Assessment On the Interaction of Pedestrian Mobility with The Traffic Flow Condition at JASA - San Matias, Guagua, Pampanga Intersection

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Abstract: - Road intersections are crucial nodes in the traffic distribution and pooling system. The purpose of this study is to assess the interaction of pedestrian mobility and the traffic flow condition at JASA-San Matias, Guagua, Pampanga intersection. The study was conducted using mixed-methods sequential explanatory research approach in which researchers conducted a survey to 385 pedestrians from the nearby municipalities that can be selected through convenience sampling and an interview was done with 10 respondents from the drivers and the employees/ employers from the nearby establishments. Travelling is one of the daily activities that most people have to endure for them to be able to pursue or for them to go and meet their purpose like education, occupation, going home, doing leisure activities and even being on emergency. The interaction of pedestrian mobility to traffic flow conditions at JASA - San Matias, Guagua, Pampanga depicts relationships with one another. The findings of the study will help the community in the vicinity to have an efficient vehicle usage and improve the utilization of the intersection.

Key Words: — *Interaction, Intersection, Pedestrian mobility, Traffic flow condition.*

I. INTRODUCTION

Transportation and mobility are required for navigating long distances, accessing essential services and goods, and participating in a variety of activities outside the home (Mollenkopf et. al, 2005) (Vella-Brodrick & Stanley, 2013). Bruton (2021) affirmed that transportation is a must for a society to run because it defines where individuals can reside and engage in recreational and work-related activities. The necessity for transportation arises from people's need to travel between places to do their daily tasks. Pedestrian mobility, on the other hand, provides individuals with more opportunities to perform fundamental tasks outside of the home environment,

such as going to work and purchasing necessities (Vella-Brodrick & Stanley, 2013). It also primarily reveals that the functions of a location are divided into two categories. One is when individuals arrive and depart a place and the other one is where people leave and arrive (Yuan et al, 2012), but Connective Cities in 2022 claimed that it is more than just traveling from point x to point z, rather it means having access to education, culture, employment, and leisure through transportation that is safe, quick, ecologically friendly, and economical thus, mobility, particularly in cities and conurbations, means the ability to engage in society and in addition the way people get around in cities is continually changing; there is a need for sustainable technologies and innovative concepts for mixing various modes of transportation that comes with continuous patterns.

As stated by Spatial (2011), cited by Lee & Holme (2015), pedestrian mobility patterns are important in a variety of disciplines, including complex systems science, sociology, geography, and city planning. Trip generation, which estimates

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the volume of trips beginning or ending in a certain traffic zone, is one method for assessing pedestrian mobility patterns (Jović & Depolo, 2011) and it is observed by Zhang et al. in 2017 that the land use influences the direction, traffic flow ratio, and travel model, all of which are factors influencing public traffic demand because the land use in the traffic analysis zone "produces" or "generates" trips. In which the zones serve as both travel destinations and attraction points. The activities that take place in a region are closely related to how tourists choose to visit there.

Forecasting travel demand is essential for modeling or predicting the volume of a given traffic element in the future in which trip generation is utilized to calculate the total number of trips generated and attracted by each area unit taking into account land use and socioeconomic characteristics (Makinde and Oyedepo, 2009) (Aloc & Amar, 2013). The aim of this study is to understand the mobility of the pedestrians, commuters and other road users to determine the effect of their movement on the flow of traffic. As Song et al. (2016) stated, understanding how people move and select modes of transportation across a huge scale transportation network is crucial for forecasting urban congestion and transportation scheduling.

The JASA - San Matias Guagua, Pampanga intersection is the passage of people traveling from Porac to Guagua, Sta. Rita - Guagua, Lubao - San Fernando, Bacolor - Lubao, and vice versa. The Jose Abad Santos Avenue has six lanes and it is intersected with 4 lanes of provincial roads heading to Porac and Guagua. The intersection is surrounded by business establishments so pedestrians often stay in the area to visit the premises and wait for a vehicle to ride to their destination. Due to this Public Utility Vehicles such as jeepneys line up next to a gas station and hospital in which one lane of road is block to load and unload passengers.

The problems in the intersection have been exposed to pedestrians for the past few years. Some of these are the traffic lights that are not functioning and the traffic enforcers that mandate the traffic but for a limited time which makes the flow of the traffic disorganized and puts pedestrians, drivers and other road users in danger. In this light, the researchers conducted this study to assess the interaction of pedestrian mobility to the traffic flow in order to come up with the potential solutions to address the issues in the area.

