

# Commuter Mode Choice Analysis in Roxas Boulevard: Examining the Significant Attributes Influencing Commuter Preferences

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**Abstract:** Roxas Boulevard is a vital road in Metro Manila, connecting central business districts with key residential, commercial, and tourism areas. Despite its importance, the area experiences severe congestion, with over 180,000 vehicles daily, and faces additional pressure from the proposed Manila Bay reclamation project. This study aims to analyze factors influencing transportation mode choice along Roxas Boulevard, focusing on cost, accessibility, travel time, comfort, safety, reliability, and cleanliness. Using Logit Choice Analysis and Binary Linear Regression through NLOGIT software, the study identifies the most significant attributes affecting mode choice. Results show that lower cost, greater accessibility, shorter travel time, higher comfort, enhanced safety, increased reliability, and better cleanliness positively influence commuter decisions. These insights are essential for urban planners to develop sustainable transportation plans that meet current and future demands, especially with upcoming urban developments, enhancing the overall transportation network and quality of life.

*Keywords:* Mode Choice, Roxas Boulevard, Stated Preference, NLogit, Manila Reclamation Project

## 1. INTRODUCTION

### 1.1 Background of the Study

An important area of Metro Manila's urban transportation system, Roxas Boulevard, links the Metropolitan's central business districts with the city's major residential, commercial, and tourism areas. This road, which stretches 7.6 kilometers along Manila Bay's coast, is essential for both commercial activity and vehicle traffic. From the study of Fillone and Mateo-Babiano (2018), among the highly congested roads in Manila, one of the key public transport routes that permits access to different modes of transport, such as the main interprovincial public transport hub, bus stations, and the Light Rail Transit-1 (LRT-1) is Roxas Boulevard, thereby, producing a large number of passenger trips daily. With that being said, recent traffic studies state that Roxas Boulevard has an average daily traffic volume of over 180,000 vehicles, emphasizing significant delays and environmental impacts.

Despite the area's congestion, the City Government of Manila proposes a reclamation project. According to the EIS Summary for the public (City Government of Manila, 2018), The

ongoing reclamation projects along Manila Bay, particularly near Roxas Boulevard, will involve the transformation of the bayfront area, with a total of 5,503 hectares being reclaimed to support mixed-use developments, including residential, commercial, and entertainment zones. Projects like the Manila Solar City, Horizon Manila, and Manila Waterfront City are set to reshape the coastline with a mix of high-rise buildings and recreational facilities. As a result, the reclamation projects along Manila Bay, particularly near Roxas Boulevard, are set to have a significant impact on transportation infrastructure. Roxas Boulevard, already a major thoroughfare in Metro Manila, will experience increased congestion as the ongoing development adds more commercial, residential, and entertainment hubs in the reclaimed areas. Therefore, this will lead to heightened vehicle density, requiring improvements in traffic management and public transportation systems.

Mode choice analysis is a crucial aspect of transportation planning, especially in congested urban roads like Roxas Boulevard. It examines the decision-making process of commuters in selecting between various modes of transportation, such as walking, bus, and jeepney. By identifying the factors that influence these choices—such as cost, travel time, accessibility, comfort, and reliability—mode choice analysis helps urban planners and policymakers develop more efficient transportation systems. In the case of Roxas Boulevard, understanding these preferences becomes even more significant as the ongoing reclamation projects and increasing traffic demand will place additional pressure on the existing infrastructure. Insights from this study can inform strategies to manage the anticipated rise in trips and mitigate further congestion, making it a critical tool for future transportation planning in the area.

## **1.2. Statement of the Problem**

Roxas Boulevard faces many challenges due to heavy congestion. The presence of many important establishments along the road and its connection to other major roads, such as EDSA, may highly contribute to the heavy congestion the road is experiencing (De Mesa et al., 2018). It is utilized as a route by buses heading to the Parañaque Integrated Terminal Exchange (PITX) (sakayPH, n.d.) and serves as a key network for freight transport moving from Manila to the east via C-5 and to the south via Cavite, SLEX, Quirino Avenue, and other routes (Punzalan and Cal, n.d.).

