

Analyzing Community Needs in the City of Urdaneta Using Text Analytics

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Abstract: - Community needs assessments are one of the functions of city managers/administrators to find ways to collect accurate data/information that represent the most important needs of a community. In such assessments, a commitment to community participation is very important to determine current situations and identify issues for action, establishing the essential foundation for vital planning. That's where a community needs assessment comes in; it can be used to inform and improve any community development initiative. The main objective of this study is to conduct a needs assessment focusing primarily on identifying community needs in the City of Urdaneta. This study utilized a mixed method whereby data were collected and analyzed quantitatively and qualitatively to analyze the community needs of the City of Urdaneta. The quantitative data were used to describe the population that resides in the city, and they were the respondents to the study. This method was utilized to obtain a direct picture of the services that the City of Urdaneta is providing to its stakeholders and provide a better understanding and explanation of their needs. The result reveals that respondents were not satisfied/dissatisfied with the drainage management provided by the city, especially when the rainy season comes, which resulted in flooded streets around the city. Based on the flood-prone map, some barangays were situated in flood-prone areas, worsening the flooding problem. The result also shows that the city should manage people with mental health and animals roaming around the city as they may pose a danger to the public. However, the respondent is satisfied with the services provided by the city based on the comments/opinions based on the word/ word patterns such as "improve services", "good services" and "excellence services". It is suggested that the city government should improve the city drainage system to eradicate or minimize flooding during rainy seasons, provide better mental services to stakeholders, and provide services that will control stray animals that roam around the city since they could endanger the public.

Key-Words: - Community Needs, Text Analytics, Voyants, Mixed Method Analysis

Received: June 9, 2022. Revised: March 15, 2023. Accepted: April 13, 2023. Published: May 9, 2023.

1 Introduction

Communities are typically characterized by a geographical area; however, they can also be based on shared interests or characteristics such as religion, race, age, or occupation. People within a community come from different backgrounds and have distinct cultures, customs, and values, [1], [2]. There is a need to utilize a wide range of ideas, tools, and wisdom to assess the community's most significant needs and create interventions / creative ideas to improve people's lives. Before conducting a community needs assessment, you should understand the different cultural groups within a community. You should also know how to work together with them to solve community issues. Furthermore, a community needs assessment provides community leaders with a snapshot of local policy, systems, and environmental change

strategies. It assists them in identifying areas for improvement. With this data, communities can map out a course for health improvement, infrastructure development, and other improvements. This is done by creating strategies to make positive and sustainable changes in their communities, [3].

The Community Toolbox, [4], group states that "in most needs assessment surveys, need means something that specifically relates to a particular group or community." It's not usually a universal need, such as food or affection. But it's more than an individual need, as in, "I need an updated couch for the living room," or "I really need a vacation." Those may truly be needs, but they are not generally the types of needs assessed in needs assessment surveys, [5]. Perceptions from the community can help administrators and policymakers gain new insights, as well as provide strong commitment and

support from the communities themselves, [6]. Conducting an assessment, particularly in a community, is imperative for many reasons. As a first step, the community's sustainability is determined. The second is on the residents and local officials becoming alert on the impact of a proposed development on the community's social and economic well-being. The third is about avoiding inequities among community groups. Assessment encourages positive impacts of the proposed development, [7].

The City of Urdaneta is a second-class city founded on January 8, 1858, and acquired city-hold status under Republic Act 8480, dated January 10, 1998. It is located in the central part of Pangasinan province with 34 barangays, and based on a recent survey, its population is about 132,940. The city has an urbanization level of 53.76 percent and has been identified as a growth pole by the Provincial Government of Pangasinan. Agriculture is still the major source of income and livelihood for the people, [8]. Urdaneta City is a center of agri-industrial development and educational advancement. It is a city with viable solid waste management, an admirable traffic system, sustainable social services, and equitable opportunity. It is also a community of God-loving, well-disciplined, self-reliant, and development-oriented people. It shall be an urban growth center and a model of effective governance in Northern Luzon. To be able to attain its vision, the mission of Urdaneta City is to provide adequate infrastructure facilities and basic social services to promote a healthy and safe environment, to practice good governance and dynamic leadership in ensuring political stability and economic self-sufficiency, and to promote people's participation in policy formulation and project implementation, [9], [10].

