Relationship of Income and Number of Transfers to Mode Choice in Metro Manila

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Abstract: Mode choice analysis will help in dictating the possible trip generations, trip distribution, modal choice, and trip assignment of a user. In this paper, the distribution for each modal choice, specifically for tricycles, jeepneys, standard buses, taxis, cars, and LRT, in Metro Manila will be obtained. This will be done by considering the socioeconomic characteristics that affect an individual to choose his transportation mode and number of transfers. The study analyzes the data from the Metro Manila Urban Transportation Integration System 1999 using the Multinomial Logit Model. This is useful in comparing to other existing travel demand forecasting software. The descriptive statistics of the dataset was obtained too to give an insight of the relationship of the data with one another. The household income level of a user combined with the number of transfers can affect users' mode choice.

Keywords: Modal Choice, MMUTIS, Multinomial Logit Model, Travel Demand Analysis

1. INTRODUCTION

1.1 Background

It is important to have a good transportation system in every modernized community. To model the volume of a given traffic element in the future, mode and route choice analysis is done, and this will be a key element to achieve efficient and effective development of road networks. According to National Cooperative Highway Research Program Report 716 (2012), estimating travel demand, including the mode and route choice of a certain area, is very essential in making decisions that involve system and facility design and operations, including developing transportation policies.

1.2 Statement of the Problem

Travel demand forecasting is an important part in traffic engineering, and this will help in modeling and predicting the volume of a given traffic element in the future. Since traffic demand forecasting software are prominent nowadays, it will be helpful to further investigate and explore how the mode choice behavior of the trip makers can be affected depending on their socioeconomic behavior as well.

1.3 Objectives

This study generally aims to show that there is a basis for modelling and a relationship between

the income level and the number of transfers to the choice of mode of the users in Metro Manila using the MMUTIS Data (1999).

The study's specific objectives are to:

a.) Generate and examine the basic features of the MMUTIS dataset into descriptive statistics to show the relationship of income and number of transfers to mode choice of the users in Metro Manila

b.) Propose a modal utility function that account for the socioeconomic class or income level of the user and calibrate a Multinomial Logit Model for mode choice

c.) Check and compare the results and structure from the proposed model T4Cast, a travel demand forecasting software which is currently under development at the time.

1.4 Significance of the Study

This research will be useful in our transportation planning and traffic management as this will help in estimating travel demand that is very essential in designing road networks and operations as well as transportation and traffic policies. This can also be helpful in being a tool or a basis in making travel demand forecasting software in the future since it can predict the mode choice behavior of different trip makers with respect to their socioeconomic classes and characteristics.

1.5 Scope and Limitations

This study would be using the data from the Metro Manila Urban Transportation Integration System or MMUTIS Data of 1999. The area and location that would be analyzed is the whole Metro Manila. Only significant data for socioeconomic conditions and travel characteristics such as the income levels, and travel time will be used. This research will only be focusing on users that have a trip purpose of "to work". The modes of travel that were considered in the modelling are only motorized vehicles, specifically for public and private modes of transportation.

1.6 Conceptual Framework

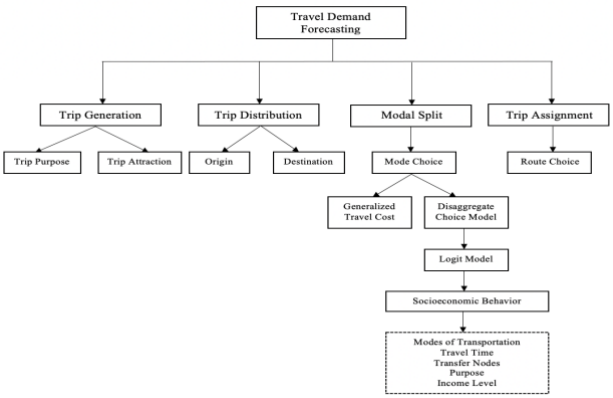


Figure 1. Research Overview

Travel demand forecasting can be divided into four steps. Trip generation dictates the purpose of the trips of an individual and the number of trips that can be there in the future. The trip distribution analyzes the origin and destination of the trip makers. On the other hand, the trip

assignment discusses which route these trips will take. Lastly, modal split is the mode of transportation that a trip maker will use. This can be modeled using a disaggregate choice model to predict the travel modes that a person will take. In this study, the socioeconomic behavior of the trip makers was analyzed to generate the utility functions and models.

2. REVIEW OF RELATED LITERATURE

2.1 Transportation in Metro Manila

Philippines' public transportation system supports and promotes multimodal travelling; commuters make use of an average of three transportation modes per trip. However, people still opt to use private vehicles in their daily commute (Narboneta & Teknomo, 2016). On the other hand, it can be inferred from the trip composition by mode from JICA 2014 that people still prefer to use public transportation especially jeepneys and tricycles over private modes of transportation. Meanwhile, the modes that have the highest percentage share in public transportation are the jeepneys and tricycles. For the private transportation, the modes that have the highest percentage share are from the motorcycles and cars.

2.2 Multinomial Logit Model

Modeling of mode choice is done by means of discrete choice model (Ben-Akiva and Lerman, 1985). Discrete models are based on choosing the mode or alternative with the highest utility for the trip maker. The Multinomial Logit (MNL) model has a chooser specific data where coefficients vary over the choices and the results for this statistical analysis model has an accuracy rate. This model is the most basic member of the family of GEV models. The basic hypothesis in this model is the extreme value distribution (Type I GEV) or the Gumbel distribution. This will help in predicting the modal choice and travel demand of a population in a certain area.

