

## **ASSESSMENT OF A ONE-WAY POLICY IN A MAJOR ROAD: THE CASE OF QUEZON AVENUE IN VIGAN CITY, ILOCOS SUR**

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### **ABSTRACT**

*This study focused on the assessment of a one-way policy in a major road in the City of Vigan Philippines. It aimed to characterize the area, pedestrians and level of service of intersections; analyze the perceptions of respondents on the necessity, acceptability and impact of the one-way scheme and test the relationships between perceptions and attributes of the respondents. It is recommended that the city government of Vigan should enact a “No loading” policy and minimal time for unloading of passengers and a “Give way to Pedestrians” policy for maximum safety. It is suggested that the traffic enforcers should strictly implement traffic rules, laws, and regulations found in the Land Transportation and Traffic Code of the Philippines. The City government should adopt some environmentally sustainable transport strategies in the pursuit of a sustainable development of the city of Vigan without sacrificing its legacy as a world heritage site.*

**Key Words:** Major Road, Traffic Management, Environmentally Sustainable Transport

## **1. INTRODUCTION**

### *1.1 Background of the Study*

In 2001 Vigan became a city and was declared as a UNESCO world heritage site and there was a remarkable growth in population, transportation system, and economic status. Many areas have developed new centers of business enterprises. The development of big shopping malls, banks, opening of new schools, construction of hotels, preservation of ancestral houses and other establishments in the poblacion part of the city have generated traffic congestion. All these developments of many new centers of activities are places where most people would want to go and correspondingly demand for transportation.

Quezon Avenue, a major road, is one of the main thoroughfares in the central business district (CBD) of the city of Vigan, a world heritage site. At present Quezon Avenue is on a one-way scheme by virtue of Ordinance Number 12, series of 1993 and it was further discussed in the Traffic Management Ordinance of 1995. The said major road is considered as one of the main accesses to the different collector roads of the city of Vigan, vehicles are parked on one side of the road and as a result the capacity of the road is observed to be affected. Flow or vehicular volume is an indicator of road capacity. Information on the volume-to-capacity ratio (V/C) and level of service (LOS) provides the planner and the local official a basis for improving the traffic condition of the roads in Vigan City that would help the traffic enforcers and planners to provide mitigations to solve traffic problems.

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### 1.2 Objectives of the Study

The study assessed the implementation of the one-way policy along Quezon Avenue, Vigan City, Ilocos Sur.

The study has the following specific objectives:

1. To characterize the major road under study
2. To gather parking data
3. To determine the average speed of vehicles that travel along Quezon Avenue
4. To determine the volume of pedestrians crossing Quezon Avenue
5. To determine the level of service of the intersections
6. To characterize the respondents' attributes and analyze the perceptions of respondents on the necessity, acceptability and impact of a one-way scheme.
7. To test the relationship between level of necessity and the characteristics of respondents, and to compare the level of necessity and level of acceptability towards the one-way scheme policy.

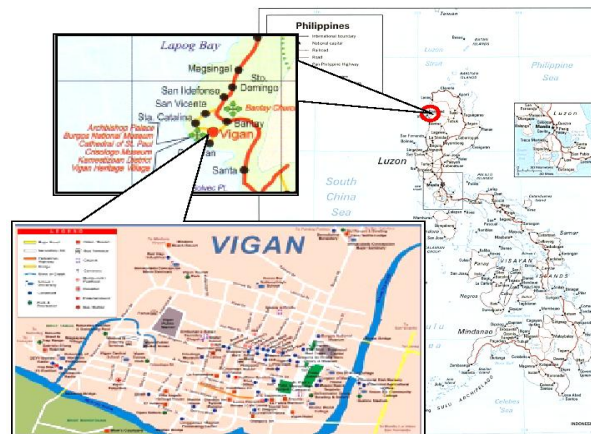
### 1.3 Significance of the study

The result of the study will surely help the engineering department of the local government of Vigan City in their effort to address traffic problems such as road accidents, congestion, pollution and energy problems which heavily confront the authorities concerned with traffic rules and management.

The result will also provide essential empirical data on the traffic conditions, issues, and concerns of the city which are considered as prime movers of the LGUs as far as traffic management policy formulation and implementation are concerned.

### 1.4 Scope and Limitations

The study focused on assessing the one way policy along Quezon Avenue, Vigan City, Ilocos Sur as shown in Figure 1. The information presented in this paper was limited to the data gathered during the conduct of road inventory, parking patrol survey, spot speed survey, pedestrian survey, and traffic volume count as well as from the perspective of the respondents on one way scheme along Quezon Avenue, Vigan City.



**Figure 1. Location Map of Vigan City**

## 2. METHODOLOGY

The researcher coordinated with the Vigan City Administration. Pieces of information needed in this study were gathered by road inventory survey, parking patrol survey, spot speed survey, and pedestrian volume survey. Traffic volume count was employed to establish information on the profile of the major road under study. A survey questionnaire was used to gather data relative to the level of acceptability and the level of attainment of the scheme.

Road inventory was done to be able to determine the present geometric condition of the road, and to determine the presence of traffic control devices and traffic characteristics of the said major road. Parking patrol survey was conducted to determine the duration of vehicles parked On-street along Quezon Avenue during the one-hour period survey on February 8, 2008. Spot speed survey was implemented to determine the average speed of vehicles randomly selected. A trap of 20 meters was established along the roadside of mid-block, General Luna street and Salcedo Street on September 28, 2008. Pedestrian Survey was conducted on October 8, 2008 to establish information on the number of pedestrians crossing the crosswalk or pedestrian lane. Likewise, jaywalkers were also considered in the survey. Traffic volume count was conducted for a period of ten hours (10) from 7:00 A.M. to 5:00 P.M. on September 10, 2005 and September 19, 2009. Manual counting was employed for every 15-minute interval considering the types of vehicle plying at selected intersections. A template for capacity analysis for Planning and Operational Method used by the Traffic Engineering Center (TEC), Metro Manila Development Authority (MMDA) and the Traffic Engineering and Management (TEAM), Department of Public Works and Highways (DPWH) was used by the researcher to derive the volume-to-capacity ratio (V/C) and identify the level of service of the intersections for the peak-hour periods. The Level of Service and Volume-to-Capacity ratio for the traffic signal analysis, criteria for intersection used for the Philippine Highways and prescribed by the Department of Public Works and Highways are presented in Table 1.

