CHOICE ANALYSIS OF ACCESS AND EGRESS MODE: USE THE PEDICAB OR WALK?

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Abstract: When traveling for a short distance in the city of Manila, one can use the pedicab or walk. Given this, there are influencing factors that could affect a pedestrian when choosing either of the two modes. However, when using pedicabs, the safety of each passenger may be at risk.This may cause more congestion along roads because of its slow movement. Comparing and contrasting the efficiency of walking and using pedicabs along the the streets of Ermita, Manila as a mode of transportation is needed to determine the reasons of each individual. Through analyzing their responses, this paper would find more avenues to improve the safety and convenience of each passenger. This study uses the logit choice analysis to identify significant mode specific variables as well as qualitative variables like when choosing the pedicab or walking. The socio-economic variables of commuters such as income, and age were also considered. Logit model shows the probability outcome and identifies significant factors of pedestrian as they choose their access or egress mode. The results can be used in improving the transport services along Ermita, Manila, specifically the routes and rules for pedicab services and the infrastructural improvement and safety of sidewalks for pedestrians.

***Key words*:** non-motorized transport, walking, Logit model, City of Manila, access and egress mode

1. INTRODUCTION

1.1 Background of the Study

There are numerous modes of transportation types, especially in Metro Manila. In comparison with other countries, urban, and city planning are designed to provide easy access on each road through a few modes of transportation. However, in the Philippines, there are areas that limit passageways for large modes of transportation such as cars and busses to pass through. Because of this, smaller transportation modes were created wherein one of which is the pedicab. In the vicinity of Ermita, Manila, pedicabs are used for short trips around the area.

In the streets of Ermita, Manila, it is almost incapable of handling traffic, especially during rush hour. Pedestrians take pedicabs because of its convenience. Although considered to be convenient, the use of pedicabs can actually cause more harm than good to some passengers, as well as drivers because it is an informal form of transportation that may cause more traffic congestion.

1.2 Statement of the Problem

There are many factors that can be considered in deciding one's mode of transportation. Common factors include travel time, cost safety, efficiency, convenience, and availability. The focus of this study is in the vicinity of Ermita, Manila, where public transportation is limited to certain routes, thus

making commuting difficult going from one place to another, especially for shorter trips. Two of the most common means of transportation for short trips in Ermita are traveling by foot or by pedicab.

Pedicabs are non-motorized vehicles (NMV) which are commonly found in the cities and local areas in the Philippines. It provides quick, convenient transportation in both rural and urban areas especially for short-round trips. (Paragas, 2000). Walking has been described as near perfect exercise. Walking at a speed of 5km/hr will suffice the energy needed to meet the definition of moderate intensity physical activity. It is also a carbon neutral mode of transport which also addresses problems in climate change. (Ogilvie et al., 2007). Pedicabs in Ermita do not have real terminals for them to wait for passengers. Instead, they establish their own informal terminals which causes traffic congestion since it occupies parts of the road. For pedestrians, certain parts of Ermita have sidewalks where they can walk safely and others are obstructed with infrastructure, illegal vendors, parking spaces and vehicles.

In order to determine a more practical option, certain research problems are considered. These problems include the pros and cons of each option, health and safety factors, environmental concerns involved, most economical choice, and other possible alternatives.

1.3 Objective of the Study
The objective of this study is to recognize the various factors that affect the choice of access/egress modes of pedestrians along the streets of Ermita, Manila.

1.3.1 Specific Objectives
1. To determine the characteristics of pedestrians and commuters that affect their choice of access and egress mode.
2. To determine the important mode-specific variables that affect the choice of using an access/egress mode.
3. To determine other external factors such as the environment and the mindset of pedestrians when they choose their access/egress modes.
4. To recommend transport policies that could affect the passenger's convenience and safety and security in relation to choosing either to walk or use the pedicabs as a mode of transportation for short trips.

1.4 Assumptions
The researchers believe that the respondents will react positively to the conducted experiment as it will greatly aid them in choosing the right mode of transportation. It is also assumed that the results gathered from the respondent's will represent the people of Ermita, Manila. This in return will greatly help for the improvement of the community around Ermita, Manila.

1.5 Hypotheses
People tend to walk instead of using pedicabs since pedicabs tend to charge a high fare to their customers. Also in some cases, areas along Ermita, Manila are too congested, giving pedicabs a harder time to maneuver through the traffic, therefore prolonging their time to travel.

1.6 Scope and Delimitation of the Study
This study focused only on people who only wants to choose either walking or taking the pedicab in their short trips and not other modes of transportation. The experiment would also only address short trips being made around the vicinity of Ermita, preferably where pedicabs are stationed around known establishments such as malls, transit stations, hospitals, parks, and schools. In terms of distributing surveys, they were randomly given to people near the selected 10 stations.

1.7 Significance of the Study
This study is conducted to determine which option is preferred by people whether to use the pedicab or walk within the vicinity of Ermita, Manila. It could capture important information about mode of transportation and whether which one is more effective and efficient. With this information, a convenient mode of transportation system with regards to pedicabs and travelling by foot will be achieved. Data collected may also be utilized for future studies regarding the topic.

1.8 Operational Definition of Terms

1.8.1 Access Mode and Egress Mode - the mode used on the first or last mile of a traveler when moving from one place to another.

