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Data - Driven Community and Extension Services for Project Decisions with Analytics

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Abstract - *A study was conducted entitled Data - Driven Community and Extension Services for Project Decisions with Analytics were conducted to help the selected institution in establishing its goals and making strategic decisions. The main objective of the study is to develop a system for the Cavite State University (CvSU) – Carmona campus, Philippines that would able to monitor and analyze community-related data for decision making. Specifically, it aims to develop a module for the analyzation of the possible target barangay, based on the number of households with income below in the poverty threshold, unemployment rate (by sex and barangay) and children (ages 6 to16 years old) who are not attending school (by sex and barangay); create a module for the community needs assessment that can be accessed online by the employees of the Local Government Unit (LGU) of Carmona, Cavite; recommend extension services through the use of decision tree algorithm; monitor the community extension projects; evaluate the extension project and instructor at the end of the training; provide reports which include gender distribution, trainee's performance, expenditures of different community extension service projects, tracer report of the trainees and project's sustainability; and evaluate the system in terms of the level of acceptability in accordance with ISO 25010 – Product Quality. Rapid Application Development model was used for the software development of the system, PHP: Hypertext Preprocessor as its programming language, C4.5 decision tree algorithm, and descriptive analytics for the visualization of the data. The system was evaluated by 63 respondent which composed of faculty members of CvSU-Carmona and employees of the LGU of Carmona, Cavite using the adapted evaluation form from the International Organization for Standardization 25010. The system obtained a computed weighted mean of 4.37 for the system testing and 4.71 for the acceptance testing with an adjectival rating of outstanding for both testings. It entails that the developed system was accepted and was able to use for project decisions.*

Keywords – Extension service, Descriptive Analytics, C4.5 algorithm, WEKA, ISO 25010.

INTRODUCTION

Extension service is a process of working with rural people in order to improve their livelihoods. This can be also an informal education process directed toward the rural population [1]. It can also an rural advisory services pertain to all activities related to the provision of information and services required by various stakeholders, especially in the rural areas, to assist and support them in the development of their own technical, organizational, and management skills and practices with the end goal of improving livelihoods and well-being [2].

Non-formal education is one of the extension services provided by colleges and universities to people who are not enrolled as regular students, which also discussed by the St. Mary's College of Catbalogan [3]. Community Extension Service is a program of the school that is capable to assist the less privileged community by helping them acquire greater control over their critical resources, easier access to basic services that the school could offer. Quezada [4] concluded that extension programs and projects of the university can improve the quality of life of beneficiaries.

By conducting extension services, different universities and colleges can have an opportunity to be accredited by other organizations. Providing and maintaining a continuous mechanism with a view to raising academic standards, in addition to improving minimum standards, was the rationale of the accreditation system in the Philippines [5]. Also, according to Usep.edu.ph [6], extension and community involvement is one of the major components in accrediting a certain university. The extension function makes an institution's presence felt in the community. It involves the application of existing and new knowledge and technology and those generated in the institution to improve the quality of life of the people. Through the extension program, people are empowered with appropriate knowledge, attitudes, and skills.

The Cavite State University (CvSU) has its humble beginnings in 1906 as the Indang Intermediate School with the American Thomasites as the first teachers. CvSU is mandated "to provide excellent, equitable and relevant educational opportunities in the arts, sciences, and technology through quality instruction, and responsive research and development activities.

CvSU has 11 campuses in the whole province of Cavite which conducting extension services, it is a partner in the delivery of CvSU's research-based knowledge in a usable form to groups, families, and individuals in local communities. The personnel under the Research and Extension Services Office provide an important bridge between university researchers and community knowledge-users.

The CvSU Carmona Campus was awarded by the Cavite State University-Main Campus its quality research and extension services, and launched its extension program in partnership with the local government unit of Carmona last December 2017, and it was entitled "ARM: Accessing community, Rendering Services, and Maintaining relationships" which composed of 5 extension projects — "Project Kompyuter", "Kakayahang Teknikal tungo sa Pag-unlad", "Project Pisara", "Barangay Entreprenyur", and "Basura ko, Ayoko". These extension projects, will help and train people in the community to know the basic usage of the computer, electronics, principles of business, teach basic and secondary education to the out of school youth, and demonstrate to the community the proper waste segregation.