**Table 1. Traffic Signal Analysis Criteria for Intersections**

Level of Service (LOS)	Volume/Capacity Ratio (V/Cap)	Description
A	Less than 0.20	Free flow traffic
B	0.21 to 0.50	Free flow traffic
C	0.51 to 0.70	Moderate traffic
D	0.71 to 0.85	Moderate heavy traffic
E	0.86 to 1.0	Heavy traffic
F	> 1.0	Force flow, Stop and go

The researcher a used survey questionnaire Form ( Figure 2) to assess the perception of Bigueños, residents of Vigan City toward the implementation of the one-way policy in the major road, that is Quezon Avenue, Vigan City. The study utilized the combination of purposive and simple random sampling procedure in the selection of respondents in the study. Purposive because only Bigueños, residents of Vigan City, were involved in answering the survey questionnaire for the study. *Slovin's* formula (Vizcarra, F.D., 2003) was used to determine the 787 respondents which were chosen at random. The survey was undertaken on February 8 to March 10, 2010 in the different barangays of the City of Vigan. The responses for each question were tallied according to the frequency of responses for each item in the survey questionnaire. Likewise the researcher

considered key informant interview (KII) that established related information that would support the findings of the study.

To determine the level of necessity of the one-way scheme, the level of attainment of the objectives of the one-way scheme, the level of acceptance of the safety rules in crossing a road or intersection, and level of attitudes of Bigueños towards one-way. A *Five-Likert Scale Method* (Wiersma, W., 2000) was the criterion used as the basis for the analysis of data. The descriptive ratings and equivalent ranges of the options used are shown in Table 2.

Figure 2. Survey Questionnaire Form

**SURVEY QUESTIONNAIRE FORM**

**Dear Respondent/s:**

Please put a checkmark (✓) beside the appropriate answer or write the data/information needed that correspond to your response. Your answers will be used for the research study entitled "Assessment of One-Way Policy in a Major Road :The Case of Quezon Avenue in Vigan City, Ilocos Sur" to assess the one-way scheme implemented by the city government along Quezon Avenue. Your answers will be treated with strict confidentiality.

FRANKLYN T. AMISTAD,MSCE

1. Name: \_\_\_\_\_

2. Address: \_\_\_\_\_

3. Sex:     Male     Female

4. Age: \_\_\_\_\_

5. Civil Status:  Single     Separated     Widow/Widower  
 Married     Single Parents

6. Educational Attainment:

<input type="checkbox"/> Elementary Level	<input type="checkbox"/> College Level
<input type="checkbox"/> Elementary Graduate	<input type="checkbox"/> College Graduate
<input type="checkbox"/> High School Level	<input type="checkbox"/> Post Graduate
<input type="checkbox"/> High School Graduate	<input type="checkbox"/> Others )Pls. Specify _____

7. Average Monthly Income:

<input type="checkbox"/> > 20,500	<input type="checkbox"/> 6,501 – 10,000
<input type="checkbox"/> 17,001- 20,500	<input type="checkbox"/> 3,001- 6,500
<input type="checkbox"/> 13,501- 17,000	<input type="checkbox"/> 3,000 or below
<input type="checkbox"/> 10,001-13,500	

8. Vehicle Ownership: ( Please indicate the number of vehicles Owned)

<input type="checkbox"/> Own a Car	<input type="checkbox"/> Own a Truck
<input type="checkbox"/> Own a Single Motorcycle	<input type="checkbox"/> Horse Drawn Vehicle
<input type="checkbox"/> Own a Tricycle	<input type="checkbox"/> Others (Pls. Specify) _____

Directions: Please indicate the level of assessment on the following statements by checking the appropriate column	Very Much Needed (5)	Much Needed (4)	Needed (3)	Not Much Needed (2)	Not Needed (1)
<b>A. Necessity of ONE-WAY SCHEME</b>					
<b>B. Objectives of establishing a ONE-WAY scheme</b>					
1. Increase safety level or reduce incidence of accidents	Very Much Attained (5)	Much Attained (4)	Attained (3)	Not Much Attained (2)	Not Attained (1)
2. Ensure a harmonious and comfortable environment by reducing air pollution					
3. Promote conservation of energy					
4. Increase road capacity for pedestrians					
5. Improve the well-being of pedestrians.					
<b>C. Pedestrian Attitude towards Walking on the ONE-WAY Street like Quezon Avenue</b>					
1. I like walking on the side walks	Very much Followed (5)	Much Followed (4)	Followed (3)	Not Much Followed (2)	Not Followed (1)
2. Walking is a smart activity to improve my well-being.					
3. I am willing to walk short distances in daily life.					
4. I like to walk and stroll not within the side walks					
5. I prefer a street with a good scenery for walking.					
6. I prefer a street with good surroundings possibly with a short detour.					
7. I prefer walking on a busy street like the Quezon Avenue possibly with a short detour.					
8. I prefer walking with the shortest route when the surroundings are not pleasant.					
<b>D. Driving Attitude along ONE-WAY Street</b>					
1. I like driving in one-way street					
2. Park vehicle/s on one side of a street following the flow of traffic					
3. Park on the left side of street not following the flow of traffic					
4. Park vehicles near the intersection					
5. Park vehicle on a crosswalk/pedestrian lane					
6. Park vehicle within 6 meters near the intersection					
7. Park vehicle within "No Parking " signs					
8. Park vehicle on roadway side of such vehicle					
9. Park vehicle within or upon a sidewalk					
10. Prefer drive a vehicle under the influence of liquor or narcotic drug					
11. Drive vehicle along one way street with speed greater than 20 KPH					
12. Drive on a One-way street moving North bound (Moving to the North) from 7:00Am to 7:00 PM at Quezon Avenue.					