Despite the significance of Roxas Boulevard, there is still very limited understanding and researchers about the factors that significantly influence the transportation mode choice among individuals traveling through or within the vicinity of the study area. One reason could be because of the noticeable lack of localized studies specifically focused on transportation preferences within Roxas Boulevard. This gap in knowledge may negatively impact the ability of urban planners and policymakers to create effective strategies and future plans addressing the actual needs and priorities of commuters in the area.

Filling this gap may contribute to the advancement of the area by analyzing the stated preferences of individuals in the context of the study area, Roxas Boulevard. The study seeks to provide actionable insights that may enhance transportation planning and improve the commuting experience in this vital urban road.

## **1.3. Main and Specific Objectives**

This study aims to identify and analyze the factors that influence the transportation mode choice of individuals traveling along Roxas Boulevard. The focus is the commuters who regularly pass through this vital road. By examining these factors, the study seeks to provide insights into the

significant attributes that influence transportation decisions in this area, contributing to ongoing and future projects such as the Public Utility Vehicle (PUV) modernization program and the land reclamation project, which are expected to increase travel demand along Roxas Boulevard. The results of this study can inform transportation planning and policy-making efforts tailored to accommodate the evolving needs of the area.

The specific objectives are as follows:

- To conduct a Stated Preference Method Survey to gather data on commuters' preferences and the factors they consider in their decision-making when selecting a mode of transportation.
- To determine the significant attributes influencing the mode choice of commuters along Roxas Boulevard
- To develop a Logit Choice Analysis that explains how travelers choose between two or more transportation modes, providing a reliable analytical tool for evaluating future transportation demand in the context of ongoing projects.

#### **1.4. Hypothesis**

This study hypothesizes that the factors examined (cost, accessibility, travel time, comfort, safety, reliability, and cleanliness) significantly influence the transportation mode choice among individuals traveling through the study area, Roxas Boulevard. Lower cost, greater accessibility, shorter travel time, higher levels of comfort, enhanced safety measures, increased reliability, and better cleanliness are all positively associated with the likelihood of choosing a transportation mode. Other variations in the said factor were expected to result in a corresponding change in the transportation preferences of commuters passing through the study area. This hypothesis will guide the investigation into understanding the relative importance of each factor in shaping transportation choices in this context.

#### **1.5. Scope, Limitations, and Delimitations**

This study focuses on identifying the significant attributes and factors that influence the mode choice of commuters passing through Roxas Boulevard. To achieve this, surveys will be conducted within busy areas along the study area. The study examines key factors such as cost, accessibility, time, comfort, safety, reliability, and cleanliness, which are considered crucial in the decision-making process for transportation mode selection.

The study is limited to these specific factors, acknowledging that other unexamined factors may also impact transportation choices. Additionally, the data collected reflects the preferences of commuters at a specific point in time, without accounting for seasonal or long-term variations. The accuracy of the data is also subject to potential errors due to respondents' honesty and attentiveness. Furthermore, while the findings are specific to Roxas Boulevard, they may serve as a valuable comparison with areas that share similar urban and transportation characteristics. The results may help test methodologies or inform transportation planning and policy development for areas with comparable features, although the findings may not be directly generalizable to all urban areas.

Despite its geographic focus, the study contributes by highlighting the importance of understanding commuter preferences in a densely populated, economically vital area like Roxas Boulevard. Insights from the study may aid in shaping urban planning and transportation policies tailored to the needs of commuters, particularly in high-traffic roads where effective transportation solutions are essential. However, the study does not extend to exploring the application of these factors beyond the scope of the collected data.

