



The Influence of Socio-Economics on Travel Behavior of Public Transportation in Malaysia

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Abstract

This paper explores the influence of socioeconomics on travel behavior among public transport commuters to increase modal share. A face-to-face survey was carried out, and 904 usable questionnaires were analyzed using SPSS. The findings showed that level of education strongly influences travel behavior while there is not much difference in gender, age, income, and occupation. However, the categories in the groups provide good information relating to travel behavior. Suggestions and recommendations are provided to help the public transport service provider setting more strategic plans to encourage more individual riders to switch to public transport and sustain existing users.

Keywords: Socio-economics, travel behavior, public transport

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1.0 Introduction

In 2019, Kuala Lumpur was ranked the seventh most polluted city globally according to Switzerland-based pollution mapping service AirVisual (NST, 2019). Kuala Lumpur currently has a U.S Air Quality Index (AQI) of 127, equating to "unhealthy for sensitive groups." One of the main contributions is private transportation. Even though the public transportation infrastructures have been developed tremendously, public transportation utilization is still at 20% of modal share (The Malaysian Reserve, 2019). This gap would raise a need better to understand associations between public transport users and travel behavior to encourage more public transportation modal share. Understanding the relationship between travel behavior and users' socio-demographics would provide insights to the public transport service providers to decide on service delivery, especially in promoting public transportation utilization.

This paper examines the travel behavior of public transport users in regards of socio-economic perspectives. Konstadinos et al., (2020) urge that travel behavior research needs to explore the impact of socio-economics attributes. It is important to understand the socio-economics of commuters in providing a better service that would encourage more public transport modal share.

It pursues to expand the prevailing empirical evidence base using data collected in-depth conveyance survey conducted in Greater Kuala Lumpur. The objective of the paper is to investigate the influence of socio-economics on travel behavior of public commuters in Greater Kuala Lumpur.

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The analysis addresses the following questions: how socio-economic influence travel behavior of public transportation usage? Using descriptive analysis, factors related to socio-demographic (gender, age, education level, income, and occupations) and their relationship to travel behavior are examined. The findings would help policy makers to plan more strategic approach to increase public transport modal share. The paper is structured into six sections: introduction, literature review, research methodology, findings, discussion, and conclusion with a suggestion for future research

2.0 Literature Review

Socio-economic factors are more critical to analyses to determine relationships on travel patterns (Sharma, 2019). As of 2021, the population of Kuala Lumpur has been increased from 7.97 million to 8.21 million with the growth rate of 2.68%. It covers an area of 2,793.27 km² (7,010/ sq mil). Due to its importance, urban migration contributed to a 2.68% increase in population annually. Kuala Lumpur is a metropolitan and the largest city in Malaysia, with a population of diversity of races and economic background. A study has shown that motorists in Kuala Lumpur spend 53 minutes on average in traffic congestion every day, not including the actual traveling time (World of Buzz, 2017). It affected the work productivity, which was estimated more than 1 million hours annually stuck in traffic congestions daily. Kuala Lumpur recorded the highest median income with RM10, 549 (Department of Statistic, 2019). The disparity of income, education and occupation are highest in Kuala Lumpur compared to other states (Tey et al. 2019). Ibrahim et al. (2021) found that gender and age played important role in influencing service quality. Therefore, it is important to understand the impact of socio-economic on travel behavior of public commuters in Kuala Lumpur.

There are many suggestions in tackling traffic congestion, especially in encouraging more motorists to switch from private transportation to public transportation. Thus, the government has spent a big budget on building and developed the state-of-art urban public transport structure under the National Transformation Programme (NTP 2017). The urban public transports available in Greater Kuala Lumpur are buses, light rail transit (LRT), Mass Rapid Transit (MRT), and commuter train. However, the target of 40% of public transport ridership has not been achieved (Ayuni, 2017). Based on Road and Transport Authority, To make the thing worse, private car registration in Kuala Lumpur has been increased tremendously from 2004 - 2019. Travel demand management (TDM) promotes that understanding the factors relating to travel behavior, significantly socio-economic, would help to encourage more motorists to switch to public transport. (Socio-economic attributes 2010).

Travel behavior refers to the complicated decision-making process of travelers during a trip regarding travel mode choice, route choice, and departure time choice (Jing, 2018). Urban mobility is the accumulation of travel behavior of all commuters that constitute the urban transport system (Bajracharya & Shrestha, 2017). Travel behavior research needs to explore the impact of socio-economics attributes (Konstadinos et al., 2020). Few studies showed that, in general, socio-economic factors significantly influence travel behavior. Socio-economic characteristics consist of gender, age, income, household size, education level, and car ownership. Socio-economic factors are more critical to analyses to determine relationships on travel patterns (Sharma, 2019). Travel behavior between males and females showed mixed results. Mauch and Taylor (1997) showed a significant gender difference in travel behavior, and Basaric et al. (2016) found that women tend to use less public transport in Serbia. Age is also another factor that has to affect travel behavior, but it should be examined with other socio-economic factors simultaneously (McCarthy et al., 2017). Income group is another prime factor in using public transport. Usually, income is also associated with private transport ownership (). Jamal and Newbold (2020) found that age and income are closely related to travel behavior. Millennials who are more IT savvy but lower-income prefer public transports than higher-income elder earners (Li et al. 2020). Finally, the higher the level of education, users would better understand the importance of public transport (Bozic & Jovanovic, 2017) and would be easier to educate them in relating to the importance of public transport utilization.