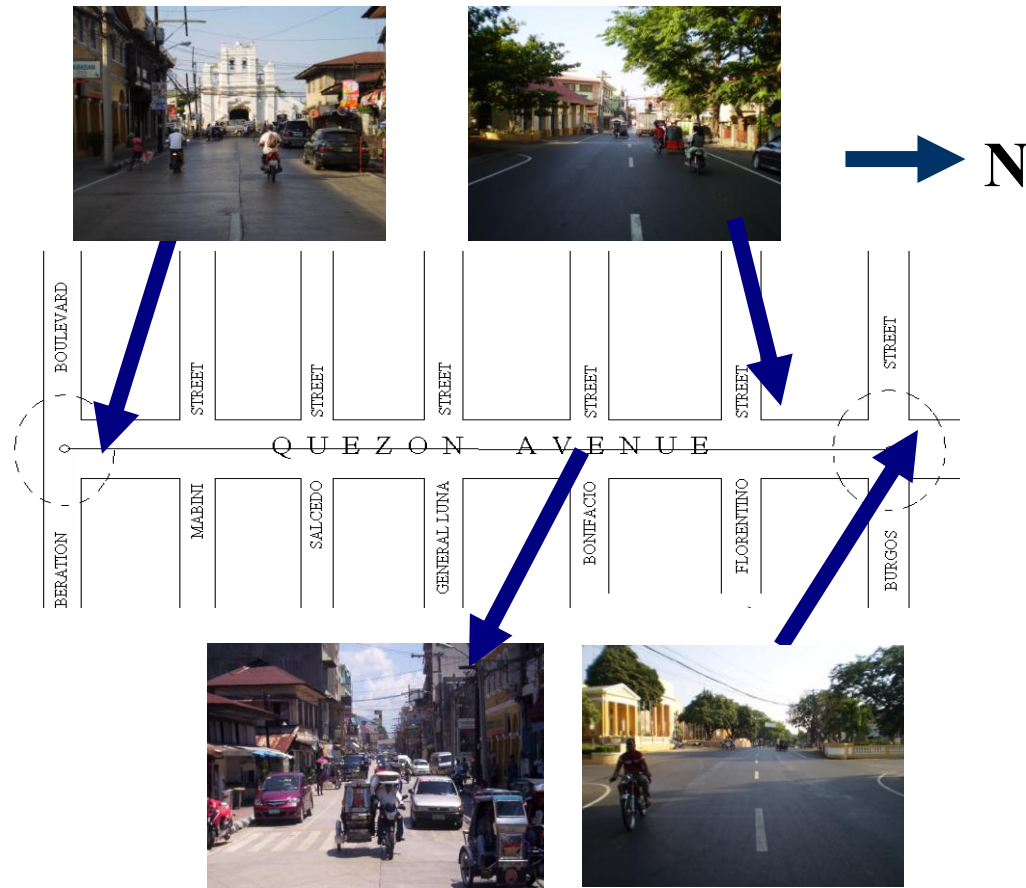
**Table 2.** Descriptive Ratings and Equivalent Ranges of the Options Used

Option	Descriptive Rating for the Level of Attainment of the Objective of One-way Scheme	Descriptive Rating for the Level of Attitudes towards the One-way Scheme	Descriptive Rating for the Level of Necessity of One-way Scheme	Equivalent Range	Descriptive Rating
5	Very much attained	Very much followed	Very much needed	4.21-5.0	Very high
4	Much attained	Much followed	Much needed	3.41-4.20	High
3	Attained	Followed	Needed	2.61-3.40	Average
2	Not much attained	Not much followed	Not much needed	1.81-2.60	Low
1	Not attained	Not followed	Not needed	1.01-1.80	Very low

### 3. RESULTS AND DISCUSSION

#### 3.1 Traffic Characteristics of the Major Road Under Study

The major road under study is Quezon Avenue, Vigan City (Figure 3; pictures were taken by the author). It is parallel to the minor road of P. Burgos, Florentino, Bonifacio, General Luna, Salcedo, Mabini, and Liberation Boulevard. The intersections along Quezon Avenue are unsignalized. The said major road is one of the main thoroughfares of the city located at the central business district (CBD) and believed to be the avenue to the different vital installations of the city (e.g. university, colleges, schools, churches, government offices, etc.). At present Quezon Avenue is on one-way scheme from 7:00 a.m. to 7:00 p.m. based on the Vigan Traffic Management Ordinance 1995 and on the Transportation Code of the City. The intersections along Quezon Avenue have four movements except Quezon Avenue-Burgos Street with six movements. The major road under study have good sight-passing distance. Since the intersections along Quezon Avenue are unsignalized, they regulate the drivers and pedestrians to consider awareness and take responsibility when crossing the road. Likewise, traffic enforcers are visible to control and manage traffic in the intersections on a regular basis because there are unregulated stoppage of vehicles and loading and unloading near the intersections especially on local tricycles that cause the unstable flow of traffic. It was observed that during the peak hours, cars, tricycles, single motorcycles contributed much to the worsening of the traffic situation of the city. Likewise, some of the buses and trucks are contributing to the said traffic situation of the aforesaid major road of the city. The non-motorized vehicle *calesa* (horse-drawn utility vehicle) also contributes to the unstable flow of traffic. Because of the present configuration, Quezon Avenue is one of the busiest road in the City.



