MODE CHOICE OF URBAN COMMUTERS – A CASE STUDY ON PASSENGERS TRAVELLING ON THE 120 BUS ROUTE FROM PILIYANDALA TO COLOMBO

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ABSTRACT

One of the most important steps in the transportation planning process is mode selection, which has a direct impact on policy decisions. Understanding the factors that influence mode choice after the pandemic and economic crisis would undoubtedly aid urban and transportation planners in better preparing for future transportation management. Many research studies have been conducted to find the influential factors in mode choice before the COVID-19 pandemic and economic crisis. Limited research has been conducted to identify the influential factors of mode choice in the post-pandemic and current tough economic situation in Sri Lanka. The objective of this study was to investigate the factors affecting passengers' modes of transportation in the urban context of Sri Lanka after the pandemic and economic crisis in the country. The mode chosen by the commuters was the dependent variable. Socioeconomic characteristics of the commuter, characteristics of travel, and characteristics of transport facilities were taken as independent variables. A Google questionnaire was administered to a sample of 203 commuters who were travelling between Piliyandala and Colombo along the 120 bus route. Multinomial logistic regression was used to identify the influential factors in mode choice. The results outlined that there had been a statistically significant relationship between travel-based characteristics of commuters, such as trip purpose (education: coefficient value 10.202, significance 0.00), vehicle ownership (coefficient value -6.723, significance 0.036), and mode choice. Findings showed that passengers who owned private vehicles chose private vehicles over public transport vehicles, and commuters travelling for educational purposes chose public transport over private transport. Increasing bus transport service frequency, setting up bus priority lanes, offering discounted fares for students travelling on public transport, and increasing school bus services are recommended, based on the above findings.

Key words: Mode choice, Economic crisis, Urban context, Sri Lanka, Covid 19, Factors

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INTRODUCTION

The mode choice of commuters was affected by the Covid-19 pandemic and the current economic situation of the country, particularly in urban areas. Hence, it is imperative to identify the factors affecting commuter mode choice in urban setting. This will enable planners to make more informed decisions about transport, such as creating a better transport system and increasing passenger satisfaction and the profitability of transport operators.

Numerous studies have been conducted to determine the factors that affected the mode choice of urban commuters prior to the pandemic and the economic crisis in Sri Lanka. However, relatively few scholars have examined the factors that affect passenger mode choice in this emergency. Passengers, bus operators, and regulators are the three main stakeholders in road transportation. Failure to find out the mode-choice factors of road passengers results in adverse effects on the main stakeholders in road transport, especially in not full filling the passenger expectations. This creates a shift from public transportation to private transportation. This modal shift lowers the revenue for bus operators and increases the bus operation cost, and other than that, the significant impact is that the traffic demand exceeds the capacity of the road system. Hence, the vehicle operational cost and the delay of all vehicles will increase. This leads to market failure. Ultimately, all this paves the way for private vehicles to become more popular. Therefore, the primary objective of this study was to explore the factors affecting the mode of choice of road passengers. Identifying the characteristics that influence commuters' modal preferences would thus assist in operating a demand-driven, passenger-oriented bus service. This could help bus operators improve their economic conditions. At the end, all these can lead to sustainable bus operations.

METHODOLOGY

This research study examined the factors influencing commuters' decisions regarding their choice of mode of travel along a bus route that connects two urban cities in Colombo, Sri Lanka. The mode chosen by the passengers was the dependent variable. The dependent variable had two categories, such as private vehicles and public transport. Public transport vehicles included only buses, and private transport vehicles included motorcycles, three-wheelers, and cars. The independent variables were personal characteristics of commuters, travel-related characteristics, and characteristics of the transport facility. These variables are shown in the conceptual framework in Figure 1.
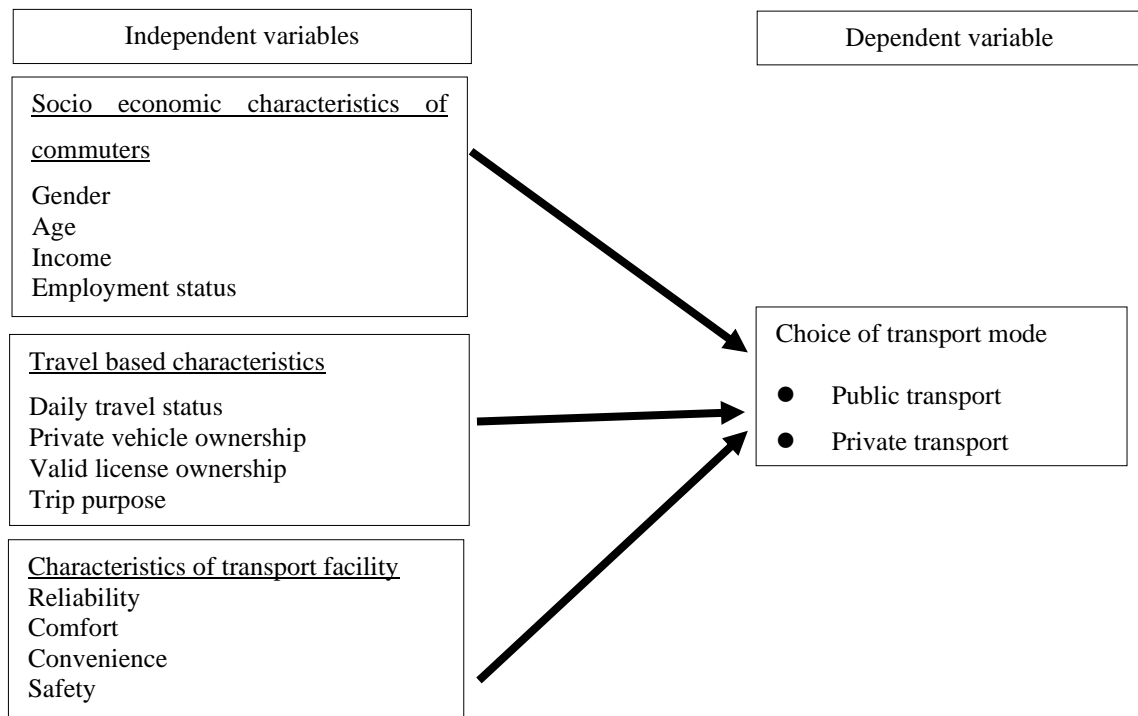
Independent variables		Dependent variable