To meet this mission, periodic assessments should be performed before taking action. These assessments will be used to determine current situations and identify issues for action. By conducting needs assessments, government administrators and policymakers will be able to identify areas for improvement and transform them into measurable action items. They will also be able to formulate a specific community strategy to address each key need. Furthermore, a community needs assessment is a systematic review of the existing programs in the community to determine if there are any gaps, [11]. The results of the needs assessment can identify where needs are not being met and may help the city design an appropriate program/intervention. That's where a community needs assessment comes in; it can inform and

improve any community development initiative. A vital planning process begins with an assessment of needs. Therefore, continued care to identify the needs of the community is given priority to ensure higher citizen satisfaction with public service delivery.

The main objective of this study is to conduct a needs assessment focusing primarily on identifying the community needs in the City of Urdaneta. The study aims to answer the following:

1. Determine the level of the delivery of social services in the City of Urdaneta;
2. Determine the opinion/sentiment of stakeholders in the City of Urdaneta on the delivery of social services in the City of Urdaneta;

2 Methods

2.1 Research Design

This study utilized a mixed method whereby data were collected and analyzed quantitatively and qualitatively to analyze the community needs of the City of Urdaneta. The proponents used survey questionnaires as a primary tool in gathering the needed data/information. The quantitative data were used to describe the population that resides in the city, and they were the respondents to the study. This method was utilized in order to obtain a direct picture of the services that the City of Urdaneta is providing to its stakeholders and provide a better understanding and explanation of their needs.

2.2 Instrument

The survey instrument was adopted and revised in line with the objectives of this study. These include gathering the needed information to assess community needs, and pilot testing with some respondents who are not residents of Urdaneta City. After that, another revision was made to validate the instrument, and questions that were not clear or directed were deleted or recast. The questionnaire was converted into a Google form and distributed online.

The questionnaire is composed of three sections. The first part focuses on the profiles of respondents. The second part of the survey questionnaire was on the city's services. And the last part is an open question, focusing on their opinion regarding the city's services.

2.3 Respondents of the Study

Families of PSU Urdaneta students who live in the City of Urdaneta were chosen as respondents. The list of students residing in Urdaneta City was taken from the student services offices of the PSU-Urdaneta City Campus. Then probability sampling was utilized, specifically the systematic sampling technique, wherein the proponents used every n dataset of members of the population.

2.4 Data Preparation and Processing

2.4.1 Data Cleaning

The first step is to clean the collected data. The study removes tweets that appeared more than once and the comments/opinions that contain no value (no answer / n/a, no). Only those comments/opinions that contain important comments/opinions were kept and saved for the next step. Three annotators decide whether comments/opinions have no value.

2.4.2 Stemming Process

The second step is to distill the comments or opinions down to their basic form. An automated stemmer was employed, utilizing a PHP application and a dictionary of root words stored in a database. It replaced words based on replacement rules. This stemming process is very significant so that the different forms of the same word are reduced to a common form. The stemming process is a feature supported by indexing and search. This is a vital part of text mining applications, natural language processing (NLP) systems, and information retrieval (IR) systems.

2.4.3 Stop Words Removal

The following step is to remove all words matching the stopwords from the given comments and opinions dataset. An English stop word translated into Filipino words was used to remove stop words in the comments or opinions. Stop words were stored in a database and accessed using the PHP stop word removal application.

2.4.4 Case Transformation

Under the data Voyant, the first step was transforming cases. This operator transforms the case of letters (i.e., lower case or upper case). The study transforms all letters in the data into lowercase for the sake of convenience. After case transformation, tokenization was employed. This operator splits the comments and opinions into a series of tokens. Several options can be implied in splitting the comments and opinions, however, the

proponent selected the default setting, which is the non-letters.

2.4.5 N-gram

The last step is to utilize the n-gram to learn the meaning of words and their neighbors by connecting a sequence of n-words from a given sequence of comments or opinions.