**Figure 3.** The major road, Quezon Avenue, and the parallel minor roads in Vigan City, Ilocos Sur

### 3.2. Vehicle on Street-Parking

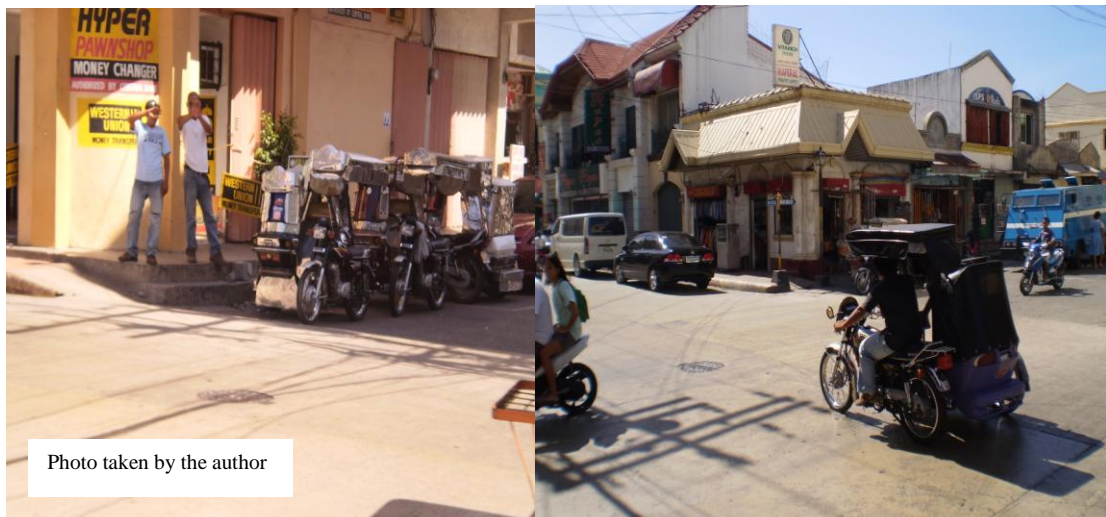
Table 3 shows the distribution of vehicles on street-parking along Quezon Avenue during the conduct of parking patrol survey on February 8, 2008. The table reflects that about 18% (77) vehicles are parked about 46 minutes to 1 hour in the morning. While more than 12 % (55) vehicles are parked for about 46 minutes to an hour during the afternoon of the same day of survey.

Single motorcycles have the most number of vehicles parked. About 36% (153) are parked at the eastern portion of Quezon Avenue while 23% (98) of these types of vehicles are parked at the western portion of the said major road. For cars, there are about 16% (67) that are parked on-street at the western portion and about 2% (6) were counted at the eastern lane. The non-motorized vehicles have the least number of vehicles parked on-street less than 1% (4 and 3) for the eastern and western slots, respectively.

In is noticed in Figure 4 that vehicles occupy the sidewalks which obstruct the way for the pedestrians. Figure 5 also shows that vehicles do not follow the traffic rules which prohibit drivers to park their vehicles within 6 meters from the section as stated in Republic Act 4136 and the provision in the Traffic Code of Vigan City. Likewise some vehicles are parked near or within the “No Parking” traffic signs.



**Figure 4.** Vehicles parked at the eastern part of Ouezon Avenue



**Figure 5** Vehicles are parked near the intersection which is within 6 meters from the intersection

**Table 3.** Distribution of Vehicles Parked Along Quezon Avenue, Vigan City on February 8, 2008

Duration	Eastern Slots at Quezon Avenue						Western Slots at Quezon Avenue						Grand Total	%
	Bi-cycle	Single Motor-cycle	Tri-cycle	Car	Truck/Bus	Total	Bi-cycle	Single Motor cycle	Tri-cycle	Car	Truck/Bus	Total		
<16 min.	0	6	2	1	1	10	0	27	15	16	0	58	68	16.04
16-30 min.	0	8	4	0	2	14	1	17	5	10	1	33	47	11.08
31-45 min.	1	11	6	2	3	23	0	4	3	5	0	12	35	8.25
46-60 min.	0	43	3	0	0	46	2	25	1	3	2	31	77	18.16
Sub-Total	1	68	15	3	6	93	3	73	24	34	3	134	227	53.53
<b>PM</b>														
<16	1	7	1	1	0	10	0	13	19	17	3	52	62	14.62
16-30 min.	2	12	4	2	3	23	0	6	2	12	1	21	44	10.38
31-45 min.	0	19	7	0	2	28	0	1	5	2	0	8	36	8.49
46-60 min.	0	47	0	0	0	47	0	5	1	2	0	8	55	12.98
Sub-total	3	85	12	3	5	108	0	25	27	33	4	89	197	46.47
TOTAL	4	153	27	6	11	201	3	98	51	67	7	223	424	
%	<b>0.94</b>	<b>36.09</b>	<b>6.37</b>	<b>1.41</b>	<b>2.59</b>	<b>47.40</b>	<b>0.71</b>	<b>23.11</b>	<b>12.03</b>	<b>15.80</b>	<b>1.65</b>	<b>53.30</b>		100

### 3.3. Speed of Vehicles

The comparative mean speed of vehicles in kilometers per hour is presented in Table 4. Among the 171 different transport modes taken as samples during the spot survey conducted on September 28, 2008, bus has the lowest speed with a mean of 14.26 kilometers per hour while single motorcycle has the highest speed with a mean of 19.65. The overall mean speed of the vehicles during the survey is 18.84 kilometers per hour. The said speed of vehicles is below the maximum speed stated in Republic Act 4136 which is 30 kilometers per hour for Municipalities and Cities in the Philippines.