2.3 Transportation Models

Variety of transportation and traffic models have been utilized in managing the traffic flow management for a specific area and are still being created. In 2006, Al Ahmadi created intercity mode choice models for Saudi Arabia using the Multinomial Logit Model. The results of the research showed that in-vehicle travel time, out of pocket cost, number of family members travelling together, monthly income, travel distance, nationality of traveler, and number of cars owned by family played the major role in decision related to intercity mode choice.

In 2011, Abuhamoud et al. generated a binary logit model of the mode choice preference of commuters between car and bus in Libya. They studied factors affecting the choice pattern of the users and it was found out that gender analysis is required to be considered in all planning.

Another study from Libya developed a multinomial logit model using nationwide revealed preferences (RP) and stated preferences (SP) surveys. Abdulsalam Bin Miskeen et al. developed the model for deference purpose of intercity trips. The researchers stated that the model indicated that gender, age, traveler nationality, monthly income, car availability, purpose of travel, duration of stay at destination, egress distance to airport or bus terminal, total travel cost and mode characteristics (privacy and convenience) have impacted the choices associated with intercity travel mode choices for intercity travels in Libya.

In the Philippines, Nairin et. al (1983) developed a model that includes the generalized

cost equation that comprises walking, waiting, loading, transfer, travel time, fare, and overloading discomfort variables. This was then compared and differentiated for different user groups. The generalized cost equation was obtained in the model by evaluating the simulated travel time and travel cost of a trip. These were integrated with the weighting factors or the coefficients that take account of the difference of importance of each trip component.

In 2016, Narboneta & Teknomo studied the travel behavior of the commuters in Metro Manila and the status of the area's public transportation sector. The researchers concluded that the gender of a user and his preferred mode of transportation were independent of each other while the age and the occupation and their preferred mode of transportation were strongly dependent on each other.

De Guzman & Diz (2005), explored the trip behavior of students in exclusive schools in Metro Manila. The research focuses on the trip patterns and trip characteristics and the socioeconomic characteristics of the students that affect their mode choice. The factors include the travel time, travel cost, convenience, and others. They stated that the combined monthly household income of the students is not a factor in the mode choice behavior since 20% of them have a combined monthly household income of more than P100,000 pesos.

In a more recent time, Mayo & Taboada (2020) studied the factors affecting public transport mode choice of commuters in an urban city, specifically in Metro Cebu. The researchers used an analytic hierarchy process to rank the factors and modes of transportation that the users choose.

In this paper, the relationship of income and number of transfers to the mode choice of the users will be analyzed. A generalized cost equation such as the one developed by Nairin et al. (1983) will be used to obtain the utility function and the multinomial model. This will then be used to observe the mode choice behavior of the trip makers in Metro Manila. Almost all the literature looked at the travel time, travel cost, and comfort in making the utility model and it has given significant results in the analysis of travel demand.

3. METHODOLOGY

3.1 Research Methodology Flowchart

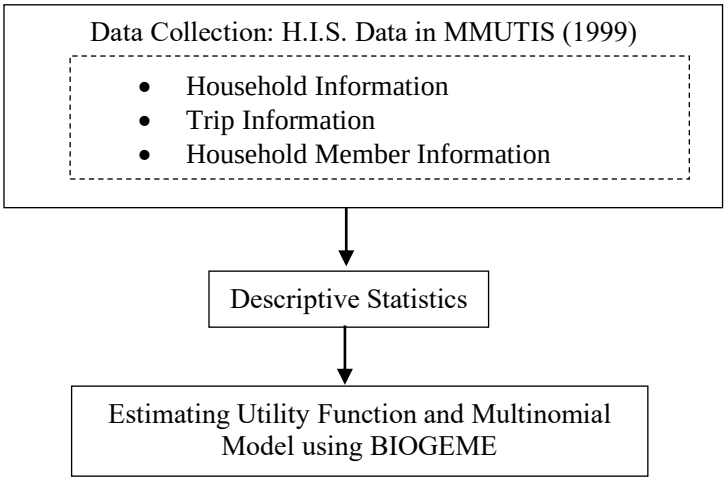


Figure 2. Research Methodology Flowchart

The research starts with the collection and processing of the data that was obtained from the MMUTIS (1999). The data that will be used will be coming from the three survey forms namely the Household Information survey, Trip Information survey, and Household Member

Information survey. This was then analyzed into descriptive statistics to see the relationship of the parameters with the mode choice behavior of the trip makers. After getting the relationship of these variables to the mode choice behavior of the trip makers, Biogeme will now be used to create the utility functions and to obtain the multinomial logit model for each transportation mode. This will be then analyzed further to see how it can be useful for future travel demand forecasting software.

3.2 Data Collection and Processing

The data that will be used in this research comes from the Metro Manila Urban Transportation Integration System or MMUTIS Data (1999).

3.3 Household Interview Survey (H.I.S.) Data in MMUTIS 1999

The following data will be obtained from the MMUTIS spreadsheet dataset. There are three forms under the H.I.S.

These three forms are the following:

a. Household Information
b. Household Member Information
c. Trip Information

The average of the income range per each income class was also calculated and these values will be used in generating the utility function and model. Sample forms can be seen in the Appendices for reference.