II. METHODOLOGY

The objective of this study is to determine the person trip within JASA – San Matias, Guagua, Pampanga and the interaction of pedestrian mobility to the traffic flow condition at JASA San Matias, Guagua, Pampanga intersection to be able to recommend solutions to address the traffic issues in the area.

2.1 Data Collection
The researcher gathered information among pedestrians, drivers, and establishments' employees or employers who traverses the JASA, San Matias, Guagua, Pampanga intersection. The target participants were generally concerned on the interaction of pedestrian mobility to traffic flow. The study used a person trip survey questionnaires for the quantitative part and an interview for the qualitative part. The quantitative results produced in the first phase were expanded upon or explained by the qualitative data, which were collected and processed second in the sequence. The first quantitative phase serves as a foundation for the second qualitative phase.

2.1.1 Person Trip Survey
The survey questionnaire that had been utilized for the quantitative part of the study was divided into five sections: the first section of the questionnaire asks about the respondents' demographics, including their name (which is optional), age, and occupation; the second section of the questionnaire, the travel information of the respondents are considered; the third, fourth, and fifth sections used a likert scale composed of six statements in which pedestrian mobility, traffic flow condition and interaction of pedestrian mobility and traffic flow condition are measured respectively.

2.1.2 Interview
A one-on-one interview involving questions that support the answers and results for the qualitative part are asked to the respondents.

2.2 Data Analysis and Evaluation
The researchers utilized inferential statistics and descriptive statistics to analyze the quantitative data that were collected for this study.

For the results of the demographic part and the travel information of the respondents in the first and second section of the questionnaires, descriptive statistics were utilized wherein frequency, percentage, and graphs were used to present the

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responses to the first objective of the study. For the third and fourth of the questionnaire, researchers utilized Pearson Product-Moment Correlation to measure the interaction of pedestrian mobility and the traffic flow condition. This would measure the degree of association between the independent variables which is the pedestrian mobility and the dependent variable, the traffic flow.

The survey uses a scale of 1 to 5 that interprets a minimum value of 1 and a maximum of 5. To solve for the mean and the correlation of the data gathered the data are analyze using the following formulas:

For mean;

$$\frac{5(\sum SA) + 4(\sum A) + 3(\sum N) + 2(\sum D) + 1(SD)}{N}$$

Where:
SA – Strongly Agree
A – Agree
N – Neutral
D – Disagree
SD – Strongly Disagree

For Pearson Correlation;

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2 \sum(Y_i - \bar{Y})^2}}$$

Where:
r – Correlation coefficient
X_i – Values of the x-variable in a sample
$\bar{X}$ – Mean of the values of the x-variable
Y_i – Values of the y-variable in a sample
$\bar{Y}$ – Mean of the values of the y-variable

The scores of the respondents in parts 3 and 4 of the questionnaire are described using the following criterion:

Table.1. Criteria for the Parts 3, 4, and 5

Score Ranges	Description
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Table.2. Criteria for the Interpretation of mean value

Mean Ranges	Description
1.0 – 1.80	Strongly Disagree
1.81 – 2.60	Disagree
2.61 – 3.40	Neutral
3.41 – 4.20	Agree
4.21 – 5.0	Strongly Agree

Table.3. Criteria for the Description of the p-value

Score Ranges	Description
$p > 0.05$	No significant relationship; therefore, null hypothesis is accepted
$p < 0.05$	Significant relationship; therefore, alternative hypothesis is accepted

Table.4. Criteria for the Description of the r-value

Pearson correlation coefficient (r) value	Strength	Direction
Greater than .5	Strong	Positive
Between .3 and .5	Moderate	Positive
Between 0 and .3	Weak	Positive
0	None	None
Between 0 and – .3	Weak	Negative
Between – .3 and – .5	Moderate	Negative
Less than – .5	Strong	Negative

Lastly, the fifth part used the Relative Importance Index to rank the degree of relationships of the statements about the interactions of the pedestrian mobility and the traffic flow condition. It uses the formula:

$$\frac{5(\sum SA) + 4(\sum A) + 3(\sum N) + 2(\sum D) + 1(SD)}{A * N}$$

Where:
SA – Strongly Agree
A – Agree
N – Neutral
D – Disagree
SD – Strongly Disagree
A – Highest Score

Spreadsheets and Statistical Package for the Social Sciences (SPSS), a software program used by researchers in various disciplines for quantitative analysis of complex data, was used

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to present and summarize the data collected through tables and graphs.

