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REVIEW OF LITERATURE

A SPATIAL ANALYSIS OF BUS PASSENGERS IN PUNE CITY: A CASE STUDY OF HADAPSAR, KATRAJ, PUNE STATION AND SWARGATE

Ms. Sania Jadhav[1] , Dr. Suyog Kulkarni[2] , Mrs. Meena[3] and Dr. Ravindra Shinde[4]

[1]Student of M.Sc Geography , Dr.D.Y.Patil Arts, Commerce and Science College.

[2]Assistant Professor (Geography),Dr. D.Y.Patil Arts, Commerce and Science College.

[3]Asst. Professor (Geography),Dr. D.Y.Patil Arts, Commerce and Science College .

[4]Assistant Professor (Geography),Dr.D.Y.Patil Arts, Commerce and Science College .

ABSTRACT

Economically and socially vibrant urban areas cannot exist without a system for moving people, goods and services. The main objectives of any city's transportation system are to provide mobility to people. Considering that people may choose a variety of modes of transportation depending on various parameters like the distance they need to travel, their physical and financial capability, affinity to a particular mode - or whatever the reason may be, the city should provide facilities for a variety of modes, e.g. walking, public transportation, bicycles, rickshaws and taxies, personal vehicles etc. The health of cities, their ability to generate income and wealth for their inhabitants, is improved if the transportation system is efficient, and if its construction and operation considers its impact on citizens, land use, the environment and economic development. Transportation demands in urban areas continue to increase rapidly as a result of both population growth and changes in travel patterns. In the era of environment concerns and limited space available in cities, transport planners have to provide a system, which can ensure safe and clean mobility to all city residents. This requires planning a system which is affordable, reliable and efficient from the users as well as operators' perspectives. A road based bus system offers an opportunity for creating a system capable of meeting multiple needs of users and operators. This paper presents a critical and spatial analysis of bus passengers with special reference to Katraj, Hadapsar, Pune Station and Swargate mobility centre in Pune city. Pune Mahanagar Parivahan Mahamandal Ltd (PMPML) is the public transport service provider for the city of Pune and Pune Metropolitan region, which includes areas surrounding Pune and Pimpri -Chinchwad.

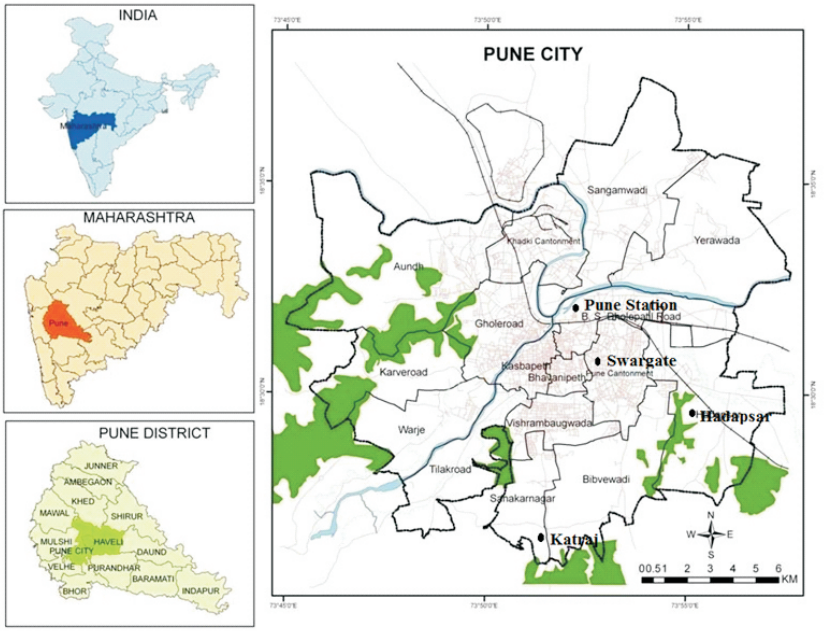
KEYWORDS :*synchronized service, optimization of routes, feeder buses.*

