Original Article

Commuters Perception Towards The Bus Base Park and Ride Implementation in Colombo City Limit

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Abstract

This study was conducted to identify the commuter's perception towards the bus base Park and Ride implementation in Colombo city limit. This study analyses the factors that commuters would consider when selecting park and ride system for their travel purpose. For the researcher to achieve the aforementioned objectives, the conceptual framework was structured based on secondary data which congregated by existing publications and articles. The research questionnaire was developed in order to gather primary data through google forms. Simple random sampling technique was used to distribute the questionnaire among the commuters who use seven corridors to enter Colombo city limit. Three hundred fifty-two responses were taken into consideration and analysis was done by taking them into one data base. The reliability of the collected data was analysed using Cronbach's alpha. The KMO test statistic for sample adequacy. Moreover, factor analysis was created based on the Principal Component Analysis by extracting 3 factors from the 22 Variables, the total amount of variance accounted, redistributed over the three extracted factors, renamed using Component Score Coefficient Matrix. Kruskal-Wallis Test was conducted for hypothesis testing and binary logistics analysis was conducted to identify the association of factors and for create a model. As per the Kruskal-Wallis test, author has found that most of the demographic variables were impacted to the commuter's perception toward the bus base PnR system. Mean values of the 22 variables were concluded that bus frequency, travel time and safety and security of PnR system were mostly influenced for selection of PnR system. Out of the extracted factors, service attribute and travel influences were having positive association toward the commuters' perception on PnR choice while comfortability factor was insignificant. As per the research findings, the overall commuters' perception on PnR can be concluded as strong positive perception.

Key words: Park and ride, Commuters Perception, Transportation, Congestion, Traffic mitigation

Introduction

Transport system development is embedded in the scale and context in which it takes place, from a local to a global perspective and from an environmental, historical, technological and economic perspective. Modern cities all over the world have been suffering from the traffic congestion that was created by the influx of private cars on the road network. Another reason for congestion is limited capacity of infrastructure and lack of innovative transport methods. Transportation is considered as the most powerful contributor to the economy and competitive strength in businesses (Zhao, 2019).

As a developing country, Sri Lanka has been achieving expeditious growth in different sectors such as financial and trades, telecommunication, construction and tourism. There for transportation play major role in the country's economy in order to accomplish the commuting demand requirement of the public citizens. Colombo Metropolitan Area is largest metropolitan area in Sri Lanka which was populated 6.13 MN as at 2019.Total personal trip demand would increase 1.75 times and the trip demand made by private own vehicles would increase vividly due to lack of public transport. Colombo city is divided to 15 sub areas and are named from Colombo 1 to 15. Those seven transport corridors were identified as major radial corridors connecting Colombo's city centre.

Research Problem

When compared with the available capacity of these roads in Colombo city limit, the average index of volume to capacity (V/C ratio) is over 0.6. The ability to handle the traffic flow in roads of Colombo city has reached to the critical proportion. In Sri Lanka many people would consider possession of motor vehicle high on their list of priorities. There for people seek private transport day by day and this lead s to congestion due to lack of road capacity and parking availability. Sri Lanka is the developing country and with compare to other transport solutions bus base park and ride can be taken as a good solution for mitigate traffic congestion in Colombo city limit .By considering the world scenario there are number of examples where this system did not provide successful result. (Karunadasa, 2017).There for it is detail investigation is required to identify the commuter's perception toward this kind of implementation.

Question 1

What are the factors effect for commuter's perception towards the bus Base Park and ride system implementation in Colombo city limit?

Question 2

What will be the impact of identified factors on commuter's perception on bus based Park and Ride implementation in Colombo city limit?

Research Objective

1. To identify the factors effecting the commuter's perception toward the bus Base Park and ride implementation in Colombo city limit.
2. To measure the impact of identified factors on commuter's perception on bus base park and ride implementation in Colombo city limit.

Significance of the Study

According to world ranks, park and ride was ranked fifth out of 18 local transport measures for both effectiveness in reducing car use and public acceptability. (Parkhurst, 2000). In early stage of development of public transport system, Park and ride enhances the modal shift to a public transport mode.

When it comes to the significance of research, it can be seen in a major perspective of importance of "Commuters perception on park and ride implementation" as a public transport method for mitigate the traffic congestion.

From the seven corridors, there is considerable amount of vehicle inflow move daily to Colombo. By implementing PnR system, it encourages to transfer commuters from private mode to public mode. According to previous findings, Park and ride is successful transport system in most developed countries. Still Colombo doesn't have efficient and developed public transport system like PnR. Even though this was not new initiative for the Sri Lanka, it's compulsory to identify the passenger's behaviour and perception toward new transport method. As per the knowledge of researcher there was no researches which conducted to identify commuters demand and perception on PnR in Colombo city limit. Understanding of the commuters' perception is important to policy decision makers for the development of transport solutions such as bus base PnR. Also it is influential for the private and public bus services and for development of the Colombo transportation system in sustainable manner. This study is important to conduct because satisfying passenger expectation is obligatory to create demand for the travel mode.

