

Assessment of Localized Congestion on the Roads of the Ninoy Aquino International Airport 3 (NAIA 3), Pasay City, Manila

Clarence Clyde P. CARANDANG

Civil Engineering Student
Civil Engineering Department
De La Salle University – Manila
2401 Taft Avenue, Manila
Email: clarence_carandang@dlsu.edu.ph
Tel: +639174906392

Nicole Elizabeth G. CRUZ

Civil Engineering Student
Civil Engineering Department
De La Salle University – Manila
2401 Taft Avenue, Manila
Email: nicole_cruz@dlsu.edu.ph
Tel: +639178077114

Aldrin Jan N. OLEA

Civil Engineering Student
Civil Engineering Department
De La Salle University – Manila
2401 Taft Avenue, Manila
Email: aldrin_olea@dlsu.edu.ph
Tel: +639179225914

Alessandra PATIU

Civil Engineering Student
Civil Engineering Department
De La Salle University – Manila
2401 Taft Avenue, Manila
Email: alessandra_patiu@dlsu.edu.ph
Tel: +639172081870

Dr. Alexis M. FILLONE

Full Professor
Civil Engineering Department
De La Salle University – Manila
2401 Taft Avenue, Manila
Email: alexis.fillone@dlsu.edu.ph

Abstract: Ninoy Aquino International Airport 3 is the largest of the four terminals in Manila that houses international and domestic flights. It is separated into two areas, the departure and arrival areas. Since majority of people use vehicles in accessing the airport, the roads inside the terminal get congested due to high volume of cars present, especially during the peak season. The main objective of the study is to assess and identify the factors that cause congestion inside the arrivals area of NAIA 3 and to provide solutions to address these problems. Four data gathering methods were used in the study to identify and assess the factors that cause congestion in the area, namely, license-plate observations, parking survey, volume counting, and survey questionnaires. The results from the data are examined in relation to the traffic management of the airport to further improve the flow of vehicles in order to alleviate the congestion within the area.

Keywords: Ninoy Aquino International Airport, traffic management, localized congestion, parking study

1. Problem Setting

1.1 Background of the Study

Ninoy Aquino International Airport – terminal 3 is one of the three terminals that serve as the gateway to the Philippines. Terminal 3, being the largest terminal airport in Manila, houses the international and few domestic flights that are not being operated at Terminal 1, such as Cebu Pacific, Tiger Philippines, Emirates, Cathay Pacific, Singapore Airlines among others. In 1997, despite the improvements done, Terminal 1 was reported to reach its peak level of 7.7 million annual passengers. To address the overflowing number of passengers, terminal 3 was constructed with an area that can accommodate 13 million international passengers per year.

NAIA terminal 3 is separated into two parts, the departure area and the arrival area. The departure area is where vehicles pass through a ramp going up and the arrival area is the area below it. The arrival area of NAIA Terminal 3 splits the road into two sections, where the left one is mainly for taxi and the right one for private cars. Each section is composed of three lanes. Six hundred meters of curbside space is provided for drop-offs and pickups per level. The loading area allows vehicles

to pick-up passengers for two minutes only. Signs like no waiting and loading and unloading anytime are distributed along the pick-up area.

The arrival area consists of 3 parking spaces. One is a multi-level parking space that can accommodate up to 2500 cars with a flat rate fee of Php 40 and an overnight rate of Php 300. Another parking is for VIP, for government officials particularly. And the third parking lot is a surface parking in front of the terminal that provides space for over 1200 cars with a fee of Php 40 for the first three hours, Php 15 for every succeeding hour and a Php 300 for an overnight rate.

1.2 Statement of the Problem

There are a lot of people who travel around the world and one of their modes of travel is by air. In the Philippines, where tourists are abundant, there is an exceptional volume of people who come and go to and from the country by air. Since these people use vehicles in accessing the airport, limited access road and limited parking spaces are major concerns in NAIA 3. Therefore, with the two 3-lane roads of the NAIA Terminal 3, each for taxi and private cars, which are used to access arrival, departure and parking areas, queueing and waiting of vehicles are present in the roads of the study area even though private vehicles waiting and parking are not allowed.

1.3 Objectives

The main objective of the study is to assess and identify the factors that cause traffic congestion along the roads inside the arrival area of the compound of NAIA 3.

The study specifically aims to examine the traffic flow characteristics of the road within the compound of NAIA 3, to analyze the factors that cause traffic congestion and propose traffic management schemes for the improvement of vehicle flow, to analyze the parking characteristics in the parking facilities, to assess the parking demand and supply of the parking facilities in NAIA 3, to propose parking fees policies based on the characteristics of the parking facilities and to recommend further studies.

1.4 Significance of the study

Everyone in the country suffers from inconvenience of costs and delays caused by the effects of traffic congestion in the roads. These aggravating congestions in the vicinity of NAIA 3 caused by several factors will be alleviated by the use of the study. With the results of the study, policy recommendations were formulated for the reduction of negative impact of the situation and for the improvement of transportation system in the study area. The study will help obtain sustainable and economical transportation system for the convenience of the people using the roads.

2. Review of Related Literature

2.1 Efficiency of Airports

Abbott (2015) conducted a study about the efficiency of New Zealand's Airports entitled, "Reform and efficiency of New Zealand's Airports". His research is about the efficiency performance of New Zealand's three largest airports. The study shows how these airports improved through the years and the different factors affecting it. This study could aid the researchers because it has some data and analysis on the effect of traffic congestion to the three airports of New Zealand. It could be a basis in comparing the effectiveness of New Zealand's Airports compared to the Philippines' NAIA 3.

2.2 Airport Facilities

Part of what dictates how traffic flows in the vicinity of an airport is how efficient the facilities in the given airport are. Co, Saminiano and Victorio (2000) created transferable parameters for forecasting the needs of an airport. Among the several factors that influence what facilities an

airport would need is the mobility of the passenger within the airport. The arrival, departure and baggage claim areas were the main areas of observation. One of the relevant findings that can be utilized from the study is the unit parking demand and unit space per vehicle in their observed airports. With the better utilization of airport parking, more revenue for expansion can be generated, which as mentioned is one of the needs for Philippine airports, the lack of proper parking facilities is a cause for an increased number of “kiss and fly” passengers or passengers that get dropped off then picked up. There is a correlation between the type of surface access trip and the destination, whether international or domestic: domestic airports tend to house more long-term parkers while international airports attract more kiss and fly passengers. Either way, private cars still dominate surface access trips.

It was established in a study conducted by Cal, Dona, Lidasan and Manalang (2009) for EASTS entitled “Airport Location and the Intensity of Urban Concentration” that NAIA v violates several regulations and restrictions set forth by various aviation authorities such as the International Civil Aviation Organization or ICAO and the Federal Aviation Authority or FAA. In a study conducted for the article concerning the population density and the distance to the airport, it was noticed that the farther the distance from the airport, the less people inhabit the area. It is evident that the zoning policies that currently exist for the vicinity of the NAIA are not being implemented and it is also possible that unsuitable predictions were made. In the article “Planning for Sustainability: The Role of Airport Surface Access Strategies as a Means of Reducing the Dependency on the Private Car for Airport Access Trips”, airport surface access strategies were analyzed. by I. Humphreys and S. Ison. The lack of surface access capacity in the Philippine setting is palpable as congestion thrives in the vicinity of the NAIA.

“Estimation of Traffic Delays and Vehicle Queues at Freeway Work Zones” by Jiang (2011) from Transportation Research Board, conducted a study about the traffic delay and disruption of traffic flow caused by the traffic capacity and low vehicle speeds. The queuing system gives the passengers a time window for drop offs and pick-ups without negatively impacting the passenger waiting time. The queuing of cars at work zone contribute to the traffic delays in the roads which causes congestion.

