KOMPUTASI: JURNAL ILMIAH ILMU KOMPUTER DAN MATEMATIKA
Vol. 21 (2) (2024), 65-76, p-ISSN: 693-7554, e-ISSN:2654-3990

Visualization of Guimaras State University Community Extension Services: Basis for Expansion

Adrian J. Forca[1*], Lita Karlitasari[2], Gustian Rama Putra[3]

[1] College of Science and Technology-Guimaras State University, Philippines

[2,3] Department of Computer Science, Faculty of Mathematics and Natural Science, Universitas Pakuan, Indonesia

Abstract

The Guimaras State University (GSU) Community Extension Services lacks tool to understand its extension services data in terms of its scope and even distribution to programs, projects and activities. Therefore, this study was conducted to visualize and inform results for expansion decisions regarding community services, training programs, and implemented programs per community cluster. Tableau Public software was utilized in this research to develop visualizations. A descriptive research component was also applied to assess the effectiveness for informing expansion strategies. Respondents in the study were evaluated the generated visualizations. The results showed that the visualizations were found to be effective in conveying information about the GSU Extension Services activities. Researchers concluded that effective visualizations can serve as a basis for GSU Extension Services to expand its present services and reach more communities and ultimately improving the quality of life.

Keywords: *Database Management System, Extension Services, Information, Visualization*

1. Introduction

Community Extension Services has been part of the mandate of Guimaras State University (GSU) as a Higher Education Institution. Its main purpose is to extend the people in the community the knowledge and skills through extension activities following with their needs to help in improving their daily lives. “Among State Universities and Colleges (SUCs) most extension programs provide opportunities for the target clientele to improve their standard of living and uplift the quality of life of the clientele.” **[1].**

At present, the institution had adopted 16 communities, 5,353 persons trained through its 9 Extension Services Program namely: Computer Literacy, Arts and Crafts Macrame Weaving, Financial Management Recipe Costing, Livelihood Skills Training Massage, Hospitality Skills Food Preparation and Food Processing, Crim Alert, Remedial Classes, Organic Farming, and Share Happiness. In the process of identifying the needs of the community around the institution, the basis can either be through the demand or as required by accreditation. This is supported by the study of Bidad and Campiseño that “extension programs are demand-driven and accreditation driven”.

As extension activities were conducted every year, data increases in terms of size thus “analyzing the vast volumes of data is becoming increasingly difficult. Information visualization can help to deal with the flood of information.” **[2].** Based on the definition, Visualization is the process of showing data into a graphical display. **[3].**

Visualization is defined as **[4]** the process of representing data graphically and interacting with these representations to gain insight into the data. Visualization is classified into three: Information

*Corresponding author. *E-mail address:* adrian.forca@gsu.edu.ph
Received: 22 June 2024, Accepted: 26 July 2024 and available online 31 July 2024
DOI: https://doi.org/10.33751/komputasi.v21i2.5260

Visualization, Data Visualization, and Scientific Visualization. The concern of Information Visualization is on the design, development, and application of computer-generated interactive graphical representations of information. This often implies that information visualization primarily deals with abstract, non-spatial data. For the focus of the Data Visualization, it for the use of tools to represent data in the form of charts, maps, tag clouds, animations or any graphical means that make content easier to understand. And for the last component, Scientific Visualization is used by Scientists to explore medical, biological, architectural and meteorological subjects. **[4]**.

This study made inspiration from the College President of Guimaras State university to implement the further expansion of its Community Extension Services to assist the adapted community to improve their quality of life. This study will assist the Extension Services Division in extending to the community its function that is appropriate for them. In the conduct of implementing the extension services to a community to be adopted by the institution, extension programs are based on two factors: The Extension Agenda of the Institution and the Needs Assessment Conducted. As such this study will be utilizing Tableau Public Desktop Software to simplify the raw data of the Community Extension Services of Guimaras State university. In the context of the software, this software will assist the study in visualizing the available data. In the context of the Administration and Extension Services Division, this study will provide a reliable and effective visualized information based on the available data from the extension services leading to adapt the community based on their needs and implement sustainable extension services to the whole province of Guimaras.

One of the key features of Tableau is its capacity to instant geocoding, Tableau automatically turns the location data and information, interactive maps with 16 levels of zoom—or use custom geocodes to map. Census-based population, income, and other standard demographic datasets are built-in. In the visual environment of Tableau, it allows the user to explore the world through data and share. Importing geographic data from R or GIS (or whatever other spatial files or custom geocode data), interactive, and shareable via Tableau Online, Tableau Public, and Tableau Server. **[5]**.

