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Analysis of Parameters Affecting Private Vehicle Ownership by Citizens in Urban Area

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ABSTRACT

In the present condition, India is growing economically. Urbanization and trend to migrate from villages and settle in the nearby urban area has increased urban boundaries. Industries are generally provided away from residential areas and in the outskirts of urban areas. Commercial activities have attracted skilled and highly educated youngsters form surroundings to urban areas. There is a transformation in the middle-class groups for the daily work trip and other activities which lead to increase in vehicle ownership. Investments in private automobiles are very much higher than ever. There is a need to study vehicle ownership and affecting parameters for urban area in Indian context. This paper highlights observations on private vehicle ownership for selected study areas in Ahmedabad. By conducting Home Interview Survey (HIS) data related to vehicle ownership have been collected and analyzed. This analysis would determine the ownership of vehicles in terms of quantification or characterization of refined vehicle type. Transportation and land use choices also play an indirect role as a result of public policies in vehicle ownership. It is observed in urban areas that smaller house and better transportation option or bigger house far away from the CBD with less investment and have a motorcycle and/or car ownership. This analysis will show how life cycle transforms in a household can influence the existing vehicle use and ownership decisions. In present scenario, the peripheries of Indian cities have more demand for travel, but transportation infrastructure is weakly supplied. It is also a reason to boost vehicle ownership

Keywords
Home Interview Survey, Household Parameters, Vehicle Ownership, Urban Area

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Introduction

For a highly populated country like India (1,366 million population in 2019 as per statistics times), it is very much essential to understand the aspects that define the consumer behavior related to purchase of private vehicles and starting the sustainable evolution policies for transportation system. In India, since 1951, there has been a continuous growth, in the quantity for registration of motor vehicles. The total registration of motor vehicles was about 0.3 million in March, 1951, which had been increased to 253 million as on 31st March, 2017. The total registration of vehicles in the country has risen at a Compound Annual Growth Rate (CAGR) of 10.11 per cent from 2007 to 2017. The growth of private vehicles rate increases continuously as per year (Road Transport Year Book 2016-2017)

Fig.1.1 Total Number of Registered Motor Vehicles (in million) 1951 – 2017
Source: Road Transport Year Book 2016-2017

Demand for urban mobility has risen drastically in India, because of urban population growth, people attracted because of multiple establishments of employments, quality of education, larger workforce participation rates, and income growth. This urban population of middle-income households is trying to spend money on private vehicles, in most cases two-wheelers and sometimes car also. In this time-frame to bring down the vehicle ownership by rules and regulations is very weak and unplanned, which furthermore increases compliance to use vehicles for non-work trips also. The higher rate of private vehicle use is also affecting the environment.

In the peripheral urban areas land price is cheap and building construction costs are lower. The existing middle class families who are unable to buy homes in the middle of city area are attracted to shift to the periphery of this city. Now people are moving to this periphery of this city. Transportation infrastructure (roads or bus transit) is not properly equipped in Peoria-urban areas. This is the one reason which is also affecting the private vehicle ownership.

There are a number of factors which lead to purchase of own vehicle.Travel behavior and household attributes tend to impact on the vehicle ownership rate, which directly affecting the traffic growth rate. Size of household, number of family members in the house, Total income of family members, Age of family members, Number of working persons, Household location, place of Work, Parking Availability at resident as well as at work place.

The survey, analysis and study; investigates th e var iables of household that gives directions to the ownership of vehicle in Ahmedabad city. The objective of the study is to analyze the reasons for speedy growth in ownership of vehicle, Presence of diverse types of vehicle and their growths that impact the quantity of vehicle ownership.

Fig: 1.2 Vehicle Parking at Residence

Fig: 1.3 Vehicle Parking at Residence

Daily travel decisions of households and individuals are also dependent on the private vehicle ownership. Motor vehicle ownership has increased, because of two main reasons, such as; urban population growth and rise of household incomes.