**Table 4.** Comparative Mean Speed of Vehicles in Kilometers Per hHour (KPH)

Type of Vehicle	Frequency	%	Mean Speed (Kilometer per hour)	Over All Mean Speed (Kilometer per hour)
Car	72	42.11	19.47	18.84
Tricycle	37	21.64	18.29	
Single Motorcycle	40	23.39	19.65	
Bus	11	6.43	14.26	
Truck	11	6.43	18.15	
Total	171	100		



### 3.4. Pedestrian

The distribution of pedestrians per hour by sex along the major road, Quezon Avenue, is shown in Table 5. It is noticed that 10-11 in the morning has the highest number of pedestrians moving across Quezon Avenue during the conduct of the pedestrian survey on October 8, 2008. This observation is true because during these hours, Bigueños, residents of Vigan City, and visitors from other places visit the different business establishments along and near Quezon Avenue. This is so because majority of the business establishments in the Central Business District of Vigan City are open during these hours. It is shown in the table that 79% (1389) just cross the street not within the crosswalk or pedestrian lane while 21% (365) cross on the crosswalk. It was noted that some pedestrians cross the street even if some vehicles are moving.

**Table 5.** Distribution of Pedestrians Per Hour by Sex Along the Major Road, Quezon Avenue

Time	Direction						Grand Total	%
	Within Crosswalk			Not Within Crosswalk				
	Male	Female	Total	Male	Female	Total		
7:01-8:00	15	20	35	15	7	22	57	3.25
8:01-9:00	18	25	43	42	37	79	122	6.96
9:01-10:00	22	8	30	58	59	117	147	8.38
10:01-11:00	13	27	40	243	254	497	537	30.61
11:01-12:00	9	15	24	80	94	174	198	11.29
12:01-1:00	16	28	44	68	128	196	240	13.68
1:01-2:00	12	16	28	45	75	120	148	8.44
2:01-3:00	10	25	35	28	39	67	102	5.81
3:01-4:00	18	20	38	19	24	43	81	4.62
4:01-5:00	25	23	48	36	38	74	122	6.96
Total	158	207	365	634	755	1389	1754	
%			20.81			79.19		100

### 3.5. Level of Service (LOS)

Table 6 presents the comparative data on the level of service (LOS) of the different intersections in Vigan City during the two-way scheme on September 10, 2005. The table reflects that Quezon Avenue-Burgos Street intersection has a level of service of C, moderate traffic for the morning and D moderate heavy traffic for the afternoon peak hour period. Thus, drivers can maneuver the vehicles with control. The same description is said to be suitable for urban places like the Vigan City. Meanwhile, Quezon Avenue- Florentino Street, Quezon Avenue- Bonifacio Street, Quezon Avenue-General Luna Street, and Quezon Avenue-Salcedo Street Intersections have levels of service of F described as forced flow and stoppages may occur which cause a delay of about 3 to 6 minutes or more and may result to a high density of vehicle queues. This suggests that there is a need to improve the intersection and rerouting of some vehicles is needed. Likewise, the intersections are warranted for signalization.

**Table 6.** Comparative Data on the Level of Service of the Intersections During the Two-Way Scheme, September 10, 2005

Intersection	Time	V/Cap	LOS	Remark
Quezon Ave.- Burgos St.	11:01-12:00 AM	0.70	C	Moderate Traffic
	4:01-5:00 P.M	0.77	D	Moderate Heavy Traffic
Quezon Ave.- Florentino St.	10:01-11:00A.M.	1.25	F	Forced Flow
	3:01-4:00 P.M.	1.49	F	Forced Flow
Quezon Ave. – Bonifacio St.	10:01-11:00 A.M.	1.34	F	Forced Flow
	3:01-4:00 P.M.	0.77	D	Moderately Heavy Traffic
Quezon Ave.- General Luna St.	11:01-12:00 A.M.	0.89	E	Heavy Traffic
	4:01-5:00 P.M.	1.35	F	Force Flow
Quezon Ave.- Salcedo St.	10:01-11:00 A.M.	0.84	D	Moderately Heavy Traffic
	4:01-5:00 P.M.	0.79	F	Moderately Heavy Traffic

The comparative data on the level of service (LOS) of the different intersections with and without tricycles passing the Quezon Avenue, Vigan City during the one-way scheme on September 19, 2009 is shown in Table 7. The table reflects that intersections in Quezon Avenue-Florentino Street, Quezon Avenue- Bonifacio Street, and Quezon avenue-General Luna Street experience stop and go or force flow with a level of service (LOS) described as F. While Quezon Avenue-Burgos Street and Quezon Avenue-Salcedo Street have a level of service of D for the morning and for the afternoon peak hour period, respectively, and described as moderately heavy traffic to heavy traffic, thus, the drivers can maneuver the vehicles with control. With these descriptions, there is a need to re-route some motored vehicles to reduce the volume of the vehicles along Quezon Avenue.

When the same intersections are analyzed without tricycles passing along Quezon Avenue the level of service (LOS) of the intersections is C described as moderate traffic. This description is justified by the value of the volume-to-capacity ratio that ranges from 0.51 to 0.69. This description is said to be suitable for urban places like Vigan City.

**Table 7.** Comparative Data on the Level of Service of the Intersections During the One-Way Scheme With and Without Tricycles Along Quezon Avenue, September 19, 2009

Intersection	Time	With Tricycle			Without Tricycle		
		V/Cap	LOS	Remark	V/Cap	LOS	Remark
Quezon Ave.- Burgos St.	11:01-12:00 AM	0.75	D	Moderate Heavy Traffic	0.69	C	Moderate Traffic
	4:01-5:00 P.M	0.70	C	Moderate Traffic	0.56	C	Moderate Traffic
Quezon Ave.. Florentino St.	10:01-11:00 A.M.	1.18	F	Forced Flow	0.60	C	Moderate Traffic
	3:01-4:00 P.M.	1.12	F	Forced Flow	0.55	C	Moderate Traffic
Quezon Ave. Bonifacio St.	11:01-12:00 A.M.	1.16	F	Forced Flow	0.66	C	Moderate Traffic
	4:01-5:00 P.M.	1.15	F	Force Flow	0.64	C	Moderate Traffic
Quezon Ave.- Gen. Luna St.	10:01-11:00 A.M.	0.89	E	Heavy Traffic	0.55	C	Moderate Traffic
	4:01-5:00 P.M.	0.72	D	Moderate Heavy Traffic	0.51	C	Moderate Traffic
Quezon Ave.- Salcedo St.	10:01-11:00 A.M.	0.97	E	Heavy Traffic	0.65	C	Moderate Traffic
	4:01-5:00 P.M.	0.83	D	Moderately Heavy Traffic	0.55	C	Moderate Traffic