This study aims to process the community extension services data of Guimaras State university that will be the basis for the institution in expanding its extension services to the community. Specifically, this study aims to:

1. Visualize the Dataset using Tableau for the following:
    a. the present number of persons trained;
    b. the present number of communities adapted for extension services on the Island;
    c. areas in Guimaras where communities are not adapted by the institution;
    d. community extension services offered to the adapted community for extension services.
2. Process the information of community extension services in Visualization as the basis for the Extension Services Division to expand its services.
3. Evaluate the Effectiveness of the Visualized Data in terms of the following categories:
    a. Big-picture considerations
    b. Color
    c. Design Issues
    d. Text Formatting
    e. Interactivity
    f. Design for Mobile

This study will focus on the Community Extension Services Available Data of Guimaras State University. In the processing of the information in the Tableau Software, it will be limited to the available data of the Extension Services Division in the Island of Guimaras.

2. Review of Related Literature

2.1. Community Extension Services

Community Extension Services has been part of the mandate of Guimaras State university as a Higher Education Institution. Its main purpose is to extend the people in the community the knowledge and skills through extension activities following their needs to help in improving their daily lives.

"Among State Universities and Colleges (SUCs**)** most extension programs provide opportunities for the target clientele to improve their standard of living and uplift the quality of life of the clientele." **[1].**

2.2. Visualization Using Tableau

Visualization is one of the solutions to drive the Administration of Guimaras State university specifically the Extension Services to expand by visualization. According to **[6]** the mapping concepts of Visualization that mapping is not misleading that the map is appealing. Therefore, it is a factor that can lead to decision making for extension services expansion. Mapping Types supported by Tableau are Proportional Symbol Maps, Choropleth Maps, Point Distribution Maps, Heatmaps, Flow Maps, and Spider Maps.

The Proportional Symbol Maps is the mapping type used for showing quantitative data for individual locations. The Choropleth Maps also known filled maps. In this mapping type, the application is on showing the ratio. Another Mapping Type is Point distribution maps which are used to show the approximate locations and are looking for visual clusters of data. Heatmap is another mapping type supported by Tableau which is called density maps. This mapping type is used to show a trend for visual clusters of data. A Flow map is another mapping type that is used to connect path across a map and used to see where something went over time. The last mapping type is Spider map which is also called as the origin-destination map that is used to show an origin location and more destination locations interact. **[6].**

Showing the Quantitative Values in Tableau is possible with the use of the Proportional Symbol Maps that is used to show individual locations using one or two example values per location. In the visualization of the data set, a data source is needed that comprises two components, first is the Qualitative Values and the Latitude and Longitude coordinates or location names subject for recognition of Tableau. **[7]**.

2.3. Effective Visualization

According to **[8]**, Visualization is colorful and impressive, however, authors highlighted that the key to effective visualization is it uncovers the real business issues that need to be addressed. As they suggest, the following are the categories of effective data visualization: Big-picture considerations, Color, Design Issues, Text Formatting, Menus, Interactivity and Design for Mobile.

2.4. Synthesis

Among the visualization as defined in the Introduction of this paper, then Data Visualization is a suitable visualization approach based on its applicability. With the use of the Tableau, it supports visualization particularly the mapping. The appropriate mapping approach support by Tableau is the Proportional Symbols Map that deals with individual locations **[6]**. Thus, it can be used to visualize the community extension activities of the Guimaras State university to map its present situation that can be that basis for decision making of the administration specifically the extension services division to expand its extension services to reach more people to be trained and communities to be adapted. To evaluate the visualized data,

3. Methodology

3.1. Visualization Process

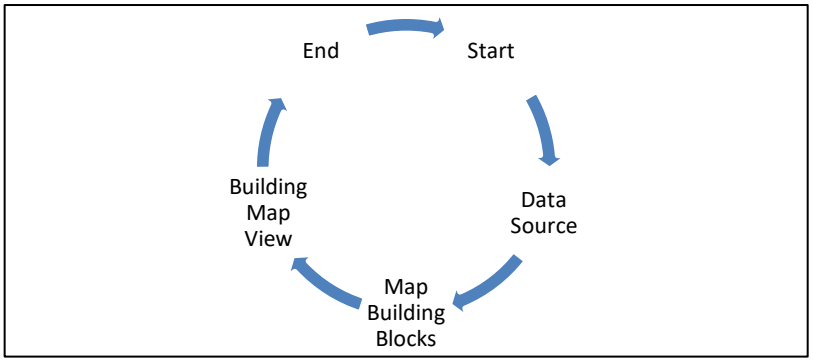

Figure 1. Visualization Process Model for Visualizing Community Extension Services using Tableau

Figure 1 describes the process of visualizing the community extension services using Tableu platform. It begins with the Start Phase by considering the appropriate data, this is then followed by the Data Sources where the data cleansing and uniformity are considered. The Next Phase is the Map Building Blocks wherein, the data are testing and loaded in the Tableau Platform. This also included appropriate data type were tagged so that the platform can interpret and visualize the data correctly. Once all Data Sources are ready and complies to the Map Building Blocks, it is loaded in the Platform and Viewed and The last Phase is the End where Exportation of Visualized Map were processed and prepared.