1.8.2 Pedicab - a pedal-based tricycle with a 2-seat passenger compartment covered by a usually folding top and a separate seat for a driver

1.8.3 Mode-specific variable - elements of the survey that are containing more information on the mode. Examples of this are Distance, Cost, and Time.

1.8.4 Socio-economic variable - elements that are containing personal and individual information of the respondent. Examples of this are Individual Income, Age, and Gender.

1.8.5 Factors - elements that are containing various circumstances that would affect the choice of mode of the respondent.

1.8.5.1 Safety - Rate on how secured the vicinity is from 1 to 5 wherein 5 states on how well protected respondents are from criminals it is while 1 would be how unprotected the vicinity is at all.

1.8.5.2 Travel Time - Rate on how fast they get to the destination from 1-5 wherein 5 states the quickest time of travel while 1 is the slowest travel time.

1.8.5.3 Accessibility - Rate on the availability of the specific mode of transportation wherein 5 states the easiest approach for respondents to their mode of transportation while 1 is the most difficult approach.

1.8.5.4 Willingness to Pay- This factor focuses on how the cost affects the distance of their origin and destination wherein 5 states the how favorable for them pay for a pedicab instead of walking while 1 is how hesitant for them to pay.

1.8.5.5 Aesthetics/Environment - Rating on cleanliness and surroundings from 1 to 5 wherein 5 states on a very hygienic vicinity and the comfortability of using their mode of transportation while 1 states on the very polluted vicinity, making the respondent uncomfortable to take their mode of transportation.

2. REVIEW OF RELATED LITERATURE

According to M. Ben-Akiva, "The methods of discrete choice analysis explains and predict given within two choices. One use of which would be between choosing modes of transport. Discrete possible outcomes are what being determined in this analysis. Logistic regression can be used for empirical analysis (Ben-Akiva, 2002). To support this principle, knowledge on Multinomial logit model is applied. According to the study by Hensher and Greene entitled The Mixed Logit Model: The state of practice, mixed logit models is considered to be the most suitable discrete choice model available as of now. The logit family of models is considered to be the most essential toolkit for analyzing discrete choices. It basically started with the simple binary logit model and was developed to multinomial logit model (MNL) and the nested logit (NL) model which became the most popular of the generalised logit models. With the study in Ermita, discrete choice analysis and multi nominal logit model are the main methods that are used. Nlogit is used to create a utility coefficient for variables. On the other hand, discrete choice analysis is used to get the probability of people using a specific mode.

3.THEORETICAL AND CONCEPTUAL FRAMEWORK

The study started with the identification of the ten (10) pedicab stations within Ermita, Manila. With this, the supply and demand on which the number of pedicabs used along the road is counted and compared to the number of people walking along the designated stations along Ermita, Manila. The data was then gathered as one of the basis of expected number of passenger and pedestrian respondents. The survey forms will then gather information on both pedicab drivers and pedestrians. The data was interpreted using two data handling techniques, namely descriptive survey method and analytical survey method. These methods was aided by a software called NLOGIT. The interpretations was evaluated to conclude the pedestrian behaviour and characteristics on pedicabs and walking.

The conceptual framework shows on how the group foresees the different type of aspects that will affect the choice of a person when given the choice of walking or taking the pedicab. As seen on Figure 3.1, three (3) main factors will affect the choice of a person, namely the mode characterization, environment, and the socio-characterization. The mode characterization focuses on the factors that are directly related the choice of transportation, while the socio-characterization focuses on the personal information of the respondent. The environment factor on the other hand, also affects the choice of a person.
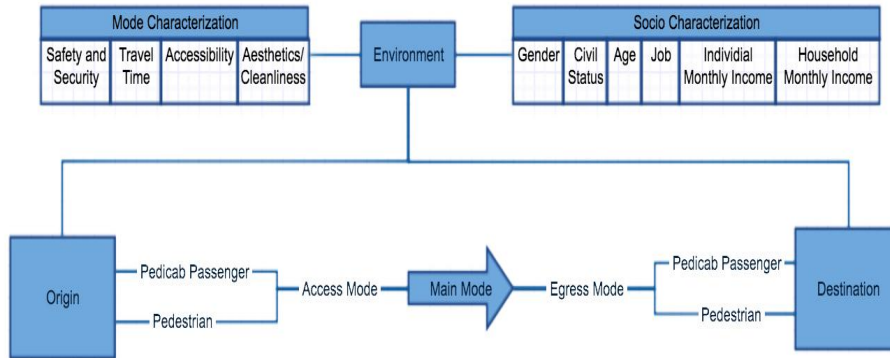
Figure 3.1: Conceptual Framework

