Park-And-Ride Facility along Public Transport Corridor – A Planning Case for Tirana City, Albania

The rapid economic development and urbanization has brought to a higher rate of increase in private vehicle ownership than road supply. This has led to an increase in traffic and parking demand. There is an uneven distribution of private vehicles in Albania, mainly in Tirana Capital. Tirana being a major Metropole of Albania, as well as other cities like Durres, Vlora, Korca, etc. have the highest percentage of the population with registered vehicles. The National Urban Transport Policy, 2006 mentions park-and-ride activity as a parking management initiative to be adopted to reduce traffic congestion on urban roads. Tirana is very well known for its well-knit public transport system, however, there has been an increase in the private vehicle usage for work trips in the city. The study aimed to plan for park-and-ride facility as a part of travel demand management along public transport corridors in the city. The first part of the study analyzed the public transport accessibility of the city and identified peripheral locations with demand for park-and-ride facility. Apart from the corridors identified for having a demand for park-and-ride, one of the corridors was selected and identified for further planning and implementation of the facility. There have been prepared several questionnaire surveys, which aimed to state the most preference method using the concept of generalized cost for the study.

Keywords: *traffic congestion, generalized costs, park-and-ride, parking management, corridor;*

Introduction

A very rapid economic development and urbanization has been experienced by the growing of the Albanian cities during the last 20 years. There has been a significant increase in the mobility of people and goods that are highly automobile-dependent. Most major cities have exhibited a high rate of increase in car ownership. Due to increased vehicle ownership, there has been a rise in parking demand. Free or low parking fee encourages private vehicle usage which leads to on-street parking of the vehicles reducing road width and accelerating road congestion, especially in commercial and core city areas. Parking management as one of the travel demand management goals has been widely discussed across the world. Park-and-ride system is a system for reducing urban traffic congestion, in which drivers leave their private vehicles in parking lots on the outskirts of a city and travel to the city center on public transportation. Park-and-ride facilities benefit commuters by avoiding a stressful drive along congested roads and also save time for searching a parking space in the city center. They also help in reducing congestion by assisting the use of public transport in congested urban areas. The service has environmental impacts as well. It helps to reduce traffic emissions at least on the most congested roads of the city. Park-and-ride facilities also help commuters who do not have direct public transport connectivity or who live beyond practical

walking distance from a transit station or bus stop. It eventually attempts in encouraging people to slowly shift to public transport.

Literature Review

With increasing population there is a space crunch that has been felt in localities. This results in increase in high rise buildings and high-density neighborhoods. Parking spaces are often compromised due to high real estate values and demand for housing. The inner-city areas usually remain very congested and dense with very little parking supply. Parking in such areas is mostly on-street in nature. Park-and-ride policy has to target those people who will remain car dependent. even with a substantial improvement in the extent and quality of public transport (Parkhurst, 2000). Park-and-ride has potential in cities with significant congestion on primary roads coupled with parking problems in the employment centers (Keck and Liou, 1976). Time savings are more important to drivers than cost savings in most cases (Stutts, 1989). Therefore, planning for park-and-ride activity must include user opinions and surveys along with market demand (Buxton, 2005). Park-and-ride has been successful in many cities abroad. In some cities of Albania, it was found that park-and-ride had either helped reduce traffic congestion, or at least slowed down its increase and some informal park-and ride initiatives exist in many big cities.

The capital of Albania, Tirana city, has an initiative to for the traffic management, where the park-and-ride lots have been integrated with bus terminal and commercial complexes to encourage public transport usage (Anand, 2013). However, over the years there has been a high increase in the number of private vehicles. For park-and-ride to work best, a city needs a good public transport system and also a considerable number of private vehicle users. No research has been conducted in the city for implementation of the service. Therefore, the study aims to understand the traffic characteristics on the major roads of the Tirana city and conduct feasibility study for locating park-and-ride facility at important locations in the city. In this paper has been introduced mostly the importance of park-and-ride facilities, the description of various analysis and methods used for the study, some area characteristics and several analysis and discussions.

Methodology

For the importance of park-and-ride facility as a travel demand management measure there have been used different publications as a basic literature. To achieve the objectives of the study both primary and secondary data were collected from different sources. Primary data was collected through questionnaire surveys. The questionnaire surveys were carried out in two phases. Initially, a questionnaire survey was used to interview private vehicle

users. This survey was done both online and by manual method. The sample size was 256 and the sampling technique used was Random Stratified Sampling. The designated on-street parking locations in the employment hub of Tirana center were the survey locations. Questions regarding the respondents' socio-economic profile, existing travel behavior, parking difficulties etc. were asked in the survey. The questionnaire was guided by the need to have a simple, short format which would be intelligible to the respondents and also relatively quick to administer. This questionnaire included different scenarios developed on the basis of calculation of existing average generalized costs and estimated future average generalized costs.