## **1.6. Assumptions**

This study assumes that the respondents who answered the survey read the questions carefully and responded accordingly. This means that the respondents fully understood all the questions, ensuring that the data collected from the survey is a reliable representation of their priorities when choosing a mode of transportation when traveling or commuting. These assumptions are crucial for the integrity of the analysis made by the researchers as it underpins the validity of the results obtained.

## **1.7. Significance of the Study**

The main objective of this study is of great importance given the current and future transportation planning needs along Roxas Boulevard, especially considering the development of the reclamation area along Manila Bay (New Manila Reclamation Project, 2018). The findings of this study will be instrumental in developing new transportation plans specially designed to accommodate the anticipated increase in traffic and commuter volume resulting from the reclamation project.

Determining and understanding the transportation preferences of current commuters passing through Roxas Boulevard is particularly important especially in urban planning. As new residential, commercial, and recreational spaces will emerge in the reclamation area, it is crucial for urban planners to create plans that consider the significant factors affecting commuters' decision-making in choosing their transportation mode. By addressing these factors— such as cost, accessibility, travel time, comfort, safety, reliability, and cleanliness— planners can develop a transportation system that aligns with the actual preferences and needs of the public.

This study may contribute in addressing the future demand for transportation options, ensuring that infrastructure provided is well-aligned with the evolving needs of the public.

Addressing these commuter preferences will not only ensure that the infrastructure provided meets current demands but will also contribute to creating a sustainable transportation system capable of accommodating future growth. This kind of approach can be essential for enhancing the efficiency and sustainability of the transportation network systems in the area, ultimately leading to improved mobility and quality of life for all users of Roxas Boulevard. By anticipating and planning for these changes, urban planners can effectively manage future demand and ensure that the transportation network evolves in a way that supports sustainable urban developments.

Lastly, the insights gained from this study can have several practical applications such as providing support or guidance to the Public Utility Vehicle Modernization Program (PUVMP), ensuring that the updated fleet of public transport vehicles meets the preferences and priorities of commuters. Similarly, the findings can be also integrated into the planning and development of the reclamation area, aiding in the design of a transportation system that supports sustainable and efficient mobility for new developments. These practical implications highlight the study's contribution to creating a more resilient and user-friendly transportation network.

## **2. LITERATURE REVIEW**

Roxas Boulevard is a crucial transportation artery in Manila, providing access to various modes of public transportation, including the primary interprovincial hub, bus stops, and the Light Rail Transit-1 (LRT-1), among other heavily trafficked roadways (Fillone and Mateo-Babiano, 2018). Consequently, a significant volume of passenger journeys is generated daily. Additionally, Roxas Boulevard serves as a key freight transit route, facilitating movement from Manila to the East (via C-5) and from Manila to the South (via Cavite, SLEX, Quirino Ave., etc.), as noted in the study by Punzalan and Cal (n.d.). This dual role in passenger and freight transportation results in substantial traffic congestion, exacerbated by the high volume of both vehicles and freight movement.

Since commuters' decisions and actions are significantly influenced by various factors, these considerations are crucial for transportation planning. Understanding these variables facilitates the development of transportation schemes customized to the specific needs and preferences of users. Factors such as waiting times, costs, and trip duration play a key role in determining commuters' transportation mode choice (Bacero et al., 2018). Other important factors include family income and educational level. Transport planners can address these priorities by making changes based on survey results. For instance, if reducing journey times is a major concern for many passengers, planners might focus on improving the transit system's efficiency.

Both Germany and the United States have high rates of car ownership, but Buehler's (2011) study comparing transport mode choice determinants between the two countries highlights their distinct mobility habits. According to the study, Germans are more likely than Americans to utilize public transportation, walking, bicycling, and other alternative forms of transportation rather than relying predominantly on private vehicles. Despite living further from public transportation than Americans, who often reside in densely populated neighborhoods with better transit access, Germans favor environmentally friendly modes of transportation. The study criticizes the car-dependent environment in the United States, attributing it to a lack of infrastructure and amenities such as bike lanes, crosswalks, and sidewalks, which diminishes the safety and reliability of walking and bicycling.