As seen in Figure 3.2: Theoretical Framework, the data will be separated into two parts, namely primary and secondary sources. These gathered data will then be used to see the factors that affect the choices of people between using the pedicab or walking and thus seeing a behavior or pattern. The considerations used will be both the graphing models from Microsoft Excel and the discrete choice analysis. The discrete choice analysis will be done by using a software called NLOGIT. This will determine the probabilityRTC of people when walking considering different factors. The discrete choice analysis, specifically using the the formula of binary choice, will help determine thechoice between the two choices: pedicab or walking.
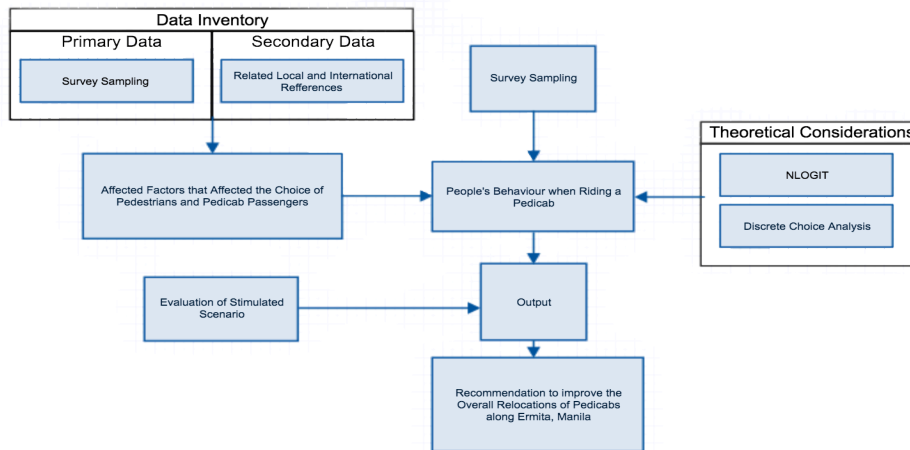

Figure 3.2: Theoretical Framework

$$U_{i,1} = \mathbf{x}_{i,1}'\boldsymbol{\beta} + \mathbf{z}_i'\boldsymbol{\gamma} + \varepsilon_{i,1} \quad U_{i,0} = \mathbf{x}_{i,0}'\boldsymbol{\beta} + \mathbf{z}_i'\boldsymbol{\gamma} + \varepsilon_{i,0}$$

Figure 3.3. Random Utility Framework With Utility of Two Choices

Where: U= utilities
x = coefficient of 1st variable considered
z = coefficient of 2nd variable considered
β and γ = common elements
ε = unmeasured influences on utility

$$P(Uw) = \frac{e^{-\mu w}}{e^{-\mu w} + e^{-\mu p}} \qquad P(Up) = \frac{e^{-\mu p}}{e^{-\mu p} + e^{-\mu w}}$$

Figure 3.5. Formula for Probability

Where: P(Uw) = Probability of Walking
P(Up) = Probability of Using Pedicabs
Uw = Utility value of walking
Up = Utility value of pedicabs

To be able to come up with value of probability of using a mode, utility value was needed to attain. Utility value of each mode is attained thru the equation that was produced by Nlogit, as seen in Figure 3.3. The coefficients were multiplied to the variable and was summed to produce the utility value for each mode.

4. RESEARCH METHODOLOGY AND RESEARCH DESIGN

4.1 Research Method
For this study, both the descriptive survey and analytical survey methods were used. The researchers first chose locations pedicabs are stationed as well as observe walking patterns of pedestrians. Given the number of people around Ermita, the researchers chose specific locations where there is a high demand of pedicab usage.Survey form were then made and were used to question both pedicab users and pedestrian walkers how they choose their modes of transportation. The survey were also done 7am -12 noon during weekdays as this timeframe would ensure passengers that would be commuting from their respective schools and workplaces.With the gathered data, these were then subjected to discrete choice analysis to better determine the behavior and understand the choices of the people around Ermita.

4.2 Research Design
In this research, the thesis used two techniques in having data mainly primary and secondary data. The primary data came from the surveys answered by people who either choose to use the pedicab as a mode of transportation or walk to their destination. These surveys were conducted in Ermita, Manila and asked the interviewee regarding what's his or her take on the two modes of transportation: the use of pedicabs or on foot. The secondary data were the local and international references that would help further understand the behaviors and characteristics of of pedestrians and commuters: the information about pedicabs asked by the owning company and books or news articles found on libraries and on credible online source. The data obtained from the conducted surveys would be shown through graphical models that would present the different information such as age, occupation, choice of transportation, and reasons for using it. With the interpreted graphical models, it would further explain the behavioral characteristics of people in relation to safety and security and how they would contribute to lessen the traffic congestion along Ermita, Manila.

4.3 Summary of Procedure
The whole graphical location of the study was initially observed through an ocular. It was done by going around Ermita, Manila and taking pictures to take note of how the vicinity looks like, especially in places where pedicabs are located. The group then constructed a survey focused on the evaluation of choice analysis of pedestrians and pedicabs in Ermita, Manila. This survey was answered on 10 locations in Ermita, Manila, importantly on places where pedicabs are stationed.Also, the walking to pedicab ratio was also taken to further help the researchers in getting an overview of the situation in each station. It was done by counting the number of pedestrians and pedicabs passing through a specific point for one hour. The collected data was encoded into the Nested-Logit software where it was analyzed by using the descriptive analysis and discrete choice analysis. From examining the choice analysis and descriptive analysis, the researchers recommended ways or alternatives for improvement in terms of the use of a pedicab or walking by foot.