2.5 Pattern Recognition Process

The schema used to determine the frequency of the words was TF-IDF, or Term Frequency – Inverse Document Frequency. This schema was used as a numeric measure to show the importance of words describing the services provided by the city. This was done in the collection of comments/ opinions in the dataset. The method used to determine the dominant words and patterns is the frequency of the appearance of words in the comments/opinions weighted toward greater importance. The TF-IDF value increases proportionally to the number of times a word appears in the comments or opinion, but is offset by the frequency of the word in the corpus, which helps to control for the fact that some words are generally more common than others. Voyant is a free, online text-analysis program. Its tools allow you to generate a word cloud of the most frequent words, generate graphs of word frequency across the corpus, and compare multiple documents, [12].

2.6 Tools Use for Text Analytics

2.6.1 Trends

Trends divides texts into ten equal segments to demonstrate patterns of word use. Trends is a visualization that represents the frequencies of terms across documents in a corpus or across segments in a document, depending on the mode. Each series in the graph is colored according to the word it represents. At the top of the graph, a legend displays which words are associated with which colors. You can click on words in the legend to toggle their visibility. Hovering over any point in the graph causes a callout box to appear with information about the point. This includes the word, the frequency (raw or relative depending on mode), and the document or document segment, [13].



Cirrus presents a cloud that displays the top 25–500 words, where higher frequency words have larger fonts in the center. The word cloud positions the words such that the terms that occur most frequently are positioned centrally and are sized the largest. As the algorithm proceeds through the list and continues to attempt to draw the words as close as possible to the center of the visualization, it will also include small words within spaces left by larger words that do not fit together snugly. It's imperative to understand that the color of words and their absolute position are not significant (if you resize the window or reload the page, the words may appear in a different location), [13].

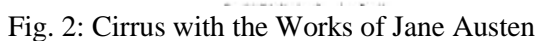
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Fig. 3: Bubbles with the Works of Jane Austen

For the profile of the respondents, descriptive measures like basic counting, frequency, and percentages were utilized, and results were presented in tables and graphical forms (charts and graphs).

For opinions, ideas, and comments on the services provided by the city government, text analytics using association rules was utilized. Word frequency and relations among word patterns were presented and analyzed using graphics and the association of words using Voyant tools.

3 Results and Discussion

3.1 Profile of the Respondents

Table 1. Socio-demographics Profile of the Respondents

Profile	Sex	Percent
Male	254	49%
Female	266	51%
Total	520	100%
No. Of Year Living in the City of Urdaneta		
0-3 years	98	19%
4-6 years	21	4%
7-10 years	28	5%
11-15 years	14	3%
16-25 years	343	66%
Over 25 years	16	3%
Total	520	100%
Modes of Residents in the City of Urdaneta		
renting	365	70%
buying/own	155	30%
Total	520	100%
Educational Attainment		
Grade School	2	0%
Some High School	7	1%
High School Graduate	431	83%
Some College/Vocational	41	8%
Vocational School Graduate	5	1%
College Graduate	23	4%
Some Graduate School	6	1%
Graduate Degree	5	1%
Total	520	100%
Monthly Family Income		
Less than 10,000	352	68%
10,000 - 14,999	78	15%
15,000 - 24,999	40	8%
25,000 - 34,999	22	4%
35,000 - 49,000	3	1%
50,000 - 74,999	5	1%
75,000 - 99,000	17	3%
100,00 or more	3	1%
Total	520	100%
In what industry is the major wage earner in your family employed?		
Agriculture	132	25%
Construction	13	3%
Manufacturing	55	11%
Retail/Wholesale	19	4%
Transportation, Communications, and Public Utilities	33	6%
Finance, Insurance, Real State	14	3%
Government	77	15%

(Includes Education)		
Services (includes Retail)	53	10%
Retired	14	3%
Homemaker	31	6%
Student	79	15%
Mining	0	0%
Total	520	100%