This if found very useful for the condition of NAIA 3 because of the same problem. The virtual queuing done in this experiment can be one of the tools that can help minimize the problem in NAIA 3. The main problem specified in this study is the queuing system that results to congestion in airports. The queuing system failed to keep the automobiles out of the traffic condition. In relation to the present study, the theory discussed in this article will be used to estimate the traffic delays caused by waiting cars along the curbside of NAIA 3, which then results to traffic congestion.

3. Framework of the Study

3.1 Conceptual Framework

Figure 3.1 shows the basic concept of why there is traffic congestion in the vicinity of NAIA 3, Pasay city. The researchers have given three causes of this traffic condition, the main cause, other causes and the basic cause of traffic congestion in the area. The main cause is about the long queuing and waiting time of vehicles in the vicinity. It discusses the main problem and reason why there is congestion in NAIA 3. This explains that the cars waiting at the terminal could increase in number and could cause traffic congestion in the area. The other causes and basic include the surroundings, the capacity of the road and the road itself. These explain that the vicinity itself could be a factor and cause to the traffic congestion in NAIA 3.

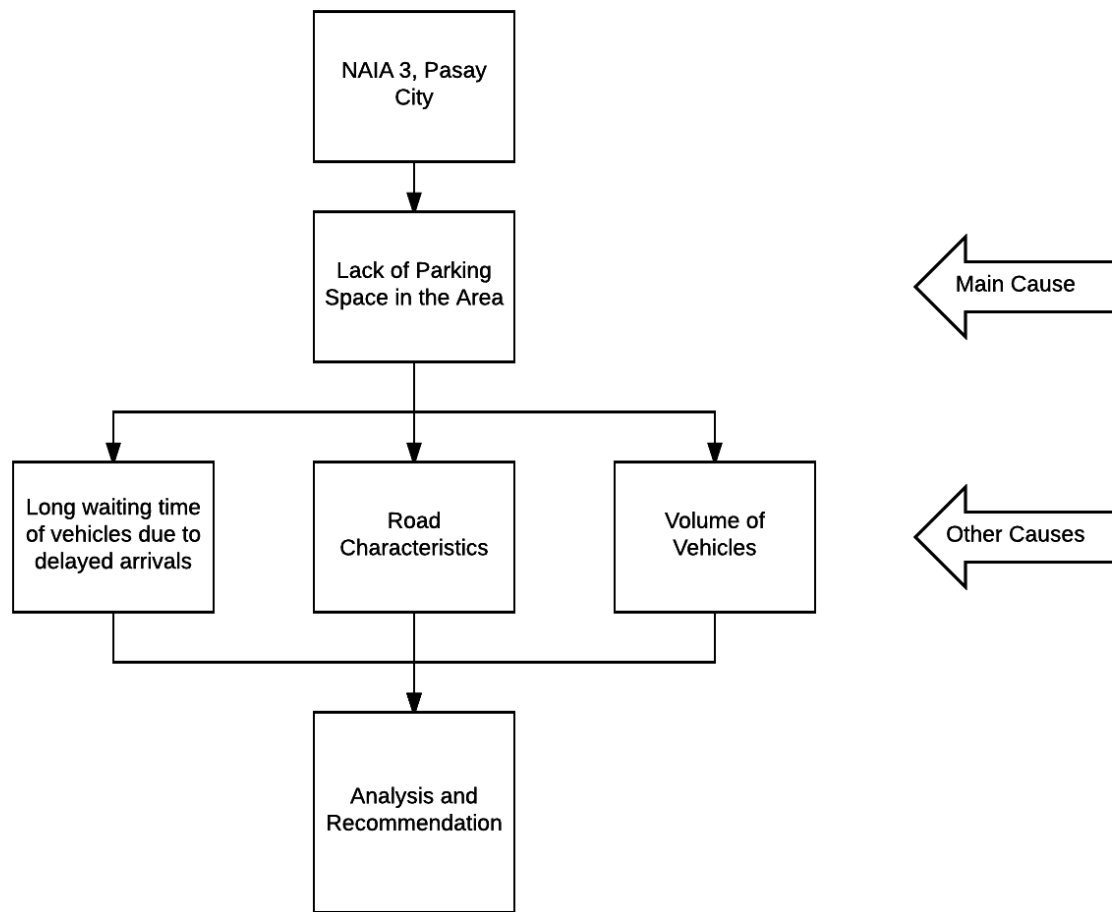


Figure 1. Causes of traffic congestion in NAIA 3

4. Methodology

4.1 Research Methods

There are four data gathering methods used in this study. The first method was license-plate observation from which the one-way road system of the study area was considered. In this method, two or more observers at two different points were designated to list, if possible, all of the passing vehicles at their designated points. The license-plates and time at which the vehicles traversed through the points are noted in this method. The second method was parking survey. In this method, vehicles on both open and multi-level parking were considered. The vehicles parked within the area were recorded every fifteen minutes within the whole duration of the survey. The third method was vehicle volume survey. Two or more observers recorded the number of vehicles passing through their designated points.

The analysis of the gathered data was derived through analytical, statistical and observational analysis. Traffic variables such as peak hour factor (PHF), travel time of vehicles, turnover rate, and duration. Empirical analysis was used in the questionnaires by evaluating, and comparing the results made.

4.2 Research Design

The study used the actual data from the methods mentioned before and from the processed data obtained from analytical, statistical and empirical analysis. The actual data obtained were travel time, volume of cars, and the relationship of the airport services to the road congestion. The processed data were PHF, PHV, turnover rate, duration, and travel time of vehicles.

The parameters including types of vehicle, the volume of vehicles and travel time were obtained from license-plate observations. The volume of vehicles parked was obtained from parking survey and vehicle volume count. The relationship of the airport to the road congestion was acquired through the distribution and collection of survey questionnaires. The PHF was acquired from the analytical analysis of volume counting.

The procedure of the topic is that the researchers would use four types of methods in order to get their data. These methods are the use of license-plate observations, parking survey, volume counting, and survey questionnaires. The first method would be achieved by setting up points to record plate numbers along the vicinity of NAIA 3, specifically the arrivals area. These points would be used as markers on where to record the plate numbers of the vehicles passing through. The second method was achieved through counting of parked vehicles on the parking areas. The third method was accomplished by counting and recording the volume of vehicles entering and leaving the vicinity. And the last method would require survey questionnaires in order to obtain the data. These questionnaires would be distributed in the vicinity of NAIA 3. After all the data has been gathered and recorded, the researchers would analyze if the acquired data is enough. If the data is not enough, the researchers would have to add more value to the target number of respondents to the data. If the data would be enough, it would be used to determine theoretical values used to analyze the situation of the traffic congestion of the area. After gathering the desired results, the researchers would then be able to assess the area and its traffic condition.