4.3.1 Survey Locations
Survey collection needs to be planned in order to attain accurate results. One of the factors that can affect survey accuracy and precision is location. The group did an ocular to be able to see where the people and pedicabs are mostly located. The group also checked out if there are establishments that needs to be considered like malls, schools, and others. Given the observations around the vicinity of the area, the group selected and conducted the survey in ten areas. This is very important because it will help the group to foresee where most people are going to and from Ermita.

The stations are as follows:
       Station 1: Light Rail Transit, Pedro Gil Station, Taft Avenue
       Station 2: Robinsons Place Manila, corner Pedro Gil
       Station 3: Roxas Boulevard, corner Padre Faura
       Station 4: Robinsons Place Manila, corner Padre Faura Street
       Station 5: Ermita Church, Antonio Flores Street
       Station 6: Light Rail Transit, Pedro Gil Station, Taft Avenue
       Station 7: Adamson University - College of Engineering, Romualdez Street

Station 8: Maria Orosa Street cr. Kalaw Avenue
Station 9: Paco Market 2011, Pedro Gil Street
Station 10: SM Manila, San Marcelino Street

From the ten chosen stations, the group tallied the ratio between the number of pedicab passengers with the number of people walking along a certain lane in the station. This was done to aid in predicting the relationship between the distance of their destination and their choice of transportation. This was also utilized with the graphical representations as stipulated by the surveys.

4.3.2 Data Gathering Techniques
The group was able to gather 500 surveys in total. Also, the data were gathered randomly in order to get surveys from both pedicab users and people who walk. To be able get random data, the group first observed the stations to see the ratio of how many are riding the pedicab compared to those who walk. This ratio would help the group in attaining a more random set of surveyors instead of a landslide result of one choice.

5.PRESENTATION OF THE RESULTS OF THE STUDY

5.1 Descriptive Analysis

5.1.1 Pedicab/Walking Ratio
The researchers observed the amount of pedicab passengers and pedestrians that pass by in a certain lane. This was done to observe the ratio between the two modes of transportations. It also aided the group for further analysis when comparing and contrasting the different factors that may affect the characteristics of each choice, which was through making a graphical representation of the ratios between the two choices.

Table 5.1 Ratio of Pedicab to Walking

STATION	PEDICAB (number of individuals)	WALKING (number of individuals)	RATIO (Pedicab: Pedestrians)
Pedro Gil	11	823	1:75
RPM Pedro Gil	45	664	1:15
Roxas Boulevard - Padre Faura	11	209	1:19
RPM Padre Faura	22	443	1:21
Quirino Church	18	237	1:14
UN Lrt Station	19	481	1:26
Adamson	16	353	1:23
Luneta	25	388	1:16
Paco Market	49	408	1:9
SM Manila	54	1577	1:30

Table 5.1 demonstrates the number of pedestrians versus the number of pedicabs that passed through the point of observation for one hour. It can be seen that the difference between their numbers are significantly high, which means that people tend to choose walking rather than the pedicab. Also, it was observed that there was a consistency on the preference to walk as opposed to taking the pedicab in the 10 zones which were chosen at random. One of the assumptions that may perceive on why the ratio of pedestrians and pedicab passengers have a significantly large gap is that the amount of

pedicabs located in these stations are too occupied, making people chose to walk to find other modes of transportations. Another assumption is that the distances that people travel. If the distance for them to travel is short, walking would be a more probable choice for them to pick. With that being said, walking can be assumed as the most probable mode of transportation in the area given the external factors around them. It also shows the ratio of pedicab to walking which means that there are n number of pedestrians passing by for every pedicab that passes through the point of observation. For example, there are around 74 to 75 people every 1 pedicab that passes through the observation point in Pedro Gil.

5.1.2 Individual Socio-economic Variables

The civil status of the people who took part in the survey consists of 26% single respondent and 74% married. Majority of the respondents or around 80 percent are within the teenage and young adult age group which is from below 18 to 35 years old. While the remaining respondents came from the middle-aged adults group which is from 36 to 55 years old. This information possibly presents that since majority of the respondents are young, they are physically able.

Table 5.2 Breakdown of the Characteristics of the Respondents For Each Mode of Transportation.

		Pedicab	Walking
Gender	Male	79(11.2%)	263(37.57%)
	Female	129(18.43%)	229(32.71%)
Civil Status	Single	182(26%)	289(41.29%)
	Married	27(3.86%)	202(28.26%)
Work	Students	125(17.86%)	91(13%)
	Employed	111(15.86%)	344(49.14%)
	Others	7(1%)	22(3.14%)

Table 5.2 presents the different characteristics of the respondents for each mode of transportation. Looking at the gender composition for each mode, there are more male respondents for walking while there are more female respondents for the pedicab. Though the difference between the male and female respondents for walking is not significant comparing it to those who took the pedicab. On the other hand, the civil status that is dominant even without considering which mode to investigate is Single. Another observation is that the mean age for the pedicab users is lower compared to the age of those who walked. The average income of the pedicab users and pedestrians also follow the same trend.
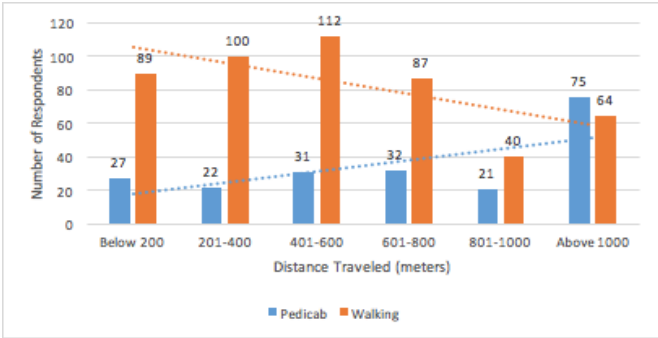