The results of Table 1 reveal that almost all the respondents (68%) family income of less than P 10, 000.00 pesos per month. According to Philippine Statistics Authority (PSA), [14], a family of five estimated monthly costs of PhP 12,082, on average in the first semester of 2021. However, about 70% of the respondents rent their house/room as they stay in the city. This indicates that the majority of the residents in the city were below the poverty line, and they did not have their own houses. Some of the reasons that can be attributed to the low income of the respondents were the following, such as the majority of respondents stated they are high school graduates, laborers, and farmers. The result of the research [15], shows that farmers from the City of Urdaneta who are engaged in farming don't own tools and machines for cultivating their farmlands. Some are engaged in agriculture. The majority of the farmers served as tenants and leases as contracted by the landowners. The result of the study confirms that only a few responses indicated that they own their own home, income is below the poverty line, and college graduates. The results also reveal that the respondents were considered/to belong to "poor" families and were expecting more help/support/services from the city government. The result reveals that there is a need to provide public provision of basic social services, especially since the majority of the city's stakeholders were below the poverty line or "poor". Furthermore, the continued delivery of basic social services must be enhanced and implemented during this time to help the poor overcome the high private costs of utilizing basic public social services, like health services and other services.

3.2 Level of Delivery Services

Figure 4 reveals that the number one concern of the respondents is the drainage system of the city obtained a mean of 358.6 which is the lowest among all the services that the city provided to its stakeholders. The main reason for this result is that in when rainy seasons some parts of the city are prone to flooding. The result reveals that the city should improve drainage systems around the city to

minimize or eradicate flooding during rainy seasons. Respondents also rated mental health with a mean of 372.2 and animal control services obtained a 362 mean as an urgent concern/need that the city government should look into. These two services were not visible in the city wherein a lot of people with mental health problems and animals are roaming around the city proper. The figure also reveals that sidewalk and pedestrian safety, garbage collection, roads/ streets, library, and street lighting services obtained an excellent rating from the respondents. The result indicates that the city administration should focus on the improvement of the drainage system of the city to minimize flooding. In addition, the respondent's concern is the facilities such as recreational facilities and parks, more streetlights, and animal control.

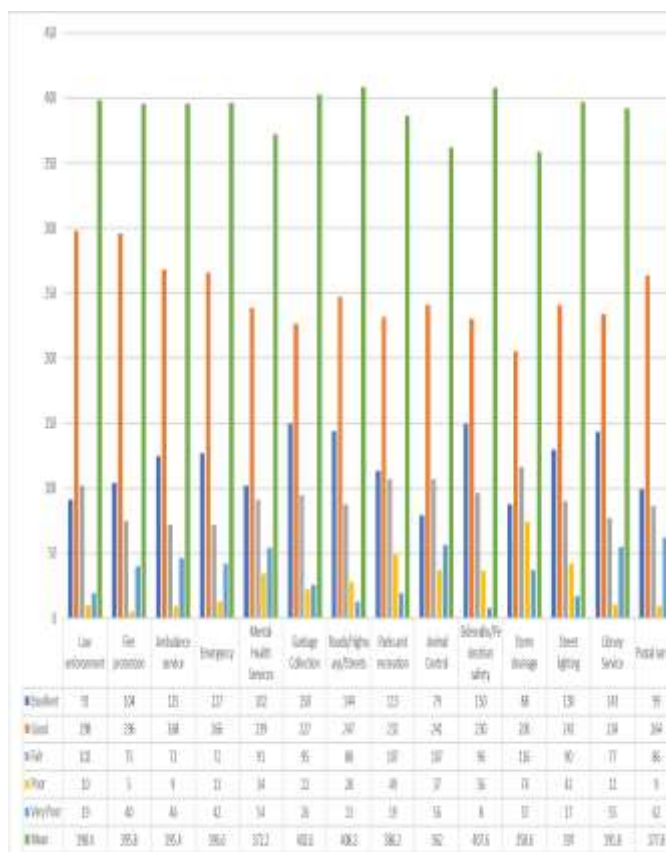


Fig. 4: Rate of General Services in the City of Urdaneta as Perceived by the Community

