

Determinants of Increasing Demand for Three-Wheeler Transportation in Colombo

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1. Introduction

With the rapid growth of urban areas and commercial cities, and given the present transport infrastructure, urban areas become more and more congested day by day causing much time wasted on trips by both public and private transport users. Therefore, with the above reason three wheelers (commonly known as tuk-tuks, metered taxis, or fare taxis) have emerged as an alternative solution which guarantees a quick and convenient mode of travel in congested city areas; besides it also generates some common problems faced by travellers such as parking, waiting, and total time taken per trip. According to statistical figures given by the Department of Motor Traffic Sri Lanka, it is clear that demand for three wheelers has increased significantly throughout the years 2014 and 2015 at an average rate of 65%.

Table 1.1: Three-Wheeler Registration Comparison

	Monthly registration of new Three Wheelers - 2014	Monthly registration of new Three Wheelers - 2015	Increment % from 2014 - 2015
Jan	5,944	8,350	+40%
Feb	5,148	7,709	+50%
Mar	6,292	12,530	+99%
Apr	6,809	10,836	+59%
May	5,750	10,947	+90%
Jun	6,126	11,509	+88%
Jul	7,145	12,338	+73%
Aug	6,450	10,372	+61%
Sep	7,538	12,396	+64%
Oct	7,250	8,299	+14%
Nov	6,895	13,208	+92%
Dec	7691	11,053	+44%

(Department of Motor Traffic, Sri Lanka 2014-2015)

According to the above figures shown in the table it is clear that demand for three wheelers has increased significantly thus representing an increase in demand for

three-wheeler transportation. As a result of the above the tax increase by the present government to reduce three-wheeler imports in to the country has thus created an increased demand for existing three wheelers which provides para-transit transport.

2. Significance of the Study

With the ever-increasing importation of motor vehicles in to the country, three wheelers which account for a higher proportion of such vehicles can be identified as a non-regularised mode of private transportation. Being a non-regularised mode of transport, the demand of consumers who are willing to obtain the services of three wheelers may differ from one consumer to another. Taking into account the urban city areas, three wheelers can be identified as a main mode of transportation to travel shorter distances. Because of the increasing demand building up in city centres in Sri Lanka, commuters face many problems. These include congestion on roads, higher waiting time, air and noise pollution, bad conditions for human health and safety. It is very much true that the Sri Lankan situation has become worse with the increased vehicle population of two and three wheelers owned mostly by the middle-income earners and operated as an occupation. The greater population of vehicles on roads have become these easy-to transit modes.

The objectives of this research are to determine the factors that affect increasing demand for three-wheeler transportation in city areas of Sri Lanka

- To identify the sample population which frequently uses para-transit as a medium of travel within Colombo
- To conduct a survey of the travel patterns, frequencies, distances and time of travel
- To build a relationship between increasing demand and the affected factors

2. Methodology

The study thus focuses on affected factors to increase or raise demand for three-wheeler transportation in the urban limits of Colombo. Data was collected through a questionnaire survey from 400 respondents using simple random sampling method. 321 were questionnaires received and after data cleaning process 318 remained. The response rate of the questionnaire is 79.5%. The reliability test has been done in checking the reliability of the questionnaire. As most of the variables are categorical, categorical data analysis techniques have been used in analysing the study. Descriptive analysis has been carried out and hypothesis testing carried out to check the association between preference towards three-wheeler transport and other factors using chi-square test. Due to the collinearity, available in data set factor analysis has been done in building a statistical model. Kaiser-Meyer-Olkin (KMO) and Bartlett's test statistics has been used to check the sampling adequacy and the identity of the

correlation matrix. After extracting the factors, a reliability test has been done to check the reliability of the factors. Cronbach's Alpha was used to the measure statistical reliability of collected primary data by using questionnaire. This is a statistical tool which is used to find factors among observed variables. Normally factor analysis is carried out to reduce the number of variables into grouping factors when the numbers of variables are high. Variables with similar characteristics are grouped under one factor. Factor analysis can produce small number of factors from large number of variables which has the ability in to explain the observed variance in the larger number of variables. Multi-dimensional variables have been analysed in this factor analysis.