3.2. Getting Coordinates of the Location

The composition of the Tableau Data Source is The Qualitative Values of the extension services and the Latitude and Longitude coordinates or location names subject for recognition of the Tableau. Importation of an excel file with a file extension of .xlsx (dot xlsx) and .csv (dot csv) which is treated as Data Source in Tableau as a union of sheets.

Extension Services Dataset was needed in this study to establish that will serve as the input data to be processed in the Tableau. The Dataset comprises the following fields: Extension Services Name, Program, Location, Number of Communities Adapted, Number of Persons Trained per Location.

To establish understanding, below is the sample dataset that consists of columns for data source components.

Table 1. Sample Dataset of Guimaras State University Location of Extension Services

Code	Name	Barangay	Municipality	Province	Latitude	Longitude
AgsBH	Agsanayan Barangay Hall	Agsanayan	Buenavista	Guimaras	10.660955	122.653599
AguBH	Aguilar Barangay Hall	Aguilar	San Lorenzo	Guimaras	10.624546	122.658534
AlaBH	Alaguisoc Barangay Hall	Alaguisoc	Jordan	Guimaras	10.629314	122.599953
BJMB	BJMP Buenavista	San Isidro	Buenavista	Guimaras	10.672196	122.637777

Table 2. Sample Dataset of Guimaras State University Extension Program for Extension Services

Extension Program Code	Program Name	Course
CompLit	Computer Literacy	BSIT
ANCMV	Arts and Craft Macrame Weaving	BIT
FMRC	Financial Management Recipe Costing	BSBS
LSTM	Livelihood Skills Training Massage	BSBS

Table 3. Sample Dataset of Guimaras State University Location of Extension Services

Extension Program	Location Code	Number of Persons Trained	Number of Communities Adapted
CompLit	BDDC	100	150
CompLit	SucBH	100	50
CompLit	DEPG	500	20
ANCMV	TamBH	120	50
ANCMV	LapBH	100	70

3.3. Map Building Blocks

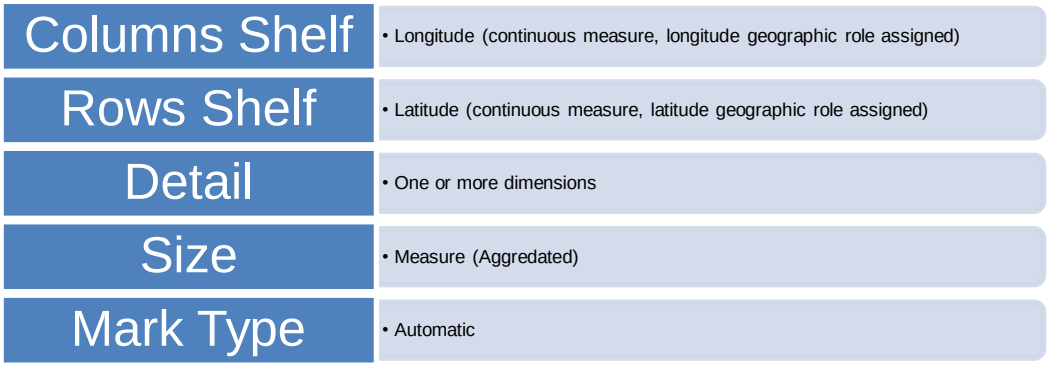

Figure 2. Building Blocks of Visualizing the Extension Services Dataset of Guimaras State University through Mapping

In the Map Building Blocks, the data are prepared to comply with mapping which includes five (5) blocks, in terms of Columns Shelf, longitude are considered such as continuous measure, longitude geographic role assigned. This is the same treatment for the second row which is rows shelf, but it considered the latitude component. Detail blocks involve the dimensions and sizes are aggregated measures and the last is the Mark Type that is set to be automatic.

3.4. Building the Map View

In building the map view, connection to data source was established followed by cleaning the data such as identification of georoles of Municipality to be equivalent to County georole. Latitude and Longitude were incorporated and clustering of available measures and dimensions. These measures and dimensions were then placed in the dashboard for Visualization Process specifically building of the Map View. To show the result of the visualization per research objective of this study, the researcher considered the Creation of Calculated fields and integrated into the visualization and was able to meet the research objectives. Finally, map views were saved and exported into an image file and publish in Tableau Public.

3.5. Research Design

The research methodology used in this study was the developmental evaluation of descriptive research. It applied the developmental research since this study involves creating visualized data that could be of use by the Guimaras State university Extension Services Division for the expansion of its Extension Services. Descriptive research was used for evaluation by the extension services personnel, extensionists and internal and external IT Experts using the Self-Made Validated Questionnaire.

3.6. Evaluation

The evaluation of the Visualized Map was conducted using the Self-Made Validated Survey Questionnaire wherein the evaluators or respondents rated the Visualized Map utilizing the Self-Made Questionnaire based on the Related Literatures Reviewed in this study.