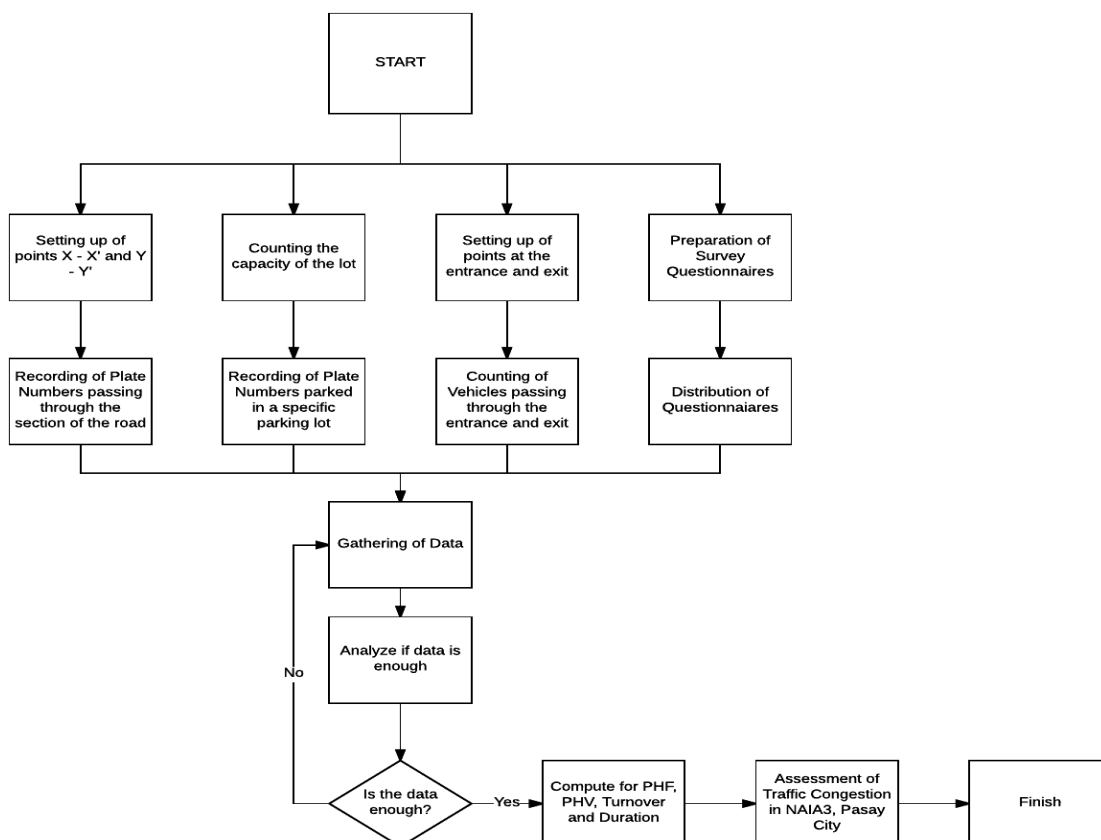


Figure 2. The flowchart of the research process

5. Analysis and Data Presentation

5.1 Vehicle Volume Survey

Vehicle volume survey was conducted from 6:00am until 6:00pm. Figure 3 shows the volume count of the points used as survey point, one is from the entrance and the other is from the exit. The area in between these two lines is shown to be the volume of vehicles within the vicinity of NAIA3. The area is shown to be large at the start of the data gathering but as time passes, it slowly lessens. Figure 4 shows the graph of vehicles within the vicinity of NAIA 3. From the graph, it shows that at 8:00am it has the highest volume of vehicles within the terminal. It has the largest difference as shown in Figure 3 and the highest value in Figure 4. The volume of vehicles within the vicinity of NAIA 3 by 5pm is low, which proves that by this time a lot of people have already left the vicinity. A lot of people are at the vicinity at the start of 6:00 am because it is by this time they already start waiting for the people they are picking-up or dropping off.

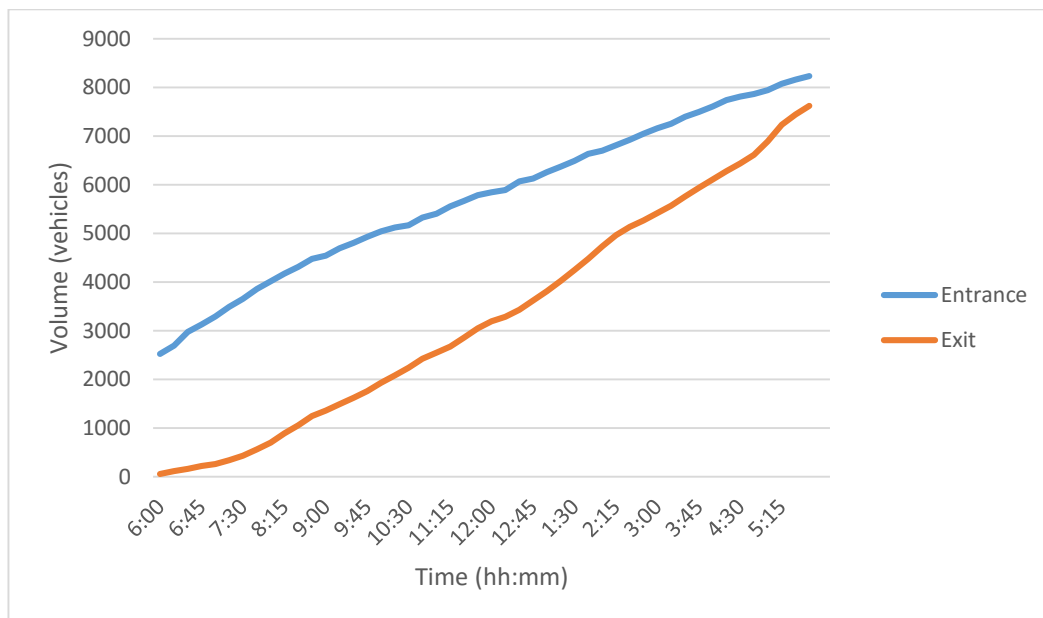


Figure 3. Volume Count of Entrance and Exit

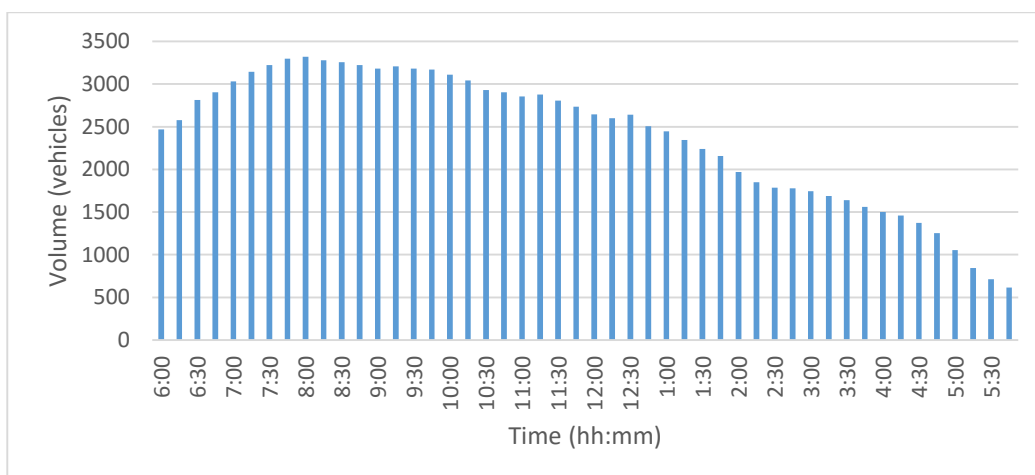


Figure 4. Volume of vehicles within the vicinity

Figure 5 shows the volume of cars entering the open parking lot in front of terminal 3. It shows that in the morning the volume of cars entering the parking lot are consistent. The volume of vehicles entering ranges from 15-30 vehicles for every 15 minutes. By 11:00am, there would be no

vehicles entering since the parking lot would be full. But after a while, the volume of vehicles entering would suddenly rise and more vehicles are inside the parking lot. The Average Delay for the whole data gathering is 52.53 min/flight. It is high and it could be a cause of more people to stay and wait for the person they are going to pick-up. This could cause a lot of people to compile and people would stay longer in the parking area where they parked. This could cause the parking lots to be more occupied and less chances of other people to park, which could cause traffic congestion within the vicinity of Terminal 3.