III. RESULTS AND DISCUSSION

The researchers obtained a total of three hundred and eighty-five (385) responses, which was the targeted sample size. The following were the findings reported by the respondents based on the survey conducted:
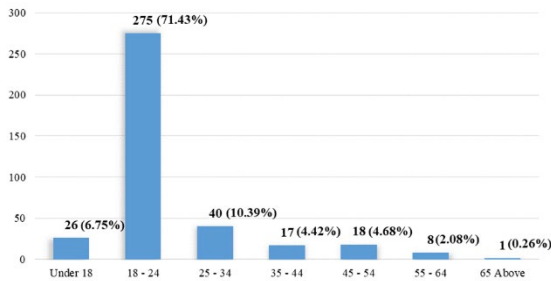
3.1 Age

Fig.1. Age of the respondents

As seen on the figure, most of the respondents are from the age group 18- to 24-year-old which is 71.43% of the total sample or 275 out of 385 respondents. There were 40 respondents whose ages range from 25 to 34 years old. 26 of the total sample are below 18 years old. 17 or 4.42% of the total sample are from the age group 35 to 44 years old. There were 18 people whose ages range from 45 to 54 years old. 8 are from the age group 55 to 64 and there is only 1 respondent who is in the age group 65 years old and above. Therefore, with this result, the researcher asserts that the majority of respondents, 275 out of 385 are young adults.
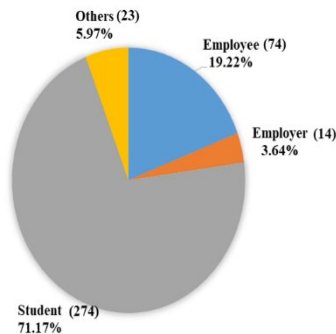
3.2 Occupation

Fig.2. Occupation of the respondents

Figure 2 shows that 71.17% of the respondents or 274 out of 385 respondents are students. There were 74 out of 385 respondents currently employed or working in any field of endeavor. There were14 who are employers of a certain job or business. There were 23 or 5.97% of the total sample who chose others because their occupation is not listed on the options pertaining to the occupation of the respondents. Therefore with this result, the researchers concluded that most of the daily commuters and passengers passing through the intersection are students from the different schools within the province of Pampanga
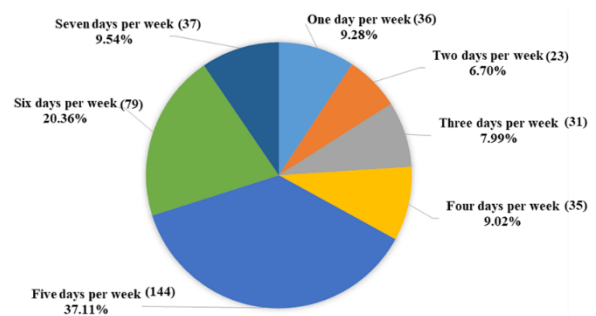
3.3 Number of Trips

Fig.3. Number of Trips per week

Figure 3 shows that 37.11% of the respondents travel five days per week. There were 79 who traveled six times per week. 37 respondents or 9.61% travels seven times a week or every day. There were 36 or 9.35% of the total number of samples who are traveling just once a week. 23 respondents only travel twice a week. 31 out of 385 respondents travel three times a week or three days per week. 35 or 9.09% travels four days per week. Therefore, with this result, the researcher concluded that the respondents travel throughout all possible days of the week, rarely on weekends.
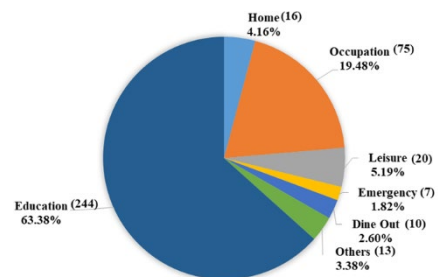
3.4 Trip Purpose

Fig.4. Purpose of trip of the respondents

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The Figure 4 results, 244 out of 385 respondents are traveling for education purposes. There were 75 or 19.48% of the total sample traveling for work purposes because their purpose of traveling is to go to work. There were 20 whose purpose of the trip was for leisure. Either will have a vacation or will just go somewhere where they can relax. 10 or 2.60% are traveling because they will dine-out or will eat in any restaurant or food store. 16 respondents are traveling because they will go home and 13 respondents chose others as their purpose of trip or travel in order to do errands and to visit relatives. Therefore, most of them are students who travel for educational purposes, with attendance at school serving as their main purpose.