3.0 Methodology

A simple random sampling was employed during the data collection process. The respondents were approached at the waiting area and questionnaire administered to all willing commuters, and they can either complete it themselves, or the enumerator would assist them. Recruited enumerators administered the process. The enumerators monitored the response time for each section to ensure that the respondents spent enough time on answering the questions. As suggested by Shamshiripour et al. (2020), the timing of the survey was kept for an average of 10 minutes to avoid overly fast responses that jeopardize the quality of responses. The items for socio-economics were based on available standard content. The travel behavior instruments were adopted from Javid et al. (2016).

4.0 Data Analysis and Findings

The survey was carried out at LRT stations of Kelana Jaya Line, covering 46km of grade-separated LRT rails tracks with 37 stations. The line LRT covers from Putra Heights LRT station through Kelana Jaya LRT station to Gombak LRT station, serving the Subang Jaya and Petaling Jaya areas mainly. A total of 934 questionnaires were collected, but only 904 were usable. This study used socio-economic variables of gender, age, monthly income, level of education, and occupation towards travel behavior.

Table 2 shows the demographic profiling of respondents. Most of the respondents were frequent public transport users, where females were the majority of respondents (53.4%). The majority of respondents were in the age range of 20-29 (61.7%), and most were students (57.4%). In terms of education level, 50.3% were Degree holders. Most respondents earned less than RM3000 monthly (48.7%), followed by an income bracket of RM3000 – RM4999 (22.1%).

SPSS analysis is used to analyze the data. The data analysis of univariate analysis was chosen as it was deemed more suitable, especially in comparing groups and when variables comprised categorical and continuous data (Pallant, 2001; DeCoster, 2006).

For this study, T-Test, Mann-Whitney U test and ANOVA were employed in comparing groups of socioeconomic factors. The t-test is used to compare the mean score for two different groups (Pallant, 2001, p.177). The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups (Pallant, 2001, p.186).

4.1 Reliability test

Reliability test was carried out on travel behavior instruments as suggested by Zikmund (2003). Table 1 shows the reliability test for travel behavior. The Cronbach Alpha of travel behavior was 0.817 which is higher than 0.7 as recommended by Nunnally and Bernstein (1994) thus it is a reliable measurement tool.

Table 1: Reliability Test

Cronbach's Alpha	N of Items
0.817	5

Table 2: Demographic Profiling

Description	Frequency	Percentage
User	Frequent User	607
	Non User	296
Gender	Male	421
	Female	483
Age	< 20	172
	20-29	558
	30-39	109
	40-49	37
	50-59	21
	>60	7
Education Level	SPM/STPM	154
	Certificate/Diploma	217
	Degree	455
	Post-Grad	38
	Others	37
Occupation	Not working	34
	Student	519
	Executive	120
	Manager	55
	Self-Employed	53
	Technical / labor Intensive	29
	Others	94
	Monthly Income	Under RM2,999
RM3,000-RM4,999	200	
RM5,000-RM9,999	150	
RM10,000-RM14,999	67	
Over RM15,000	29	

4.2 Gender

A T-Test was conducted to analyze gender impact on TB, o. The analysis compares the mean score on the continuous variable of Travel Behavior for two different groups of gender. An independent samples t-test was conducted to compare the travel behavior scores for males and females. There was no significant difference in scores for males (M=3.41; SD= 0.986), and females (M=3.47, SD= 0.962); $t(0.902) = 0.879, p=0.380$). The magnitude of the differences in the means was minimal (eta squared = 0.0009). The Mann-Whitney U Test provided the significance level of 0.430 which is exceed the cutoff point of 0.05 as suggested by Pallant (2001). Therefore, null hypothesis is accepted which indicated that there is no difference between gender with regard to Travel Behavior. Table 3 and Table 3a present the results of the T-Test and Mann-Whitney U Test for Gender.