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Various factors are critical in shaping commuter transportation mode choices, with time efficiency, cost, and travel duration being primary considerations. Bacero et al. (2018) also found that socio-economic indicators, such as household income and education levels, have a strong influence on transport mode preference. These factors play a central role in determining whether commuters opt for private vehicles or public transit.

A more localized analysis of commuter behavior in urban areas in the Philippines, particularly in Metro Cebu, was conducted by Mayo and Taboada (2019). Their findings revealed that safety was the top priority for commuters, followed by accessibility and comfort, which significantly influenced their transport choices. Even with worsening traffic conditions, many still preferred private or semi-private vehicles over mass transport systems, reflecting the high value placed on personal safety and convenience. This research is especially relevant for understanding how commuters in the Philippines might approach transport decisions in other

cities, including Metro Manila.

Several studies from other developing countries as cited in the same study, complement these findings, indicating that factors such as connectivity, security, and comfort are key to transportation choices (Del Castillo and Benitez, 2012; Fu and Juan, 2017). In various international contexts, demographic factors like gender and income have also been shown to play a significant role. For example, women in countries such as Thailand, Malaysia, and India tend to rely more on public transportation compared to men (Satiennam et al., 2011; Nurdden, 2007). These gender differences mirror findings in the Philippines, where socio-economic circumstances can heavily shape commuting behavior.

Age is another variable that impacts transport preferences. Studies conducted in countries such as Malaysia and Japan suggest that older individuals are more likely to use public transportation, while younger populations tend to favor private vehicles (Nurdden, 2007; Dissanayake et al., 2012). In Metro Manila, research by Okamura et al. (2013) found that commuters frequently use Jeepneys for short trips due to their affordability, but often avoid them for longer journeys, citing concerns about safety and comfort.

Infrastructural aspects, such as the availability of parking and public transit options, also play a role in influencing commuter choices. Research from cities like Bangkok and Manila shows that better connectivity, such as increased availability of rail services, can reduce dependence on private vehicles and buses (Chalermpong and Ampansirirat, 2011; Fillone et al., 2019). Such infrastructural improvements are essential to addressing the congestion issues along major transportation routes like Roxas Boulevard.

Other socio-demographic characteristics, including income and occupation, are linked to commuting behavior across different settings. Studies from countries such as Libya and Indonesia show that individuals with higher incomes tend to prioritize convenience and comfort, even at higher costs (Joewono and Kubota, 2007a; Diaz, 2011). In contrast, lower-income groups often rely on more affordable, though less convenient, public transport options. Moreover, behavioral factors, including personal attitudes toward traffic stress and environmental concerns, further influence these decisions (Dissanayake et al., 2012; Guillen et al., 2013).

In summary, extensive research on transportation mode choice highlights the critical importance of factors such as safety, convenience, cost, and socio-economic background. In urban settings like Metro Manila, these considerations must be factored into transportation planning, especially in the context of high traffic volumes and limited public transport infrastructure. As existing studies suggest, improving the accessibility, comfort, and safety of public transit options could encourage commuters to shift away from private vehicle use, which is essential to mitigating congestion.

### **3. METHODOLOGY**

The study involved ninety (90) respondents, comprising students, the unemployed, working people, self-employed people, and retired individuals. As seen in Figure 1, they were chosen at random and interviewed from areas near the proposed route along Roxas Boulevard, namely at the Parañaque Integrated Terminal Exchange (PITX) and SM Mall of Asia (MOA). Furthermore, internet respondents also took part by filling out online survey forms. These online respondents were carefully chosen to ensure they traveled along the vicinity by limiting the eligibility of the survey forms.



Figure 1. The study area, Roxas Boulevard from Luneta Park to PITX

The respondents' profiles and travel characteristics were included in the survey questionnaire that was utilized for the study's data collection. These were processed, and the data were then formatted in NLOGIT.

