

Comparison of Urban and Rural Public Transport Characteristics: A Case Study in Trincomalee

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Abstract - This research finds out the significant differences between rural and urban public transportation with reference to personal, trip, and access characteristics. Personal characteristics of trip maker include gender, age, employment status, vehicle ownership, possessing a driving license, monthly income, residence location, and PT usage time interval. Trip characteristics include type of journey, purpose of the journey, waiting time, and traveling time. Access characteristics include traffic condition, distance between public transportation and starting point, cost to reach PT station, and accessibility issues to PT services. Data were collected by distributing the questionnaire forms in Trincomalee district from 11th July to 01st August in 2022. The significant different characteristics were identified through chi square tests. It was found that, nine variables out of 18 variables were significantly different in urban and rural area public transportation. The significant variables were, age, employment details, having a vehicle, frequency of using public transportation, purpose of the trip, waiting time, type of transportation mode used to reach public transportation, distance between starting point to PT station, and accessibility issue. Understanding the public transportation characteristics differences between urban and rural area helps to enhance the existing public transportation and further develop the sustainable and accessible PT service in future.

Keywords: *Public transportation, Chi squared test, Trip characteristics*

I. INTRODUCTION

Town and cities are getting larger and busier also roads are becoming more congested. There are more private vehicles on the road now than before [1]. Therefore, people are being actively encouraged to use PT, when possible, to lighten the load and to ease the pressure [2]. Public transportation does a great job of moving multiple people around with the use of a single vehicle [3]. According to the National Geographic Society's 2009 Greendex report, a survey has been conducted around 17 countries regarding the frequency of using public transportation [4]. As shown in Figure 1, in America, only 5% of the people use PT every day and 61% of the people never use PT. About 52% of Russians use PT every day.

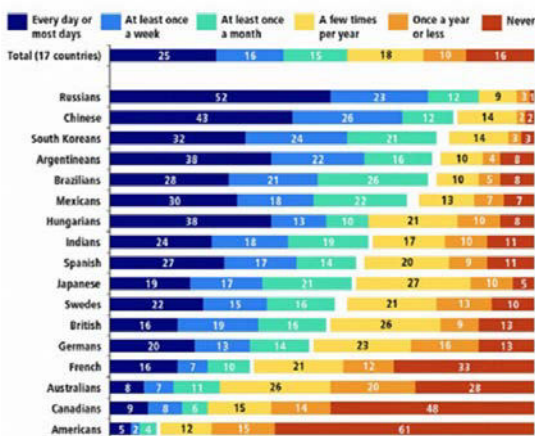


Figure 1: Public transportation user percentage (Source: [4])

In Sri Lanka according to Ministry of Transport, 32% of the people use private transportation and 68% of the people use

public transportation [5]. The demand of public transportation is differed from one country to another country. But 68% of passenger in Sri Lanka use PT to get round in day-to-day life. Among that 63% of passengers use bus service and 5% of the passenger use rail services. In Sri Lankan Road 87.1% of private vehicles and 5.7% PT vehicles are moving in the road. As such public transportation in Sri Lanka is the very important service. Identify the PT user's characteristic will help to tune up the service of public transportation network, improve the level of service delivery and foreseeing the level of demand of public transportation [6]. Demand of the public transportation is mainly depending on the PT users' characteristics. Such as, gender, age, income level, household size, education level, employment level, and relationship status [7]. In Sri Lanka, research have been done in 2015 regarding the characteristics of public and private transport users in Colombo metropolitan area [8]. Much research has been done only in rural areas or only in urban areas around the world. Mainly they have focused on walking as a choice of mode to reach PT station. They have not analyzed the different characteristic of urban and rural area people how it influences on the mode choice to reach PT station [9]. The focus in this research is to analyze the characteristic of PT in Trincomalee district highlighting the difference between urban and rural PT services.

