A Community-Based Assessment on Public Transportation Needs of Sitio Remedios (*Dakung*), Sasmuan, Pampanga

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Abstract: - A needs assessment survey is an important tool for investigating and identifying problems in a particular location in order that they may be addressed correctly without wasting both time and resources. Analyzing community problems is a process of examining a problem or issue extensively before acting on a solution. It starts with identifying the underlying causes of a problem, then continues to propose possible solutions and a strategy for change. Accordingly, the researchers aimed to assess Sitio Remedios (Dakung), Sasmuan, Pampanga, to understand how residents get to their destinations and the transportation issues, they frequently face daily to suggest solutions and improvements that could greatly benefit and cater the needs of the community. The research methods utilized are a quantitative, descriptive approach wherein survey questionnaires were administered among 358 individuals for the household interview survey, 20 respondents for the roadside interview, and a 12-hour traffic count for the screen line survey. The findings provided the characteristics of a person's travel, current travel patterns and routines, transportation modes, fare cost, and the kind of improvements (infrastructures and or services) that respondents believe will benefit the community most significantly. The volume capacity ratio (VCR) of the San Pedro bridge was calculated and evaluated to assess traffic volume and determine whether it needed to be modified or enhanced. Using the results of the assessments, a conclusion has been made confirming that Sitio Remedios has numerous transportation issues that negatively impact people's mobility. The researchers' recommendations are based on the study's findings and conclusions from the community-based evaluation, which include a prospective bridge project, upgrading existing road networks, and improving ports and harbors.

Key Words: — *travel patterns, screen line survey, traffic count, volume capacity ratio (VCR).*

I. INTRODUCTION

Humans rely heavily on transportation in their everyday lives. It is utilized to get access to health care, education,

employment, recreational activities, and other essential public services. This importance of transportation is demonstrated by how individuals, corporations, and governments rely on it to obtain resources and sustain the economy. Given this massive importance of transportation, having transportation difficulties may have a detrimental influence on almost every aspect of a person's life as well as the entire community.

A society cannot operate at its best without well-regulated transportation-related system. It is essential for overall productivity and sustainable development to be able to move, work, or travel around the world on time, or deliver various things efficiently. To keep the entire world going forward, there

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must be seamless mobility of people, resources, jobs, and economies (Impoff, 2020).

Due to the varying transportation requirements in each place, small communities, particularly those in rural and coastal areas, may find it difficult to take use of all the benefits that may be obtained through the utilization of good transportation. In rural areas, offering reliable, inexpensive, and safe modes of transportation is difficult. Low population density in rural locations frequently declines fixed transit route usage, and the tax base used to pay for system upkeep and repairs is typically smaller. Transportation safety has also been impacted by the absence of infrastructure investment and the escalating use of rural roads over time ("Barriers to Transportation in Rural Areas – RHIhub Toolkit," 2012).

A community has unique needs that set it apart from other communities. This is mostly due to the fact that each community is distinguished by its own social and cultural institutions, unique network of ties, history, culture, and physical geography. An assessment of the community condition will be extremely beneficial in determining how to best meet the needs of the community and how to develop its existing resources. It will practically unveil and highlights the significant demands and means, as well as the corresponding sociocultural structures which certainly helps understand the problem (Community Tool Box, 2018).

Analyzing community problems is a method of thoroughly considering a problem or issue before acting on a solution. It begins with identifying the causes of an issue, followed by identifying potential solutions and a strategy for improvement (Berkowitz, 2018).

To establish an appropriate transportation system and improve neighborhood mobility, it is critical to understand how inhabitants of small towns wander from their local destinations, as well as the transportation challenges that they often face on a daily basis (Farmer, 2018).

In accordance with this, the research study assessed the transportation needs of Sitio Remedios (Dakung), Sasmuan, Pampanga and promoted well-founded transportation alternatives that may help the community in overcoming the challenges that they regularly experience in public transport. This entailed collaboration with local inhabitants in assessing their mobility needs, potential solutions, and objectives, to

contribute to generating the most appropriate solutions that would either increase people's mobility or reduce their transportation needs.