Socio economic characteristics of commuters

Gender
Age
Income
Employment status

Travel based characteristics

Daily travel status
Private vehicle ownership
Valid license ownership
Trip purpose

Characteristics of transport facility
Reliability
Comfort
Convenience
Safety

Choice of transport mode

● Public transport
● Private transport

Figure: 1 Conceptual Framework

A pilot survey was conducted among randomly selected 30 commuters to develop possible levels of responses for the identified independent variables. Then a Google Form was used as a questionnaire to collect primary data for the above variables. This questionnaire had two sections: Section A and Section B. Section A was set for private transportation users, and Section B was set for public transportation users. Public transport vehicles referred to buses, and private transport vehicles referred to motorcycles, three-wheelers, and cars. This questionnaire was administered to a sample of 384 commuters who travelled between Piliyandala and Colombo along the 120-bus route, which is a corridor to the city of Colombo, and 203 valid responses were received. Piliyandala is a suburban city located around 18 km away from the capital, Colombo. The data was collected through an online survey. The following steps were taken to reduce the bias of the online survey: First, before launching the survey, a pilot test with a small group of respondents was conducted to identify any potential issues or biases in the questionnaire. The purpose of the survey was clearly explained to respondents, ensuring they understood the context and meaning of the questions. Second, the questionnaire was sent to many people to ensure that the survey population represented a wide range of demographics and backgrounds (Couper, 2001). To reach a wider audience and minimize the chance of bias connected with a particular platform, the questionnaire was shared among the commuters via several methods, including WhatsApp, Gmail, etc. (Dillman et al., 2014).

In this study, a sample size of 384 was estimated using a sample finder website with a level of confidence of 95% and a margin of error of 5%. A multicollinearity test was performed among independent variables, and it was assumed that the variables had no multicollinearity as the variance inflation factor (VIF) ranged between 1 and 10 (Bhat, 2006). A multinomial logistic regression model (LR) was run to examine the statistical significance of factors that influenced the choices of mode of transportation of commuters. The results of the model yielded the B (coefficient) value in the parameter estimations and the significance value (Patil et al., 2020).

RESULTS AND DISCUSSION

Multinomial Logistic Regression test was run for this study while keeping private transport as the reference category. This test yielded parameter estimates. These parameter estimates are shown in Table 1.

Table 1: Parameter Estimates- B values and significant values with reference values

	B	Sig.	Reference Sig. value
Having a Private Vehicle ownership	-6.723	.036	< 0.05
Trip purpose – Education	10.202	.000	< 0.05

According to Table 1, private vehicle ownership and education-purpose trips had statistically significant relationships with mode choice because factors showed a significant value less than 0.5. Passengers who owned private vehicles were choosing private vehicles over public transport vehicles (coefficient value =-6.273, significant value = 0.036). This finding can be validated by the private vehicle peak hour passenger volume, which was 3700 per hour (Electrophoresis, 1994). As per the collected data from the survey for the 120-bus route, approximately 50% of the sample of respondents who answered the survey admitted that they use their own vehicle for travel. With reference to the news Marian (2022) broadcast on News First: "The shortage of fuel in the country has negatively affected public passenger transport services." Therefore, this can be another reason why private vehicle owners choose their own vehicles to travel without getting delayed. One of the other reasons was that there were some restrictions on public transport, like interprovincial public transport, so that also prompted people to use their own vehicles (Nilar, 2021). As per the findings, it is suggested to increase bus shares by increasing bus service frequencies and implementing bus priority lanes because the bus priority lane is an excellent way to encourage public transportation and reduce traffic congestion (Julius & Thillaiampalam, 2021).

According to the survey results, commuters travelling for educational purposes chose public transport over private transport (coefficient value =10.202, significant value = 0.00). It holds true as most of the respondents who were making educational trips were students and not income-makers. Most government school students used to come to school by using group transportation coaches like "Sisusariya" because they were given the lowest bus fare (Kiriella, 2022). Therefore, they were choosing public transport over private vehicles. Based on the findings, increasing the bus frequency, increasing the school bus services, and offering discounted fare rates to students are beneficial to the student's community (Kiriella, 2022).

CONCLUSIONS

The evidence from the study of 120 bus route from Piliyandala to Colombo has shown that travel-based characteristics (vehicle ownership and educational trip purpose) influenced the mode choice of passengers. In conclusion, passengers, operators, and regulators are the main three parties in the transport sector. Meanwhile, the above research findings benefit passengers, bus operators, and regulators in many ways, such as increasing bus service frequency, which will be profitable for bus operators because of the increased number of operations; passengers will be satisfied because of the increased bus services; and regulators will be satisfied because there will be a lesser number of private vehicles on the road, which will reduce congestion and environmental pollution if recommendations from this research are implemented.

The main limitation of this study is that it has not compared the influential factors of mode choice with pre-Covid-19 and pre-economic crises in the country. Hence, future researchers can conduct a comparison of the factors related to mode choice before COVID-19 and the economic crisis. In addition, researchers can focus on increasing sample size, sampling method, and more variables, especially the availability of fuel, to identify more statistically significant variables that could affect mode choice.

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