Figure 5.1: Breakdown of the Distance Travelled By Pedicab Users and Pedestrians

Figure 5.1, shows that the highest number of respondents who walked and the lowest number of respondents who took the pedicab are those who travelled the least which is below 200 meters. However, the highest number of respondents who took the pedicab and the lowest number of

respondents who walked are the ones who travelled the farthest which is above 1000 meters. It can be observed in both of the trendlines that as the distance increases, the number of pedicab users also increases while if the distance decreases, the number of respondents who walked increases. These results show that respondents chose to ride the pedicab while the distance increases while respondents walk with smaller distances.
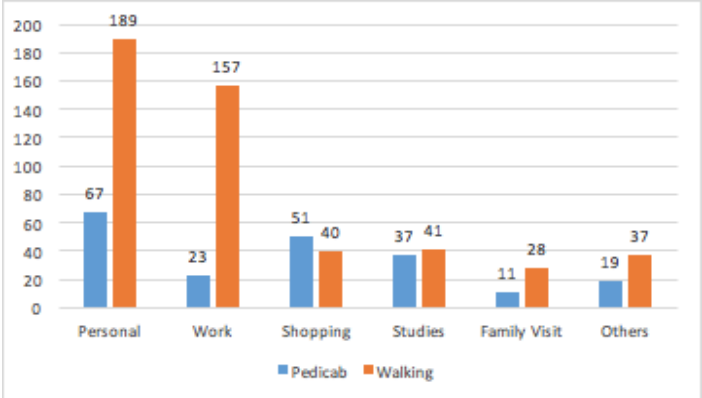

Figure 5.2 Bar graph representation for Trip Purpose

Figure 5.2 shows that a majority of the people in Ermita commute for personal purposes. This means that respondents were not willing to divulge the reasons for their commuting which the researchers respected.

5.1.3 Mode Specific Variables

For the mode specific variables, the respondents were asked to rate them from 1 to 5 with 5 being the highest and 1 being the lowest. The following figures show the rating that each of the five variables got from the 500 respondents.
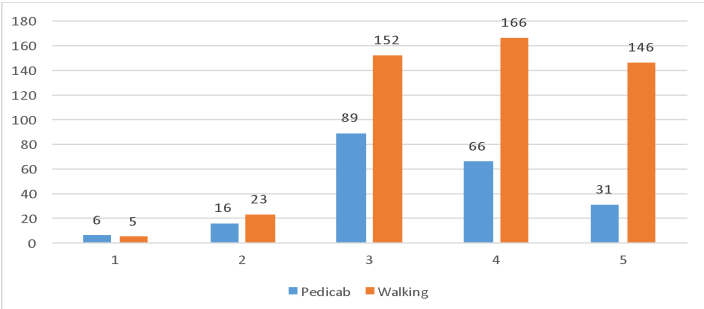
5.1.3.1 Safety

Figure 5.3 Detailed Bar Graph for Safety

Figure 5.3 shows how the overall results of the respondents when rating their safety when walking or riding a pedicab. As observed, a total of 650 or 92.86 percent of the respondents rated it between 3 to 5 which means that majority of them believe that their distance along Ermita, Manila is a safe place to walk in. 97 out of 208 or 46.64 percent of pedicab users and 312 out of 492 or 63.41 percent of those who walked rated safety with 4 and 5. It can also be compared that only 31 or 14.9 percent of the pedicab users gave a rating of 5 while 146 or 29.67 percent of those who walked gave the same rating. With this information, it can be assumed that commuters feel safe whenever they commute but it can also be observed that pedestrians feel safer compared to pedicab users.

In addition, a research paper entitled "Environmental perceptions and walking in English adults" revealed that women feel safer to walk during the day. It also mentioned that they are more concerned about walking for utility and safety. However, men are not influenced by concerns about safety. As shown earlier in Table 5.2, there are more number of men who walked and the number of women is also significant plus the survey was taken at daytime which explains why Safety got a good rating.

These factors may also have contributed to the rating that the pedicab users gave for Safety in pedicabs.
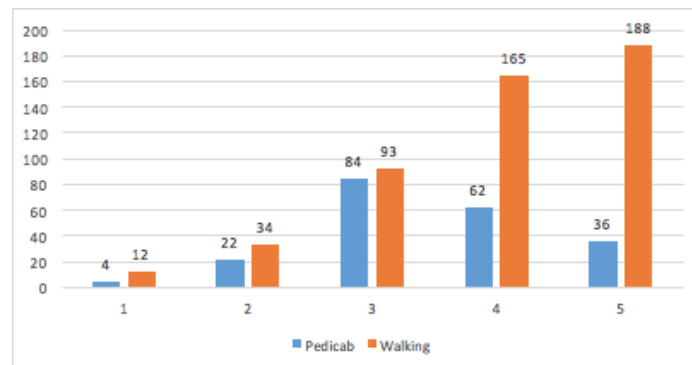
5.1.3.2 Travel Time