Based on the result of the interview, respondents stated that the number of vehicles in the neighborhood increases between seven and eight o'clock in the morning, while two of them said that it was between four and six o'clock in the afternoon. Figure 1 indicates that most of the respondents are ages 18-24 years old and a great number of the everyday commuters and travelers who use the intersection are students from the several schools in the province of Pampanga. Therefore, it is acceptable that the result in Figure 3 shows that 37.11% of the respondents travel five days per week with the purpose of education. The demand for urban travel is significantly influenced by student commuting, and private car commuting, particularly in areas close to schools, has a significant impact on urban traffic (Liu, 2022).

According to the respondents in the qualitative part, the volume of pedestrians increases around seven am and a lot of people are also in the vicinity between 4:00 and 5:00 p.m., because the majority of interviewees stated that there are more pedestrians in the afternoon since school is over and work is done, and people emerge to go home. To sum up, the volume of vehicles and the rush of pedestrians rises due to the students and employees going in and out of the school and work.
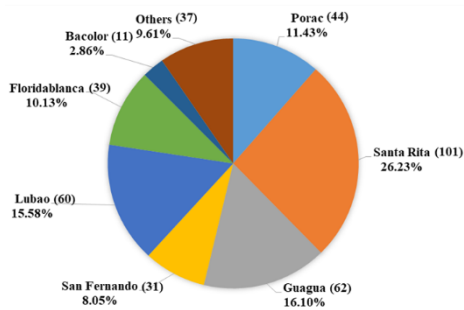
3.5 Trip Origin

Fig.5. Trip origin of the respondents

Figure 5 shows the trip origin of the respondents, 101 or 26.23% of the total sample are coming from the municipality of Sta. Rita in Pampanga. 62 respondents are coming from Guagua, 60 are coming from Lubao, 44 are coming from Porac, 39 are from Floridablanca, 31 are from the capital town of the province the City of San Fernando, and 11 are from Bacolor. There were 37 of the total sample who chose others as their travel origin. They could be coming from the other municipalities or cities in the province namely, Angeles City, Mabalacat, Sto. Tomas, Sasmuan, Minalin, Macabebe, Magalang, Masantol, Mexico, Arayat, Sta. Ana, Candaba, San Luis, and Apalit. Therefore, with this result, the researchers assert that the majority of respondents came from Sta. Rita because among all the origin, this location is the nearest one.
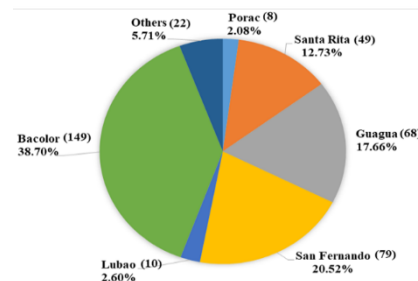
3.6 Trip Destination

Fig.6. Trip destination of the respondents

Figure 6 shows that most of the trip destinations are going to Bacolor which takes up 38.70% or 149 out of 385. There were 68 respondents whose travel destination is in Guagua, 79 are going to the City of San Fernando. There were 49 whose trip destination is in Santa Rita. 8 are going to Porac. 10 are in Lubao and 22 chose others as their travel destination or to another place in the province or maybe outside the province. Therefore, the researchers conclude that the Bacolor is the most visited destination, where Don Honorio Ventura State University is located.
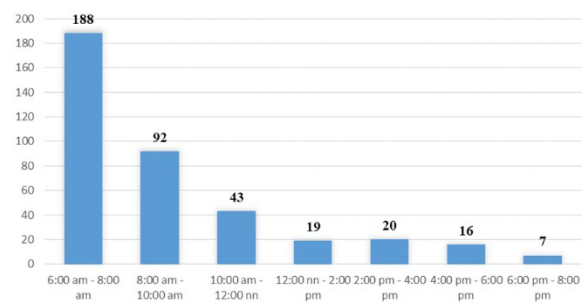
3.7 Time of Travel

Fig.7. Time of travel of the respondents

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Figure 7 shows the time of travel of the respondents or the usual time they are traveling to work, school, or any place they plan or wish to visit. 188 respondents, which is almost half of the total sample, travels from 6:00am to 8:00 am since most of the respondents are students and employees and this is the usual time of their school and work schedules.

There were 92 traveling from 8:00am to 10:00 am, which is also one of the usual time/schedules when people usually travel. 43 travels between 10:00am and 12:00nn. 20 respondents travel from 2:00pm to 4:00pm, 19 travels from 12:00nn to 2:00pm, 16 travels from 4:00pm to 6:00pm and 7 travels from 6:00pm to 8:00pm. Therefore, one of the factors why the busy road starts at 6 am is because the respondents are traveling to their work or schools as their trip destination.