1.1 Related Literatures

Given the clear significance of taking community needs into consideration when designing public transportation systems, relatively little quantitative work has been done to make sure transit systems have been planned with these requirements in mind. Without proper assessment of the needs of a specific community, time, money, and effort could go into waste by proposing projects that are not really suitable to cater the needs of a community (Currie, 2004).

According to an article of Polloso (2018), in a roundtable discussion with Inquirer editors and reporters in the Philippines, nearly P20 of every P100 that Filipinos paid in taxes to run the government for a year went to projects that were later canceled, terminated, or the focus of legal action because they were thought to be irregular, unnecessary, expensive, or unjustified. As of December 2017, P583.5 billion has been "wasted" on abandoned or terminated projects, which is the bane of Philippine government expenditure.

1.2 Needs Assessment Purpose and Use

The Needs Assessment is an important instrument that gives information on many components of the transportation system, such as the system's current state, how the system is utilized, and the system's predicted future usage. The report will guide decision making on how to meet the area's transportation requirements, as well as future decision making on which projects to support in the subject area, using data acquired from a needs assessment (Gahan, 2019).

A community-based assessment is one method to consider when analyzing the transportation difficulties and requirements of a given location. According to a transportation needs assessment survey done in Delaware, United States in 2017, survey data is crucial for developing a strategy that takes into account the diverse requirements and interests of stakeholders, mobility-disadvantaged communities, and the general public. The researchers will be able to obtain information on existing transportation services, gaps, and unmet requirements of people, particularly targeted demographics that include mobility-disadvantaged individuals, by using a transportation assessment survey (Scott, O'Hanlon, Metcalfe, & Timmreck, 2019).

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1.3 Travel Patterns

Identifying the travel patterns or travel behavior of the population is one way to comprehend and evaluate the transportation needs of a community. To develop a more efficient traffic system that meets human mobility demands, a thorough study of travel patterns is necessary. This information is mostly reliant on traffic models based on relatively ample samples of data acquired from trip generation and traffic counts (Breyer, 2021).

Trip Generation is the first phase in the Transport Planning Model's (TPM) traditional four-step transportation forecasting process. The TPM is generally divided into four sequential, connected sub models: (Trip Generation, Trip Distribution, Modal Split, and Trip Assignment), which are extensively used to anticipate travel demand. Trip Generation forecasts the number of trips that originate or end in a specific traffic analysis zone. (Levinson, 2021)

According to Levinson (2021), every journey or trip has two ends, an origin and a destination. Trips are classified based on the activity performed by the individuals at the destination place. People participate in activities, which serve as the trip's "purpose." Home, work, shopping, school, dining out, socializing, entertainment, and servicing passengers (picking up and dropping off) are all key activities that individuals in the community usually engage in. Going to the doctor, banking, and other vital activities are also tasks that resident perform on a less-than-daily or even weekly basis.

1.4 Modes of Transportation

Identifying transportation modes is critical in analyzing and comprehending an area's present transportation situation and demands. Transportation modes are critical components of transportation systems because they facilitate the mobility of individuals living in a certain place. Modes are classified into three major groups based on the medium used: land, water, and air. Each mode has its own set of standards and characteristics that are tailored to meet the distinct needs of freight and passenger traffic (Rodrigue, 2020).

Rodrigue (2020) also emphasized on his study that understanding transportation modes in a community leads to significant disparities in how the modes are deployed and used in different sections of the community. More recently, there has been a movement toward including the connecting of modes into measuring the production and distribution of particular activities. As transportation modes are utilized to support economic activities and produce money, demand for transportation and mode ownership are major commercial features.

1.5 Transport Needs Gap Measurement

In a study of Currie (2004) regarding "Gap Analysis of Public Transport Need", a literature assessment of quantitative ways to evaluating the geographical distribution of persons experiencing transportation demands discovered a variety of methodologies. Population data, socioeconomic indicators, transportation supply metrics, and distance, cost, and accessibility to services are all included to the key components of the methodologies applied on his research study.

Currie (2004) used the abovementioned methods to his transportation gap study in Colorado and Montana in North America. He quantified the needs in relation to the number of persons in a chosen target demographic using population measures. In his analysis, socioeconomic variables were also included, which take into account the number and distribution of social groups regarded to be in need of transportation services.