Table 1. Income Range and its Average Income per Income Level and the Corresponding Income Level in the H.I.S. Form

INCOME LEVEL	INCOME RANGE	AVERAGE INCOME
1	Under P3,000	P1,500
2	P3,000 - 5,999	P4,500
3	P6,000 - 9,999	P8,000
4	P10,000 - 14,999	P12,500
5	P15,000 - 19,999	P17,500
6	P20,000 - 29,999	P25,000
7	P30,000 - 39,999	P35,000
8	P40,000 - 59,999	P50,000
9	P60,000 - 99,999	P80,000
10	P100,000 - 149,999	P125,000
11	P150,000 - 199,999	P175,000
12	P200,000 - over	P225,000

3.4 Descriptive Statistics

The descriptive statistics will be focusing on the relationship of the different parameters with the socioeconomic characteristics, especially the household income level of each user.

3.5 Discrete Choice Modeling

3.5.1 Biogeme

Biogeme is a programming software that is used for estimating maximum likelihood estimation of parametric models with a special emphasis on discrete choice models. This is used to get the utility functions for the modal choice analysis. The programming language in this software is Python.

3.5.2 Multinomial logit model

The Multinomial Logit Model or MNL Model will be used in this study. The general equation for this utility function is of the form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n \quad (1)$$

where:

$\beta_1, \beta_2, \ldots, \beta_n$ = regression coefficients with the explanatory variable and the outcome

$X_1, X_2, \ldots, X_n$ = independent variables that correspond to the parameter stated

Y = dependent variable that represents the number of trips per mode

For the MNL Model, the following equation was used to predict the probability of the trips per modal choice:

$$P_i = \frac{e^{Y_i}}{e^{Y_i} + e^{Y_{i+1}} + e^{Y_{i+2}} + \ldots + e^{Y_n}} \quad (2)$$

where:

$Y_i, Y_{i+1}, Y_{i+2}, \ldots, Y_n$ = dependent variables obtained from the utility function

P_i = probability of trip makers that will use the given mode choice

3.5.3 Dependent and independent variables

In this study, the dependent variables are the modal choice of the users. This research focuses on tricycles, jeepneys, standard buses, taxis, cars, and LRT. These modes of transportation are all motorized vehicles and show significance in the analysis of mode choices in Metro Manila. The independent variables are the trip maker attributes (travel time, household income level, and the number of transfer nodes).

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics Related to Mode Choice, Income Level, and Number of Transfers

Based on the dataset, in the trip purpose section, “to home” purpose has the greatest number of users. This is followed by “to school” and then “to work.” On the other hand, most users belong to the low to middle income levels (from under P3,000 to P20,000-29,000). The least number of users comes from the higher income levels which are from P150,000-199,999 to P200,000 over. Meanwhile, jeepneys have the greatest number of users in the mode of travel section followed by walking. It can be inferred here that the users here in the Philippines still opt to choose public transportation. For the number of transfer nodes, users still choose the shorter or the least number of transfers for their route choices. The number of users per mode per household income level was also obtained. The users from lower income levels choose public modes of transportation such as tricycles, standard buses and jeepneys whereas users from higher income levels choose private modes of transportation like private cars. The table shows the summary of the data obtained from the MMUTIS dataset.

Table 2. Summary of the Descriptive Statistics for the MMUTIS Data

	Income Level	**Trip Purpose**	**Travel Time (min)**	**Travel Mode**	**Number of Transfers**
Average	3 to 4	3 (to school)	36.279	6 (jeepney)	1.867
St. Error	0.00255	0.00422	0.0618	0.00541	0.00186
Median	3	2 (to work)	20	6 (jeepney)	1
Mode	3	1 (to home)	30	6 (jeepney)	1
Std. Dev.	1.640	2.744	40.203	3.515	1.211
Variance	2.690	7.531	1616.283	12.357	1.466

Based on the MMUTIS (1999) datasheet, the average of the users is from the income levels 3 (P6,000 to 9,999) to 4 (P10,000 to 14,999). On the other hand, it can also be observed that the average of the number of transfers of the users is in between 1 to 2. Moreover, in the table, it can also be inferred that the standard deviation of each parameter, especially for the travel time, is relatively high. This means that it has a high dispersion or variability. and it has a great or high magnitude of deviation of the value from the mean. The mean, median and mode for each parameter are also obtained and these factors are helpful in the aggregate data.

The percentage share per mode per income level was also obtained to see the relationship between the income level of a user with their choice of modes of transportation.

Table 3. Percentage Share per Mode per Income Level

Income Level	Tricycle (%)	Jeepney (%)	Standard Bus (%)	Taxi (%)	Car (%)	LRT (%)
Under P3,000	30.90	55.60	6.26	1.22	4.79	1.22
P3,000 - 5,999	27.56	55.01	8.83	1.36	5.11	2.13
P6,000 - 9,999	21.67	54.96	11.01	2.42	7.74	2.21

P10,000 - 14,999	18.49	52.08	11.82	2.80	12.03	2.78
P15,000 - 19,999	14.50	49.33	12.23	3.83	16.93	3.16
P20,000 - 29,999	12.37	42.61	12.23	4.55	24.97	3.26
P30,000 - 39,999	10.32	32.53	10.87	4.68	39.25	2.35
P40,000 - 59,999	7.19	29.3	9.37	5.24	46.6	2.34
P60,000 - 99,999	5.19	17.6	6.27	5.98	62.2	2.74
P100,000 - 149,999	6.14	17.00	2.86	3.11	69.61	1.26
P150,000 - 199,999	2.43	12.55	1.22	2.43	80.97	0.41
P200,000 - over	2.99	5.86	1.43	2.08	87.37	0.26

For the percentage share per mode per income level, it can be observed in this section that users from lower income levels choose public transportations specifically jeepneys. On the other hand, users from higher income levels tend to choose private modes of transportation or private cars. It can also be observed that there is an increase of percentage share for standard buses and LRT for the users from the middle-income levels. Aside from this, it can also be observed that there is a trend between the number of transfers and the income level of the users. The table below shows the percentage share per number of transfers per income level of the dataset.