These scenarios were in the form of choice sets, which were presented in front of the respondents, who were willing to shift to park-and-ride. The respondents thereafter selected their choice sets, which helped in assessing the demand acceptability to park-and-ride. Secondary data related to traffic scenario of the city like total volume count, modal split, traffic congestion etc., different peripheral locations in the city were collected from different transport departments and offices. For analysis of the data, information collected was classified in the light of objectives set forth for the study.

Study Area

Tirana city is under the jurisdiction of Municipal covers an area of 41.8 km^2 and has a population of around 700,000 habitants. The area is mostly residential with several business and commercial big and small centers, existed and in the construction phase. From the public vehicles' viewpoint, Tirana has one of the highest vehicular densities per km^2, among all the other Albanian cities, experiencing a fast annual growth of vehicles. The share of private vehicle flow is higher on roads leading to the employment centers. The study area comprises of two municipal areas: Bllok area and Astir area.

<u>Identification of Locations with Demand for Park-And-Ride at the City Level</u>

Of the total registered vehicles in Bllok and Astir areas, more than 80% are private cars and around 20% are two-wheelers. The share of private vehicles in the traffic volume on key roads is 75% but they meet only 10% of the travel needs (Citizen's Report, 2011). There are many areas in the city, that have very narrow roads with slow-moving, as well as fast moving traffic plying on them. This is the prime reason that deters the speed of movement and therefore, multiplicity in mode of travel becomes a curse instead of a boon. In addition to the public modes of travel, there are many privately owned vehicles operating in Bllok area including cars, two-wheelers and bicycles. This high index of vehicles under private ownership is major concern for the transportation network in the city. This is also reiterated from the fact that road traffic in city streets and on arterial roads is extremely congested.

Parking is a major transportation issue and not all the roads of the study areas are occupied by parking. The average road width for 4 lanes is 12 meters

of which 3 meters on each side are used for on-street parking leaving only 9 meters for vehicular traffic.

Park-and-ride lots work best on peripheral locations with an employment center at considerable vicinity. On the basis of data availability, 32 peripheral locations were identified in and around the study areas for analyzing the traffic scenario and finding out locations, which are suitable for park-and-ride activity. These locations were important junctions with heavy traffic flow during peak hours. Total number of vehicles entering the city during morning peak hours was considered.

Majority of the modal share of traffic on these roads are of cars. Around 53.47% of the traffic consists of cars followed by 12.25 % of buses, 11.23 % of goods and other heavy vehicles.

The total share of private vehicles is 82.12% of the total traffic composition. The average traffic flow on the arterial roads is 3125 vehicles with an average of 64 % of private vehicles.

A considerable share of buses can be observed on the western part of the study area along with flow of goods and heavy vehicles. Heavy flow of goods vehicles can be observed on the extreme peripheral roads as there are many industrial units just outside the study area. This part has a dense residential set up. Locations where there is high private vehicular flow in spite of having a fair share of buses are the locations which can come up as park-and-ride sites.

Average bus frequency in the study area is 5-6 minutes during peak hours. It was observed that the inner-city areas especially areas near the commercial districts have bus frequency of less than 3 minutes. This is because of plenty of routes passing through these areas. The bus frequency decreased towards the outskirts of the city with a smaller number of buses running at an interval of more than 9 minutes.

All the aforementioned information was analyzed to determine, whether the city requires a park-and-ride facility to be set up. All the data were collected to identify locations with demand for park-and-ride facility. Out of 32 locations, 12 locations having a demand for park-and-ride facility were identified on the basis of certain criteria. The criteria for selecting corridors with demand for park-and-ride are corridors having:

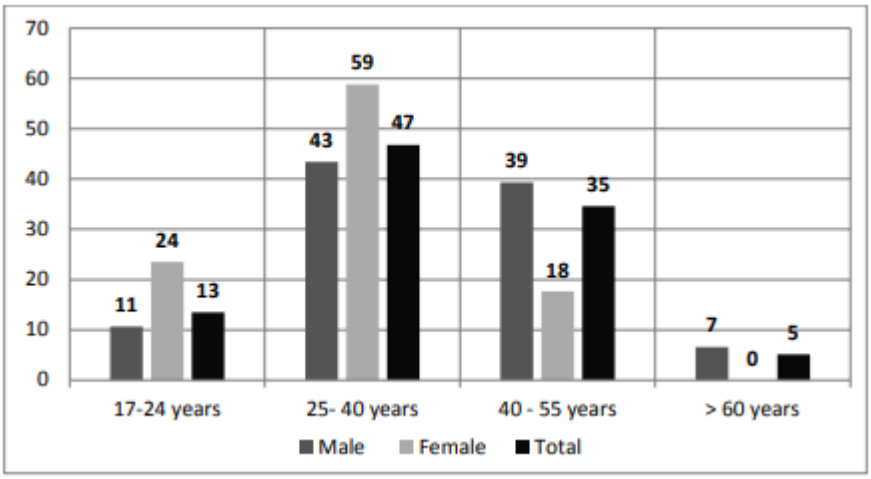
a) more than 58% flow of private vehicles
b) more than 12% flow of buses
c) total traffic flow above 2546 vehicles in peak hour
d) more than 15 bus routes
e) less than 7 minutes bus frequency

Results

User Survey

In order to understand the demand for park-and-ride facility and to identify feasible locations for the facility along the corridor, a user perception survey was conducted. The survey was conducted with the help of questionnaires and the target population involved individuals commuting to work in private vehicles using the study corridor partially or wholly. 236 respondents were interviewed to understand their travel behavior. The survey was conducted in the on-street parking sites. Socio-demographic factors play a key role in determining any individual's travel pattern. Therefore, basic questions like age, gender, employment type, number of working hours and monthly income were asked to understand the relation between these attributes with travel pattern. Majority of the respondents i.e., almost 50% using private transport for work, belonged to the young working age group followed by 33% of the respondents who were in the age group of 40 to 55 years (Figure-1). Fifty-nine percent of the female respondents belonged to the age group of 25 to 47 years. It was observed that the mature adults were likely to use private vehicles to work when compared to the young adult age group of 17 to 24 years and the old age group (above 60 years).

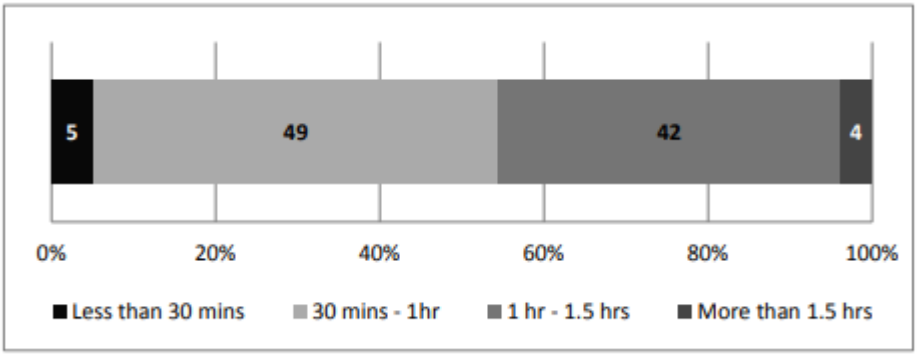
Figure 1. *Graph showing the age and gender characteristics*



Out of the 236 respondents of the survey, 62% travelled by car while 38% travelled by two-wheelers. The average occupancy of both cars and two-wheelers was one. Only 9% cars had double occupancy, while 18% of the two-wheelers had double occupancy. Single occupancy vehicles contribute to road congestion, as one car is used to transport one person thereby takes up more road space, but transports fewer people compared to higher occupancy vehicles like bus. Park-and-ride aims to shift people from single occupancy vehicles to higher occupancy vehicles. Almost 90% of the respondents travelled for more than 8 kilometers and the average trip length was 15 kilometers. (Litman T.,

2013). Park-and-ride sites are a success if the average trip length is more than 8 km. Seven percent travelled to work for a distance of six to eight kilometers. 49% of the respondents had a journey time half an hour to one hour, while 42% took one hour to one and half hours to reach work destination. Five percent reached in half an hour, while it took more than one and half hours for 6% of the respondents to reach their workplace. The average time taken during peak hours was 55 minutes (Figure-2).