Figure 5.4 Detailed Bar Chart for Travel Time

Figure 5.4 shows the breakdown of how each respondent rated the variable Travel Time based on the mode of transportation they used. 98 out of 208 pedicab users and 353 out of 492 pedestrians gave a rating of 4 and 5, which means that they assume that walking, instead of the use of pedicabs, is faster for them to go to their destination. The assumption of the travel time of pedicabs would vary due to several factors such as the tendency of taking a longer route considering traffic regulations like one way roads or roads where pedicabs are prohibited. The main possible reason why pedicabs take a longer travel time is due to traffic congestion. Pedicabs are small and can force themselves to pass through alleys and illegal areas such as sidewalks but there are instances that they get stuck in traffic as well.

Another factor to be considered to explain why pedestrians rated Travel Time with 5 is due to the distance they travel. Results showed that the highest number of pedestrians that gave a rating of 5 came from those who travelled less than 200 meters. A trend was observed that as the distance increases, the number of pedestrians that gave a rating of 5 decreases, while the number of pedicab users who gave a rating of 5 increases. This means that sometimes walking is faster instead of pedicabs especially when travelling short distances.
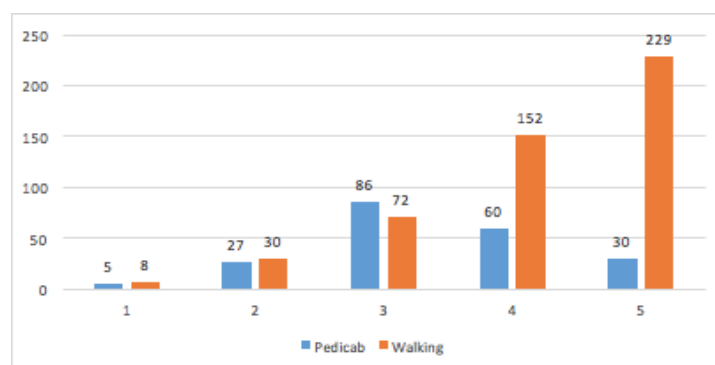
5.1.3.3 Accessibility

Figure 5.6 Detailed Bar Graph for Accessibility

Figure 5.6 shows the breakdown of how each respondent rated the variable Accessibility based on the mode of transportation they used. Accessibility here is classified as how easy for each mode of transportation it is to go from their origin to destination. It can be seen this graph that pedestrian find walking more accessible as seen how the majority ratings are from 3 to 5.
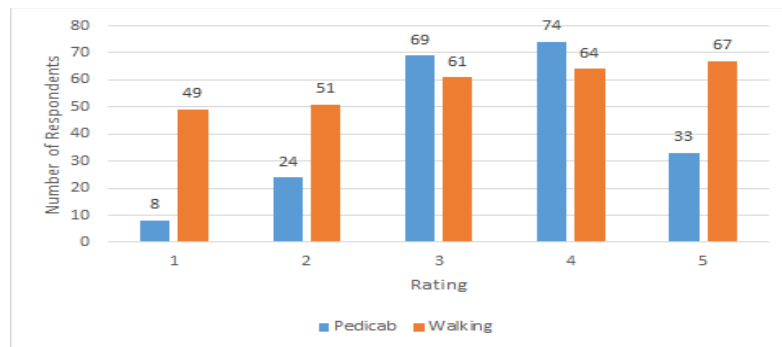
5.1.3.4 Willingness to Pay

Figure 5.7: Detailed Bar graph for Willingness to Pay

Figure 5.7 shows the breakdown of how each respondent rated the variable Willingness to Pay based on the mode of transportation they used. For the pedicab respondents, 74 chose 4 as their willingness to pay, while 107 pedestrians chose 5. These results imply that pedicab users are willing to spend to afford the use of pedicab but it should be considered that there a few respondents who rated 1 and 2. One of the possible reasons for this is the baggage that they carry. For example, in the station in Paco Market, a lot of pedicab users carry a baggage coming from the market. It can be assumed that some of them does not want to spend for the use of pedicab but they do not have a choice since they cannot bring their baggage if they walk especially if their destination is far which would make it difficult for them to carry their baggage. However, the ratings that the pedestrians gave for Willingness to Pay are different since ratings it got are somewhat similar to each other. This means that some are willing to spend for pedicab while some chose to walk in order to avoid additional expenses. This suggests that cost is a considerable factor when it comes to choosing which mode to use.
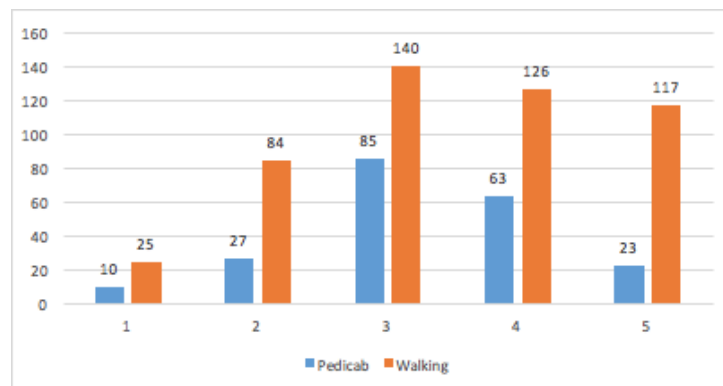
5.1.3.5 Environment