Currie (2004) continued his research study by using measures of transportation supply that indicate the availability of transportation in his study region such that requirements may be measured relative to supply available in the area. He also used metrics for accessibility, cost, and distance to facilities (such places of employment or shopping), which represent the challenges (or impediments) to accessing desired services and contribute in the identification of poor accessibility conditions.

1.6 Study Area

The vast majority of the population in the Philippines lives around the coastal areas, which is especially exposed to storms, flooding, increasing sea levels, saltwater intrusion, and other climate change effects. Given the country's geological characteristics, it is typical for many localities or places to have their own particular demands for transportation in their community (Toldo, 2021).

Sasmuan is a fourth-class municipality in Pampanga's coastal province. It is bounded on the north by the municipalities of Guagua and Minalin, on the east by Macabebe, on the west by Lubao, and on the south by Manila Bay. It is surrounded by fish ponds, streams and rivers, making it difficult to transport its

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residents on a daily basis. Sasmuan Municipality's primary exports are fish and rice, making it also known as an agricultural town (Editor W.I.P., 2022).

Sitio Remedios, also known as "Dakung" is located at San Nicolas 2nd, Sasmuan, Pampanga. San Nicolas 2nd is a coastland wetland bordered by the Rio Grande River in the municipality of Sasmuan, province of Pampanga. According to the 2022 population data of the Local Government Unit of Sasmuan, the population in the area is 4964 with a total of 804 households. This accounted for 13.27% of Sasmuan's total population. ("San Nicolas 2nd, Sasmuan, Pampanga Profile – PhilAtlas," n.d.).

II. METHODOLOGY

This research intends to analyze the transportation problems in Sitio Remedios (Dakung), Sasmuan Pampanga in order to gain a better understanding of the existing situation to propose solutions that will benefit people not only in the study area but also those who enter and exit the locality.

Following the methodology developed for the study in reference to several studies, traffic surveys, and assessments from various countries, a household interview survey (HIS) and a roadside interview survey were conducted. These surveys collected information on the travel patterns of persons who resided in the research region and traveled in and out of it. The researchers also conducted a screen line survey to collect data on the volume of traffic on the roads heading into and out of the study area.

Table.1. Outline of Traffic Surveys

SURVEY	OBJECTIVES	COVERAGE	METHOD
Household Interview Survey (HIS)	- To obtain trip characteristics of residents in the study area	sample size of 358 residents of the study area	home visit interview survey
Roadside Interview	- To obtain trips not registered in a household survey, especially external- internal trips	on-road stations in the study area and sample size of 20 drivers	day OD interview at roadside
Screen Line Survey	- To obtain current traffic volume entering and exit from/to the study area	on-road stations in the study area	day vehicle traffic count at roadside – 12 hours

2.1 Household Interview Survey (HIS)

The Household Interview Survey (HIS) is aimed to understand travel behaviors of individuals, and their activities, depending on age and socio-economic characteristics. This includes the demographic survey and self-formulated survey questionnaire

to assess the socio-economic characteristics and travel behaviors of the residents in addition to the perceived barriers in transportation, among residents of Sitio Remedios (Dakung), Sasmuan, Pampanga. The survey questionnaire approach was utilized as it guarantees the advantage of achieving objectivity, measurability, and collection of large amounts of data in a limited span of time (Barribeau et al., 2005). The questionnaire was designed based from the variables utilized in the review of related literature, survey questionnaires from the previous studies of DTCB (2011), Scott et al. (2019), and (RVMPO, 2016).

2.2 Roadside Interview

This interview provided information from trips that were not recorded in the household interview survey, particularly external-internal trips. This entailed polling a sample of drivers and passengers in vehicles crossing the bridge as they enter and exit the study area. In contrast to the household survey, drivers will not be willing to devote much time to a survey, thus the respondents were just asked a few questions about their origin, destination, and purpose of their trip.

2.3 Screen Line Survey

The HIS collected data on travels taken by the residents of the study area. However, on any given day, non-residents of the community who live outside entered the study area for a different trip purpose. This was not covered by the HIS and so there will be no data regarding them. In line with this, a screen line survey has been designed to collect trip information from such non-residents as they enter and exit the area, as well as traffic volume data from a traffic count program. The traffic volume was calculated using this method by counting the number of vehicles entering and exiting the study area. The counted traffic volume was used not only to evaluate traffic congestion at a specific location, but also to calibrate the current trip origin and destination information overviewed by the household interview survey in terms of vehicular and passenger travel.