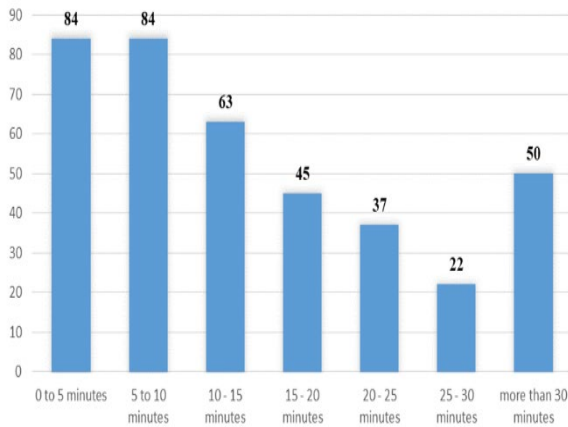### 3.8 Time to traverse the intersection

Fig.8. Time to traverse the intersection

The figure shows the time to traverse the intersection. Only 84 responders travel for less than five minutes, and the same number and percentage travel for five to ten minutes. There were 63 respondents who took between 10 and 15 minutes to cross the intersection. 50 respondents had to wait more than 30 minutes before they could cross the intersection because of the heavy traffic jam in the area. 37 people declared that it takes 20 to 25 minutes to cross the intersection and be able to go to the opposite side of the road, while 22 people said that they need 25 to 30 minutes in order to do so.

Therefore, this concluded that it only takes 0 to 10 minutes because the respondents had a little distance to traverse the intersection, so it didn't take them hours to reach the other side.
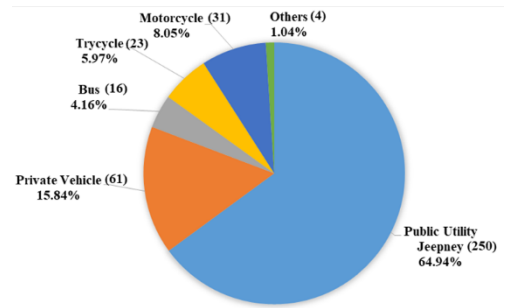
3.9 Mode of Transportation

Fig.9. Mode of transportation of the respondents

As shown on the figure above, more than half of the total sample or 64.94% of the total sample, which is 250 respondents, are using Public Utility Vehicles such as Jeepneys as their mode of transportation in going to places. 61 of 385 respondents use private vehicles such as cars as their mode of transportation, which enables them to take less time to travel. 23 ride motorcycles because their point of travel is near to their destination. There are 16 who ride on buses because their place is far from where they will go. There are 31 who own private motorcycles and use it as their mode of transportation. There are 4 who chose others. They could be just walking, or riding any other modes of transportation. Therefore, with this result, the researcher concluded that one of the factors that contributes to heavy traffic is the Public Utilities because of not having their fixed and organized terminal, which greatly affects the other sides of the road.

According to the respondents, the area's non-working traffic signal systems are to blame for the congestion in the intersection, which results in an unmanaged traffic flow as a consequence of drivers and vehicle owners failing to yield. The regular flow of traffic at a crossroads can be severely disrupted by a broken traffic light. This incidence also leads to accidents in which pedestrians' safety is at risk. Generally, pedestrians crossing the road are involved in one of the most frequent forms of collisions that result in pedestrian fatalities. In addition to being essential for guaranteeing smooth movement, pedestrian crossings can also help create networks of pedestrians that are more secure (Kim & Mateo-Babiano, 2018).

Figure 5 shows the trip origin of the respondents, who are coming from the municipality of Sta. Rita in Pampanga. Since most of the respondents are students, it is justifiable that most of the trip destinations are in Bacolor, where Don Honorio Ventura State University is located. Being said, the usual time

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travel of the respondents is from 6:00 am to 8:00 am in the morning via Public Utility Vehicles shown in Figure 9. Thus, the congestion usually falls during these periods.