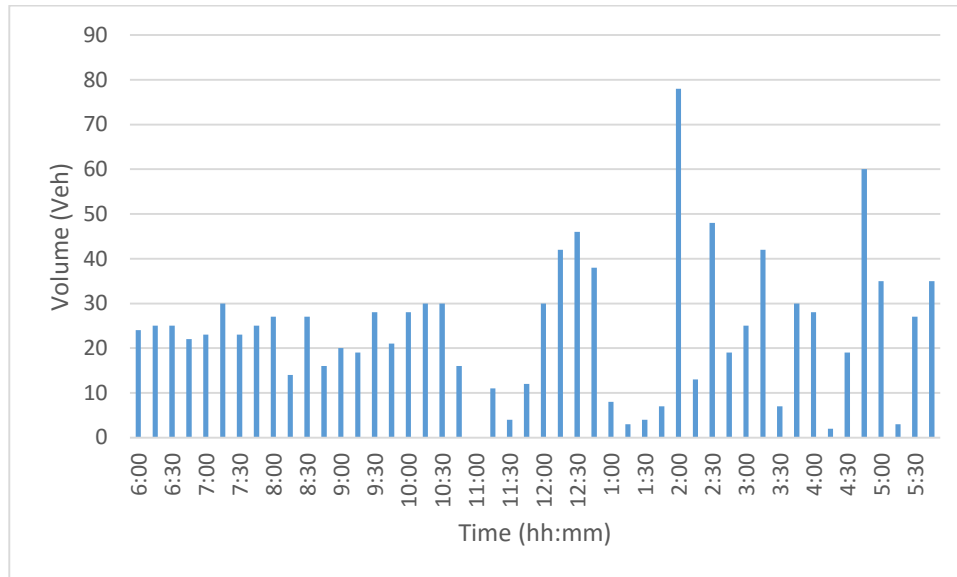


Figure 5. Volume of vehicles entering the Open Parking

Figure 6, Figure 7 and Figure 8 shows the volume of vehicles per road. Figure 6 shows the comparison of the two modes allowed in the road which are the bus and private cars while Figure 7 compared the volume of taxis and private vehicles. Figure 6 shows that during the morning, there is a large volume of vehicles passing through the Arrivals Area compared to the volume during the afternoon. There are only a few buses passing through the Arrivals area compared to the private vehicles. Figure 7 shows that the number of taxis and the number of Private Vehicles passing through the access road differs depending on the time. There are times that there are more Private Vehicles and sometimes there are more Taxis passing through. Figure 8 shows that total volume of vehicles passing through the departures area and it also shows the difference between the volume of Private Vehicles and Taxis. Compared to Figures 6 and 7, Figure 8 shows that during the afternoon there are more vehicles in the Departures Area compared to during the morning. This could be proven by getting the Peak Hour, Peak Hour Volume and Peak Hour Factor as shown in Table 1. Table 1 shows that the Peak Hour of using the Arrivals Area and Access Road is during the morning, exactly at 7:00am-8:00am for the Arrivals Area and 8:00am-9:00am for the Access Road. It is also shown that for the Departures Area, the Peak Hour is during the afternoon which is at 2:00pm-3:00pm.