INTRODUCTION :

Pune city is the seventh most populous city in India and the second largest city in the Maharashtra state. It is situated 560 meters above sea level on the Deccan plateau, on the right bank of the Mutha River. It is the administrative head quarter of Pune district, cultural and educational capital of the state of Maharashtra is located approximately 160 kilometers south-east of Mumbai. Pune is also known as a twin city with two municipal corporations of Pune and Pimpri - Chinchwad. Pune being a large city draws a considerable floating population for work and education every day. Pune's transportation system should be designed to cater to transportation needs of not only the residential population but also the floating population. The demand for public transport is dependent on both physical and socio-economic characteristics of urban areas. Availability of road infrastructure, geographical spread of the city, mixed land use patterns, population density, and income

distribution are some of the important characteristics that influence public transport demand. As these characteristics change with time, the public transport demand also changes. It is imperative that bus systems are planned such that they satisfy the requirements of users as well as service providers within the limited resource constraints. Public transportation Station must be close to origin and destination of commuters preferably within 500 meter of both home and work place. Bus transport is the most desirable and sustainable system from societal perspective. A well planned bus system can provide a high level of mobility to a large section of the population with least cost .However, a poorly planned system causes inconvenience to the users, loses ridership, encourages use of private vehicles and imposes financial burden on the operator. A flexible, comfortable, easily available and reliable bus service may encourage shift from private vehicles to public transport. Since travel demand varies over time and space, public transport systems often have underutilized capacity at non peak hours and high load peak factor in peak hours. The objective of an efficient system is to meet the diverse demands and minimize operator's loss. This requires that the optimizing routing, scheduling and synchronizing problems are given special attention, while designing an efficient bus system. At present, the PMPML has a fleet of 1600 buses, transporting about 80 thousand commuters daily. Swargate, Hadapsar, Pune station and Katraj are major bus stations in Pune and serves as BRT terminals.

Fig 1 Location of study area



OBJECTIVES:

(a) To study the present status of bus transport system.
(b) To study the problems faced by bus passengers.
(c) To suggest remedial measures for bus transport system.

DATA BASE AND METHODOLOGY:

This study is based on primary and secondary data. The secondary data is collected from the internet, newspapers, websites and research papers, journals and various publications of the central and state government on transport system. Primarily, this study is based on the primary data which is collected by the survey using the questionnaires.

A total of 200 questionnaires were filled with 50 at each of four locations in the city. The questionnaires consisted of questions relating to the use of public vehicles respectively. These questionnaires were filled by users of public vehicles and the informal interviews of the users were also taken by the researcher on the centers.

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These filled questionnaires was studied, coded, processed, tabulated and analyzed with the help of tables and graphs. The computer generated output is used for analysis and interpretation of the data.

RESULTS AND DISCUSSION:

A detailed spatial analysis of the users of public vehicles consists of some aspects such as gender and age group analysis of users of public vehicles ,time and purpose of users, problems faced by the users and the causes of this problem, solution of this problem of the users are main concerned.

GENDER ANALYSIS OF BUS PASSENGERS:

It indicates that gender is the key variable of work trip. Work travel conditions vary significantly between male and female workers. More interestingly, notable interaction between gender and income exists. We found that low income female workers are compelled to walk to their work place.