Traffic jams, a lack of parking for cars, and a loss in public transit service of downtown districts are issues that almost everyone is aware of. According to respondent 6, establishments near the intersection where people buy necessities or complete chores add to traffic congestion in the vicinity. The flow of traffic is occasionally slowed down by vehicles entering and exiting business parking lots and most of the time illegal parking also contributes to the cause of congestion. The main causes of traffic congestion are unlawful parking on the side of the road, impatient drivers and retail establishment disturbances, and conducting business on public streets (Ali et al., 2021).
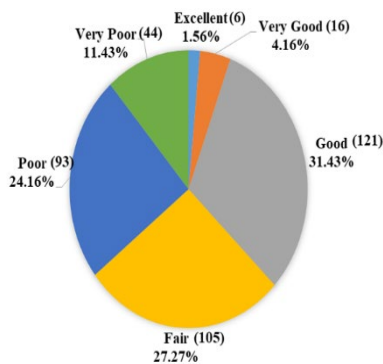
3.10 Traffic Condition

Fig.10. Traffic Flow Condition

Figure 10 shows the traffic conditions during the trip. Most of the respondents agreed that the condition of traffic flow in the area is good because it had 31.43% or 121 responses followed by a fair rating with 105 responses. 93 or 24.16% of the sample said that it is poor considering the different road widening projects, excavation projects, and other road-related projects of both the local and the national government. 44 out of 385 mentioned that the traffic is very poor. It is taking them minutes or sometimes hours for them to be able to get rid of that traffic.

There were only 16 and 6 who said that the traffic is very good and excellent, respectively. With this, it was concluded that the traffic condition in the area is fair to good depending on the time of their travel.

3.11 Pedestrian Mobility
Table.5. Weighted Mean of Pedestrian Mobility

Pedestrian Mobility	Mean	Standard Deviation	Verbal Description
I can access the intersection at any time of the day.	3.41	1.06	Agree
I can accurately estimate the time of my travel.	3.31	1.11	Neutral
I can go to my destination using a different route other than the intersection.	3.51	1.20	Agree
I often visit the establishments in the vicinity of the intersection.	3.23	1.08	Neutral
I frequently ride the public utility vehicle in the area.	3.68	1.31	Agree
I always walk on the sidewalks and cross the pedestrian lane in the intersection.	3.30	1.31	Neutral
Grand Mean	3.41		Agree

Table 5 shows the computed averages pertaining to pedestrians' mobility. Based on the computed averages, statement 1 has an average of 3.41. This means that the respondents agreed that they can access the intersection at any time of the day. Also, respondents agreed that they can go to their destination using a different route other than the intersection and it has a computed average of 3.51. As for statement 5, the computed average is 3.68 and respondents agreed that they frequently ride the public utility vehicles in their area. The respondents neither agreed nor disagreed on statements 2, 4, and 6 with computed averages of 3.31, 3.23, and 3.30, respectively. Respondents have hesitations on these statements that is why they have no response at all or they just have a neutral response.

In general, the grand mean was 3.41, indicating that the majority of the claims were correct. As a result of the survey, respondents agreed with the statements regarding pedestrian mobility, implying that pedestrians are frequently in the intersection area.

3.12 Traffic Flow Condition

Table 6. Weighted Mean of Traffic Flow Condition

Traffic Flow Condition	Mean	Standard Deviation	Verbal Description
The intersection is always congested	3.88	0.95	Agree
The Public Utility Vehicles causes traffic in the intersection.	3.26	1.03	Neutral
The speed of the vehicles are slower than the others.	3.52	0.79	Agree
It takes a while before the vehicle traverses the intersection.	3.85	0.77	Agree
The trip takes longer than expected due to congestion.	3.91	0.86	Agree
There is bumper-to-bumper traffic in the intersection.	3.77	0.93	Agree
Grand Mean	3.70		Agree

The table above clearly shows that the respondents agreed on statements 1, 3, 4, 5, and 6 with computed averages of 3.88, 3.52, 3.85, 3.91, and 3.77, respectively. Meaning, respondents agreed that the intersection is always congested, there are lots of vehicles, the speed of vehicles is slow, it takes time, minutes

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or hours before a vehicle can transverse in the intersection, trip takes longer because of congestion, and the traffic is bumper-to-bumper in the intersection. As for statement 2, the computed average is 3.26 and respondents neither agreed nor disagreed on this one. They have a neutral agreement.

Almost all of the statements were agreed upon by the majority of the responders. In this regard, the grand mean of 3.70 indicated that it agreed with the claim of the statements regarding traffic flow conditions, implying that there is congestion in the area.