Gathering and analyzing of data, monitoring of extension projects, and generating different statistical reports finding it more difficult by the extension coordinator which can be addressed through adopting the technology. In relation, Fao.org [7] stated that the information system provides promise in the acceleration of the development in developing countries. This is especially the case for giving extension services, which often engages in the exchange and transfer of information and knowledge in different school's development and management.

In line with this, the idea of bringing up the study entitled Data - Driven Community and Extension Services for Project Decisions with Analytics were conducted to help the selected institution in establishing its goals and making strategic decisions.

OBJECTIVES OF THE STUDY

The main objective of the study is to develop a system that can able to monitor and analyze community-related data for decision making. Specifically, the developed system aims to develop a module for the analyzation of the possible target barangay, based on the households with income below the poverty threshold, unemployment rate (by sex and barangay), and children (ages 6 to 16) who are not attending school (by sex and barangay); create a module for the community needs assessment that can be accessed online by the Local Government Unit of Carmona; recommend extension services through the use of decision tree algorithm; monitor the community extension projects; evaluate the extension project and instructor at the end of the training; provide reports which include gender distribution, trainee's performance, expenditures

of different community extension service projects, tracer report of the trainees, and project's sustainability; and evaluate the system in terms of the level of acceptability in accordance with ISO 25010 – Product Quality.

METHODOLOGY

For a successful software development, adopting methodology model were considered, the Rapid Application Development by Shelly & Rosenblatt [8] was used in the study.

Rapid application development (RAD) is a team-based technique that speeds up information systems development and produces a functioning information system. RAD uses a group approach, but goes much further. The end product of RAD is the new information system. RAD is a complete methodology, with a four-phase life cycle that parallels the traditional SDLC phases.

RAD relies heavily on prototyping and user involvement. The RAD process allows users to examine a working model as early as possible, determine if it meets their needs, and suggest necessary changes. Based on user input, the prototype is modified and the interactive process continues until the system is completely developed and users are satisfied. CASE tools can be used to build the prototypes and create a continuous stream of documentation.

RESULTS AND DISCUSSION

System Overview

Data - Driven Community and Extension Services for Project Decisions with Analytics system was designed and created to support the Cavite State University – Carmona Campus for their goal to help the municipality of Carmona.

The developed system were composed of different pages and modules which includes:
The developed system contain different modules which includes population, community-needs assessment, respondent profiling, and extension service. This modules will be used for the monitoring and recommendation of barangay and extension service.

The barangay profiling module was used for the barangay profiling, all the data that was inputted to this page were came to the local government unit of Carmona. This module required the user to provide the following information for the profiling of barangay: households with income below poverty threshold (Fig. 1), unemployment rate by sex and by barangay (Fig. 2) and children 6-16 who are not attending school by sex and by barangay (Fig. 3). This information was the basis to recommend possible target barangay. Graphs of the stated information were also included in this module to easily analyze the distribution of data to the different parameters.

Figure 1. Screenshot of the households with income below poverty threshold graph

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Figure 2. Screenshot of the graph for the unemployment rate of barangay

Figure 3. Screenshot of the graph for children 6-16 who are not attending school

The community needs assessment module was intended for the gathering of data and it can be used and accessed by the local government unit (LGU) of Carmona (see Figure 4). A questionnaire was included in this module so that the LGU will not use pen and paper. Since the developed system was a mobile responsive, the community-needs assessment can be done online, for its efficiency and portability, the LGU can use mobile phones, tablet or any devices that are connected to the internet.

Figure 4. Screenshot of the community-needs assessment module

The extension service module was intended for the recommendation of extension project for the recommended barangay based on the population module (Fig. 5). Parameters such as preferred field of specialization based on the CNA module and number of possible attendees per specialization was used as parameters, and C4.5 decision tree algorithm was used in recommending extension projects.