Table 1 Gender Wise users of bus passengers in percentage

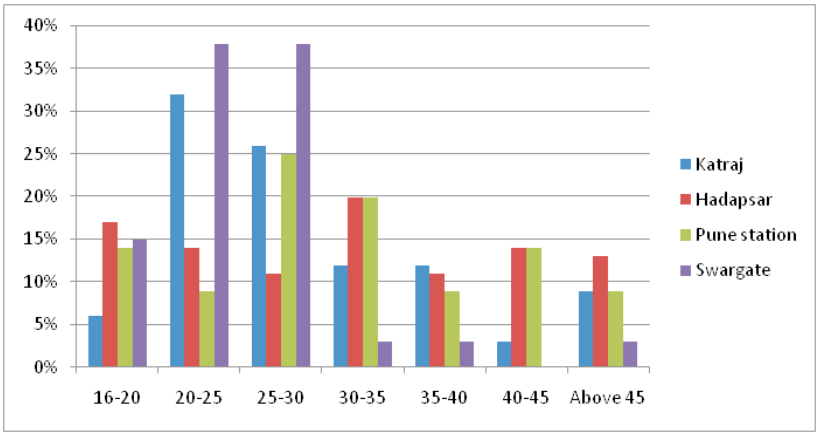
Katraj		Hadapsar		Pune Station		Swargate	
Male	Female	Male	Female	Male	Female	Male	Female
75	25	50	50	51	49	62	38

Source: Computed by researcher

By a detailed analysis of the gender wise bus passenger in percentage it can be concluded that there is more number of male passengers as compared to female passengers at every bus stop. It is little high in Swargate and Katraj where the male users are high because these are two main junctions from where a lot of other places in and around the city can be easily approachable. On the other hand the highest number of female bus passengers is seen at Hadapsar. Both gender have been used the mode of travel is bus. Simultaneously, there is a little difference between the male and female bus passengers at Pune station. Considering overall mobility situation it can be said that if low income female workers income increase they would switch to other mode of transport to enjoy more comfortable travel options.

Age-wise analysis of bus passengers: The maximum number of bus passengers is seen in the age group of 20-25 and 25-30 mainly at Katraj and Swargate .On the other hand at the Pune station the maximum percent of people who use bus belonging to 25-30 years age group. A higher number of bus passengers belonging to the all age groups collectively seen at Hadapsar and Pune station, while Katraj and Swargate have a relatively lower number of passengers belonging to all the age groups. Simultaneously, in the age group of 16-20 years highest number of passengers is used bus transport system in Hadapsar and followed by Pune station, Swargate and Katraj respectively 14 and 15 percent. The highest number of people travelling from bus is students with almost 20-27 percent passengers belonging to this category. The Bharti Vidyapeeth University and Sinhgad colleges are two of the main educational institutions located near Katraj hence the highest number of student's i.e.27 percent is seen from the katraj depot.

Fig 2 Age-wise analysis of bus passengers in percent



Daily Bus Passengers Analysis :This analysis is based on the mode of transport they used for travel such as public transportation like PMPML buses, rickshaws, cabs or private transportation like two wheelers, four wheelers etc. maximum number of people which represents 79 percent used public transportation, where as 45 percent people used private vehicles. Even though there was not much of a difference seen between the collective percentages of public and private transport users.

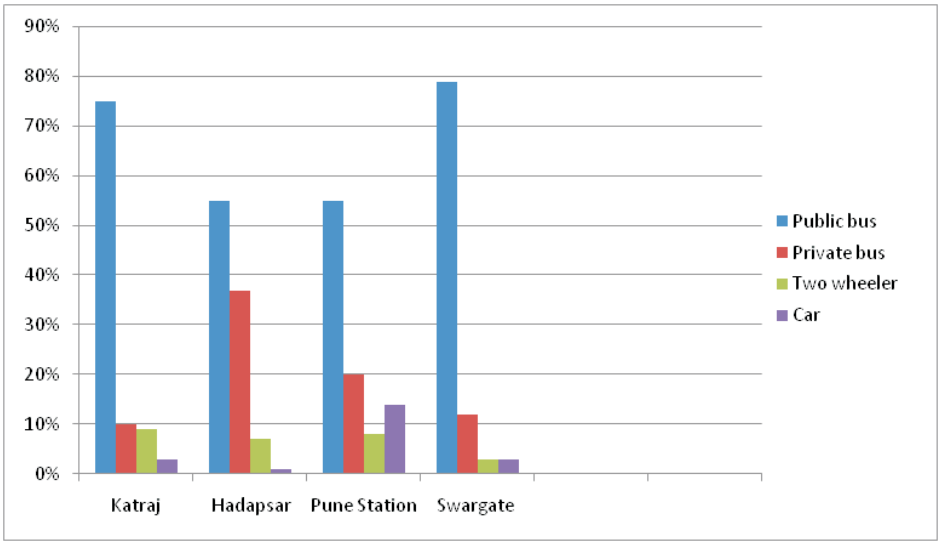
Table No. 2. Daily Bus Passengers Analysis in percent