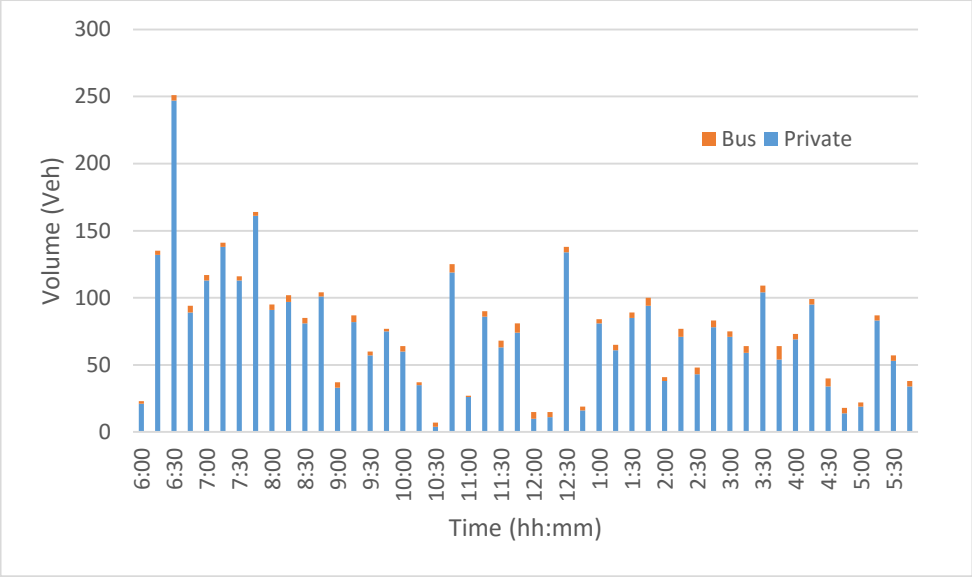


Figure 6. Volume of vehicles at the Arrivals Area

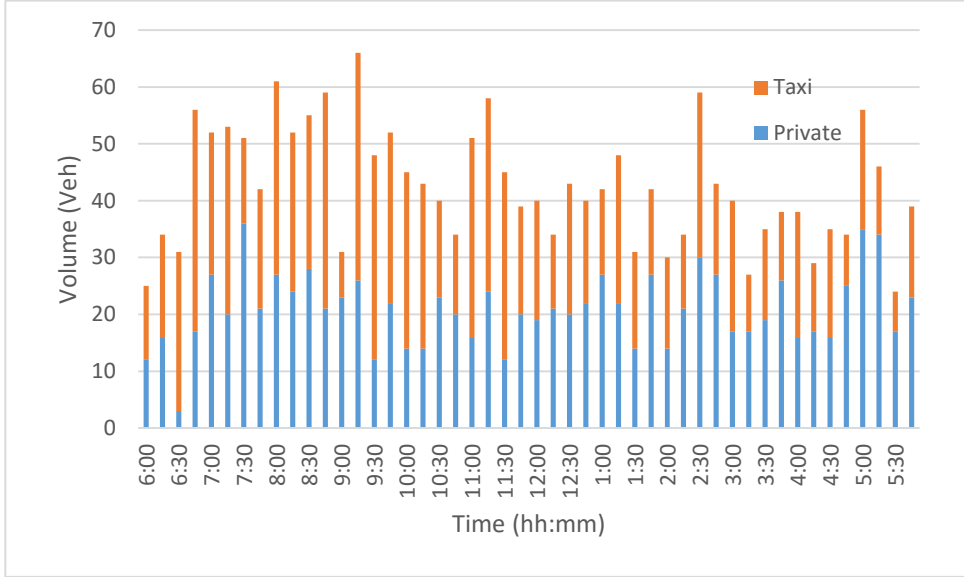


Figure 7. Volume of vehicles along the Access Road

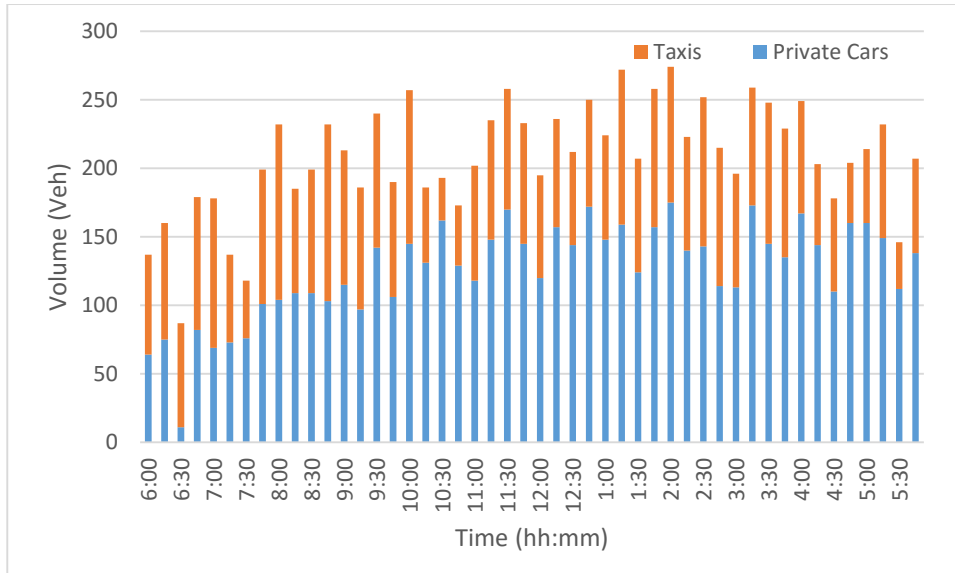


Figure 8. Volume of vehicles at the Departures Area

Table 1. Volume Studies

Road	Peak Hour	PHV	PHF
Arrivals Area	7:00am - 8:00am	538	0.820
Access Road	8:00am - 9:00am	227	0.930
Departures Area	2:00pm - 3:00pm	964	0.880

Table 2 shows the total delay in minutes of flights in terminal 3 during the date of study. It shows that during the early morning there were no delays for all the flights in the terminal. By 10:00am, it shows that it started to have delays in flights which have different values per hour. It does not affect the volume of vehicles within the vicinity since during the times there are delays for flights there is a low volume vehicles compared to the time that there are no delays. Figure 9 shows the comparison of delayed flights with the number of flights per hour. This shows that starting at 9:00am there a number of delayed flights that occur in the arrivals area of Terminal 3. Because of this delay in the arrival of flights in the airport, these could cause fetchers or people picking-up the passengers to stay longer especially to the people parked in the parking areas. This could cause people to wait a longer time and could affect the parking duration and the turnover rate of the parking areas.

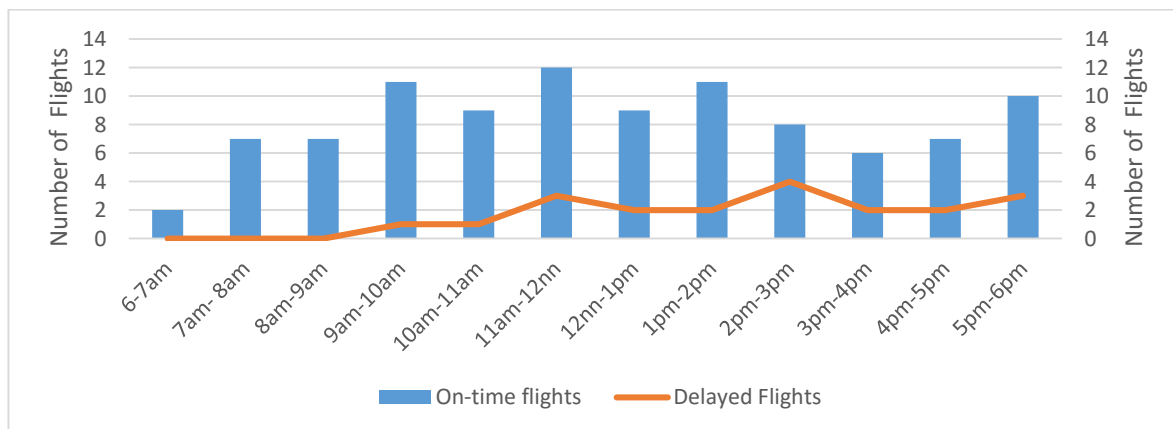


Figure 9. Number of delayed flights

Table 2. Total Delay Time of Flights

Time	Total Flights	Delayed Flights	Total Delay (mins)
6:00am - 7:00am	2	0	0
7:00am - 8:00am	7	0	0
8:00am - 9:00am	7	0	0
9:00am - 10:00am	12	1	0
10:00am - 11:00am	10	1	128
11:00am - 12:00pm	15	3	37
12:00pm - 1:00pm	11	2	93
1:00pm - 2:00pm	13	2	265
2:00pm - 3:00pm	12	4	139
3:00pm - 4:00pm	8	2	0
4:00pm - 5:00pm	9	2	91
5:00pm - 6:00pm	13	3	140
		Average Delay	52.53 min/flight

5.2 Parking Study

Table 3. Parking Parameters of the Multi-Level Parking and Open Parking

	Multi-level Parking	Open Parking
Total no. of vehicles parked	2366	1478
Total parking slots	1249	509
Time of study	12	12
Parking duration (hr/veh)	6.209	4.175
Turnover rate (veh/stall-hr)	0.158	0.242