Figure 5. Screenshot of the extension service module

Tables and graph with regard to the recommended extension projects was also provided to showcase the details of recommendation, and Weka was used in this study to verify and test the algorithm that was used (Fig. 6).

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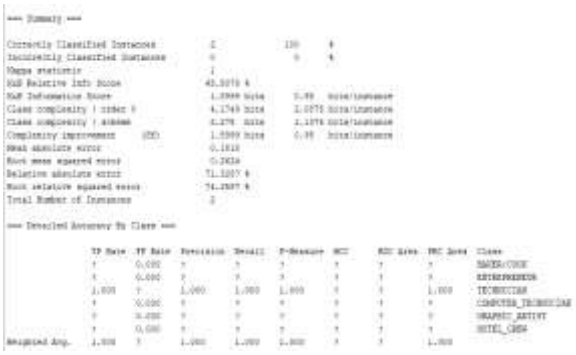

Figure 6. Algorithm evaluation through the use of Weka tool

Software Evaluation

For the system testing, the developed system was evaluated by 63 respondent which composed of 33 CvSU-Carmona faculty and 30 LGU officer. They were chosen through total population sampling technique and they evaluated the developed system with the used of adapted evaluation form from the ISO 25010 which composed of 8 criteria namely functionality suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability

Table 1. Overall result of the system testing

CRITERION	MEAN (N=63)	ADJECTIVAL RATING
1. Functional Suitability	4.95	Outstanding
2. Performance Efficiency	4.18	Very Satisfactory
3. Compatibility	3.90	Very Satisfactory
4. Usability	4.19	Very Satisfactory
5. Reliability	4.34	Outstanding
6. Security	4.20	Very Satisfactory
7. Maintainability	4.48	Outstanding
8. Portability	4.74	Outstanding
AVERAGE	**4.37**	**OUTSTANDING**

The functionality criterion got a highest computed mean of 4.95 with an adjectival rating of outstanding, it shows that the majority of the respondents are agree that the developed system operates in accordance to its implied and stated needs. Performance efficiency the lowest computed mean of 3.90 with an adjectival rating of very satisfactory. The result perceive that some of the respondents did not seen how the developed system perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact. However, the computed mean still an acceptable since it resulted in a very satisfactory remarks. For the overall result, the system testing got an average mean of 4.37 with an adjectival rating of outstanding. The result implies that the developed system passed the ISO 25010 Product Quality and highly recommended to be used (Table 1).

The acceptance testing was tested by the extension coordinator and MIS officer of the CvSU-Carmona. An adapted evaluation form from ISO 25010 Quality in Use were used for this testing to identify if the developed system were acceptable and ready to be implemented.

The evaluation form was composed of five criteria namely: effectiveness, efficiency, satisfaction, freedom from risk, and context coverage.

Table 2. Overall result of the acceptance testing

CRITERION	MEAN (N=63)	ADJECTIVAL RATING
1. Effectiveness	4.58	Outstanding
2. Efficiency	4.50	Outstanding
3. Satisfaction	4.50	Outstanding
4. Freedom from risk	5.00	Outstanding
5. Context coverage	5.00	Outstanding
AVERAGE	**4.71**	**OUTSTANDING**

For the overall result of the acceptance testing, the developed system got an average computed mean of 4.71 with an adjectival rating of outstanding. The result implies that the developed system meet all the standard and needed requirements. It also show that that the system was acceptable to the client and it was ready for deployment (Table 2).

CONCLUSION

Based on the conducted study entitled Data - Driven Community and Extension Services for Project Decisions with Analytics it was concluded that the developed system meet all the needed requirements such as recommendation of the adopted barangay; implementation the community needs assessment questionnaire in the developed system which can be accessed online; recommendation extension service through the use of decision tree algorithm; real time monitoring of every extension project; evaluation the extension project and instructor at the end of the training; providing a reports using descriptive analytics passing the system evaluation in terms of level of acceptability in accordance to ISO 25010 – Product Quality.

In addition, the developed system was acceptable to the intended users and it can perform all the functions based on its stated objectives.

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