Katraj		**Hadapsar**		**Pune Station**		**Swargate**	
Public	Private	Public	Private	Public	Private	Public	Private
79	21	58	42	55	45	79	21

Source: - Computed by Researcher

Mode of transportation used frequently by bus passengers (percent): From the analysis of table and graph it is evident that maximum number of people uses public buses frequently while only a small number of people use other mode of transportation which reflects that there is immense pressure on the public transport body to provide the proper service to the public. The graph has shown that most of the people of Katraj, Swargate use public bus for travel which represents 75 and 79 percent respectively. It is followed by Hadapsar and Pune station represents 55 percent people. The uses of private vehicles such as car, auto rickshaws and cabs have less percentage of people. Only 20 percent people said they used private buses from Pune station which mostly belong to companies which are established in Hinjewadi and Pimpri-Chinchwad. Due to low accessibility of public vehicles in some areas at certain time and less availability of time to travel force them to utilize the other private vehicles. Simultaneously, some people said they used bus to travel from their origin source to destination of work, education and for other purposes such as to meet their friends and relatives, because it is a cheaper option for which they have no need to spend much money for that, and easily and faster service of the buses.

Fig no.3.Mode of transportation used frequently by bus passengers (percent)



DISTANCE TRAVELLED BY BUS PASSENGERS:

The distance which is covered by the passenger is totally based on the purpose of travel such as business, work, education, visiting to relatives and friends, for the purpose of marketing, recreational activities, sports activities etc. The movement of people at and from Katraj is totally based on the education and work purpose, 41percent of the bus passengers travelled a distance of more than 15 kms daily while 38 percent of people travelled about 10-15 kms. At Hadapsar 55 percent people travelled a distance of 5 to 10 kms in a day, and 23 percent people travelled more than 15 kms daily. On the other hand Pune station and Swargate represents respectively 43 percent and 41 percent people travelled distance more than 15 kms. Simultaneously if we analysis the purpose of travel by bus than we found that at katraj, 36 percent people said they use bus for education purpose like to attend the school, college and other competitive coaching classes. This reveals that most of the travelers by bus are students. This is followed by the workers to reach their work destination and 8 percent women represents that they use bus mode of transport to go the market to buy vegetables and other groceries, to return back their home, to visit their relative and colleague places, recreational and sports activities.

Fig.no.4 Distance travelled by bus passengers

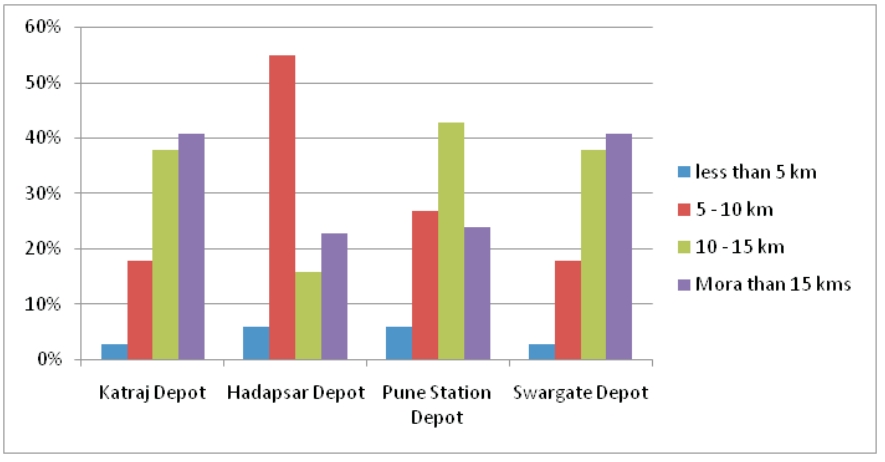


Table no.3 Purpose of traveling by bus passengers (percent)