Figure 5.8 Detailed bar chart for Environment Rating

Figure 5.8: shows the breakdown of how each respondent rated the variable Environment based on the mode of transportation they used. The highest values show the both pedicab users and pedestrians, respectively, rated Environment with 3. More pedestrians rated Environment 4 and 5 than the pedicab users. This shows that environment is a factor for pedicab users. One of the probable reasons are heat and pollution. Since pedicabs go around Ermita with the traffic, the heat smoke coming from the vehicle exhaust can be felt by the passengers. It can also be noticed that the values of 4 and 5 for walking are near the value of 3. This suggests that pedestrians are not bothered with the type of environment Ermita has. One factor that must be investigated is the distance travelled by those who walked.

The researchers also took into consideration the distance travelled by those who rated Environment with 4 and 5. The results revealed that majority of the respondents that rated both 4 and 5 travelled less which are below 200 meters to around 600 meters. This can explain why these respondents rated Environment with a good mark because they only travelled near which can also mean that they possibly did not much feel the environmental factors.

5.1.3 Other Factors

The data shows that majority of pedicab user have an average waiting time of 3-5 minutes before acquiring a pedicab. This data goes to show that although pedicabs are still widely used in Ermita, Manila , it is not as readily available and accessible compared to the other modes of transportation.

5.1.4 Choice Data

Out of the 700 respondents, 492 of them chose walking as their mode of transportation and the other 208 chose the pedicab. It can be clearly seen that more than half or 70.28% percent prefer walking while the other 29.71% percent prefer taking the pedicab.

5.1.5 Additional Questions for Pedicab Users

Table 5.3. Additional Questions for Pedicab Users

	Yes	No
If pedicab fare increases by around 20-30 PHP, would you still choose the pedicab?	92	116
If it is traffic and it will take longer to reach your destination , would you still choose the pedicab?	73	135
If the sidewalk is cleaner and more accessible, would you still choose the pedicab?	115	93

Table 5.3 shows the tabulation of the answers of the pedicab users if they are still willing to take the pedicab even if several factors are to be adjusted. The three factors that were adjusted are fare, travel time, and sidewalk quality. Looking at the results of the first question, more than half said that they would not use the pedicab anymore if the fare was increased. This suggests that they still consider the cost when choosing a mode of transportation. The same relationship was observed when it comes to the travel time. In fact, in can be observed that there is a significant number of pedicab users who said no to using the pedicab if it would take them a much longer time to travel which suggests that one of the main factors why they take the pedicab is the travel time. However, a different result was obtained from the third question which was about sidewalk quality. More pedicab users still wanted to use the pedicab even if the sidewalks are fixed. This means that the quality of sidewalk does not affect their choice of not picking walking as a mode of transportation.

Table 5.4 Average Rating for Each Variable.

Factor	Average Rating	
	Pedicab	Walking
Safety	3.48	3.86
Travel Time	3.50	3.98
Accessibility	3.40	4.15
Willingness to Pay	3.48	3.22
Environment	3.30	3.46

Table 5.4 shows the weighted average of each factors in each respective mode of transportation.

5.2 NLogit Results

5.2.1 Command Document and General Information

Table 5.5 NLogit Input Variables

NLOGIT INPUT	Variables
Lhs (Choice)	Pedicab, Walk
Rhs	Disafe, Time, Cost
Rhs2	one

As seen on Table 5.5, one of the variables for the command input is Lhs, an action that consists of the mode choices given to the respondents, which is pedicab or walking. Another variable is the Rhs, which contains the mode specific factors considered for the model. These factored combinations were tested to be considered as one single element in rhs. For example, dividing cost by income, dividing cost by distance, and other combinations. Moreover, these factors are utilized to obtain the most ideal combination that will answer the objectives of the paper.

5.2.2 P-Value
The importance of the P-value in relation to the obtaining the probability of each mode of transportation is to ensure that the factors used are significant for the equation. These factors are seen below the P-value code, P[|Z| >z]. Also, the amount of data in the binary results is relevant to the significance of each factor. This was to ensure a higher confidence level for all factors, hence the importance of each factor for the probability of each mode of transportation.

Table 5.6 Coefficient and P-Value Table

Variable	Coefficient	P [|Z| > z]
DISAFE	-.00732479	.0000
TIME	-0.09625086	.0082
COST	.01882196	.0000
A_PEDICAB	-2.04211185	.0000

      From the factors and combinations that have been tried and tested, the most significant Rhs chosen was Disafe, which is distance over safety rating, Time, and Cost. It can be seen that all the considered factors have a P-value of less than .0082, which affirms a 99% significance factor.