Literature Review

Introduction

Rapid development of the cities all around the world and rapid increase of vehicular flow has become major issue for environment pollution and traffic safety. Expansion of the network capacity by new road construction has never been a viable solution to traffic congestion due to the restricted land Room, especially in urban areas, and because new or widened roads attract more traffic demand, creating undesirable congestion on the unchanged roads (Meng, 2012)

Park and Ride's basic procedure involves persuading commuters to move part of their journey to public transport by providing a monitory discount or time savings towards driving the entire journey. (Rachel Katoshevski -Cavaria, 2018).Park and ride system can be fragmented into its three main components (Karunadasa, 2017), (Stephen Ison, 2016)

1. Private transport mode

Private transport mode is necessary for the park and ride scheme for proper operations. As per the Bo's (2004) in some cases which passengers are moved by private transport to public transport cannot be categorized as Park and Ride. For example: conventional public transport use. Country development and economy is highly influenced to the incensement of the private own vehicles (Seik, 1997)For example: Poland park and ride system is popular as a result of charging less amount for the parking facility. (Kurek, 2020)The versatile advantages of private transport mean that riders from diverse backgrounds, such as low-density suburban areas, can use Park and Ride. (Karunadasa, 2017)

2. Public transport access

Park and ride stations are mostly located in the city limit boundaries. The public transit network is not very attractive to suburban and metropolitan commuters because of the difficulties of public transport. Spatial productivity in public transport is in higher level and emission rate and fuel consumption has been lower than one tenth of road traffic. (Shahi Taphsir Islam, 2015). Key element for attractive public transport in PnR is nonstop and accurate bus service between park and ride station to city centre. (Cairns, 1998). As per the (Dickins, 1991)proper public transport access and strategic park and ride system has advantage to promote public transportation.

3. Planned services

Park and ride system is combination of private transportation and public transportation. Proper bus operation, Better Park and ride station facility and lower fares should be offered for maintain accurate park and ride system. (Cairns, 1998)The Park and Ride scheme can be developed on a range of forms, varying from the use of limited shared-use locations to the intent-built of several thousand sites. (Karunadasa, 2017). Baohong (2012) Commented that layout preparation and formal assessment criteria have been developed to guide practice in Park and Ride system. Hollevoet (2011) Identified that passenger's modal choice is mainly depend on, spatial determinants, socio-demographic determinants, travel mode and journey determinants and psychological determinants.

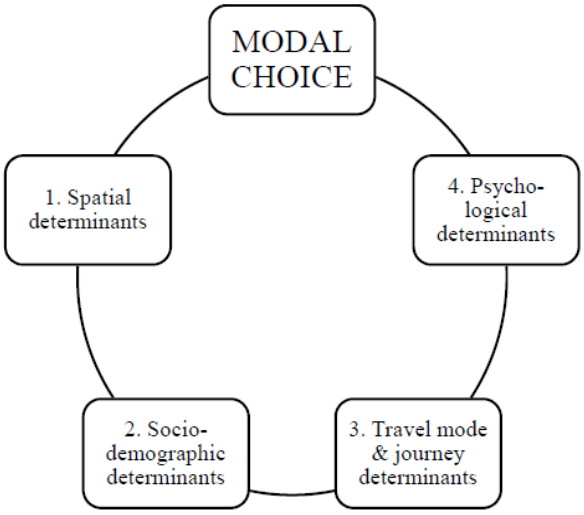

Figure 1.2: Model choice determents
Source:: (J. Hollevoet, 2011)

In empirical studies, discrete choice model have been established by (Hui Ying, 2009) to identify the influencing factors for travel behaviour. Several researches have been conducted base on this model and (Avishai Ceder n, 2013) analysed that Transit users favoured out-of-vehicle times with reduced volatility when making transfers. By analysing 11 PnR stations Qin and Guan (2012) analysed about PnR behaviour (Shahi Taphsir Islam, 2015) and they were used binary logit model for analyse the behaviour. Time and the cost were the mostly effected factors for PnR and traveller's income, occupation and origin and destination of the trip have been effected when choose the PnR system. Islam (2015) analysed the factors for park and ride behaviour and results were represented that travel time of public transportation, total travel time in PnR system, means of public transportation and parking fee to the destination were influencing factors for PnR modal choice. Based on the survey results researcher analysed travellers who earned higher monthly income and longer duration of license of drivers were not interested in use of

PnR. (Kurek, 2020).H.G Quin (2012) analysed that relationship between choices of PnR with intention to use parking, based on structural equation model.