Table 4. Percentage Share per Number of Transfers per Income Level

Income Level	1	2	3	4	5	6	7	8	9	10	11
Under P3,000	95.2	3.6	1.03	0.05	0.04	0.008	0.004	0	0	0	0
P3,000 - 5,999	84.9	10.6	4.11	0.3	0.06	0.006	0	0	0	0	0
P6,000 - 9,999	54.5	16.3	3.87	0.97	0.1	0.02	0	0	0	0	0
P10,000 - 14,999	35.1	21.8	24.8	12.3	4.5	1.07	0.26	0.04	0.005	0.003	0
P15,000 - 19,999	32.6	15.8	23.9	17.0	7.9	2.18	0.50	0.12	0.008	0.003	0.003
P20,000 - 29,999	26.9	11.8	24.9	21.3	10.7	3.32	0.91	0.18	0.03	0	0
P30,000 - 39,999	30.2	10.5	22.6	20.8	10.8	3.85	0.85	0.33	0.06	0	0
P40,000 - 59,999	24.8	9.9	23.4	23.4	12.3	4.61	1.37	0.25	0.04	0	0
P60,000 - 99,999	28.9	10.4	20.9	23.1	11.4	3.24	1.66	0.31	0.09	0	0
P100,000 - 149,999	23.8	8.4	20.3	25.8	13.9	5.09	2.27	0.34	0	0	0
P150,000 - 199,999	37.5	7.49	21.5	20.5	7.2	4.24	1.63	0	0	0	0
P200,000 - over	37.0	10.4	17.0	19.4	8.3	3.36	1.68	0.34	0	0	0

In the table above, users from income levels 1 (under P3,000) and 2 (P3,000 - 5,999) have the greatest percentage share for the least number of transfers. It can also be observed that the

users from the middle-income classes 4 to 8 (P10,000 – 14,999 to P40,000 – 59,999) use as many transfers as they can for their trips. One possible reason for this is that the lower income classes might be travelling in a shorter distance. However, this cannot be proven yet since there is no sufficient data and evidence such as the travel distance of the users. Another possible reason for this is that the users from the middle-income levels are part of the working class or the employee sector. This may mean that they usually have more transfers for cheaper travel cost.

Since this research will be focusing on the trip purpose of "to work", data from that trip section were obtained. From the trip purpose of "to work" datasets, jeepneys again have the greatest number of users. This will be followed by walking and then standard buses and the fourth the greatest number of users is the car. Meanwhile, the number of transfer nodes is still dependent on some of the transportation modes. Users that choose cars as their transportation mode usually have one transfer node whereas jeepneys, standard buses and other public transportation usually have two to three transfer nodes. Typically, shorter travel time also indicates that users will only be having one transfer node, and this can be significantly observed when trip makers choose walking as their mode of travel.

4.2 Multinomial Logit Model

From the descriptive statistics that was analyzed, the travel time, household income level and the number of transfer nodes are significant in creating the utility functions and models. The equations for the utility function for each transportation mode are shown below.

$$Y = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (3)$$

$$YA = \beta_A + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (4)$$

$$YB = \beta_B + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (5)$$

$$YC = \beta_C + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (6)$$

$$YD = \beta_D + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (7)$$

$$YE = \beta_E + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \quad (8)$$

where:

$\beta_A, \beta_B, \beta_C, \beta_D, \beta_E$ = coefficients for the transportation modes

$\beta_1, \beta_2, \beta_3$ = coefficients for independent variables or the parameters

X_1 = independent variable that corresponds to the income level (B_Income)

X_2 = independent variable that corresponds to the number of transfers (B_Transfers)

X_3 = independent variable that corresponds to the travel time (B_Time)

Y = dependent variable that represents the number of trips for tricycles

YA = dependent variable that represents the number of trips for jeepneys

YB = dependent variable that represents the number of trips for standard busses

YC = dependent variable that represents the number of trips for taxis

YD = dependent variable that represents the number of trips for cars

YE = dependent variable that represents the number of trips for LRT

The coefficients for the utility functions of each variable together with their corresponding statistics parameters are shown below.

Table 5. Summary of the Utility Functions Coefficient with their corresponding Statistics Parameters

Name	Value	Std err	t-test	p-value	Robust Std err	Robust t-test	Robust p-value
B_Income	1.55e-5	5.3e+01	2.93e-07	0.9999	2e-06	9.15	0
B_Transfers	-2.3e-9	1.8e+308	-1.3e-317	0.9995	2e-06	-9e-04	0.9992
B_Time	6.7e-8	1.8e+308	3.7e-316	0.9999	0.00149	4.5e-05	0.9999
COE_A	1.52	0.0154	99.1	0	0.0154	99.1	0
COE_B	0.534	0.0175	30.4	0	0.0175	30.4	0
COE_C	-1.62	0.0342	-47.3	0	0.0342	-47.3	0
COE_D	0.254	0.0185	13.7	0	0.0185	13.7	0
COE_E	-1.25	0.0295	-42.4	0	0.0295	-42.4	0
Rho-Square for the Logit Model		**0.234**					

The coefficients for the income level, number of transfers and the travel time are very low. This means that little changes will be observed when used to check for the mode choice behavior of a user. Moreover, since the coefficients for income level and travel time are positive, this can also be interpreted that as you increase each independent variable separately and individually, the percentage share of a certain dependent variable, which are the transportation modes, will also increase. Meanwhile, since the coefficient for the number of transfers is negative, the percentage share of a dependent variable will decrease as you increase the number of transfers.