Descriptive statistics, Bartlett's &KMO test, Communalities, Total Variance, and Rotated Component Matrix are computed and analysed using SPSS 16.0 software. The Bartlett's test compares the observed correlation matrix to the identity matrix. It checks whether there is a particular redundancy between variables that can be summarized with a small number of factors. If the variables are perfectly correlated, only one factor is sufficient. A pilot survey was conducted to the check the trustworthiness of the data set. KMO value should be greater than to 0.5 to accept factor analysis. The requirement is that the KMO value should be greater than 0.7 in the test for acceptance and the Bartlett's test should be significant. Communalities are the proportions of variance accounting for the common factors of a variable. Communalities scores range from 0 to 1. A value of 1 means that common factors will explain all variables and a value of 0 means the common factors will not explain all variables. Total variance is explained by the initial solution table. Eigenvalue is the total variance describe by each factor. Eigenvalues less than one do not have enough total variance explained to represent a unique factor. KMO and Bartlett's test analytical tools are used for factor analysis and fulfil the ultimate objective of the research. Table, charts and figures generated through SPSS output are used to demonstrate the final conclusion. The reliability test value of 0.809 for the entire data set exceeded the Cronbach's Alpha value of 0.6 indicating that the reliability of the variables is in moderate level and data set can be accepted. Only five out of the six summarised factors, namely affordability, availability, suitability, assurance and concessions exceeded Chronbach's Alpha value of 0.6. Therefore, only these factors: namely, affordability, availability, suitability, assurance and concessions were used further in analysis. The outcome of hypothesis testing indicates whether the five summarised factors are independent or dependent from the i^{th} factor. Factors which represent a significance value of 0 or below 0.05 can be identified as dependent factors for the five summarised factors, affordability, availability, suitability, assurance, concessions and payment. A significance value below 0.05 indicates that null hypothesis is rejected, meaning that factors are not independent from the i^{th} factor and further indicates that the alternative hypothesis is accepted, meaning the factors are dependent on the i^{th} factor.

H0 : Factor is independent from the i^{th} factor

H1 : Factor is dependent from the i^{th} factor

i^{th} factor= (Gender, Age, Monthly Income (Rs), Sector of Employment, How often do you use Three Wheelers per day?, Distance travelled per trip (KM), For what purpose do you mostly use Three Wheelers, Place of residence, Place of work)

Hypothesis was tested for the five summarised factors which exceeded 0.6 of Chronbach's Alpha value.

3. Results

84% of sample respondents preferred three wheelers as an alternative to public transportation. According to the study, most users of three wheelers are middle level income earners per month, who may mostly do not own any private vehicle, rather they are having the affordability to use para transit modes in their journeys. The respondent stake at least one trip per day using short distance commuting vehicles especially three wheelers, while many are used to travel very short distances (less than 2 km). The main purpose of using three wheelers is for trips of personal interest, apart from leisure purposes, work related purposes and any other purpose. With many factors that have led public transportation to be inefficient, a majority of the population prefer to use three wheelers as an alternative to public transportation; agreeing with factors of: more flexibility than public transportation modes, convenience of travel, least cost compared to flexibility and distance of travel, ease of finding a mode, less time taken to travel the distance, income level of users, government intervention and increasing vehicle prices, limited amount of parking space, better availability of modes during off-peak hours and also the knowledge that drivers have when it comes to links and roads for destinations. Safety and security, environmental factors and discounts have to be addressed further. According to the results of hypothesis testing, flexibility, safety and security, time taken to reach the destination, increasing vehicle prices, and limited parking space for private vehicles are highly significant factors for preference towards three-wheeler transport. In building factor model strength of the relationship among variables is measured using KMO and Bartlett's test. KMO test statistic measures sample adequacy. Since the KMO test statistic is greater than 0.6, it can be concluded that sample is adequate. According to the table 4.9 value of KMO is 0.772. The recommended value of 0.5 is exceeded from the KMO value of this sample. Therefore, it can be preceded further with the factor analysis.

The hypothesis is H0: Correlation matrix is an identity matrix. And H1: Correlation matrix is not an identity matrix. As P-value of the Bartlett's test is 0.000, null hypothesis is rejected. It can be concluded that, correlation matrix is not an identity among variables used in factor analysis matrix which further supports the strength of

the relationship. According to the factor model, the six factors extracted: namely, affordability, availability, flexibility, assurance, concessions and payments, can be considered as the dimensions of three-wheeler transport in Sri Lanka.

4. Conclusion/Recommendation

The respondents have come up with various disagreements with the use of three-wheeler transportation, yet they prefer three-wheeler travels over other modes, especially over public transportation. One such factor is safety and security. Therefore, the government should implement safety and security measures for three wheelers and train the three-wheel drivers for safer travel. For further research, it is suggested to consider the safety and security of three wheelers and environmental impacts of the three wheelers especially in the areas of Colombo. This survey was conducted in Colombo district in Sri Lanka. Knowledge on increasing demand for three-wheeler transportation can be improved in the international context especially in Asia. Further research can also be developed to measure the performance two wheelers and private vehicle transportation.

5. References

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