Concerning the availability of respondents and logistical considerations for the study, the convenience sampling method was selected as the most feasible approach. This decision was made because the study required the collection of ordinal data from a large number of participants to effectively identify and analyze the various factors influencing transportation mode choice. Convenience sampling, as suggested by Valerio et al. (2016), is particularly suitable for qualitative data collection when time constraints and accessibility are significant concerns. Convenience sampling was employed in this study to efficiently gather the necessary data. This approach is designed to capture insights from a large number of respondents in a relatively short period, making it ideal for studies with logistical limitations. By focusing on individuals who were easily accessible along the Roxas Boulevard route, the researchers were able to collect data from a diverse group of commuters. These individuals represent a variety of demographics and transportation preferences, providing a broad range of perspectives.

However, it is important to recognize that this method may introduce certain biases, as the sample may not be fully representative of the larger population. Despite these limitations, convenience sampling remains a practical and effective choice for exploratory research, particularly in dynamic urban settings such as Roxas Boulevard. The method allows for the timely collection of data while still capturing valuable insights into the factors that influence commuter decision-making. Although the sample may not fully represent the broader population, the data collected provides a preliminary understanding of the key attributes that affect mode choice in this specific context. This initial exploration can serve as a foundation for future research, which may employ more rigorous sampling techniques to further validate and expand upon the findings of this study.

The study comprised participants who are familiar with the road via various modes such as walking and public transportation such as the use of buses and jeepneys. Through this, all factors discussed were analyzed apart from accessibility for the participants who opt to walk instead of utilizing PUVs.

As the paper seeks to analyze the factors affecting the mode of transportation choice, the factors were ranked from most to least influential in the mode of transportation which was

determined by qualitative data collected resulting in a collection of ordinal data for each factor. To incorporate the ranking system and differentiate the mode of transportation that participants use, a survey was conducted about the characteristics of the commuters on their origin and destination as well as the times they usually travel, cost of traveling, travel time, and mode of transportation.

The utility function of the various modes of transportation—walking, bus, jeepney—was analyzed and determined in this study using NLOGIT software. Programs for estimating, simulating, and analyzing multinomial choice data, such as commuters' choices from a range of options when commuting, are offered by NLOGIT. It has become the primary statistical tool for approximating and simulating multinomial logit models, such as willingness to pay.

The data collected were then incorporated to create a model, validation and predictability were then run through NLOGIT using the Binary Logit Regression yielding the values of the coefficient, T-stat, and P-values for all variables. With a model to base actual and predicted results, a statistical analysis was conducted to test the results by likely fit measures. Sensitivity analyses were conducted to examine how responsive the model is to changes in variables like travel time and cost. The model is further validated through scenario testing, comparison with external datasets.

**4. RESULTS**

**4.1 Characteristics of the commuters**

Given the nature of the study, ordinal data collected are discussed in the following subchapter. Apart from the ratings of each function, supplementary data such as time traveled and cost of traveling to further determine their impact on the influence of factors such as cost and travel time. Other characteristics such as age and gender demographics are added as supplementary data.

Based on the results of the study, the majority of respondents are between the ages of 21 and 25, with around 50 individuals in this category, making it the most dominant age group by a significant margin. Secondary age groups include those aged 16 to 20 and 26 to 30, each with approximately 10 respondents. There is a minor representation from other age groups, including 10 to 15, 31 to 35, 36 to 40, 41 to 45, 46 to 50, and 51 to 55, each having fewer than 10 respondents. This distribution suggests that the survey or study from which this data is derived is heavily skewed toward younger adults, particularly those in their early twenties.