The p-values for the coefficients of the variables are high. One of the possible reasons why the p-values are high is because the dataset is too large and that means that there are large values that deviate from the normal data. It can also be seen there that the covariance and correlation of each coefficient from one another is low. However, this can still be used to see if there is a trend or pattern in the modes of transportation of the users.

The figures below show the change in percentage share per mode as the users increase their household income level and the change in percentage share per mode as the users increase their number of transfers.

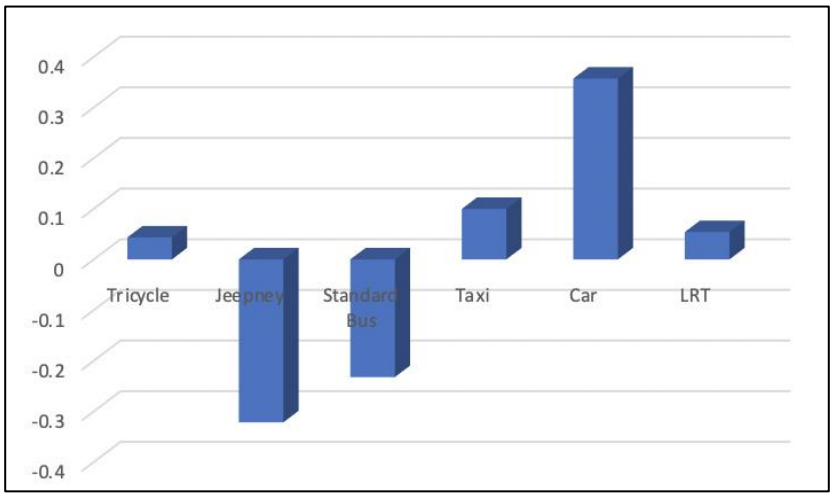


Figure 3. Change in Percentage Share per Mode from Household Income Level 1 (Under P3,000) to Household Income Level 12 (P200,000 and over)

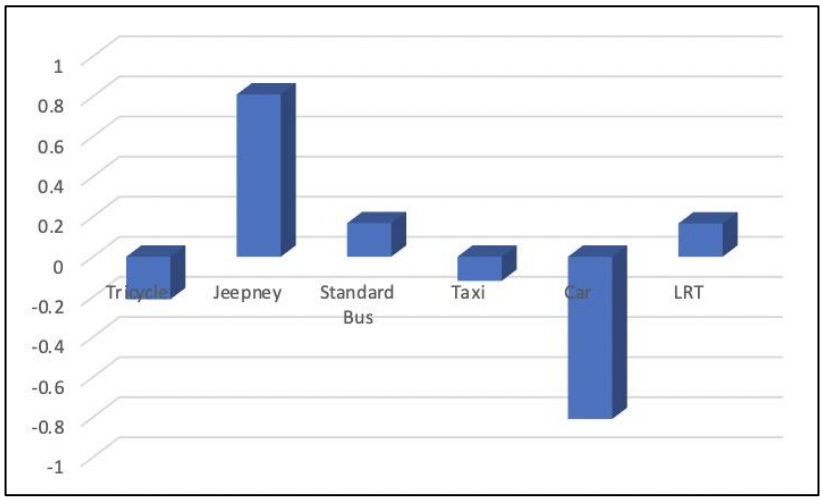


Figure 4. Change in Percentage Share per Mode from 1 Transfer Node to 8 Transfer Nodes

Using the utility function and model, it shows that as the user increases his income level the probability of him to choose public transportations decreases. In some cases, it can also be observed that users from the middle classes prefer standard buses. For the number of transfer nodes, the probability of the users choosing jeepneys and standard buses increases the most among the others if the number of transfers increases. This means that users prefer to have less transfers when using private modes of transportation such as cars, taxis and even tricycles.

4.3 A Plausible Model for a Travel Demand Forecasting Software

Travel demand forecasting software are very useful in transportation engineering, in this case the T4Cast Model. This model uses the travel demand process that includes the four-step model.

For the modal split modelling in T4Cast Model, the researchers used the general travel cost calculation to make the utility functions (Villar, Valdez & Palmiano, n.d.). To account for the route choices of the users, the researchers used a nested logit model. A sample of modal split using nested logit model that comes from the T4Cast Model is shown below.

