Breaktrhough during the 2019 Dangal ng MSC Awards.

Loriebenn B. Madriño finished her Bachelor of Science in Information Technology in Marinduque State College - Boac Campus and her Master in Information Systems in Asia Pacific College – Manila. She became a Science Research Assistant in SUSTAIN-IPTBM Project under DOST-PCAARRD Program at Marinduque State College - Boac Campus (2020-2021) and became Research and Extension Coordinator of MSC Sta. Cruz Campus (2021-2023). Currently, she is an Instructor and Program Head of BSIS Program under the College of Information and Computing Sciences – Sta. Cruz Campus.

Jeremie R. Robles finished his Bachelor of Science in Information Systems in Marinduque State College – Sta. Cruz Campus and his Master in Information Technology in Technological University of the Philippines – Manila. He became a Science Research Analyst in Markaduke Research and Development Center under DOST-PCAARRD Native Pig Project at MSC Torrijos Campus – (2018 – 2022). He is also an Associate Member of National Research Council of the Philippines (NRCP). Currently, an Instructor of the College of Information and Computing Sciences at Marinduque State College (Sta. Cruz Campus).