### 3.6 Respondents' Attribute

The attributes of the respondents is shown in Table 8. There are more male respondents (635 or 81%) than female respondents (152 or 19%). Majority (502 or 64%) of the respondents are 15-29 years old, 390 or 50% are married while 385 or 49% are single.; 357 or 46% and 221 or 28% are college level and college graduates, respectively; 325 or 42% have income greater than 6,500 pesos monthly; 317 or 41% own a single motorcycle.

**Table 8.** Respondents' Attributes

<b>Profile</b>	<b>No.</b>	<b>%</b>
<b>Sex -</b> Male	635	80.69
Female	152	19.31
<b>Age –</b> 15-29	503	63.91
30-44	170	21.60
45-59	102	12.96
60 and above	12	1.53
<b>Civil Status -</b> Single	385	48.92
Married	390	49.56
Separated	2	0.25
Single Parent	4	0.51
Widow/er	6	0.76
<b>Educational Attainment</b>		
Elementary level	6	0.76
Elementary graduate	20	2.54
High School Level	64	8.13
High School graduate	113	14.37
College level	357	45.36
College graduate	221	28.08
Post graduate	6	0.76
<b>Ave. monthly income</b>		
> 20,500	8	1.02
17,001-20,500	4	0.51
13,501-17,000	30	3.81
10,001-13,500	67	8.51
6,501-10,000	216	27.45
3,001-6,500	173	21.98
3,000 or below	215	27.32
No response	74	9.40
<b>Vehicle Ownership</b>		
Own a car	59	7.49
Own a truck	7	0.89
Own a tricycle	196	24.90
Own a single motorcycle	317	40.28
Own a horse drawn vehicle	1	0.13
Others	13	16.67

### 3.7. Level of Necessity of the One-way Scheme

The level of necessity of the pedestrian scheme is presented in Table 9. The table shows that the level of necessity of one-way scheme along Quezon avenue a major road in Vigan City is “High” as justified by the overall mean rating of 3.71 which means that the scheme is much needed in the city because of the so many vehicles plying around the central business district of the city.

**Table 9.** Level of Necessity of the One-way Scheme along Quezon Avenue

Level	No.	%
Very Much Needed	164	20.84
Much Needed	295	37.48
Needed	269	34.18
Not Much Needed	52	6.61
Not Needed	7	0.89
As a whole	3.71	
Level	<b>High</b>	

### 3.8. Level of Attainment of the Objectives of Establishing the One-way Scheme

In any kind of endeavor, there are objectives to be attained and this project is not an exception. Table 10 presents the level of attainment of the objectives of establishing the one-way scheme in Vigan City. A mean rating of 3.42 which means a “high” level of attainment of objectives of the one-way scheme was achieved. This indicates that the objectives set by the city government and the planners were well attained.

**Table 10.** Level of Attainment of the Objective of Establishing the One-way Scheme

Objective	Mean	Descriptive Rating
1. Increase safety level or reduce incidence of accidents	3.48	Much attained
2. Ensure a harmonious and comfortable environment by reducing air pollution	3.54	Much attained
3. Promote conservation of energy	3.43	Much attained
4. Increase road capacity for pedestrians and vehicles	3.35	Attained
5. Improve the well-being of pedestrians	3.28	Attained
As a whole	<b>3.42</b>	<b>High</b>

### 3.9. Level of Attitudes of Bigueños Towards Walking on the One-way Streets along Quezon Avenue

The level of attitudes of Bigueños towards walking on the one-way street along the Quezon Avenue is presented in Table 11. It reveals that attitudes indicated are accepted by the Bigueños as justified by a mean that ranges from 3.09 to 3.52 which can be described as followed and much followed, respectively. As a whole, the attitudes towards walking of Bigueños have an overall mean of 3.26 which can be concluded “average” level of acceptability.

**Table 11.** Level of Attitudes of Bigueños Towards Walking on the One-way Streets along Quezon Avenue

Attitude	Mean	Descriptive Rating
I like walking on the side walks.	3.52	Much followed
Walking is a smart activity to improve my well- being.	3.43	Much followed
I am willing to walk short distances in daily life.	3.33	Followed
I like to walk and stroll not within the sidewalks.	3.11	Followed
I prefer a street with walkways and good scenery for walking.	3.25	Followed
I prefer a street with good surroundings possibly with a short detour.	3.17	Followed
I prefer walking on a busy street like Quezon Avenue possibly with short detour.	3.09	Followed
I prefer walking with the shortest route when the surroundings are not pleasant.	3.17	Followed
<b>As a whole</b>	<b>3.26</b>	<b>Average</b>

### 3.10. Level of Driving Attitudes of Bigueños on the One-way Scheme Along Quezon Avenue

The level of driving attitudes of Bigueños on the one-way street along Quezon Avenue is presented in Table 12. It reveals that driving attitudes indicated are accepted by the Bigueños as justified by a mean that ranges from 3.310 to 1.381 which can be described as followed and not followed, respectively. As a whole, the driving attitudes of Bigueños have an overall mean of 2.475 which can be concluded “low” level of acceptability of the attitude presented to them. This indicates that the respondents are aware of the traffic rules.