Literature Review

By study and review of various literatures for vehicle ownership than some conclusion is analyzed here. They use various methods or models to analyzing about household parameter which is influencing vehicle ownership. Leong Lee Vien and Ahmad Farhan MohdSadullah (2005) have worked to develop the motorcycle ownership model for Malaysia. Based on the conclusion of the study, motorcycles will emerge to be one of a major mode of transportation in the nearer future for the low and middle income group people. D. M. Priyantha Wedagama (2009) has analyzed household variables that affect ownership of car & two wheelers in the Deenpasar city in Bali. Analysis has derived that the rise in quantity of students & working persons in a house may influence the rate of two wheeler ownership increases. Also increase in distance of travel may influence person's preference to own a four wheeler. Capacity of four wheeler or car may influence the household to own a car. K. I. Wong et al. (2011) has investigated and studied the household ownership of car and motorcycle in study area Macao. The result shows that A raise in the household income would also increase the private vehicle ownership rates. Dash et al. (2013) has used India's Consumer Expenditure Survey data (the data have been collected by the Nation Survey Sample Office). It had been observed that the presence of children & household size and per-capita expenditures has a positive relationship with motorcycle & car ownership. Ravi Choudhary (2016) studied the variables highlighting ownership of vehicle for rural as well as the urban population in India. The study explains that if the size of the household increases than rural as well as urban population are also inclined to own the private vehicles. Family structure and size of household plays an important role in choice of transport mode.

Study Area

The west zone of Ahmedabad is selected as the study area for this survey. This west zone is a residential zone of Ahmedabad. The data has been collected from four wards Naranpura, Stadium, Ranip, Wadaj of West zone of Ahmedabad City, Gujarat which are selected as a study area for the present study.

Table No. 2.1 Population detail of Study Area

Name of Ward	Total House Holds	Total Population	Total Population of Male	Total Population of Female
Naranpura	20829	88032	45421	42611
Old Wadaj	16290	75687	39933	35754
Ranip	24960	120152	65270	54882
Stadium Area	16979	75051	39278	35773

Source: Ahmedabad Municipal Corporation

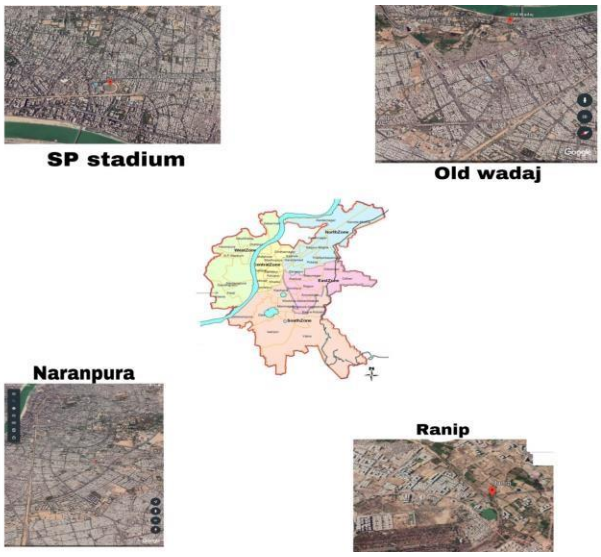

Fig 2.1 Study Area selected in Ahmedabad city

Data Collection

In this study, Data collected by Home Questionnaire Survey. This survey collects the information about household.

(1) No. of family member in Household
(2) Age of family members
(3) Monthly income of family members (4) No. of working person and no. of students
(5) Motorized vehicle ownership etc.

Also, this survey collected the travel data of household. Like,

(1) Mode of travel
(2) Trip purpose (3) Travel Distance etc.

The data collected from West Zone of Ahmedabad i.e.Naranpura, Wadaj, Ranip, and Stadium ward by home interview survey.

It is also defined as face to face survey method. Through this method, the interviewer travel to the physical place of the household and enquire from questionnaire and note down the information. In this the interviewer approaches the respondents by visiting the respondent directly. Based on all these information attempts are made to determine the quantity of trips to household and design the equations of vehicle ownership.

Details of study area with population and number of households are as shown in Table 3.1. The sample size is determined as per Standards of BPR.

Table No. 3.1: Detail of Study Area

Study Area	Population of Study Area	Total no. of House Holds	Sample Size Standard	Collected Sample Size
S.P.Stadium	75051	16979	1 in 8 (12%)	1048
Naranpura	88032	20829	1 in 8 (12%)	1055
Wadaj	77814	17237	1 in 8 (12%)	1050
Ranip	120152	24960	1 in 8 (12%)	1058

Source: U.S Bureau of Public Roads, 1967

Data Analysis

The analysis performed is based on the ownership of the vehicle, broadly, divided into three categories as two-wheelers, four-wheelers and Bicycles. On the basis of this analysis in every ward Two-Wheeler ownership ratio dominates compared to the car. In these wards about average 61% ownership is only about Two-wheeler. Category wise vehicle ownership in study area is as shown in Fig:4.1