Purpose	Katraj	Hadapsar	Pune Station	Swargate
Business	5	10	10	5
Work	30	26	16	30
Education	36	12	29	36
Visiting relatives	2	7	6	2
Friends	3	7	9	3
Returning back to home from work	12	19	14	10
Going to the market	8	8	10	10
Recreational activities	2	6	3	2
Sports activities	2	4	3	1
other		1		1

Source: - Computed by researcher

Time spent by bus passengers in travelling: The durability of time spent in travelling is basically dependent on two factors such as the timings of travelling whether these are rush or non -rush hours and secondly the purpose of the travels by the different society of the people. The maximum time by the passengers in travelling during the rush hours, it is approximately up to one hour in reference to all centers katraj, Hadapsar, Pune station and Swargate represents respectively 68 percent, 58 percent, 59 percent and 56 percent. On the other hand 28 percent people at Katraj, 34 percent people at Hadapsar, 38 percent Pune station said to reach their destination during the rush hours they need to spend at least two hours daily. And for going to a long distance that is to go from one corner of the city to the other corner like Hadapsar to Nigdi they need to spend up to three hours, because for reaching their destination sometimes there is a need to change their buses at certain location and for boarding to another bus they need time to wait for their route bus. During the non-rush hours the spent time was not much more up to 2 hours.

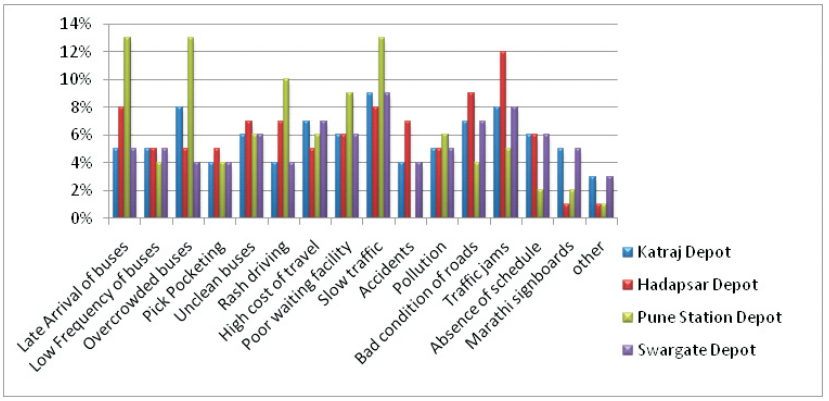
Table no.5 Time spent during rush hours by bus passengers (percent)

Time Spent	Katraj	Hadapsar	Pune Station	Swargate
Up to 1 hr	68	58	59	56
Up to 2 hrs	28	34	38	37
Up to 3 hrs	4	8	3	7

Source: - Computed by researcher

Problem faced by bus passengers during travelling: Basically the commuter's travel problems can be classified under four categories viz. problems with regard to cooperation, with respect to crew, pertaining to co-passengers, and other problems.

Fig no.5 Problem faced by bus passengers during travelling



During these travelling hours there is many types of problems which is faced by bus passengers at daily basis for ex. late arrival of buses, low frequency of buses, overcrowded and unclean buses, rash driving by the driver resulted as an occurrence of an accident ,high cost of travel, unavailability of neat and clean bus stops, pollution, huge traffic jams due to the bad conditions of road, it become a cause of unavailability of bus services at the allotted time for the particular route of bus. On the other hand if we analyze these problems in case of women surely found that there is unavailability of healthy and clean environment for the female bus passengers. They faced the problem of eve teasing, Unwanted physical contact, blowing of whistles, derogatory remarks and continuously uncomfortable staring, that causes a fear in the mind of women's.