Table 3. T-Test- Gender

	Mean	Gender	N	Mean	Std. Deviation	Std. Error
TB		Male	421	3.4157	.98619	.04806
		Female	483	3.4727	.96235	.04379

Table 3a. Mann-Whitney U Test - Gender

	Null Hypothese	N	Sig.	Decision
1	The distribution of TB is the same across	Mann-Whitney U Test	0.430	Retain the null hypotheses

categories of Gender- Make- Female

Analysis of variance (ANOVA) is when it compares the variance (variability in score) between the different groups (independent variable) with the variability within each of the groups. ANOVA has been utilized for the rest of the analysis to investigate the comparison between sub-groups and travel behavior.

4.3 Age

A one-way between-group analysis of variance (ANOVA) was conducted to explore the impact of age on travel behavior. Subjects were divided into six groups according to their age (Group 1: less than 20; Group 2: 20-29; Group 3: 30-39; Group 4: 40-49; Group 5: 50-59; Group 6: Above 60).

The significance value for Levene’s test was greater than 0.05; therefore, it is not violated the assumption of homogeneity of variance. There was no significant difference between group [F (2, 898) = 1.749, p = 0.123]. Post-hoc comparison using the Tukey-HSD test indicated that the mean score for each group was not significantly different. Table 4 and Table 5 present the descriptive test and Anova test for age, respectively.

Table 4: Descriptive Test for Age Group

Age	N	Mean	Std. Deviation
<20	172	3.3721	.92881
20-29	558	3.4337	.97048
30-39	109	3.4526	1.01584
40-49	37	3.8018	1.06127
50-59	21	3.7778	.92696
>60	7	3.2857	1.00791

Table 5. ANOVA- Age

		Sum of Squares	df	Mean Square	F	Sig
TB * Age	Between Groups (Combined)	8.204	5	1.641	1.739	0.123
	Within Groups	847.398	898	0.944		
	Total	855.602	903			

4.4 Income Level

A one-way between-group analysis of variance (ANOVA) was conducted to explore the impact of income level on travel behavior. Subjects were divided into six groups according to their income level (Group 1: under RM2.9k; Group 2: 3k – 4.9k; Group 3: 5k – 9.9k; Group 4: 10k – 14.9k; Group 5: Over 15k). Table 4 shows the descriptive test for income group.

The significance value for Levene’s test was greater than 0.05; therefore, it is not violated the assumption of homogeneity of variance. There was no significant difference between group [F (5, 880) = 1.219, p = 0.298]. Post-hoc comparison using the Tukey-HSD test indicated that the mean score for each group was not significantly different. Table 6 presents the demographic test for income, and Table 7 presents the Anova test for Income groups.

Table 6: Descriptive Test for Income Group

Income	N	Mean	Std. Deviation
Under RM2,999	440	3.5080	.97293
RM3,000-RM4,999	200	3.3500	1.02604
RM5,000-RM9,999	150	3.3889	.93360
RM10,000-RM14,999	67	3.4080	.98100
Over RM15,000	29	3.6207	.77010

Table 7: ANOVA Table – Income groups

		Sum of Squares	df	Mean Square	F	Sig
TB * Income	Between Groups (Combined)	5.779	5	1.156	1.219	0.298
	Within Groups	834.102	880	0.948		
	Total	839.881	885			

4.5 Education Level

A one-way between-group analysis of variance (ANOVA) was conducted to explore the impact of education level on travel behavior. Subjects were divided into five groups according to their level (Group 1: SPM/STPM; Group 2: Diploma; Group 3: Degree; Group 4: Postgrad; Group 5: Other). There was a statistically significant difference at the $p < 0.05$ level in education level for the five education levels [$F(4, 896) = 3.202, p = 0.013$]. Despite reaching statistical significance, the actual difference in mean scores between the groups was quite small. The effect size, calculated using eta squared, was 0.014 (Table 8). Post-hoc comparison using Tukey-HSD test indicated that the mean score for Group 4 ($M = 3.84, SD = 0.865$) was significantly different from Group 5 ($M = 3.13, SD = 0.998$). Group 1 ($M = 3.53, SD = 0.995$), 2 ($M = 3.42, SD = 1.05$) and 3 ($M = 3.41, SD = 0.923$), did not differ significantly from either Group 4 or Group 5. Table 8 and Table 9 presents the descriptive test for education level and Anova test, respectively.

Table 8. Descriptive Test for Education Level

Education	N	Mean	Std. Deviation
SPM/STPM	154	3.5476	.99503
Certificate/Diploma	217	3.4178	1.04995
Degree	455	3.4125	.92398
Post-Grad	38	3.8421	.86207
Others	37	3.1261	.99800

Table 9. ANOVA Table for Education Level

		Sum of Squares	df	Mean Square	F	Sig
TB * Education Level	Between Groups (Combined)	12.016	4	3.004	3.202	.013
	Within Groups	840.551	896	0.938		
	Total	852.567	900			

Table 9a. Measures of Association

	Eta	Eta Squared
TB * Education Level	.119	.014

4.6 Occupation

A one-way between-group analysis of variance (ANOVA) was conducted to explore the impact of occupation on travel behavior. Subjects were divided into seven groups according to their occupation. The significance value for Levene's test was greater than 0.05; therefore, it is not violated the assumption of homogeneity of variance. There was no significant difference between group [$F(5, 880) = 1.219, p = 0.298$]. Post-hoc comparison using the Tukey-HSD test indicated that the mean score for each group was not significantly different. Table 10 presents the report for occupation, while Table 11 present the Anova Test for Occupation.