3.13 Interaction of Pedestrian Mobility and Traffic Flow Condition

Table.7. Interaction of Pedestrian Mobility with the Traffic Flow Condition

Pedestrian Mobility		Traffic Flow Condition
	Pearson Correlation	0.126
	Sig. (2-tailed)	0.013
	N	385

Table 7 depicts the Pearson correlation of pedestrian mobility and traffic flow condition which is 0.126 as a weak positive correlation, implying that, while both variables tend to rise in response to one another, the relationship is not very strong (Cherry, 2022). The P-value, or correlation coefficient, is 0.0013, indicating a significant interaction because it is less than 0.005. Kwon, Morichi and Yai (n.d.) agreed that pedestrian and traffic flow conditions are correlated because they claimed that pedestrians and vehicles interact because their actions influence one another. Liu et al. (2018) stated that the interaction between pedestrians and vehicles is always ongoing, reflecting their complicated traffic behaviors and having some internal traffic flow mechanisms.

The relationship suggests that pedestrian mobility has a weak direct significant interaction, but it does not imply that it influences traffic flow in all aspects because, as respondents mentioned in the interview, inoperative traffic lights are mostly responsible for congestion in the area. However, Dinakar and Kumar (2017) argue that the interaction between pedestrians and traffic flow conditions is greater at unsignalized pedestrian crosswalk locations, and that the change in vehicular flow characteristics will increase with an increase in non-compliant

pedestrian behavior as well as several stages of pedestrian road crossing behavior.

3.14 Relative Importance Index of the Interaction of Pedestrian Mobility and Traffic Flow Condition

Table.8. Relative Importance Index of the Interaction of Pedestrian Mobility and Traffic Flow Condition

	Relative Importance Index Value	Importance
Rush hours significantly increase the amount of vehicles at the crossroads	0.874	1
The vehicles parked alongside the road affect the flow of traffic	0.789	2
Pedestrians who jaywalks in the intersection slowed down the traffic flow.	0.776	3
Vehicles going in and out of the establishment's parking causes disturbance to the traffic flow	0.730	4
The traffic flow is being slowed down by public transportation vehicles stopping to pick up commuters	0.729	5
The volume of pedestrians in the area affects how the traffic moves	0.726	6

According to the table, rush hours greatly increase the number of vehicles at the crossroads, ranking first in how pedestrian mobility interacts with the traffic flow situation in the area. It was followed by automobiles parked alongside the road, which disrupted traffic flow. Then, pedestrians who jaywalk in the intersection slowed traffic flow came in third place. The vehicles entering and exiting the establishments also cause disruption. Public transportation that stops to pick up passengers was ranked fifth. Finally, the volume of pedestrians influences how the traffic flow was ranked sixth.

Four out of ten interviewed respondents in the qualitative part of the study believed that the number of pedestrians in the area did affect traffic flow because pedestrians are the ones who traverse the intersection, but the remaining six respondents said that it does not have a significant effect because they affirmed that the causes of congestion are vehicles, not pedestrians. Commuter is a type of pedestrian alongside with residents and tourists. This suggests that they mistook pedestrians for only those who are crossing the intersection and did not include those who are in the intersection to either wait for a vehicle to ride or those who are there to carry out errands.

In order to minimize and alleviate congestion, all of the respondents stated that the way to lessen the congestion in the area is to repair the damaged traffic signals. Traffic lights are used to regulate traffic flow in one way or another. Therefore, the overall goal is to improve safety, control traffic and travel times, and give drivers guidance (The Purpose of Traffic

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Signals | ELTEC, n.d.). If a traffic signal is not possible, there must be a knowledgeable traffic enforcer in the area who will manage the flow of traffic at all times. Every road safety policy must include effective traffic enforcement; hence the value of a strong traffic enforcement corps cannot be underestimated. According to Sherwin Gatchalian (2017), in order to preserve public safety and order on our highways, traffic enforcement personnel are essential, thus a well-educated traffic enforcer working in connection with best methods for enforcing traffic regulations would make the road safer for everyone, especially drivers and pedestrians.

IV. CONCLUSION

Based on the results of the study, the majority of respondents are young adults who travel throughout the week, rarely on weekends, in which the volume of pedestrians increases around 7:00 a.m. due to respondents traveling to work or schools as their trip destination, and many people are also in the vicinity between 4:00 and 5:00 p.m., because the majority of interviewees stated that there are more pedestrians in the afternoon because school is over and work is done, and people emerge to go home. It is also concluded that it only takes 0 to 10 minutes to traverse the intersection because the respondents had a short distance, so it didn't take them hours to go to the other side.

The majority of daily commuters and passengers going through the intersection are students from various schools throughout the province of Pampanga, and they are traveling for educational purposes, with attendance at school serving as their primary goal. Public Utility Vehicles, such as Jeepney, are currently one of the most common modes of transportation that contribute to traffic congestion because it is used by the majority of commuters at the intersection.