Methodology

Research design

The main objective of this paper is to analyse the commuter's perception on bus base PnR implementation and identify factors affecting the choice of PnR in Colombo city limit. This study describes the relationship between the independent variable and the dependent variables and is the most common primary approach for data collection of studies.

Variable identification

Author has identified several attributes that define the perception and choice of PnR as viewed by commuters. Commuters willingness for choose bus base PnR is dependent on many factors that are evaluated as dependent variables in this analysis. Question has been developed as "Yes" and "No" pre-set responses to analyse the dependent variable of willingness to choose PnR system.

22 variables are identified as independent variables which are obtained from the empirical findings, literature and information from industry experts. As state in figure3.1, those variables categorized under 9 main factors. These variables are known to be influencing factors of commuter's perception on bus base PnR implementation in Colombo city. As per the empirical findings, Demographic variables in determinants of modal choice play vital role for the commuter's perceptions in social and psychological perspectives.

Questionnaire design

Primary data collection process was accomplished from internet base google forms. The questionnaire consisted 22 main questions and it segregated into 3 main parts. Which consists about the demographic and travel characteristics question, Likert scale questions of independent variables and dependent variable by using dichotomous question.

Analysis

In summarizing the analysis chapter researcher can conclude that two major goals of the study. First goal is to identify the factors affecting to commuters' perception on bus base PnR system implementation and the second one is to identify the level of acceptance of PnR implementation to in Colombo city limit. Researcher has analysed demographic variables, cross tabulation, independent variable frequency analysis, KMO and Bartlett test, factor analysis, Kruskal Wallis test, hypothesis testing and finally the binary logistics regression model.

Conclusion and Recommendations

According to Chi square value and cross tabulation were determined that gender, age, education, monthly income and present journey time have an association with the acceptance of the PnR system. Males have disagreed to use PnR rather than the females and respondents who were in matured ages (46-55) tend to disagree in using the PnR system while bachelor degree holders from the sample are more likely to agree to use PnR system. Researcher has identified the respondents who earn higher income levels have mostly disagreed to use PnR for their travel purposes. This was also indicated in the cross tabulation analysis as 16.4% of

respondents earning above LKR100, 000 per month were not willing to use PnR. In the cross tabulation test conducted on the average journey time factor, it was identified that there is an association between PnR acceptance decision and category of respondents' journey time This indicates that 13.6% of the respondents who take time less than 30 minutes to complete their journey has disagreed. As per the responses provide by the sample, Malabe corridor was the most utilized road out of the seven corridors. High-level corridor and Galle corridor was the second and third most utilized corridors in the sample population. However, there is no significant association between PnR acceptance and the routes used by the respondents. KMO and Bartlett test result identified that the sample size is adequate in order to perform exploratory factor analysis. Kruskal Wallis test was done to analyse the relationship between demographic variables and extracted three main factors. It discovered that occupation, route and distance are dependent from the service attribute factor while gender, age, income, transport expense, travel mode and vehicle ownership are dependent from comfortability factor. Influences factor is dependent on age, occupation, income, transport expense, route, travel mode, average journey time and average journey distance. Researcher has identified the considerable impact from the demographic and travel characteristics variables toward the three main factors.

Pearson correlation and hypothesis testing was performed to determine the relationship between acceptance of PnR and extracted three factors. Service attribute and Influences factors were significant while Comfortability factor have identified as insignificant factor for the willingness to choose PnR system. Binary logistics model was constructed to identify the probability and predictors of the three main factors. According to omnibus test, it was demonstrating that adding Components 1, 2 and 3 explains and contributes to the model apart from being intercepted. Hence, it can be concluded, that there is a relationship between commuters' perception on bus base PnR implementation and the combination of determinants of commuters' perception on bus base PnR implementation in Colombo city limit. Also it showed two positive relationships, first with willingness to use PnR and service attributes and secondly with commuters' willingness to use PnR and influences.

Recommendation

In order to implement effective PnR system for the Colombo city limit, foremost consideration is to educate and inform the general public about the park and ride system and its benefits for the reliability and environmental aspect. Commuters place more importance on travel influences and service attributes, there for it can also be recommend to develop infrastructure facilities for the main corridors. According to research data, the researcher would recommend bus frequency, system efficiency and safety reliability must be promoted among the passengers to create a positive attitude toward the PnR system. Respondents have recognized PnR as good method to travel without difficulties and they have identified: it as a prominent way to reduce traffic, save the time, as a good initiative to future generation. Policy makers' involvement is highly impact to enhance the PnR system for transport efficiency in Colombo city limit and it can be concluded that it is mandatory to develop PnR system for demolish private vehicle dominant transportation system in Colombo.

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