3.7. Respondents of the Study

The respondents of the study were the Extension Services Personnel and Extensionists of the Guimaras State university on three campuses: Salvador, Mosqueda, and Baterna Campus.

3.8. Research Instrument

A Researcher Made Instrument comprises two (2) parts that were used in determining the reliability of visualized data specifically Visualized Map. Part I. of the research instrument includes the Profile of the Respondents in terms of Classification like IT Expert, Extensionist and Extension Services Personnel.

Part II of the research instrument included the evaluation of the visualization to determine its effectiveness. Evaluation of Visualization is categorized into seven (7) categories namely: Big-picture considerations, Color, Design issues, Text Formatting, Menus, Interactivity, and Design for Mobile.

3.9. Data Gathering Procedures

The Visualized Data Specifically Mapping of Community Extension Services was Visualized in Guimaras State university based on the Data Source that was collected in the Extension Services Division and evaluated based on the objectives of the study and evaluated by 20 respondents as identified.

The visualized data on the community extension services was evaluated using the Self-Made Validated questionnaire that comprises the seven (7) categories namely: Big-picture considerations, Color, Design issues, Text Formatting, Menus, Interactivity, and Design for Mobile.

The Evaluation Criteria used was the Likert Scale [9] which is a five-point scale with 5 as the highest and 1 as the lowest was used in rating the reliability of the visualized information.

The following is the mean scoring scale and its interpretation for effectiveness:

Table 4. Mean Score and Verbal Interpretation

Mean Score	Verbal Interpretation
4.21-5.00	Very High
3.41-4.20	High
2.61-3.40	Moderate
1.81-2.60	Low
1.00-1.80	Very Low

3.10. Data Analysis Procedures

To determine the result of the evaluation of the visualized information, an evaluation rating was encoded using the Spreadsheet program. Mean was used in computing and measuring the effectiveness of the visualized information.

Mean was used in determining the distribution of the respondents in terms of their profile classification and the evaluation of the visualized information.

4. Results and Discussion

This section provides the presentation, analysis, and interpretation of results of the study Visualization of Guimaras State Collee Community Extension Services: Basis for Expansion that addresses the objectives defined herein.

For Objective 1. Figures shown below are the visualization based on the Dataset of Community Extension Services of Guimaras State University.

Figure 3 shows the visualization of Dataset for the Number of Persons Trained clustered and mapped per Municipality.

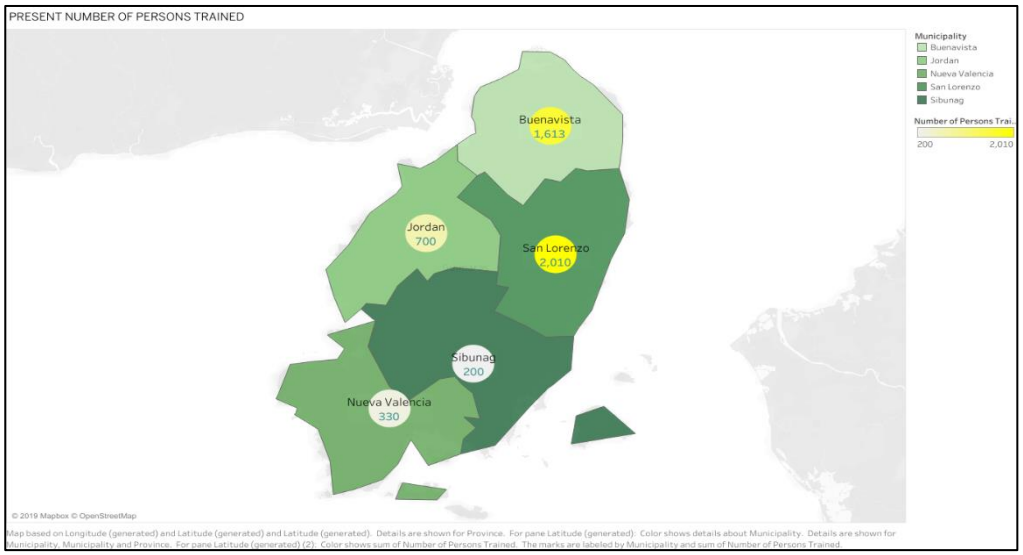

Figure 3. The present number of persons trained

4.1. Description of "NUMBER OF PERSONS TRAINED"

Map-based on Longitude (generated) and Latitude (generated) and Latitude (generated). Details are shown for Municipality and Province. For pane Latitude (generated): Color shows details about Municipality. The marks are labeled by Municipality. For pane Latitude (generated) (2): Color shows the sum of Number of Persons Trained. The marks are labeled by the sum of the Number of Persons Trained.