**Table 12.** Level of Driving Attitudes of Bigueños on the One-way Scheme Along Quezon Avenue

Attitude	Mean	Descriptive Rating
I like driving in a one-way street	3.310	Followed
I park vehicle/s on one side of a street following the flow of traffic.	3.029	Followed
I park on the left side of street not following the flow of traffic.	2.750	Followed
I park vehicles near the intersection.	2.590	Not much followed
I park vehicle on a crosswalk/pedestrian lane.	2.535	Not much followed
I park vehicle within 6 meters near the intersection.	2.663	Followed
I park vehicle within “No Parking” signs.	2.309	Not much followed
I park vehicle on the roadway side of such vehicle.	2.453	Not much followed
I park vehicle within or upon a sidewalk.	2.270	Not much followed
I prefer to drive a vehicle under the influence of liquor or narcotic drug.	1.381	Not followed
I drive a vehicle with speed greater than 20 Kph	2.194	Not much followed
I drive on a one-way street moving north bound (Moving to the North) from 7:00 am to 7:00 Pm along Quezon Avenue.	2.208	Not much followed
<b>As a whole</b>	<b>2.475</b>	<b>Low</b>

### 3.11. Establishing the Relationship Between the Level of Necessity of A One-way Scheme Along Quezon Avenue and the Profile of Residents in Vigan City

The relationship between the level of necessity of a one-way scheme and the profile of residents in Vigan City is presented in Table 13. It was found out that the civil status ( $\chi^2=17.397$ ), educational attainment ( $\chi^2= 18.478$ ) and average monthly income ( $\chi^2= 60.707$ ) have significant relationships. It implies that regardless of civil status, educational attainment and average monthly income of the respondents they feel the necessity of having a one-way scheme along Quezon Avenue to increase safety, ensure a harmonious and comfortable environment by reducing air pollution, increase the road capacity and other objectives in the implementation of a one-way scheme like the one in Quezon Avenue.

**Table 13.** Summary of the Relationship Between the Level of Necessity of One-way Scheme Along Quezon Avenue and the Profile of the Respondents

Variable	Statistics	Value	Tabular Value
Sex	$r_{pb}$	0.026	1.960
Age	$\chi^2$	4.827	12.592
Civil Status	$\chi^2$	17.397*	12.592
Educational Attainment	$\chi^2$	18.478*	15.507
Average monthly income	$\chi^2$	60.707*	21.026
Vehicle Ownership	$\chi^2$	7.933	12.592

\* Significant at 0.05 level

### 3.12. Comparison Between the of Level of Attitudes Towards Walking and the Level of Driving Attitudes of Bigueños Towards the One-way Scheme Along Quezon Avenue

Table 14 shows that there is a significant difference at 0.05 level found between the level of attitude towards walking and the level of the driving attitudes of Bigueños towards the one-way scheme along a one-way street as justified by a computed t-value of 3.031 which is higher than that of the tabular value of 2.101. This implies that there is a wide gap in the attitude towards walking and the driving attitudes of the Bigueños towards the creation and implementation of the one-way scheme along Quezon Avenue.

**Table 14.** Comparison between the Level of Level of Attitudes Towards Walking and the Level of Driving Attitudes of Bigueños Towards the One-way Scheme Along Quezon Avenue

Variables	Mean	SD	t-value	Tabular value	Interpretation
Level of Attitude Towards Walking	3.260	0.447	3.031*	2.101	Significant
Level of Driving Attitudes	2.475	0.632			

\* Significant at 0.05 level

#### 4. SUMMARY

The major road under study is Quezon Avenue, Vigan City parallel to the minor road of Burgos, Florentino, Bonifacio, General Luna, Salcedo, Mabini and Liberton Boulevard.

In the morning, there are 93 vehicles parked at the Eastern slots of Quezon Avenue, while 134 vehicles are parked at the Western slots of Quezon Avenue. In the afternoon, 201 vehicles are parked at the Eastern slots of Quezon Avenue while 223 vehicles are parked at the Western slots of Quezon Avenue.

The average speed of vehicles that travel along Quezon Avenue are the following: Car (19.47 KPH), Tricycle (18.29 KPH), Single motor ( 19.65 KPH) , Bus ( 14.26 KPH), Truck ( 18.15 KPH) and as a whole the mean speed of vehicles that travel along Quezon Avenue is 18.84 KPH.

Among the 1,754 people who cross Quezon Avenue daily, 365 are within crosswalk while 1,389 are not within crosswalk.

It was found out that the Level of Service (LOS) of the majority of the intersections during the implementation of the two-way scheme at Quezon Avenue is "F" described as force flow or stop and go. When one-way scheme was analyzed the LOS of the intersections are "F" , "E", and "D" described as force flow or stop and go, heavy traffic, and moderate heavy traffic, respectively. When the intersections were further analyzed with the assumption that tricycles do not traverse along Quezon Avenue, it was derived that the LOS is "C" for all intersections described as moderately traffic.

The respondents of the study are 635 males and 152 females; 503 are 15-29 years old; 390 are married while 385 are single; 357 are on the college level while 221 are college graduates; 604 earn P 3,000.00 below up to P 10,000.00 a month; 317 own single motors, 196 own tricycles while 59 own cars.

The level of necessity of a one-way scheme has a mean rating of 3.71; the level of attainment of the objectives of establishing a one-way scheme has a mean rating of 3.42; the level of attitudes of Bigueños towards walking on a one-way street like Quezon Avenue has a mean rating of 3.26; the level of driving attitude of Bigueños on the one-way scheme along Quezon Avenue has a mean rating of 2.475.

There is a significant relationship between the level of necessity of the one-way scheme along Quezon Avenue and the following attributes of the respondents: civil status ( $\chi^2=17.397$ ); educational attainment ( $\chi^2= 18.478$ ); and average monthly income ( $\chi^2= 60.707$ ).