The traffic flow condition in the area is rated fair to good because of the rush hour, broken traffic lights and undisciplined drivers who fail to yield when traversing the intersection in which are the major contributors of the traffic congestion in the area.

The pedestrians agreed that they are often in the vicinity of the intersection and the flow of traffic in the area is congested during their stay with this it is concluded that pedestrian mobility does have a positive or direct weak significant interaction with the traffic flow condition at JASA – San Matias, Guagua, Pampanga intersection.

V. RECOMMENDATION

Considering the aforementioned findings and conclusions, the recommendation to resolve the traffic issue in the area includes the repairing and transforming of the traffic light management. If it was not possible a traffic enforcer must be present at all times to manage the traffic flow in the area.

The researchers also recommend that a public transportation terminal must be available daily for commuters to wait for a vehicle to travel in order manage the rush of pedestrians and reduce the use of private vehicles. And also, the implementation of a specific places to park and to load and to unload passengers to carry out a systematic transportation system because it is an important intersection with a high pedestrian traffic so public transportation management should be prioritized.

It is also recommended that parking restrictions near busy intersections must be observed because the National Building Code requires larger developments and traffic-generating buildings, as well as parking structures, to consider a specified minimum distance of 100 meters.

REFERENCES

[1]. Ali, N., Javid, M., Hussain, S., & Rahim, A. (2021). Understanding traffic congestion from stakeholders' perceptions in the central area of Lahore, Pakistan. Journal of Applied Engineering Science, 19(1), 125–136.

[2]. Aloc, D. S., & Amar, J. A. C. (2013). Trip Generation Modelling of Lipa City. Seminar and research methods in civil engineering research program, University of Philippines Diliman. 10(2.1), 1 - 9.

[3]. Bruton, M. (2021). Introduction to Transportation Planning. Routledge Library Editions.

[4]. Cherry, K. (2022, April 15). What is Correlation? Verywell Mind.

[5]. Connective Cities (2022). Urban Transport and Mobility. Federal Ministry for Economic Cooperation and Development.

[6]. Dinakar, R.J.S.J and Kumar, P.M.S.S (2017). Impact of Vehicle Pedestrian Interaction on Traffic Flow: Midblock & Intersections.

[7]. Gatchalian, S. (2017). Professionalization and Institutionalization of Traffic Enforcers.

FRANCHESCA DIANNE D. TUAZON., ET.AL.: ASSESSMENT ON THE INTERACTION OF PEDESTRIAN MOBILITY WITH THE TRAFFIC FLOW CONDITION AT JASA - SAN MATIAS, GUAGUA, PAMPANGA INTERSECTION

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[8]. Jović, J., & Depolo, V. (2011). The role of trip generation models in sustainable transportation planning in South-East Europe. Transport, 26(1), 88–95.

[9]. Kim, H., & Mateo-Babiano, I. (2018, June 27). Pedestrian Crossing Environments in an Emerging Chinese City: Vehicle Encountering, Seamless Walking, and Sensory Perception Perspectives. Sustainability, 10(7), 2200.

[10]. Kwon, Y., Morichi, S., & Yai, T. (n.d). Pedestrian and Vehicles Traffic Flow in Mixed Traffic Conditions of Narrow Street. 1-11.

[11]. Liu, H., Deng, H., Li, Y., Zhao, Y., & Li, X. (2022, May 27). School Surrounding Region Traffic Commuting Analysis Based on Simulation. International Journal of Environmental Research and Public Health, 19(11), 6566.

[12]. The Purpose of Traffic Signals | ELTEC. (n.d.).

[13]. Vella-Brodrick, D. A., & Stanley, J. (2013, September). The significance of transport mobility in predicting well-being. Transport Policy, 29, 236–242.

[14]. Yuan, J., Zheng, Y., & Xie, X. (2012). Discovering regions of different functions in a city using human mobility and POIs. Proceedings of the 18th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining - KDD '12.

[15]. Zhang, T., Sun, L., Yao, L., & Rong, J. (2017). Impact Analysis of Land Use on Traffic Congestion Using Real-Time Traffic and POI. Journal of Advanced Transportation, 2017, 1–8.

FRANCHESCA DIANNE D. TUAZON., ET.AL.: ASSESSMENT ON THE INTERACTION OF PEDESTRIAN MOBILITY WITH THE TRAFFIC FLOW CONDITION AT JASA - SAN MATIAS, GUAGUA, PAMPANGA INTERSECTION

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