SUGGESTIONS GIVEN BY BUS PASSENGERS:

This table shows the solutions for providing the better bus facilities. According to the most people for the betterment of bus services Pune government should introduced more new buses and the frequency of these buses also should be high. It can be observed from the table maximum and almost an equal number of bus passengers wanted better facilities to be provided and announcement of stops to be made inside the buses. A significant number of people also wanted a real time bus information system to be made available which provides a free app to mobile users to check the status and details of their bus. On the other hand 20 people said there should be the reduction of fares, if the reduction will be low than the usage of buses will be increased automatically. And some people say there should be the removal of encroachments, increase in road width to ease traffic, and other miscellaneous changes with 5 percent of people.

Table no.6 Suggestions given by bus passengers in percent

Kinds of changes	Katraj	Hadapsar	Pune Station	Swargate
More frequency of buses	29	8	18	19
Reduction in fare	20	7	12	15
Removal of encroachments	5	5	5	6
Increase road width	5	5	7	18
Better facilities to be provided	15	30	17	19
Announcement in buses	10	30	20	14
Real time bus information system	11	15	21	9
other	2	1	0	1

Source: - Computed by researcher

Simultaneously the problems which are faced by female passengers most number of them said they wanted ladies special buses with more security and police patrolling especially during the night hours. Which will be helpful for solving the cases of eve teasing and women can be freely move from one place to another place by the public buses. Simultaneously, the Govt. should create the employ opportunity for the women also such as driver and conductor in buses; there should be the good and eco-friendly bus stops, neat and clean washrooms and proper sitting arrangements. Problems basically arise due to lack of holistic planning and failure to adhere to the plans.

CONCLUSION:

A good bus transport system will promote urban economy, enable social interaction, increase productivity of resources ,provide mobility to people, enable accessibility to opportunities, increase safety, safeguard environment, set directions and patterns of growth and enhance the image of a city. As these characteristics change with time the public transport demand also changes. Optimizing, Routing, scheduling and synchronizing issues are the major components of good transportation system from a point of origin to a point of destination. The goal is to provide the best service to the customer at minimum cost to the producer. For a bus transit service, it is always preferable to expand its catchment areas much as possible. Total synchronization is the most difficult task of transit schedulers. It is a combined strategy for the required frequency, efficient assignment of trips to a single bus chain and synchronization of certain arrivals. For a good and synchronized service, optimization of routes, optimization of transfers, an effective time scheduling and availability of effective feeder services are required. This is possible by relating the traffic demand in terms of passengers per hour per direction to the number of buses and its frequency to ensure that the BRTS corridor is used to the optimum and the buses are of appropriate design, ensuring that a BRTS corridor has service lanes, footpaths, cycle tracks, bus lanes and motor vehicle lanes without exception, by design the bus lanes on the sides and scrapping the median bus lanes.

REFERENCES:

1. “Revising/Updating City Development Plan of Pune City-2041”, Under JNNURM, 2012, Maj.Gen.S.C.N. Jatar, Retd,Nagrik Chetana Manch.
2. M.S. Nimbalkar, Dr.V.R.Nagarale, “Urban Transportation Problems in a Million City: A case study of Pune Urban Area.” Shodh Samiksha aur Mulyankan, International Indexed & Refereed Research Journal, p.352.
3. Nalwade, S.B. “Geography of Pune Urban Area - Archived from the original on 22 December 2007”.Retrieved 4 April 2008.
4. “Comprehensive Mobility Plan for Pune City”, Urban Infrastructure services limited, Nov.2008.
5. Mukti Advani and Geetam Tiwari,(2006) “Review of capacity Improvement Strategies for bus transit service” Journal of Transport Management, issue of December-2006. Volume 30, pp.363-391.
6. “Urban agglomerations/cities having population 1 million and above” (PDF).Provisional population totals, census of India 2011.Registrar General and Census Commissioner, india.2011.Retreived 26 January 2012.
7. Agarwal O.P. (2001), “Towards a National Urban Transport Policy”, Indian Journal of Transport Management, vol.25.