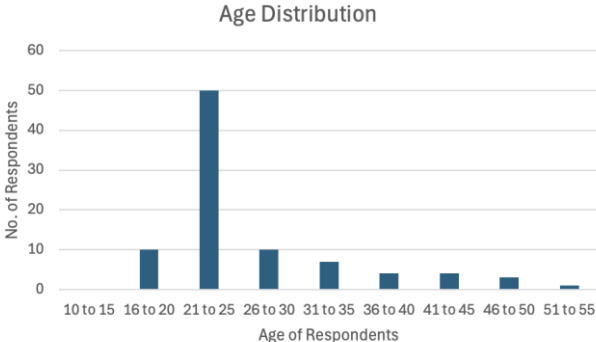


Figure 2. The age group of the respondents

From the figure below, the majority of respondents are male, comprising 57% of the



total sample. In contrast, females represent 43% of the respondents. This indicates a gender imbalance in the sample, with males being more prevalent than females by a margin of 14%. This distribution suggests that the data collected may reflect a predominantly male perspective, which may possibly influence the overall findings and interpretations of the study or survey from which this data is derived.

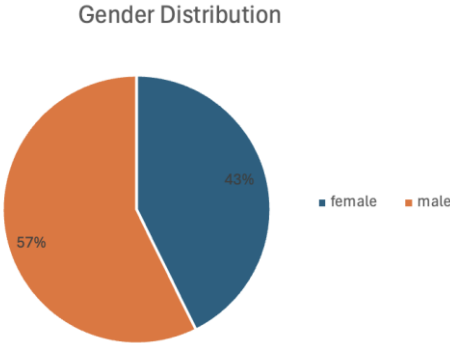


Figure 3. The gender distribution of the respondents

On the other hand, figure 3 shows the civil status distribution of the respondents wherein majority of respondents are single, with about 70 individuals in this category. In comparison, the number of married respondents is significantly lower, with approximately 15 individuals. This indicates that single individuals represent the predominant civil status among the surveyed population, outnumbering married individuals by a substantial margin. This distribution suggests that the data may primarily reflect the perspectives and experiences of single individuals.

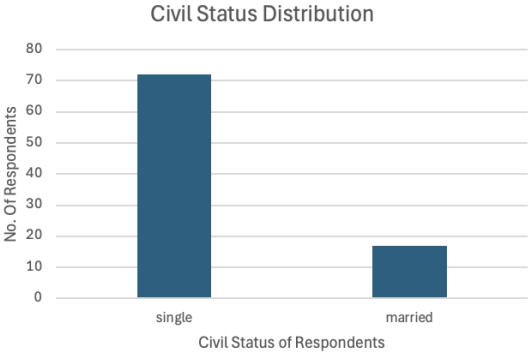


Figure 4. The civil status distribution of the respondents

Based on the results suggested by Figure 5, the data indicates that a significant portion of respondents travel for recreational purposes, with 33 individuals citing this as their primary reason for travel. This is closely followed by education-related trips, which account for 31 respondents. Work-related travel is the least common among the respondents, with 27 individuals identifying this as their primary trip purpose. Overall, the graph suggests that recreational activities are the most common reason for travel among the surveyed group, while work-related trips are the least common, though the numbers for education and recreation are relatively close.

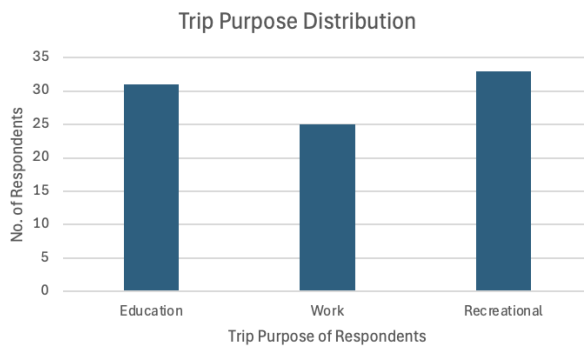


Figure 5. The trip purpose distribution of the respondents

According to Figure 6 below, the data reveals that the majority of respondents fall within the lower income brackets. Specifically, 30 respondents have an average income of Php 10,000, making it the most common income bracket. This is followed by 25 respondents in the Php 15,000 income bracket. The Php 35,000 income bracket includes a smaller yet significant group of 20 respondents. Higher-income brackets, such as Php 75,000 and Php 150,000, have very few respondents, with each category comprising only 5 respondents. Overall, the graph indicates a concentration of respondents in the lower income brackets, with a steep decline in the number of respondents as income levels increase.