2.4 VCR Computation

According to Department Order No. 22 of Department of Public Works and Highways (DPWH), in determining the volume capacity ratio (VCR) of a certain road infrastructure, one of the important parameters is road capacity, which according to the Highway Capacity Manual, Highway Research Board, Washington D.C., 1965, is defined as follows: capacity is the maximum number of vehicles, which have a reasonable

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expectation of passing over a given section of a lane or a roadway in one direction or in both directions during one hour under prevailing road and traffic conditions. The traffic volume at the upper E level is per definition equal to THE CAPACITY. The borderline between levels E and F is also referred to as VCR= 1.00.

The levels are defined as follows:
• Level A: free flowing traffic, VCR less than 0.20;
• Level B: relatively free flowing traffic, VCR between 0.21 and 0.50;
• Level C: moderate traffic, VCR between 0.51 and 0.70;
• Level D: moderate/heavy traffic, VCR between 0.71 and 0.85;
• Level E: Heavy traffic, VCR between 0.86 and 1.00; and
• Level F: Saturation traffic volumes, stop and go situations.
At level F, capacity will actually start to drop because of heavy congestion and low travel speeds.

III. RESULTS AND DISCUSSION

3.1 Characteristics of Person's Movement

- The majority of the research participants who were interviewed reported having average monthly incomes of less than P5,000. According to data gathered from the HIS, 33.05% of respondents—or a significant portion of the sample size—are unemployed, which is consistent with the findings of this study.
- The respondents' low monthly salary has an impact on both their ability to drive and vehicle ownership. According to the majority of survey responses, 66% of respondents said they do not have the ability or capability to drive a motor vehicle, while 34% said that they have the ability to drive. Furthermore, a total of 184 people, or 53.40% of all respondents, said that their household relies entirely on public transportation and does not own any vehicles for transportation.
- Approximately 716 trips are produced in a daily basis in Sitio Remedios. Motorized transport accounted for 87.15% of the 716 total trips, and non-motorized transport accounts for 12.85% of the responses.
- Tricycles are the most common means of transportation, contributing to 44.97% of all the survey responses, followed by boats (36.87%) and motorcycles (15.92%). The data collected for this research study clearly demonstrated how dependent residents are on motorized and public transportation.

- For ages 15 and below, a large share of responses revealed that their most frequent travel mode to school is by Walking (48.34%). This is in accordance with the location of the elementary school in the study area, as Sitio Remedios has its own primary school for children.
- A considerable percentage of respondents assessed their weekly fare to be more than 500 pesos, accounting for 25.42% of survey responses. Given that the majority of respondents' monthly income is less than P5000, the fare cost is quite high and consumes a large portion of their monthly budget.
- Sidewalks and Parking are major concern in the study area since the ratings that were obtained from the respondents falls under the "Needs Improvement" classification.
- The efficiency of travelling by foot, land, and water in the study area is quite satisfactory since most of the respondents answered "Very Good" in the household interview survey (HIS).
- The transportation impediments that impact the everyday mobility in the study area while using their chosen mode of transportation are due to fare cost and safety (41% and 39% of the survey responses, respectively).
- The barrier that burdens the population turns to be "lack of transportation infrastructure" with the majority of 42% of the survey responses.
- Respondents were also asked what types of improvements in their neighborhood they believe would benefit the general population. The "construction of footbridges, bridges, roads, etc." was chosen by a considerable number of respondents, accounting for 78% of all survey responses.
- The number of trips a person makes in a day in Sitio Remedios is computed as 1.024. Excluding 'To Home' trip, most of trips are dominated by 'Personal Business' and 'Shopping' purposes, accounting for 34.64% and 25.42% of the survey responses, respectively.
- Motorized transport appears to be important at Sitio Remedios (Dakung), accounting for 87.15% of all responses from the trip report. Tricycles received the most responses, accounting for 52.56% of the total, followed by boats, which accounted for 37.82% of the total survey data.

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- The majority of the internal-external trips collected from the Roadside Interview are concentrated in the areas of Guagua, Lubao, and Santa Lucia, all of which are likely the destinations of the travels. These locations are the source of employment, shopping, and other personal business that the respondents use as the purpose of their trip.