Figure 2. *Graph Showing the Journey Time Characteristics of the Sample*



The peak travel time was between 9 to 10.30 a.m. Majority of the traffic was observed during this time. Many preferred leavings home as early as 8.30 a.m. to avoid traffic during peak hours. Only 1% of the respondents reported flexible timings of work. These respondents were employees who followed different time zone or international timings of work. Around 51% of the respondents had monthly travelled expense above 1800 ALL. This expense is exclusively the amount spent on regular commuting to work destination. (Litman T., 2015). Nineteen percent of the respondents had a monthly travelling expense of 1200-1800 ALL. Majority of the two-wheeler users had a monthly travelling expense of above 1000 ALL. Fifty-three percent of the respondents took major part of the study corridor for regular commute, while 40% travelled partially using the corridor and 7% covered a small stretch of the corridor during their commute (Figure-3).

Most of the parking is on-street in nature and activities are monitored by the municipal corporation. Fifty-one percent of the people pay an hourly fee of 10 to 20 ALL. These are the car users while 26% of the respondents pay less than 10 ALL. They are the two-wheeler users. There is a significant percent of respondents (21%) who do not pay any fee for parking. They park in the private employer's car park.

Such free parking and easy availability of parking space encourages employees to use private vehicles instead of public transport. Some respondents complained that the number of parking spaces provided in the private employer 'scar park is not sufficient in comparison to the number of employees in the company. (Lesley L., 2009). In some companies, the car park gets occupied by 11 a.m. forcing rest of the employees to park on-street for more than eight hours a day. Seventy-two percent of the respondents made

daily payment of parking fees, while 28% had adopted monthly parking fee payment facility. In two or three parking locations, the parking of vehicles has been extended to both sides of the road thereby narrowing the road width.

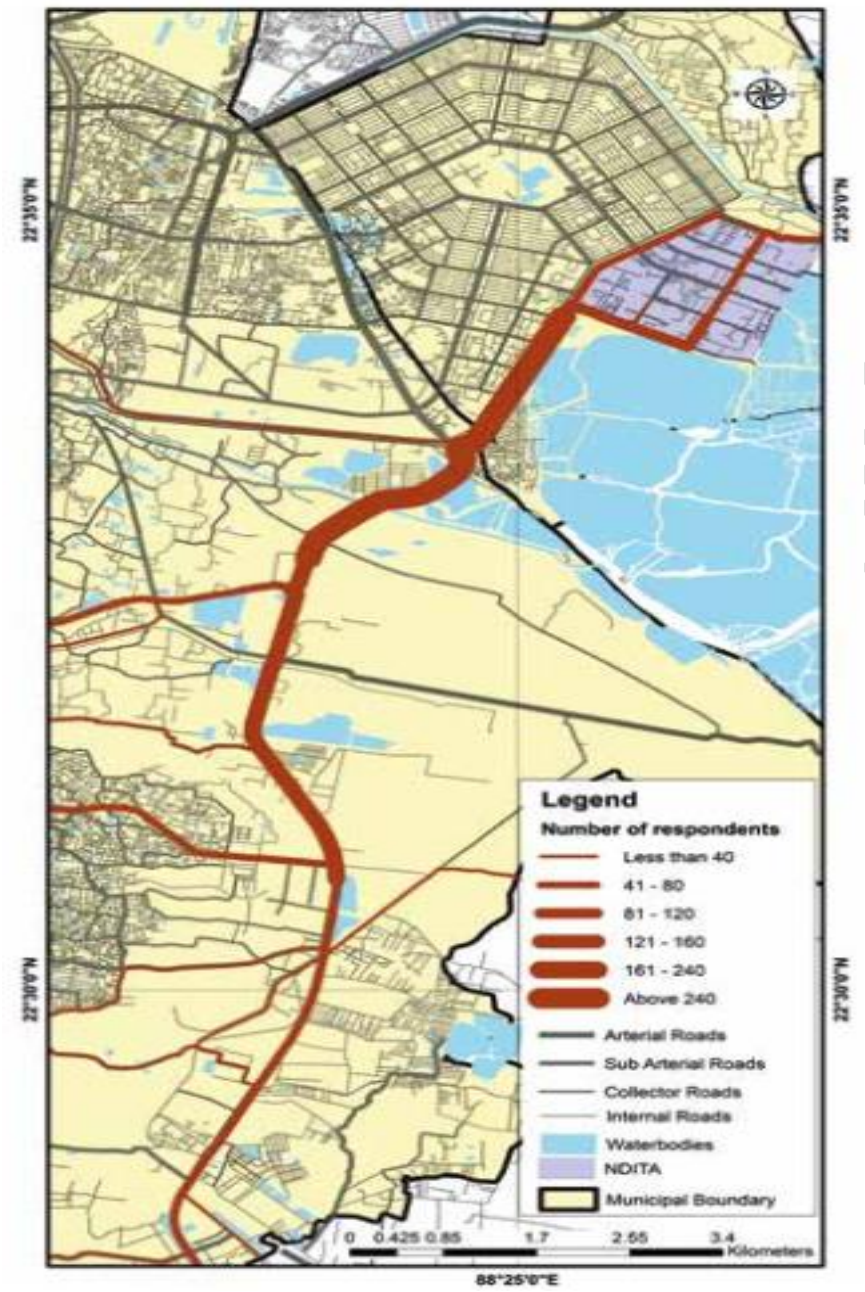
The cars are parked for almost the major part of the day. Encroached pavements and both sides parking makes it even more difficult for people and vehicles to move. Though, many companies have their own car park, many buildings do not allow two-wheelers to be parked in the private car park. Only cars are allowed to park. This leads to a huge number of two wheelers parked parallel on the nearby street. Many locations, even though they are not declared parking spots, are used for parking. Thirty-three percent of the people cited finding difficulty in parking space as a reason for being late to work. Another 33%share of respondents said that they find the place of parking to be unsafe or insecure. They often find headlights or car parts damaged. In many companies, the private car parks become full and as a result of which it increases the parking pressure on the roads. The major issue faced by the municipal authorities is the non-payment of parking fees. Many cars are parked for more than 8 hours a day.