Table 10. Descriptive Test for Occupation

Occupation	N	Mean	Std. Deviation
Not Working	34	3.5392	.93569
Student	519	3.4091	.92456
Executive	120	3.4278	1.04357
Manager	55	3.4788	.97450
Self-Employed	53	3.3962	1.12481
Technical / labour Intensive	29	3.3793	.95836
Others	94	3.6702	1.06480

Table 11. Anova Test for Occupation

		Sum of Squares	df	Mean Square	F	Sig
TB * Occupation	Between Groups (Combined)	6.086	6	1.014	1.071	.378
	Within Groups	849.516	897	.947		
	Total	855.602	903			

5.0 Discussion

The findings showed that socio-economic factors play an important impact in travel behavior. It is important to note that the findings were derived from only one LRT line which is Kelana Jaya which covers mainly area in Subang Jaya and Petaling. Residents in these can be

categorized from middle to high income groups. There is no difference between male and female public transport commuter. The study showed that more females chose public transport over males. Perhaps, as the public transport service has improved tremendously, it gives more safety assurance to female commuters than private vehicles. This is also shared by Brohi et al. (2018) in their study of smart cities in Malaysia. They found that issues like safety, security and inappropriate infrastructure dampen private commuters to switch to public transport. Even though there is no significant difference between age groups, the age group of 40-60 showed higher means than younger age groups. This could be that these age groups are more matured and understand the impact of public transport in the long run. Ibrahim et al. (2020) found that gender and age played an important roles in service quality of public transport in Kuala Lumpur. Interestingly to note that income bracket of fewer than RM2999 and more than RM15000 showed a higher means. As public transport is affordable, much lower income group choose public transport over private. Nevertheless, it is good to note that the higher-level income also chooses public transport. This could relate to age group analysis that this group is more mature and see public transport is more convenient and comfortable. The analysis of education level showed a significant difference between groups. It showed that the post-graduate level has a different perception of travel behavior and SPM/STPM graduate. This is essential findings for the service provider that commuters are from different backgrounds. The previous study showed that lower-income groups and lower levels of education formed most public transport users (Ngah, 2020). Looking at the findings, most of the users shared the same perception or reaction towards travel behavior. The findings produced mixed results of minimal differences, perhaps because of the background and income status of public transport commuters of Kelana Jaya Line. Other Lines are mixture of income status thus might provide more details findings. However, the findings present good information for public transport service providers in encouraging more commuters to use public transport as mentioned by Sharma (2019). Finally, even though there is no difference between types of occupation, those not working showed higher means as public transport is affordable. The findings provided mixed results compared to previous studies. It is interesting to note that public transport users in Greater Kuala Lumpur are similar in terms of characteristics, making it easier for the service provider to create plans to sustain and attract current and potential users in the future.

6.0 Conclusion

The purpose of the study was to explore the impact of socio-economic on travel behavior. While users in Greater Kuala Lumpur showed no difference in gender, age, income level, education level, and occupation, the findings provide a good potential for public transport service providers to provide better service. The service provider would plan and promote better packages and services to encourage more private transport users to switch to public transport. Few findings suggest that different groups of users showed a more substantial positive influence on the travel behavior of public transport. Understand their needs and wants would help to increase public transport modal share. Looking at countries like South Korea, Singapore, and Hong Kong, the various age group, occupations, income brackets, and gender opt to use public transport, thus helps to reduce air pollution and increase work productivity. This research encountered few limitations. Collecting data during transit and waiting time for the next train created challenges for researchers to record real answers. Another limitation is the service provider only allowed researchers to collect data at Kelana Jaya Line while there are another three lines were not explored. Thus the comprehensive findings on socio-economic of Greater Kuala Lumpur are absent. Recommendation for future research is to carry out a qualitative research would help discover more rich information about users discovering their honest opinions on public transport services in future research. The findings offered rich information to the service provider of public transport in improving their services and infrastructure. In addition, an investigation of personal norms, psychological and self-efficacy towards travel behavior would enlighten more insights of public commuters as promoted by Abdullah et al. (2020) and Shamshiripour et al. (2020) in the wake of pandemic Covid19 which set a new norms and new way of life. The findings would help service providers to understand about public transport commuter and able to provide specific incentives to attract, attain and retain public transport commuters.

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Paper Contribution to Related Field of Study

Travel/Transportation

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