3.2 Characteristics of Road Traffic

- The San Pedro bridge, which is the only road leading to the area, was discovered to have a carriage width of only 2.95 meters. This bridge has only one lane and is only suitable for small vehicles such as small cars, tricycles, and motorcycles to pass through.
- Using the screen line survey and a 12-hour traffic count from 6:00 AM to 6:00 PM, 3044 cars were counted in calculation of the traffic volume. Based on the 12-hour traffic count that was conducted by the researchers, the peak hour of traffic volume is from 6:00 AM – 7:00 AM, 12:00 PM – 1:00 PM, 5:00 PM – 6:00 PM which are all have listed more than 300 vehicles crossing the San Pedro Bridge.
- The computed volume count ratio (VCR) is above 1.0 therefore falls under Level F that states saturation traffic volumes, stop and go situations. As a result of severe congestion and slow travel times at level F, capacity of the bridge will actually start to decline.

IV. CONCLUSION

The Community-Based Assessment conducted in Sitio Remedios is an important instrument that gives information on many components of the transportation system in the study area, such as the system's current state, how the system is utilized, and the system's predicted future usage. This research study examined the travel patterns and travel characteristics of the individuals in the area and analyzed the different transportation system that currently used in the locality. The major purpose of the study is to provide basis in decision making on how to meet the area's transportation requirements, as well as future decision making on which projects to support in the subject area, using data acquired from the needs assessment performed. Gaining the benefits of this research study could lead the way for the improvement of the transportation system in the study area by utilizing the data acquired into baseline data for future government projects and proposals, as well as for future researchers.

Based on the analyzed findings, the drawn conclusions are as follows:

- The majority of the population lived below the (PSA) poverty line, with monthly incomes only below P5000.This is considerably due to the fact that a substantial number of the respondents are also unemployed, which explains why their monthly income tends to be low.
- Fare Cost is a major burden in the population in utilizing their primary mode of transportation because it consumes a large percentage of their monthly income. This also explains why most of the people in the study area does not own any type of vehicle and relies solely on public transportation for their daily movement because they do not have the financial means to purchase their own vehicles.
- Tricycles and Boats are the primary public transportation mode that are available in the area. The main factor to consider when choosing tricycle as mode of transport is the fare cost, as current fuel or gasoline price increases have had a significant impact on the fare price as well.
- A significant percentage of respondents also use boats as their primary mode of transportation because they are thought to be more affordable than tricycles. However, the safety of using this mode of transportation is the residents' major concern. The boats used to transport people from Zone 1 to Zone 2 and vice versa are not properly maintained and use only bamboos for steering the boats, pursuant to survey data regarding the Safety that was viewed as a barrier in using their primary means of transportation. Since boatmen are not always available and it takes time to find one who is available to offer a ride when transporting people and goods, the availability of the boats is another major concern.
- Sidewalks and Parking in the area are also an area of concern since they were rated as 'Needs Improvement' by the respondents. Given that Sitio Remedios is a coastal community, its development is slower than that of the rest of Sasmuan. The sidewalks are narrow, and there is no sufficient area for

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individuals to park their cars, resulting in taking up road space.

- The majority of 42% of survey respondents identified 'lack of transportation infrastructure' as a barrier that affects the general population. It is supported by the ideas and improvements that respondents believe would help their community the most, with a vast number of respondents answering "construction of footbridges, bridges, roads, etc.' accounting for 78% of all survey responses. The respondents feel that a transportation infrastructure must be established or developed in their research area in order to improve their transportation system and increase their mobility.

- The San Pedro Bridge, the sole road network in entering and departing Sitio Remedios, has only one lane and a total carriage width of 2.95 meters. The only types of vehicles that may pass across the bridge are small cars, tricycles, and motorcycles. This one-lane bridge cannot accommodate the area's typical yearly daily traffic since the computed VCR value falls beneath Level F, which denotes saturation traffic volumes and stop-and-go situations. Capacity will actually begin to decline at level F due to significant congestion and slow travel speeds. This can serve as an initial basis for improving the current bridge to accommodate the number of cars and minimize traffic congestion in the area.

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