The Visualization shows that GSU Community Extension Services have reached and trained the five municipalities in the province of Guimaras. Buenavista is trained with 1,613 persons, San Lorenzo was trained with 2,010 persons. Also, the visualization shows that 700 persons were trained from Jordan, 200 persons from Sibunag and 330 persons came from Nueva Valencia. This implies that San Lorenzo was the Municipality with the highest persons trained while Sibunag was the least from the five municipalities being trained under the GSU Community Extension Services.

Figure 4 shows the visualization of the present number of communities adapted for extension services on the Island.

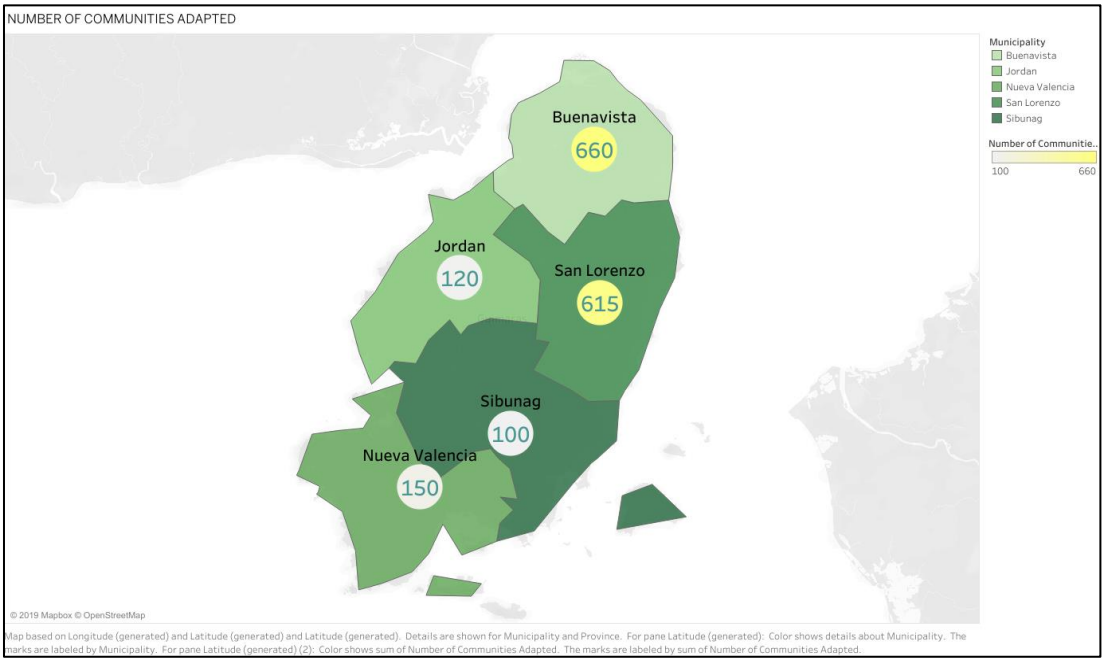

Figure 4. The present number of communities adapted for extension services on the Island.

4.2. Description of "NUMBER OF COMMUNITIES ADAPTED"

Map-based on Longitude (generated) and Latitude (generated) and Latitude (generated). Details are shown for Municipality and Province. For pane Latitude (generated): Color shows details about Municipality. The marks are labeled by Municipality. For pane Latitude (generated) (2): Color shows the sum of Number of Communities Adapted. The marks are labeled by the sum of the Number of Communities Adapted.

The Visualization above shows that 660 Communities coming from Buenavista were adapted by GSU Community Extension Services, 615 of communities adapted were from San Lorenzo, 120 communities from Jordan, 100 from Sibunag and 150 communities from Nueva Valencia. This implies that the most with the number of communities adapted were Buenavista and the least number of communities adapted was Sibunag.

Figure 5 shows the visualization of Adapted Areas against the Not Adapted Areas for Community Extension Services of Guimaras State University.