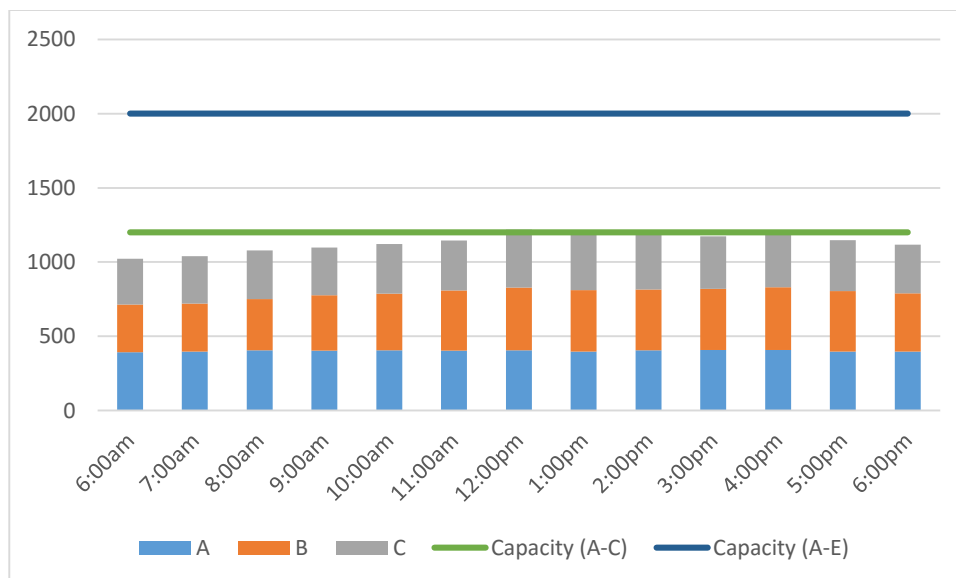


Figure 10. Volume of parked vehicles in the multilevel parking

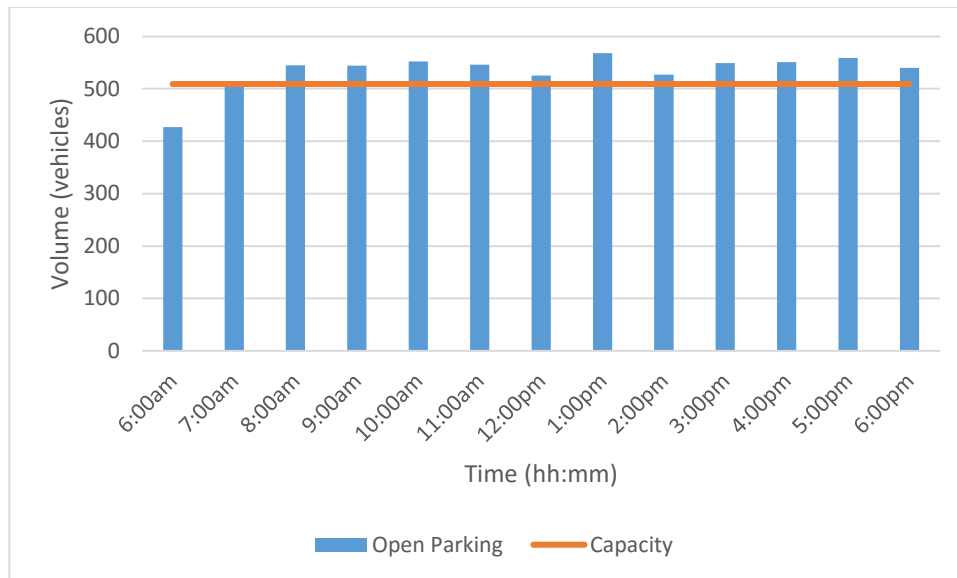


Figure 11. Volume of parked vehicles in the Open parking

The multi-level parking consists of 1249 parking spaces for the three levels while the open parking has allotted 509 parking slots. The total number of vehicles were counted to be 2366 for multi-level and 1478 for open parking. Parking duration is obtained as 6.209 hr/veh and 4.175 hr/veh for the multi-level and open parking, respectively, while turnover rate is obtained as 0.158 veh/stall-hr and 0.242 veh/stall hr, for the multi-level and open parking, respectively.

The multi-level parking is able to accommodate the demand for parking, early in the morning. Figure 10 shows a graph of the volume of vehicles parked in the multi-level parking while Figure 11 shows a graph of the volume of vehicles parked in the open parking. For Figure 10, the green line shows that capacity of floors A-C, while the blue line shows the capacity of the whole multi-level building from levels A-E. Levels D and E are not available to public since these are used by the employees and other VIPs of NAIA 3. As shown in Figure 10, starting from 12:00pm it is not able to accommodate the required parking and it even has exceeded the capacity of the parking level during this time. It is shown that there are illegally parked vehicles in both the multi-level parking and the open parking of NAIA 3. But if they would allow floors D and E, be open to the public it would be able to accommodate the required demand of parking of vehicles for both the multi-level and the open parking. In Figure 11, it is shown that from 8:00am onwards the capacity is exceeded and the parking lot is full. The extra number of parked vehicles is the same as the multi-level parking wherein the fetchers illegally park in available spaces in the parking space.

Given these data, it could be seen that the turnover rate is very low, less than 1 vehicle per space, and this occurs when a high volume of cars parked in the same space. It means there is less vehicle movement at an individual parking space and also indicates that the vehicles were parked for a long duration. Occupancy rates are high, which make congestion worse as people cannot easily find a parking space. The average parking duration indicates that the vehicles were parked for long hours. There is overnight parking also. Travelers are allowed to park overnight.

5.3 License Plate Observations

License-plate observation technique was done from 6:00am to 6:00 pm at the taxi loading area and private car loading area. The first and second beginning points of the observation were at the entry of taxis loading area and entry of passenger cars loading area, respectively. The number of vehicles were observed at the exit of arrivals area, which is also the end point that is same for both sections. The obtained data consists of the last three to four digits of the license plate number and the travel time of the vehicles observed along the road sections mentioned. The data produced some errors using this technique cause by missed plate observation, incorrect plate observation, and illegible or unusable data entry. In this case, the maximum vehicles that were matched was

equal to the minimum value from number of cars entered and number of cars exited (Maximum vehicles that can be matched = Min (Entered, Exited)).

Table 4. Number of Vehicles using License Plate Observations

Vehicle Classification (VC)	Number of Vehicles (entry)	Number of Vehicles (exit)
Passenger Car	3984	6463
Cabs/Taxis	1380	6463
	Sum = 5364	

The maximum number of vehicles that were matched are 1380 taxis and 3984 passenger cars. For taxis, 1191 out of 1380 taxis were matched and 189 (13.70%) were not matched due to invalid data entry. For passenger cars, 3274 out of 3984 were matched and 710 (17.82%) were not matched due to invalid data entry. 86.30% taxis and 82.18% passenger cars were matched. From table 4, the sum of the number of vehicles of the entry point for both sections did not exceed the number of vehicles at the exit point. These values have large discrepancy of 6463-5364 = 1099 vehicles because of the cars parked. Also, the time interval cannot cover all the cars entering and exiting.

Table 5. Number of Taxis Classified by Travel Time

Travel Time	< 15 minutes	15 – 30 minutes	30 – 1hour	> 1hour
Number of Taxis	688	121	130	257
Distribution	57.53%	10.12%	10.87%	21.49%

Table 6. Number of Passenger Cars Classified by Travel Time

Travel Time	< 15 minutes	15 – 30 minutes	30 – 1hour	> 1hour
Number of Passenger Cars	1416	419	438	1001
Distribution	43.25%	12.80%	13.38%	30.57%

Tables 5 and 6 shows the number of vehicles per how long the vehicles travelled or stayed along the road sections of the observation. In table 6, 1416 (43.25%) passenger cars only travelled less than 15 minutes along the section of the road, whereas, the remaining 1858 cars (56.75%) travelled more than 15 minutes. In the passenger car loading area, a car is only allowed for two minutes to idle/wait for fetching, otherwise, the traffic officers will make them leave. With the 2-minute allowed idling of vehicles, a maximum of 10-15 minutes will the vehicles travel along the road section. Meaning, 1416 (43.25%) passenger cars travelled from entrance of the loading area and immediately exited. While the remaining 1858 (56.75%) cars, when more than two minutes of idling is not allowed, would have parked in the parking spaces of the terminal. From data, the average travel time of 1416 passenger cars which travelled less than 15 minutes is 7 minutes and 5 seconds.

Unlike in the road section of passenger car loading area, the taxi loading area might have private rules by the terminal regarding the idling/waiting time of taxis, whereas, table 5 only shows the distribution of taxis per how long they travel from point to point.

In the study area, it was observed that some cars leave and return. This may be due to lack of parking space or high parking rate. From the data file, the average of re-entry times of passenger cars is 2.12 with a maximum of 15 times of re-entry. This shows that the drivers choose to leave and return to terminal instead of waiting to park and/or parking.

5.4 Survey Questionnaires

The survey results showed the different qualitative data for the research. The results show the different opinions of the people within the terminal, specifically the arrivals area, about the

terminal itself. The researchers gathered a sample size of 500 people. These 500 questionnaires were given to the fetchers of terminal 3 on 6 different days. The dates of the gathering of data for the survey questionnaires are March 23, May 11, May 16, May 19, May 21, and May 27, 2016. The researchers asked about different data about the terminal. According to the results, the people fetching in the arrivals area usually use their own private cars. A majority of them use this to access the airport. Between the multilevel parking building and open parking, more than half of the sample parked on the open parking area. The most common number of people being picked-up in the terminal is 1 people and the usual number of fetchers is just 1 person. The usual waiting time of the fetchers is from the range is 30-45 mins. The frequency of people going to Terminal 3 is that the people visit terminal 3 only twice a year. The researchers asked the 500 people on their opinion about the main reason of delay of pick-up. The results show in Figure 14 that the people agree that the main causes of late pick-up of people is by the delay of arrival of flight, there is no available parking space and that the pick-up area is congested. The last part of the questionnaire shows statements and the researchers would ask the 500 people if they agree to these statements or not. The top 5 statements the sample size agrees on is that there should be an MRT/LRT line in Terminal 3 and all the terminals of NAIA, if they would park for less than 30 minutes it would be free, there should be an alternate route for vehicles going back and forth Terminal 3, allow the use of trolleys in Parking areas.