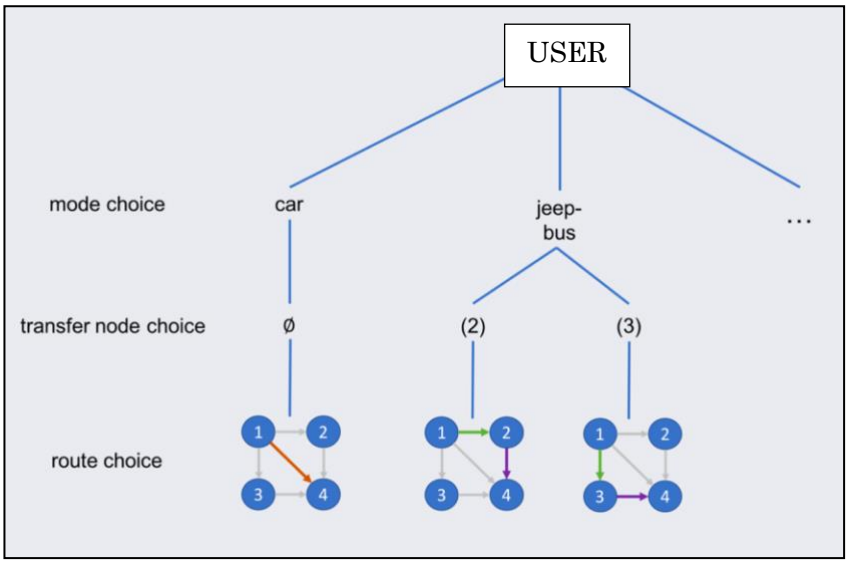


Figure 5. Nested Logit Model Analysis (Villar, Valdez & Palmiano, n.d.)

The researchers in the T4Cast Model stated that the mode-choice decision is homogeneous within each class but differs among classes. The decision of each user for their mode of transportation depends on their income level. It can be observed here that users from lower income levels prefer to use public transportation while users from higher income levels prefer to use private transportation.

5. CONCLUSIONS

In this research, there were six transportation modes that were analyzed and observed namely, tricycle, jeepney, standard bus, taxi, car, and LRT. In the trip purpose section, only the data from users who have "to work" purpose was modeled.

For the descriptive statistics, it is observed that the income level of the users affects their mode choice behavior. Users from lower income level prefer to use public transportation such as jeepneys while there is an increase in percentage share for standard buses for the users in middle-income classes. Furthermore, users from higher income levels prefer to use private transportation such as private cars and taxis. For the number of transfers, users from the middle-income levels take the greatest number of transfers when travelling.

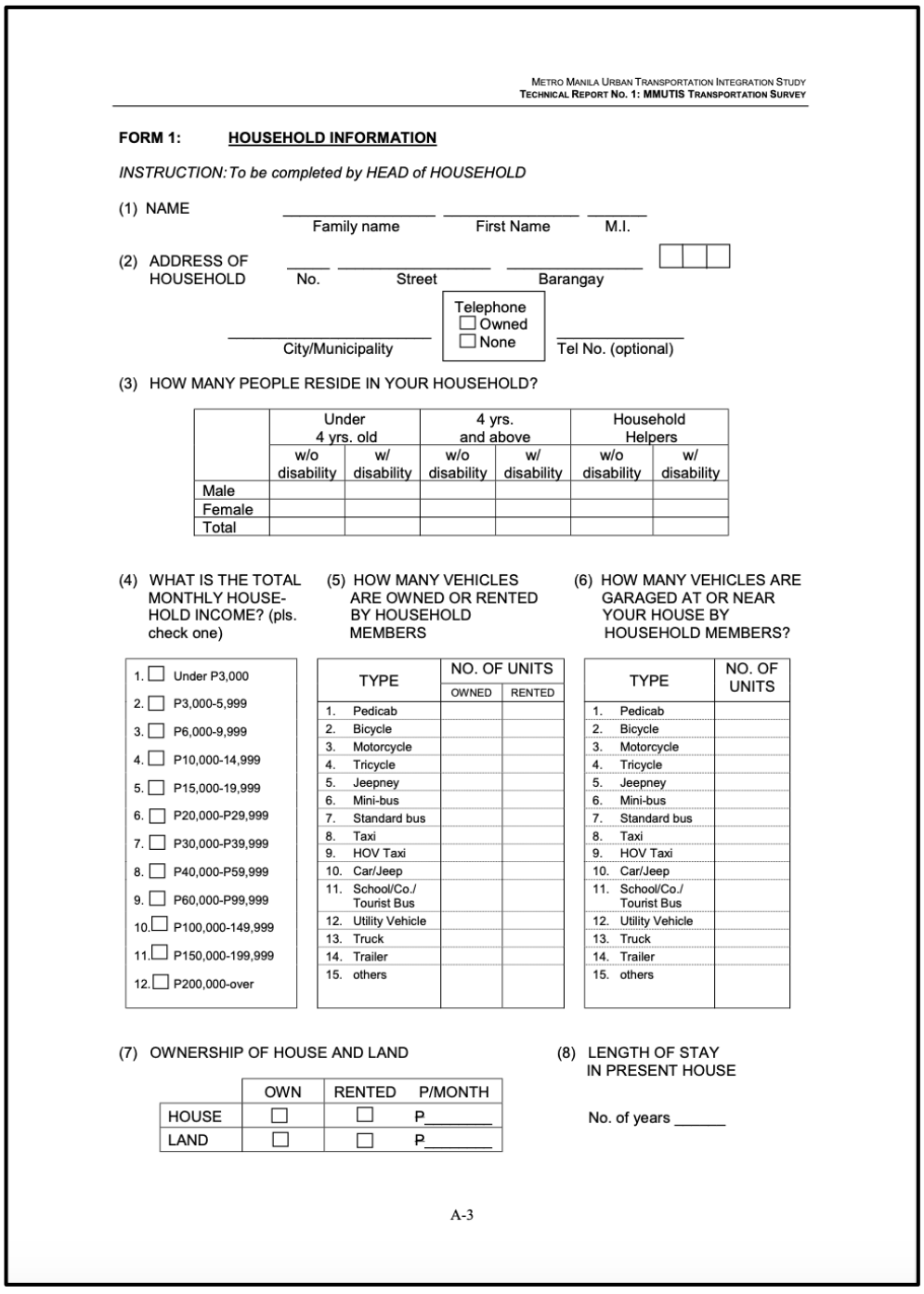
On the other hand, for the utility function and multinomial logit model, the difference of the results may be relatively low, but with their nominal values, it can still be considered as significant. The income level of a user affects their mode choice. Similar with the descriptive statistics results, trip makers from lower income levels prefer to use public transportation especially jeepneys and standard buses while trip makers from higher income levels prefer to use private transportation such as cars. It can also be observed that there is a trend in the probability of shares of modes in terms of the number of transfer nodes. Users that have the greatest number of transfers prefer jeepneys and standard buses whereas users with just one or two transfers choose cars, taxis, and even tricycles.