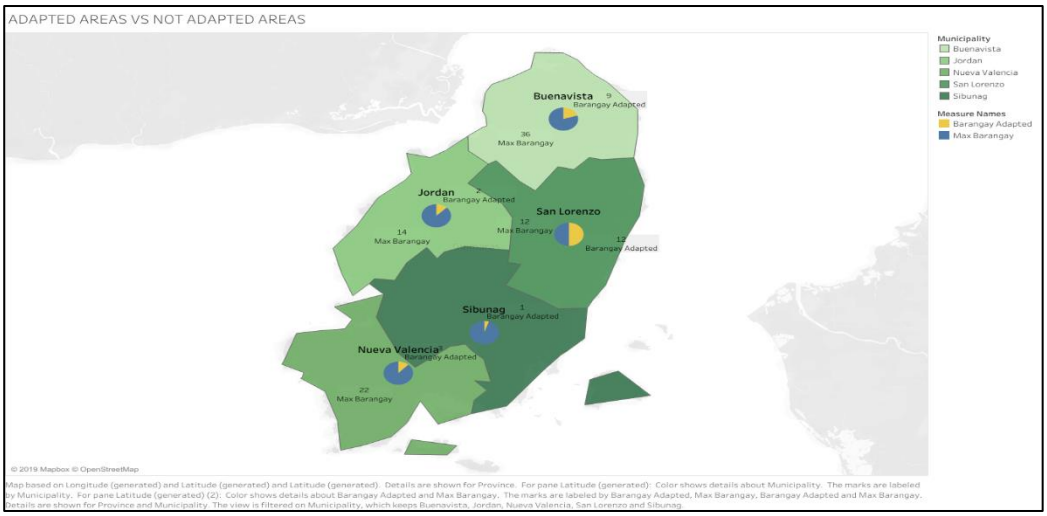

Figure 5. areas in Guimaras where communities are not adapted by the institution

4.3. Description of "AREAS ADAPTED"

Map-based on Longitude (generated) and Latitude (generated) and Latitude (generated). Details are shown for Province. For pane Latitude (generated): Color shows details about Municipality. The marks are labeled by Municipality. For pane Latitude (generated) (2): Color shows details about Barangay Adapted and Max Barangay. The marks are labeled by Barangay Adapted, Max Barangay, Barangay Adapted and Max Barangay. Details are shown for Province and Municipality. The view is filtered on Municipality, which keeps Buenavista, Jordan, Nueva Valencia, San Lorenzo, and Sibunag.

Visualization shows that adapted 9 out of 36 Barangays of Buenavista were adapted by GSU Community Services, 12 out of 12 Barangays from San Lorenzo were adapted, 2 out of 14 Barangays adapted from Jordan. Also, 1 out of 19 Barangays of Sibunag was adapted by GSU Community Extension Services and 3 out of 22 Barangays of Nueva Valencia was adapted for GSU Community Extension Services. This implies that the greatest number of adapted communities was in San Lorenzo while the least is from the municipality of Sibunag.

Figure 6 shows the visualization of the dataset for the Number of Programs per Municipality.

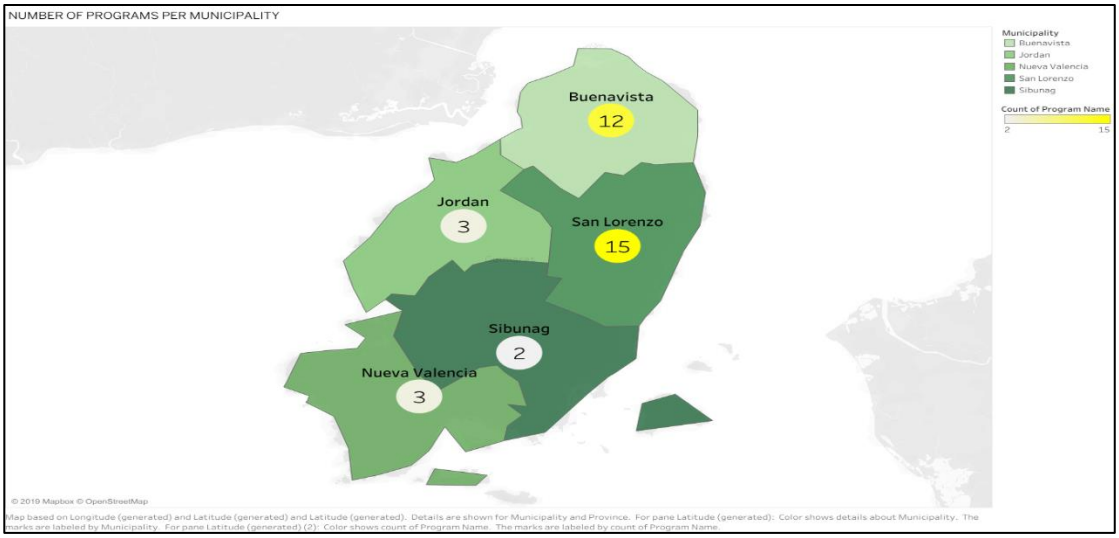

Figure 6. community extension services offered to the adapted community for extension services.

4.4. Description of "NUMBER OF PROGRAMS PER MUNICIPALITY"

Map-based on Longitude (generated) and Latitude (generated) and Latitude (generated). Details are shown for Municipality and Province. For pane Latitude (generated): Color shows details about Municipality. The marks are labeled by Municipality. For pane Latitude (generated) (2): Color shows count of Program Name. The marks are labeled by the count of Program Name.

The Visualization above shows the number of community extension services programs per Municipality. The Community in Buenavista has been extended with 12 Extension Programs, 15 for the community of San Lorenzo, 3 programs for Jordan, 2 for the municipality of Sibunag and 3 extension programs for Nueva Valencia. This implies that San Lorenzo has been extended with the greatest number of programs and Sibunag with the least number of programs has been extended.