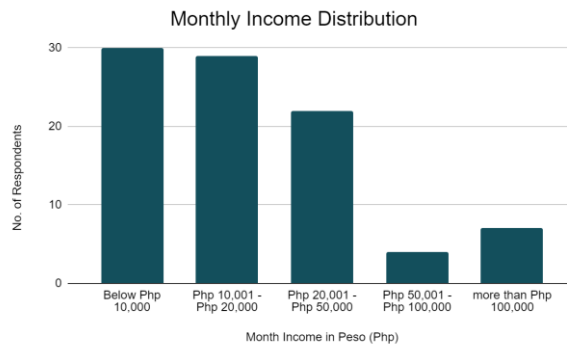


Figure 6. The average income distribution of the respondents

## 4.2 Logit Choice Analysis Results

In the formulation of the utility function for the different modes of transport, the following variables were considered: cost of travel (fare), travel time, trip purpose, age, civil status, income, and mode-specific attributes such as safety and accessibility. These variables were used as input in the NLOGIT model to formulate a utility equation. The coefficients and statistics of the variables are shown in Tables 1 and 2.

Table 1. Variables considered in Choice Modeling whether to use Modernized Jeepney or use other modes

Variable	Model Name	Description
CHOICE	Choice	Use Modernized Jeepney or other mode
<b>Mode and Route Specific Variables</b>		
TIME	Travel Time	Travel time of respondents (in minutes)

COST	Cost	Cost of Travel of their mode of transport (in Pesos)
ACCESS	Accessibility	
TIME	Waiting Time	
COMFORT	Comfort	Rating for factor affecting modal choice from 1 (least influential) to 5 (most influential)
SAFETY	Safety	
RELIABIL	Reliability	
CLEAN	Cleanliness	

#### Generic Variables (of Respondents)

TRIPP*	Trip Purpose	1 (Education or Work) 0 (Leisure, etc.)
AGE	Age	Age of Respondent
SEX*	Male/Female	1 Male 0 Female
WRKAGE*	Working Age	1 Working Age 0 Not Working Age
CSTATUS*	Civil Status	1 Single 0 Married
AVEINCO*	Average Income	1 Below 10,000 2 10,001 - 20,000 3 20,001 - 50,000 4 50,001 - 100,000 5 Above 100,001

\* Dummy Variable

Table 2. Logit Choice Model Estimation results of the mode-specific and socio-economic variables

Variable	Coefficient	T-stat	P-value
TTIME*	-0.00045	-0.027	0.0943
COST***	-0.76584e-04	-0.478	0.0000
(AGE*)	-0.02878	-0.503	0.0652
(SEX*)	0.10482	0.397	0.0549
(CSTATUS)	-2.12565	-2.609	0.0108
(AVEINCOME*)	-0.10984	-0.147	0.0876
No. of observations			90

\*significant at 10% , \*\* significant at 5%, \*\*\*significant at 1%  
( ) socioeconomic variables

Table 3. Logit Choice Model Estimation results of the route-specific variables

Variable	Coefficient	T-stat	P-value
PAY***	0.67956	0.359	0.0002
ACCESS01***	1.24967	1.457	0.0000

TIME01	0.48925	0.624	0.1568
COMFO01*	0.42845	2.671	0.0917
SAFE01***	0.41433	0.255	0.0000
RELIA01***	0.01241	0.076	0.0000
CLEAN01	0.08297	0.367	0.2654
No. of observations			90
*significant at 10% , ** significant at 5%, ***significant at 1%			

Tables 2 and 3 provide the final model with the Logit Choice Model Estimation Results for both mode-specific and route-specific variables having atleast 10% level of significance. The mode-specific variables are expected to be negative as shown in Table 2 including TTIME (significant at 10%) and COST (significant at 1%). For travel time (TTIME), the longer the travel time of a passenger, the higher the disutility is as represented by the negative coefficient. Moreover, the data explains that the COST variable is negative, indicating that people are more likely to choose a mode of transportation when they are cheaper than other transportation options. Additionally, the large difference between the coefficients suggests that passengers prioritize cost over travel time when choosing a mode of transport.