Lastly, between the T4Cast Model and this research study, both used the generalized travel cost calculation to make the utility functions. The researchers also stated that the mode-choice decision is homogeneous within each class but differs among classes. It is still observed that the mode choice behavior of users is dependent on their income level.

6. RECOMMENDATIONS

The researcher recommends getting the latest dataset available. It is also highly recommended to explore and to investigate more parameters to observe more relationships to the mode choice behavior of a user. Future researchers may include other trip purposes too. Considering more and/or other transportation modes can also still be studied further. Lastly, other types of models can be used such as nested logit models to consider the differential degrees of interdependence among the subsets of different mode choices in the dataset.

APPENDIX A. Sample Household Information Form



METRO MANILA URBAN TRANSPORTATION INTEGRATION STUDY
TECHNICAL REPORT NO. 1: MMUTIS TRANSPORTATION SURVEY

FORM 1: HOUSEHOLD INFORMATION

INSTRUCTION: To be completed by HEAD of HOUSEHOLD

(1) NAME _____ Family name _____ First Name _____ M.I.

(2) ADDRESS OF HOUSEHOLD _____ No. _____ Street _____ Barangay ☐☐☐

_____ City/Municipality Telephone ☐ Owned ☐ None _____ Tel No. (optional)

(3) HOW MANY PEOPLE RESIDE IN YOUR HOUSEHOLD?

	Under 4 yrs. old		4 yrs. and above		Household Helpers	
	w/o disability	w/ disability	w/o disability	w/ disability	w/o disability	w/ disability
Male						
Female						
Total						

(4) WHAT IS THE TOTAL MONTHLY HOUSE-HOLD INCOME? (pls. check one)

1. ☐ Under P3,000
2. ☐ P3,000-5,999
3. ☐ P6,000-9,999
4. ☐ P10,000-14,999
5. ☐ P15,000-19,999
6. ☐ P20,000-P29,999
7. ☐ P30,000-P39,999
8. ☐ P40,000-P59,999
9. ☐ P60,000-P99,999
10. ☐ P100,000-149,999
11. ☐ P150,000-199,999
12. ☐ P200,000-over

(5) HOW MANY VEHICLES ARE OWNED OR RENTED BY HOUSEHOLD MEMBERS

TYPE	NO. OF UNITS	
	OWNED	RENTED
1. Pedicab		
2. Bicycle		
3. Motorcycle		
4. Tricycle		
5. Jeepney		
6. Mini-bus		
7. Standard bus		
8. Taxi		
9. HOV Taxi		
10. Car/Jeep		
11. School/Co./ Tourist Bus		
12. Utility Vehicle		
13. Truck		
14. Trailer		
15. others		

(6) HOW MANY VEHICLES ARE GARAGED AT OR NEAR YOUR HOUSE BY HOUSEHOLD MEMBERS?

TYPE	NO. OF UNITS
1. Pedicab	
2. Bicycle	
3. Motorcycle	
4. Tricycle	
5. Jeepney	
6. Mini-bus	
7. Standard bus	
8. Taxi	
9. HOV Taxi	
10. Car/Jeep	
11. School/Co./ Tourist Bus	
12. Utility Vehicle	
13. Truck	
14. Trailer	
15. others	

(7) OWNERSHIP OF HOUSE AND LAND

	OWN	RENTED	P/MONTH
HOUSE	☐	☐	P_____
LAND	☐	☐	P_____

(8) LENGTH OF STAY IN PRESENT HOUSE

No. of years _____

A-3

APPENDIX B. Sample Household Member Information Form

FORM 2: HOUSEHOLD MEMBER INFORMATION

INSTRUCTION: To be completed every HOUSEHOLD MEMBER aged 4 yrs, and above.

(1) NAME _____ (Family Name) _____ (First Name) _____ (M.I.) ☐☐

(2) AGE _____ (3) SEX: (pls check) Male ☐ Female ☐ (4) DISABLED: Yes ☐ No. ☐

(5) WORK ADDRESS _____ (No.) _____ (Street) _____ (Barangay) ☐☐☐

_____ (City/Municipality)

(6) SCHOOL ADDRESS _____ (No.) _____ (Street) _____ (Barangay) ☐☐☐

_____ (City/Municipality)

(7) OCCUPATION (Please Encircle)

1. Officials of Govt. & Special Interest Org., Corporate Exec., Mangers, Managing
2. Professionals
3. Technical & Assoc. Professionals
4. Clerical Worker
5. Service Workers & Shop & Market Workers
6. Farmers, Forestry Workers & Fisherman
7. Traders & Related Workers
8. Plant & Machine Operators & Assemblers
9. Laborers & Unskilled Workers
10. Student (Elem.)
11. Student (H.S. & Univ.)
12. Housewife
13. Jobless
14. Others, specify_____