To answer Objective 2, the basis that datasets were processes are presented in Figures 3,4,5, and 6 respectively. Figure 3 shows the present number of persons trained where results implied that San Lorenzo was the Municipality with the highest persons trained while Sibunag was the least from the five municipalities being trained under the GSU Community Extension Services. Figure 4 shows the present number of communities adapted for extension services on the Island. Result for Figure 4 implies that that the most with the number of communities adapted were Buenavista and the least number of communities adapted was Sibunag. Figure 5 shows the visualization of Adapted Areas against the Not Adapted Areas for Community Extension Services of Guimaras State university which implies that the greatest number of adapted communities was in San Lorenzo while the least is from the municipality of Sibunag. Figure 6 shows community extension services offered to the adapted community for extension services which imply that San Lorenzo has been extended with the greatest number of programs and Sibunag with the least number of programs has been extended. Based on the available data per visualization results in the number of persons trained, a number of communities adapted, comparison of adapted vs not adapted community and number of programs per municipality, information was processed that can be the basis for the Guimaras State university Community Extension Services to expand its present service. Per visualization results, Sibunag is the least from the criteria set in the objectives of this study.

To answer Objective 3 of the study, researcher-made questionnaire that was used to determine the effectiveness of the study based on the literatures cited in this study.

Table 4 shows the results of the GSU Extensionists, internal and external IT Experts feedback on the visualization of the GSU Community Extension Services Dataset.

Table 4. shows the respondents' feedback on the effectiveness of the Visualization of Guimaras State university Community Extension Services in terms of the seven effectiveness categories.

Category	Mean	Verbal Interpretation
Big-picture considerations		
Simplicity	4.25	Very High
Data overload	4.30	Very High
Chart Choice	4.20	High
Metadata	4.35	Very High
Sub Mean	*4.28*	*Very High*
Color		
Choice	4.45	Very High
Consistency	4.55	Very High
Sub Mean	*4.50*	*Very High*
Design Issues		
White Space	4.30	Very High
Layout	4.40	Very High
Table Use	4.60	Very High
Icons	4.15	High
Duplication	4.15	High
Clear Sections	4.60	Very High
Personalization	4.60	Very High
Sub Mean	*4.34*	*Very High*
Text Formatting		

Size	4.55	Very High
Labels	4.32	Very High
Consistency	4.45	Very High
Cut-off text	4.35	Very High
Sub Mean	*4.42*	*Very High*
Menus		
Choices and Placement	4.40	Very High
Filtering	4.45	Very High
Location of Filters	4.45	Very High
Sub Mean	*4.43*	*Very High*
Interactivity		
What if	4.35	Very High
Location Intelligence	4.40	Very High
Sub Mean	*4.38*	*Very High*
Design for Mobile		
Text	4.47	Very High
Images	4.35	Very High
Sub Mean	*4.41*	*Very High*
Grand Mean	4.39	Very High

The table shows that for the Big-picture considerations category, it has a Sub Mean of 4. 28 which can be interpreted as “Very High”. The Simplicity subcategory yielded a mean of 4.25 which can be interpreted as “Very High”, Data overload yielded a mean of 4.39 which can be interpreted as “Very High”, Chart Choice yielded as mean score of 4.20 which can be interpreted as “High” and Metadata subcategory yielded a mean of 4.35 which can be interpreted as “Very High”. For the first category, Visualization has considered the Big-picture considerations as such that it is simply, data are not overloaded, the appropriate chart was chosen, and metadata is present and relevant.

The second category is Color which yielded a mean of 4.50 that can be interpreted as “Very High”. Its subcategories: Choice yielded a mean score of 4.45 which can be interpreted as “Very High” and Consistency with a mean of 4.55 which can be interpreted as “Very High”. This implies that the Color Category of Visualization chosen with consistent to the worksheet.

The third category is Design Issues yielded a means score of 4.34 which can be interpreted as “Very High”. This category consists of seven (7) subcategories: the White Space yielded a mean score of 4.30 which can be interpreted as “Very High”, Layout yielded a mean of 4.4 which can be interpreted as “Very High”, Table Use yielded a mean of 4.60 which can be interpreted as “Very High”, Icons yielded a mean score of 4.15 which can be interpreted as “High”, duplication yielded a mean of 4.15 which can be interpreted as “High”, Clear Sections yielded a mean score of 4.60 which can be interpreted as “Very High”, Personalization yielded a mean score of 4.60 which can be interpreted as “Very High”. This implies that the Design issues were considered in the visualization such as white space, layout, table use, icons, duplication, clear sections, and personalization.