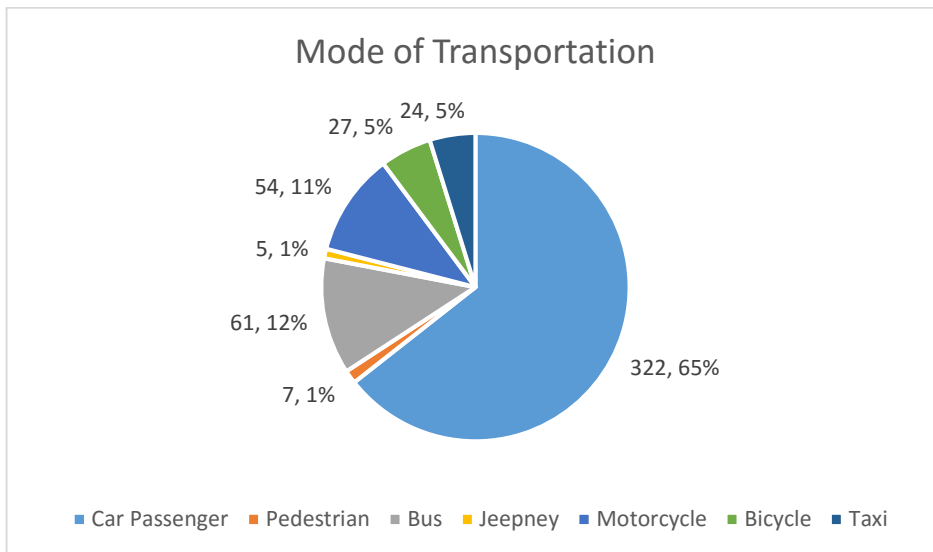


Figure 12. Survey Results on the sample’s mode of transportation

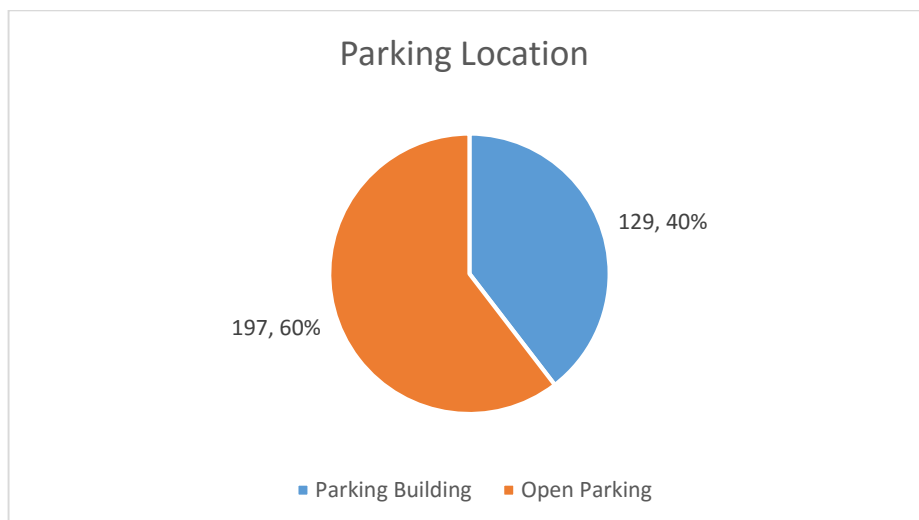


Figure 13. Survey Results on the Parking Location

Table 7. Survey results on number of fetchers vs. number of passengers

		number of pax					sum	%
		1	2	3	4	>5		
number of fetchers	1	82	30	15	6	3	136	27%
	2	68	40	21	10	4	143	29%
	3	59	33	9	4	4	109	22%
	4	34	24	5	3	1	67	13%
	>5	26	12	5	1	1	45	9%
	sum	269	139	55	24	13	500	100%
	%	54%	28%	11%	5%	3%	100%	