(8) EMPLOYMENT SECTOR (Please Encircle)

1. Agriculture, Hunting & Forestry
2. Fishing
3. Mining & Quarrying
4. Manufacturing
5. Electricity, Gas & Water Supply
6. Construction
7. Wholesales & Retail Trade; Repair of Motor Vehicles Motorcycles, Personal & Household Goods
8. Hotels & Restaurants
9. Transport, Storage & Comm.
10. Financial Intermediation
11. Real Estate, Renting & Business Activities
12. Public Adm. & Defense; Compulsory Social Security
13. Education
14. Health & Social Work
15. Other Community, Social & Personal Service
16. Private Households
17. Extra-territorial Organizations

9) MONTHLY INCOME (Please Encircle)

1. Under P3,000
2. P3,000-5,999
3. P6,000-9,999
4. P10,000-14,999
5. P15,000-19,999
6. P20,000-P29,999
7. P30,000-P39,999
8. P40,000-P59,999
9. P60,000-P99,999
10. P100,000-149,999
11. P150,000-199,999
12. P200,000-over

(10) STATE THE TYPE OF DRIVER'S LICENSE HELD.

☐ 1. Student ☐ 2. Non-Prof. ☐ 3. Professional ☐ 4. None

(11) PLEASE LIST ALL THE PLACES VISITED ON THE SURVEY DAY. No of trips ☐☐

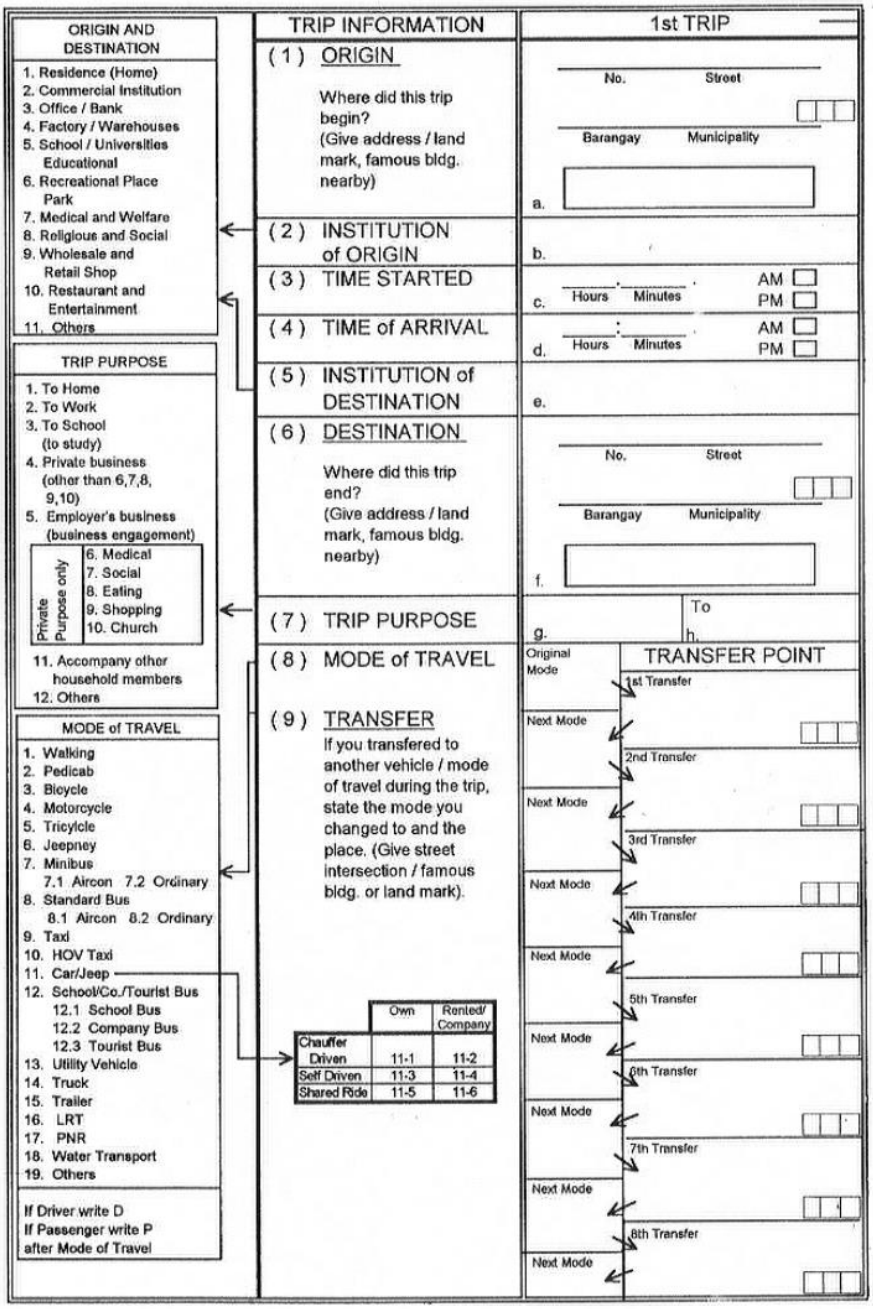
_____ _____
_____ _____
_____ _____

(12) DO YOU WORK ON (Office Hours): ☐ 1. Fixed Time ☐ 2. Flexible Time

APPENDIX C. Sample Trip Information Form

Form 3: TRIP INFORMATION

INSTRUCTION: To be completed for every HOUSEHOLD MEMBER aged 4 years and above



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