II. MATERIALS AND METHODOLOGY

As the first step, questionnaire was prepared with multiple choice questions in three active languages in Trincomalee which helps to understand the PT users' characteristics. Questions were included to collect data on age, gender, employment details, having a vehicle, having a driving license, monthly salary, frequency of using public transportation, type of the day, type of the public transportation, purpose of the trip, waiting time, travelling time on public transportation, type of transportation modes used to reach public transportation, traffic condition in the journey start point to public transportation, cost to reach PT, and accessibility issue. Then questionnaire was distributed in Trincomalee district for all eleven DS division. In Trincomalee district, out of the total population 73.1% people are Tamil speakers and 26.7% people are Sinhala speakers. Therefore, the same proportion was taken in the sample. Four hundred filled questionnaire forms were collected. The data in the questionnaire forms were fed into Excel sheet and chi square test was used for the analysis. The chi squared test is intended to test how likely it is than an observed distribution is expected [10]. A Chi-square test is a nonparametric test which used for hypothesis tests about whether your data is as expected. The Chi-square test statistics is calculated using Equation 01 [10].

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

Where; χ^2 is the chi-square test statistic, O is observed frequency, and E is expected frequency. The basic idea behind the test is to compare the observed frequency in the data to the expected frequency that would be seen if the null hypothesis is true.

III. RESULTS AND DISCUSSION

Chi-squared tests were used to identify whether there were statistically significant differences between urban and rural PT users. Nine characteristics showed a significant difference as shown in Table 1.

Table 1. Chi Squared Test Relationship

Characteristics	P value
Age	0.029*
Employment status	0.003*
Gender	0.710
Having vehicle	0.000*
Having driving license	0.644
Monthly salary	0.590
Frequency of using public transportation	0.000*
Type of the day	0.084
Type of public transportation	3.230
Purpose of the trip	0.018*
Waiting time	0.000*
Traveling time on PT	0.149
Type of transportation mode use to reach PT	0.020*
Traffic condition in the journey start point to PT	0.063
Distance between stating point to PT	0.000*
Cost to reach PT	7.230
Accessibility issues	0.000*
Note- * Significant at 95% confidence level	

According to the results, in rural areas, school students and elders do not have an interest to travel on public transportation. But in urban all age category people use public transportation. In rural area mostly school students have a habit to travel public transportation. But in urban areas all employment stage people use to travel in public transportation. Shopping, medical purpose and schooling for this urban area people do not use public transportation. Because in urban area shops, hospital and school are near to the residence. But rural area they are not near to their home. Therefore, rural people want to travel long to reach destination. Because of that they use public transportation waiting more time than urban people. Another difference in urban and rural area is the type of access transportation mode. In urban area hiring three-wheelers are available with low cost as the bus stop is near to the origin. But rural area, sometime people need to travel another bus to access PT services. In some village people come to one main junction or main road to access public transportation. PT service is available few times per day into some villages. If people want to travel in other time want to come for main road or main junction which is so far from public transportation. But in rural area people can access public transportation services easily. Rural people face many difficulties to access public transportation than urban people.

IV. CONCLUSIONS

The objective of this study was to identify the significant differences between urban and rural of public transportation characteristics. The motivation factor of this study was the increment of private vehicle on the road. It was found out the most significant differences in PT between rural and urban areas related to the behaviour of trip makers with the aspect of characteristics of trip makers, characteristics of public transportation, characteristics of transportation modes used to reach public transportation. The analysis has found that characteristics of age, employment status, ownership of a

vehicle, frequency of public transportation, purpose of trip, waiting time, access mode of transportation, access distance, and accessibility issues were significantly different between urban area and rural area. These differences between rural and urban, bus and train user’s characteristic in Trincomalee can be very helpful in future to improve PT system in Trincomalee. The perception of the traveler related to the PT will be an essential requirement for the development of the area. As a future work of this study, it is needed to capture the traveler’s implicit needs and wants of the mode of the PT.

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