This is a big issue as parking demand even though being high in the area, the authorities do not benefit from the revenues. The respondents of the survey do not use public transport for their daily work trips fora variety of reasons. (Rites, 2010). Majority (26%) of them do not use public transport because the bus stops far from their place of residence, 21% cited discomfort due to overcrowding, while 20% said public transport takes longer time than private transport.

The other reason cited for not using public transport were poor infrastructure, less frequency, no last mile connectivity, low coverage of public transport, increased travel expenses etc.

Overcrowding may be due to less public transport frequency during peak hours. Therefore, in order to make people shift to parks, the existing bus infrastructure must be upgraded so that people find equal comfort and convenience travelling in buses just like they do in their private vehicles. Sixty percent do not have direct bus connectivity, a major reason for using private vehicles for work trips. Six percent have bus stop within 100 meters of their place of residence while for 21% of the respondents the nearest bus stop is within 100 to 300 meters and for majority (38%) of them the bus stop is at a distance of more than 300 meters. (Lesley L., 2009). Sixteen percent of the respondents were very likely to shift to alternative modes of transport if the infrastructure is improved and upgraded, 47% were likely to shift while 19% were unsure of the decision and12% were not likely to shift to alternate modes of travel even if facilities were improved.

Figure 3. *Graph showing the route taken by the sample*



Willingness to Shift to Park-and-Ride Facility

All the 236 respondents were asked about shift to park-and-ride as a facility. Sixty-nine percent were willing to shift to the facility while 26% were not willing to shift and 6% were unsure of their decision. (Shoup D., 2005). The two most important reasons for shifting to park-and-ride were to save time and money. Seventy-four percent of the people were willing to save time. Fifty-four percent of the total respondents also wanted to save money (Figure-4&5). Therefore, these two things must be properly delivered during the time of

facility implementation. If the facility did not succeed in fulfilling these demands the entire project might fail.