The fourth category is Text formatting which yielded a mean score of 4.42 which can be interpreted as “Very High”. Its subcategories are size yielded a mean score of 4.55 which can be interpreted as “Very High”, Labels yielded a mean of 4.32 which can be interpreted as “Very High”, Consistency that yielded a mean score of 4.45 which can be interpreted as “Very High”, Cut-off text that yielded a mean score of 4.35 which can be interpreted as “Very High”. This implies that the Text formatting was evaluated in the visualization in which size, labels, consistency, and cut-off text are considered and applied in the visualization of the dataset.

The fifth category is Menus that yielded a mean score of 4.43 which can be interpreted as “Very High”. Subcategories are choices and placement yielded a mean score of 4.40 which can be interpreted as “Very High”, Filtering yielded a mean score of 4.45 which can be interpreted as “Very High”, and Location of Filters yielded a mean score of 4.45 which can be interpreted as “Very High”. This result implies that the menus have appropriate choices and placement, filtering and location of filters are applied and relevant to the visualization.

The sixth category is Interactivity that yielded a mean score of 4.38 which can be interpreted as “Very High”. Subcategories under it are what-if which yielded a mean score of 4.35 which can be interpreted as “Very High” and Location Intelligence yielded a means core of 4.40 which can be interpreted as “Very High”. This implies that the interactivity component of the visualization is considered where what-if questions are addressed by visualization and was able to intelligently locate

the location of the Extension Services.

The Seventh category is Design for Mobile which yielded a mean score of 4.41 which can be interpreted as “Very High”. Subcategories under it are text which yielded a mean score of 4.47 that can be interpreted as “Very High” and Images has a mean score of 4.35 which can be interpreted as “Very High”. This result implies that the design for mobile is integrated into the visualization and was able to present the text and images in the context of mobile.

Evaluating its effectiveness, the result showed that the evaluated visualization yielded a gran mean of 4.39 which can be interpreted as “Very High”. Respondents of the study agreed that visualization is effective as it considers the different categories of visualization such as Big-picture, color, design issues, text formatting, menus, interactivity and design for mobile.

5. Conclusion

Based on the objectives considered, the following conclusions were derived:

Extensionists who evaluated the Visualized Dataset using Tableau agreed that it was able to visualize the present number of persons trained, visualize the present number of communities adapted for extension services in the Island, visualize the areas in Guimaras where communities are not adapted by the institution and visualize the community extension services offered to the adapted community for extension services.

Tableau was able to Process the information of community extension services into visualization as the basis for the Extension Services Division to expand its services based on objectives of the study.

Visualization has Evaluated its Effectiveness of the Visualized Data in terms of these categories Big-picture considerations, Color, Design Issues, Text Formatting, Interactivity and Design for Mobile. As an implication, the visualization dataset considered a big-picture, color, addressed design issues, text formatting, it has interactivity and design for mobile thus, it is effective.

References

[1] C. Bidad and E. Campiseño, "Community Extension Services of SUCs in Region IX: Basis for Sustainable Community Enhancement Program," *E-International Scientific Journal*, vol. 2, no. 3, pp. 235-243, 2010.

[2] D. A. Keim, "Information Visualization and Visual Data Mining," *IEEE Transactions on Visualization and Computer Graphics*, vol. 8, no. 1, pp. 1-8, 2002.

[3] UK Essays, "The Advantages of Information Visualization Information Technology Essay," 12 May 2016. [Online]. Available: https://www.ukessays.com/essays/information-technology/the-advantages-of-information-visualization-information-technology-essay.php?vref=1.

[4] Library Curtin University, "Visualisation and Interactive Media: What is Visualisation?," 20 August 2019. [Online]. Available: https://libguides.library.curtin.edu.au/c.php?g=388681&p=2688784.

[5] Tableau, "Maps," [Online]. Available: https://www.tableau.com/solutions/maps.

[6] Tablaeu, "Mapping Concepts in Tableau," 2019. [Online]. Available: https://help.tableau.com/current/pro/desktop/en-gb/maps_build.htm.

[7] Tableau, "Create Maps that Show Quantitative Values in Tableau," 2019. [Online]. Available: https://help.tableau.com/current/pro/desktop/en-gb/maps_howto_symbol.htm.

[8] M. Yuk and S. Diamond, "Evaluating Data Visualizations," [Online]. Available: https://www.dummies.com/programming/big-data/big-data-visualization/evaluating-data-visualizations/.

[9] L. Liedke, "Beginner's Guide: What is a Likert Scale and How to Use It?," 7 October 2019. [Online]. Available: https://wpforms.com/beginners-guide-what-is-a-likert-scale-and-how-to-use-it/.

[10] N. Marrero, "Visualization Metrics: An Overview," *Visualization*, 2007.

[11] B. Zhu and H. Chen, "Information Visualization for Decision Support," *Handbook on Decision Support Systems 2.*, 2008.

[12] V. Gonzalez and A. Kobsa, "Benefits of information visualization systems for administrative data analysts," in *Proceedings on Seventh International Conference on Information Visualization, 2003. IV 2003.*, London, UK, 2003.