There is a significant difference between the level of attitude towards walking and the level of driving attitude ( $t = 3.031$ ).

#### 5. CONCLUSIONS

Based on the findings of this study the following conclusions were drawn:

1. The major road under study is Quezon Avenue, Vigan City. The unsignalized intersections along Quezon Avenue have four movements except Quezon Avenue-Burgos Street with six movements. There are traffic control devices along Quezon Avenue.
2. Majority of the vehicles parked along Quezon Avenue are parked at the western slots of Quezon Avenue.

3. The highest mean speed traveled along Quezon Avenue is that of single motorcycles followed by car, tricycle, truck and the lowest is by bus.
4. Majority of the pedestrian crossings are not within crosswalk.
5. Majority of the intersections' level of service during the one-way scheme are "D" and "F" during the morning and afternoon peak-hour period.
6. The level of necessity of a one-way scheme along Quezon Avenue is "high"; the level of attainment of the objectives of establishing a one-way scheme is "high"; the level of attitudes of Bigueños towards walking in the one-way street of Quezon Avenue is "average"; and the level of driving attitudes of Bigueños on the one-way scheme along Quezon Avenue is "low".
7. There is a significant relationship between the level of necessity of the one-way scheme along Quezon Avenue with educational attainment, civil status, and average monthly income, while there is no significant relationship between the level of necessity of the one-way scheme along Quezon Avenue and the following: sex, age, and vehicle ownership.

## 6. RECOMMENDATIONS

1. Planners should adopt the Manual on Uniform Traffic Control Devices (MUTCD) and the Highway Safety Standard-Part 2: Road Signs and Pavement Marking Manual of the Department of Public Works and Highways. Also recommended is that the LGU should assess the adequacy of traffic control devices available in the major roads and the collector roads in their respective service areas to ensure safety on the road.
2. Traffic policies in Republic Act 4136 also known as the Land Transportation and Traffic Code of the Philippines concerning traffic laws, rules, and regulations should be implemented.
3. It is recommended that the city should amend the speed set in the city of Vigan of 35 KPH to 30 KPH to be in uniform with other LGU.
4. Pedestrian crossing should be found within crosswalks and LGUs should enact ordinances prohibiting jaywalking and mandating a "Give way to pedestrian" policy in the city.
5. There is a need to re-route some motored vehicles to reduce the volume of vehicles along Quezon Avenue especially during peak hours.

The LGU should encourage the people to use non-motorized vehicles like bicycles, promote car pooling, and implement strategies on how to reduce conflict among street users such as pedestrians and drivers. The city government should adopt an Environmentally Sustainable Transport (EST) System and should consider improvement on urban planning of the city and implement mitigation measures to solve problems that are brought about by the inevitable growth of the different transport modes with the limited road space in the city of Vigan.

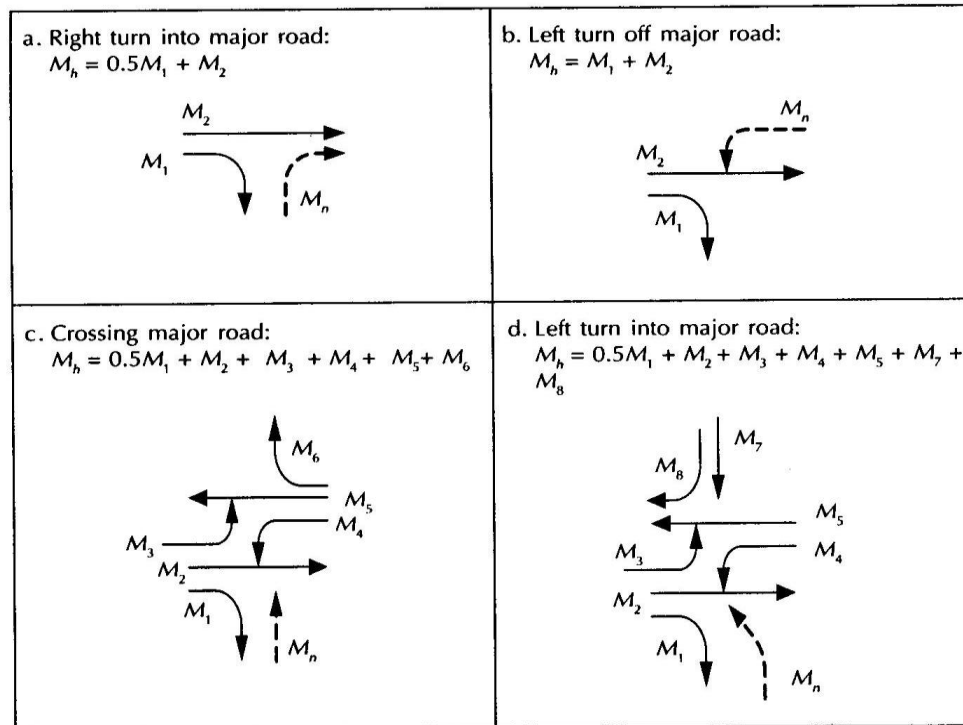


6. The Intersections require improvement. Traffic signals and geometric improvements may be necessary. The implementing agency and other researchers may verify the derived LOS by using a more appropriate method in analyzing unsignalized intersections. It is recommended that Planners and Researchers should analyze the structure of the major road traffic considering the major road traffic streams ( see figure 6 ).

LGU should consider the involvement of the public for the betterment of traffic management practices in the heritage city of Vigan.

7. Although sex, age, and vehicle ownership were found not to have a significant relationship with the level of necessity of the one-way scheme along Quezon Avenue, there is still a necessity for these categories to be oriented on the importance of having a necessity of a one-way scheme especially to the elderly.

Figure 6. Major Road Traffic Streams



Source: Organization for Economic Cooperation and Development 1978.

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