Figure 4. *Willingness to save time*

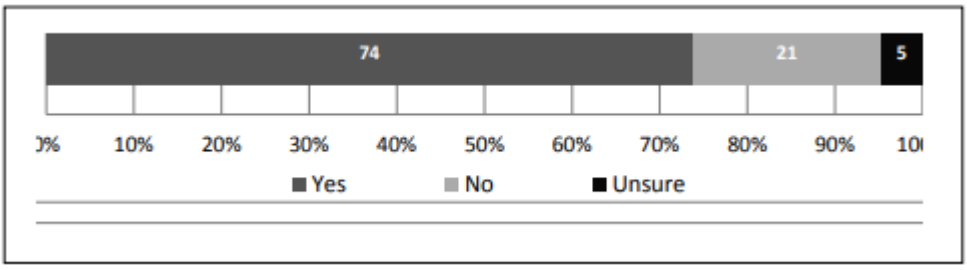
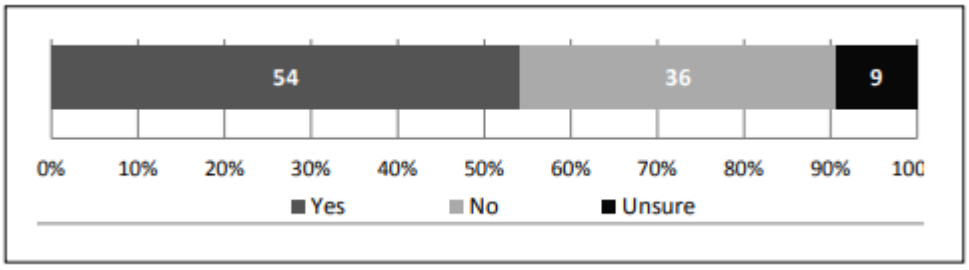
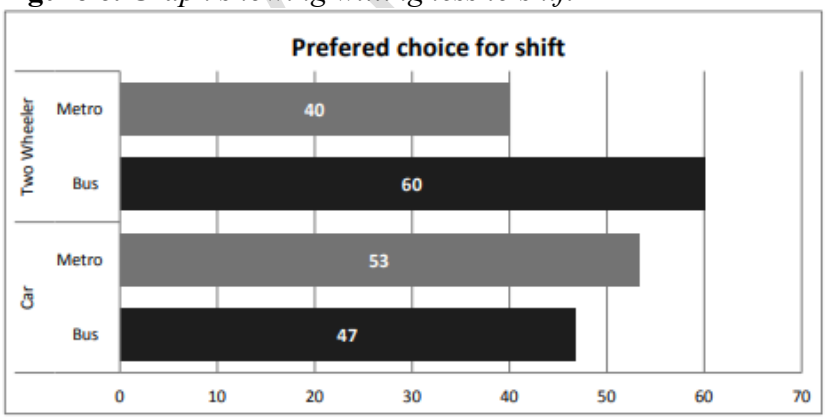


Figure 5. *Willingness to save money*



Fifty-three percent of the car users wanted to travel by Metro after parking their car while47% of them preferred to shift to bus service (Figure-6). Sixty percent among the respondents willing to shift wanted to shift to bus service while 40% wanted to shift to Metro service.

Figure 6. *Graph showing willingness to shift*



Conclusion

Park-and-ride facility at the feasible locations will help to reduce some amount of vehicular pressure from the corridor, improving the level of service of the corridor, reduced congestion, reduced parking demand and overall

reduced emissions. However, this park-and-ride facility can only be made successful along with other travel demand management measures. For successful operation of the facility, other facilities like bus and road infrastructure, bus headway etc. must be improved. On-street parking around the park-and-ride station and employment centers must be abolished. Parking fee must be charged on the basis of the surrounding market value of the place. This will help in discouraging the use of private vehicles and encourage people to use public transport. The identification of feasible locations was done using basic parameters and some assumptions. A suitable product mix of official, commercial and retail units must also be analyzed by conducting a thorough market demand research to make the entire project profitable. This project can be implemented as a pilot project to see the acceptance of the facility by the citizens. The success and loopholes of implementation must be then studied and rectified while implementing the facilities in other locations in and around the city.

References

Anand C., 2013, *Presentation on Bus-based Public Transport in Bangalore - BMTC Experience*, Bangalore Metropolitan Transport Corporation.

Buxton S. P. G., 2005, *Towards a Truly Strategic Appraisal Process for Evaluating Park and Ride Schemes: The Development of an Assessment Framework for London*, PTRC, London.

Christopher Zegras T. L. et. al. 1997, *An Analysis of the Full Costs and Impacts of Transportation in Santiago de Chile*, The International Institute for Energy Conservation. DiRenzo J. et. al, 1979, *Study of Parking Management Tactics*.

Lesley L., 2009, *Generalized Costs and the Value of Time as a Method of Patronage Forecasting*, Acta Technica Jaurinensis.

Litman T., 2013, *Parking Management Strategies, Evaluation and Planning*, Victoria Transport Policy Institute.

Litman T., 2015, *Generated Traffic and Induced Travel - Implications for Transport Planning*, Victoria Transport Policy Institute.

Parkhurst G., 2000, *Influence of Bus-Based Park and Ride Facilities on Users' Car Traffic*, Transport Policy. Indian Journal of Transport Management 32

RITES, 2010, *Detailed Project Report for Metro Corridors in Kolkata*.

Shoup D., 2005, *The High Cost of Free Parking*, American Planning Association Planner Press.

S.K.C.A. a. L.P., 1976, *Forecasting Demand for Peripheral Park-And-Ride Service*, Transportation Research Record.

Stutts E. A., 1989, *Park-and-Ride Planning Guidelines for the Colorado,* Springs Metropolitan Area.