3.3 Sentiment of the Community of the Delivery of Social Services by the City of Urdaneta



Fig. 5: Word Cloud that describes the services provided by the City

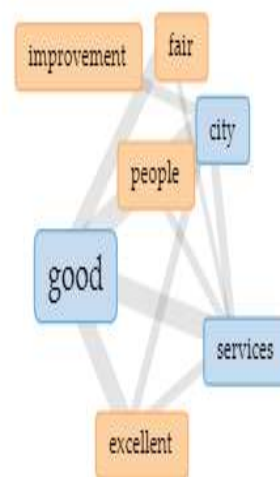


Fig. 6: Connection of Words to describe the Services provided by the City



Fig. 7: High-Frequency Terms used to describe the City's Services

Figures 5, 6, 7, and 8 revealed that the majority of the words employed by the respondents to describe the services offered by the city were “excellent”, “good”, and “fair”. Furthermore, a connection of words indicates that the city has good and excellent services and there are also improvements in the services offered by the city. Likewise, in terms of the frequency of words used to describe the services delivered by the city, the word “good” emerged as the most frequent word, followed by “excellent”. The results reveal that the city provides “good” and “excellent” services.

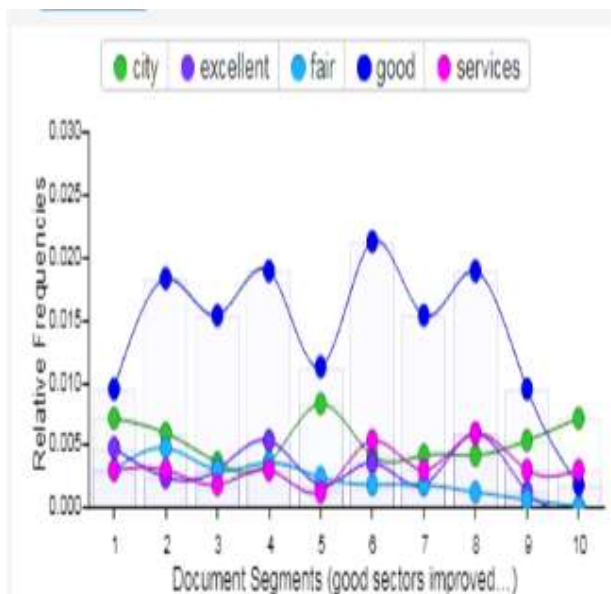


Fig. 8: Sentiments of Respondents on the services provided by the city

The figures show the sentiment of the respondents on the services provided by the city. Their sentiments were considered positive because of the

word/word patterns like “good services”, “improve services”, “excellent services” and “fair services”. These were the common words dominating the data set of comments/opinions/ideas of the respondents that reside in the city of Urdaneta. This reveals in the results that the social services provided by the City of Urdaneta are considered “good”.

4 Conclusion

This study aimed to gather and analyzed to better understand how city services are being provided by the City of Urdaneta to its stakeholders. Furthermore, determine the level of delivery of these services by the City of Urdaneta and determine the degree of satisfaction utilizing sentiment analysis through word/word patterns association. The result reveals that respondents were not satisfied/dissatisfied with the drainage management or flood control services provided by the city, especially when the rainy season comes, which resulted in flooded streets around the city based on the flood-prone map some barangays were situated into a flood-prone area which worsening the problem of flooding. The results also show that the city should manage people with mental health and animals that roam around the city as they may poise a danger to the public. However, the respondent is satisfied with the services provided by the city based on the comments/opinions based on the word/ word patterns such as “improve services”, “good services” and “excellence services”. It is suggested that the city government should improve the city drainage system to eradicate or minimize flooding during rainy seasons, provide better mental services to stakeholders, and provide services that will control stray animals that roam around the city since they could endanger the public.

Analyzing and evaluating the services provided by as certain institution can be done using qualitative data and analyzed using text analytics. This is a very effective way to analyze and evaluate products and services because it is a direct opinion and feeling coming from respondents.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

Christine Lourrine S. Tablatin, Michael E. Acosta and Frederick F. Patacsil, collaboratively conducted the research.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

No funding was received for conducting this study.

Conflict of Interest

The authors have no conflict of interest to declare.

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