5.2.3 Descriptive Statistics for the Alternatives

Table 5.7 Descriptive Statistics for Alternative Pedicab

VARIABLE	UTILITY FUNCTION COEFFICIENT	ALL (498 obs) Mean	210 obs that chose PEDICAB
DISAFE	-.0067	312	171.183
TIME	-0655	21.972	14.333
COST	.0301	30.078	35.757
A_PEDICAB	-1.8362	1	1

Table 5.8 Descriptive Statistics for Alternative Walk

VARIABLE	UTILITY FUNCTION COEFFICIENT	ALL (498 obs) Mean	288 obs that chose WALK
DISAFE	-.0067	312	171.183
TIME	-0655	21.972	14.333
COST	.0301	.000	.000

Out of 700 surveys, 211 observations chose pedicab , 488 chose walking, and 1 bad observation. As seen in Table 5.6 and 5.7 the coefficients are for Disafe, Time, Cost that give a value of -.00732479, -0.09625086, and .01882196 respectively. Disafe and Time have a negative value, therefore it is considered as a disutility. This signifies that the larger the value of distance over safety and travel time, the more likely it will not choose the mode. Furthermore, the positive cost value shows that pedicab users are willing to pay for the convenience of riding pedicabs. A_WALK has no value because it is used as the basis for the A_PEDICAB variable. The A_PEDICAB variable has a given coefficient as -2.04211185 as to 0 for A_WALK

5.2.4 Modal Split Analysis
Based on Table 5.7 and Table 5.8, the equation for each mode are determined to be used for the Discrete Choice Analysis.For pedicab, the utility equation is Uped=-0.0073d - 0.0963t+0.0188c-2.0421 and for walk, the utility equation is Uwalk=-0.0073d - 0.0963t+0.0188c. With the information of the distance over safety, time, and cost, utility of each mode can be computed and can be used to know the probability of choosing each mode.

5.2.5 Matrix Crosstab

Table 5.9 Matrix Crosstab

	PEDICAB	WALK	TOTAL
PEDICAB	121	90	211
WALK	90	398	488
TOTAL	211	488	699

With the given equation from the results of NLOGIT, the program was able to produce a crosstab matrix that would check if the predicted choice of mode from the coefficient values of the factors considered for each of the 700 surveys are tantamount to the real choice.

Based on the Matrix Crosstab in Table 5.9, for walking, 398 out 488 have the same actual and prediction results and 90 out 211 are not the same. For Pedicabs, 207 out 288 predictions were the same with the actual number of respondents who picked pedicab as their choice. The data suggests that there are more percentage from respondents, who chose walking, that they would most likely pick pedicab as their mode based on their answers from the surveys.

6. CONCLUSION
As demonstrated, walking is the mode of transportation that will be most likely be chosen by commuters in Ermita, Manila for their access and egress travel. Results showed that walking got a higher in comparison with the use of pedicab sin 4 out of 5 of the mode specific variables. These factors are Safety, Travel Time, Accessibility, and Environment. Civil status, age, and income are not considered as factors since no relevant trend was seen from the observations. On the other hand, gender can be considered as a factor since it has a significant effect in the rating of Safety. Amongst the 5 mode specific variables, the ones that can be considered as factors that affect the choice of commuters are Safety, Travel Time,and Willingness to Pay.

Asides from the 5 mode specific variables, the researchers have also observed two other key factors in affecting the choice of commuters. These are the distance, cost and time travelled. There are more commuters who walk at distances of 800 meters and below while pedicab users rise at around the distance of above 1000 meters. The study revealed that the number of pedicab users will lessen if the cost gets higher and if the travel time gets longer.

7 .RECOMMENDATIONS
Improving the survey questionnaire is highly recommendable to ensure more accurate and detailed data. A few of which is for the survey to be easy to understand and answer without the aid of the researcher. This is to ensure that the questions of the researcher and the points of inquiries of the respondent are understandable. Also, make sure that the survey questions are concise in order to shorten the survey. This is to avoid negative reactions from respondents, specifically in not answering the survey. In addition, in having more accurate data, considering additional situational-based questions for walking and as to why the respondent did not choose the other mode of transportation is recommended in order to obtain specific factors that affect the choice of a person.

Also, it is recommended to dress casually when conducting a survey. People react differently depending on the clothes you wear. Wearing clothes that are too formal result to endangering yourself as you are a susceptible target for thieves but gain higher respect from people as they take you more seriously. On the other hand, wearing simple clothes like a shirt and a pair of shorts elicit stares and doubtful expressions. It was also observed that the researchers had to mention the school they came from to garner responses. Also, the results will be more significant if the surveys were done at different time slots which includes night time.

Based from the range calculated from the standard deviation, it can be seen that the respondents spent an average range of 19-31 Pesos in commuting using a pedicab with a distance of a range distance of 352-1649 meters. From this given data, along with the issue that the use of pedicabs are still illegal around the vicinity of Ermita, Manila, it is recommended that the data and results of this research would be forwarded to Mr. Eduardo Isiderio, MTRO director, to be read and understood. The research data and results may be used in order to legislate practical rules and policies in order to regulate the use of pedicabs for efficiency and safety reasons. This is to ensure that the safety and security of each passenger and pedestrian, especially along Ermita, Manila, is prioritized. One suggestion would be strict regulation on this mode of transportation and to set standard prices for pedicabs by a peso per km system. Additionally, stricter enforcement of the law by Mayor Joseph Estrada's office is necessary, such that all pedicabs are only limited to a certain route in the city of Manila.

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