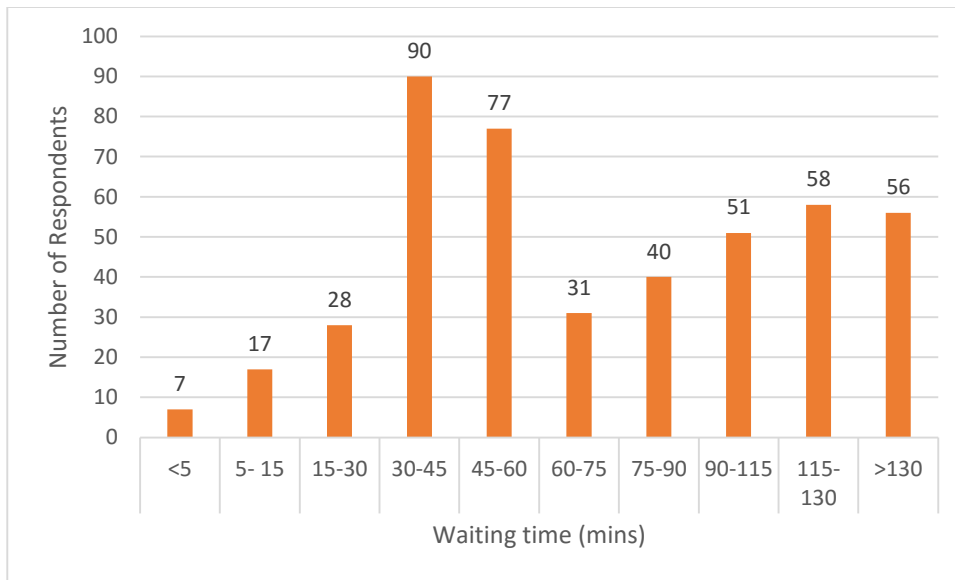


Figure 14. Survey Results on the waiting time since arrival in minutes

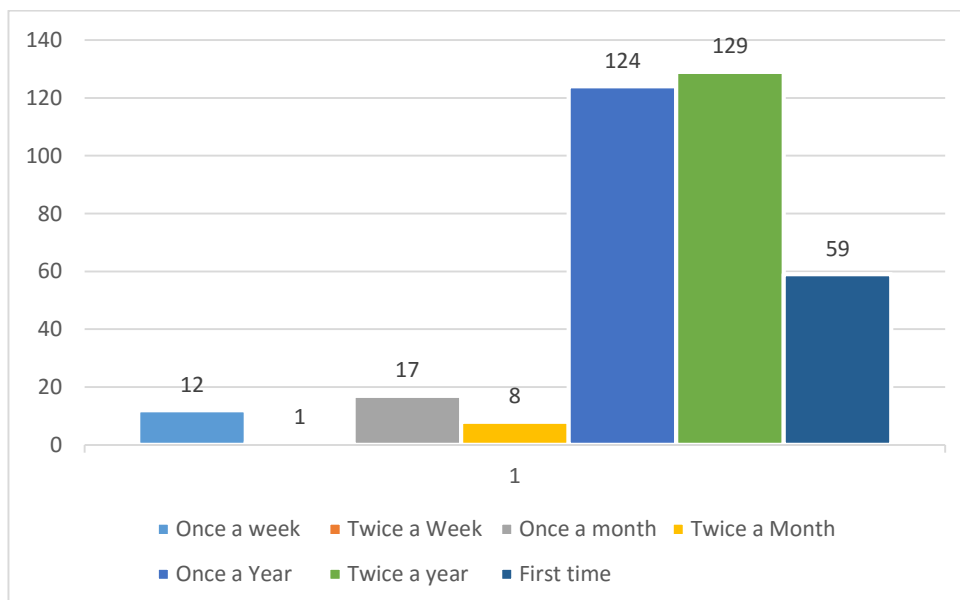


Figure 15. Survey Results on the frequency in Terminal 3

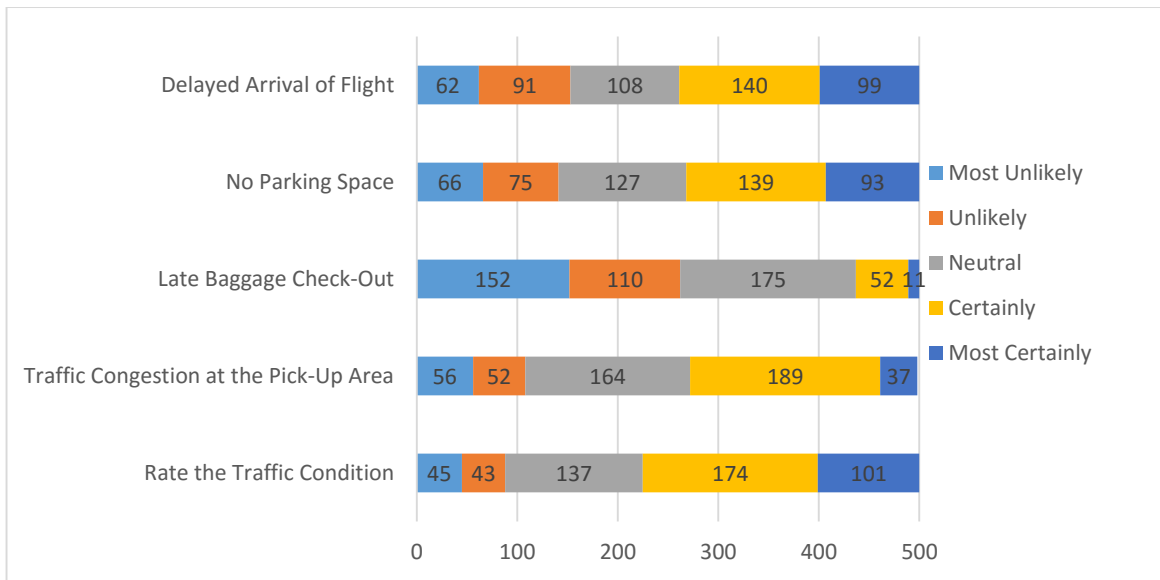


Figure 16. Reason for Delay of Pick-up

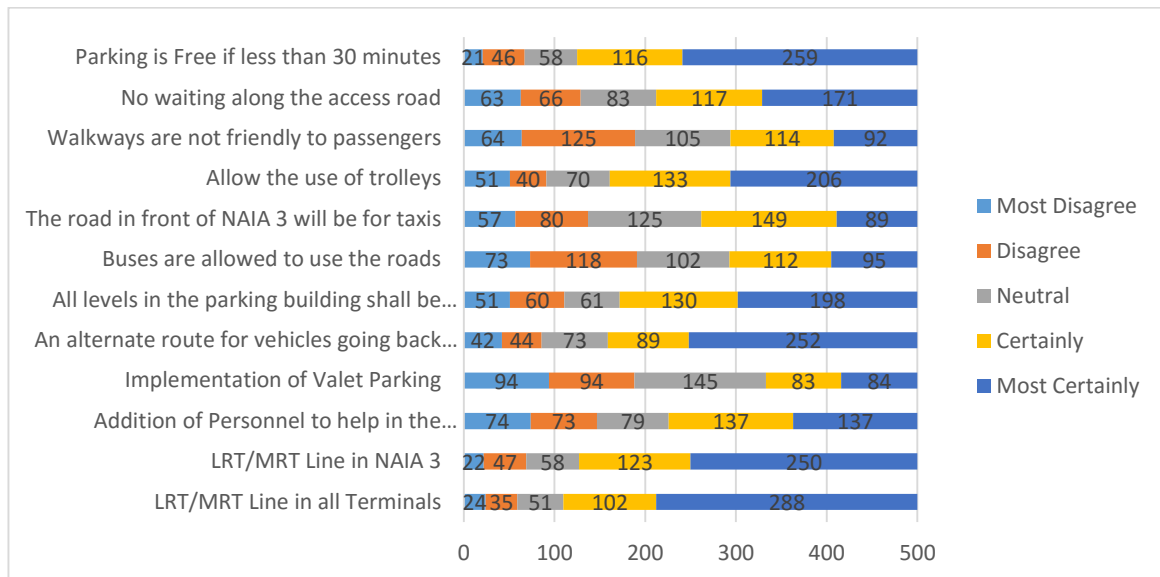


Figure 17. Analysis of Statements given

6. Conclusion

Based on the obtained data, the factor that causes traffic congestion was due to the lack of parking facilities within the study area. In the worst possible situation, the peak hour volume in the study area is 538 vehicles from 7:00am up to 8:00 am which is distributed to parking areas and arrival loading areas. Parking areas, both open parking and multi-level parking, in the study area are used by the public, airport employees and taxis. The allotted space for private cars in the open parking, with a total of 509 parking slots, can accommodate approximately 124 vehicles per hour. While the allotted space for private cars in the multi-level parking, with a total of 1249 parking slots, can accommodate approximately 198 vehicles per hour. In an hour, only 322 vehicles can be accommodated by both parking spaces in the terminal. Since there is only a 2-minute idling allowed in the loading area for private cars, drivers should find a place to park. From license-plate observation, 56.75% of entering private cars uses the parking spaces, while the remaining tend to leave immediately. Approximately 596 vehicles (59.75% of 1049 vehicles) uses the parking spaces but only 322 vehicles are accommodated meaning, the remaining 274 vehicles tend to wait. Due to

unserved vehicles, the volume of cars tends to increase, thus, congestion in the study area aggravates over time. Moreover, in this kind of situation, some drivers tend to exit and re-enter the terminal by driving around Andrews Avenue (road around the terminal) instead of parking. On an average, private cars have an average of 2.12 times of re-entering the terminal which is very inefficient for the drivers. The survey results show the different opinions of the people picking-up the passengers in Terminal 3. The sample size is 500 people. The data that the researchers gathered is that the average waiting time of people is around 30 up to 45 minutes and the people visit the terminal only twice a year. The results show that the main cause of long waiting time of passenger pick-up is because of the delayed arrival of flight, there is no parking space available and that the road for picking-up passengers is congested.

Parking capacity of the study aggravates the congestion of traffic. The parking capacity of both parking areas can not suffice the increasing volume demand of vehicles over time. Because parking lacks capacity, inconvenience to drivers due to re-entering the terminal is being experienced. Worst case is at morning where peak volume is being experienced.

7. Recommendations

It is recommended that there should be more parking space for the vehicles going to pick-up passengers. Levels D and E of multi-level parking should be open to the public. This is one of the factors that cause traffic congestion within the vicinity of NAIA 3. The researchers also suggest that for the parking spaces available within the terminal, if the people entering the parking area has stayed for just 30 minute the parking cost would be free. The researchers would recommend an implementation of a policy considering that the number of fetchers should also be equal to the number of persons to pick-up. The researchers would also recommend that there would be a route that would make a private for only people going back and forth the terminal. Lastly, the researchers recommend that there would be an LRT or MRT line serving all the terminals of Ninoy Aquino International Airport. It is recommended for future researchers to study and focus on a parking study considering overnight parking for Terminal 3. It is a study that could focus on that portion of the terminal and could learn its relationship with the traffic congestion of Terminal 3.

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