On the other hand, as seen in Table 3, Safety (SAFETY), Access (ACCESS) Reliability (RELIABIL), and Affordability (PAY) have positive utilities indicating that passengers would consider using a specific mode of transportation given its Safety, Accessibility, and Reliability features and the Affordability of fare. Regarding the socio-economic characteristics of the respondents, the negative sign of the AGE variable suggests that older individuals are less likely to determine the attributes of a mode of transportation based on their preference. In contrast, the positive value of the SEX coefficient indicates that females are more inclined to consider these characteristics compared to males. Finally, the negative sign of the AVEINCO variable, which represents the respondent's average income, indicates that as income increases, the likelihood of considering public transportation including buses and jeepneys decreases.

### 4.3. Utility Functions

Based on the results of the study, the following utility equations for different modes of transport along Roxas Boulevard were created. The utility equations are shown below:

$$\bullet U_w = -0.00045t - 0.000077p + 0.41443s - 0.02878e + 0.10482g - 2.12565i \quad (1)$$

$$\bullet U_b = -0.000077p + 0.41443s + 0.42845c + 1.24967a + 0.01241r + 0.08927l + 0.67956f - 0.02878e - 2.12565i \quad (2)$$

$$\bullet U_j = -0.000077p + 1.24967a - 0.00045t + 0.42845c + 0.41443s + 0.01241r - 0.02878e \quad (3)$$

Where:

- $w = Walking$
- $b = Bus$
- $j = Jeepney$

- *t = Travel Time*
- *p = Cost*
- *s = Safety*
- *c = Comfort*
- *a = Accessibility*
- *r = Reliability*
- *l = Cleanliness*
- *f = Affordability*
- *e = Age*
- *g = Sex*
- *i = Average Income*

## 5. CONCLUSION AND DISCUSSION

The study's findings allow for drawing important conclusions about commuters' preferred modes of transportation along Roxas Boulevard. Young individuals between the ages of 21 and 25 make up the majority of respondents; most are unmarried, with educational backgrounds ranging from high school to college degrees. This group typically uses buses and walking as their primary forms of transportation.

The results of the Multinomial Logit (MNL) model indicate that significant factors influencing mode choice include age, civil status, trip duration, cost, affordability, accessibility, and comfort. The model demonstrates good predictive capability, as it aligns well with the observed commuter behavior, particularly in highlighting the significance of cost-effectiveness and shorter journey times. Younger, unmarried individuals tend to favor walking, while bus riders prioritize accessibility, comfort, and affordability. These findings are consistent with similar mode choice analyses in urban areas, reinforcing the reliability of the model's outcomes.

The NLOGIT model used in this study was effective in analyzing mode choice decisions, as it successfully identified key attributes affecting commuter preferences. The model's ability to reflect real-world behaviors, such as the prioritization of cost and accessibility, supports its validity. However, future research could benefit from comparing these findings with past studies conducted in areas with similar characteristics to further validate the model's effectiveness.

These results suggest that enhancing pedestrian infrastructure, as well as improving the accessibility and affordability of public transportation, could significantly influence commuter decisions. Urban planners should focus on developing pedestrian-friendly environments and improving bus services to cater to these preferences. Additionally, the findings underscore the importance of sustainable transportation systems that address commuters' actual needs to improve mobility and quality of life.

For future research, expanding the scope to include additional factors influencing transportation choices, conducting longer-term studies, and using a larger, more diverse sample size are recommended. These steps will help produce more accurate and comprehensive insights, contributing to better urban transportation planning in Metro Manila.

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