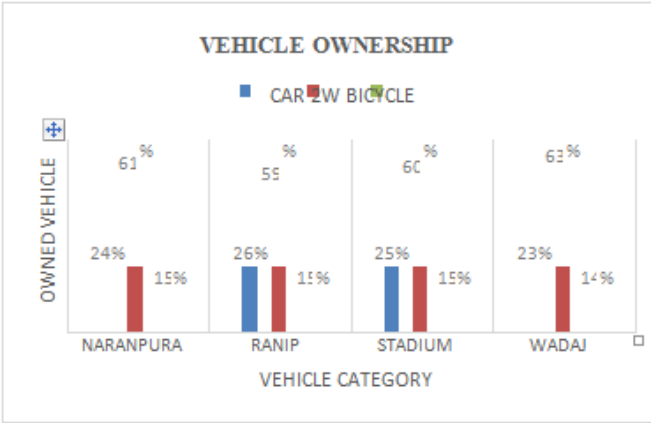

Fig. 4.1 Vehicle Ownership

This analysis showing that about average 49% people in these four wards choose Two-wheeler for any travel purpose. Use of Twowheelers dominates in almost every ward, the reason behind this could be the traffic of the city, parking space problems and maintenance cost. Also it is showing that average 19% people using car for any travel purpose. The average use of bus and auto is 13% and 4% by people for their any travel purpose. Mode choice in study area is as shown in Fig:4.2.

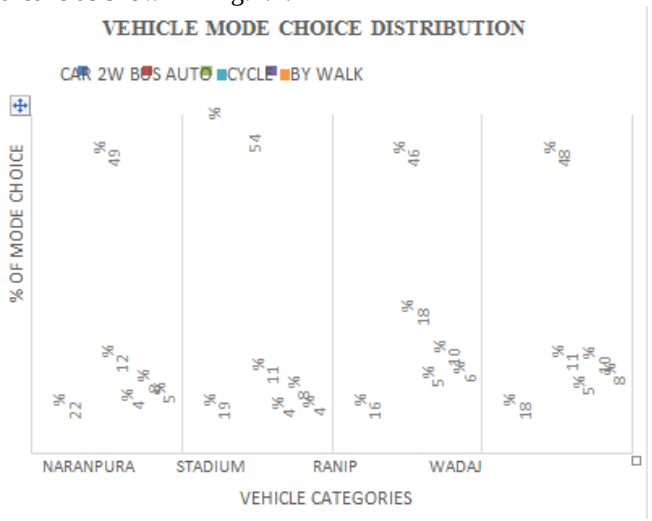

Fig. 4.2 Ward wise Vehicle Mode Choice Distribution

A raise in the household income would also increase the private vehicle ownership rates. This analysis shows that every income range of families has owned at least one two-wheeler for their daily trips. In every income range two-wheeler ownership ratio is maximized. The annual income range above 50000 has maximum ownership of both cars and two-wheelers. There are 54% of families who have owned two-wheeler, no car. High income range families have both two-wheeler and car. It was observed that the ownership of the car increases with the rise of household income. Vehicle ownership as per income is as shown in Fig:4.3

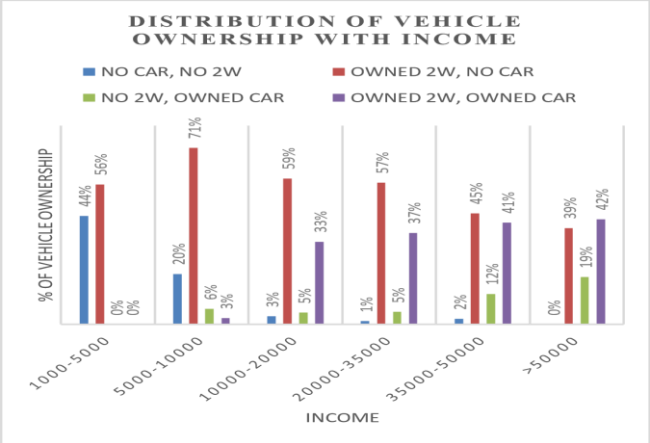

Fig. 4.3 Vehicle ownership as per Income

Travel distance also plays effective parameter for vehicle ownership. Travel to the nearest place (about 6 km) people used Two-wheeler. To the nearest distance place Two-wheeler is a convenient option for people. For the longer route people prefer car for travelling. Increase in distance of travel may influence person's preference to own a four-wheeler. For the long travel distance people do not prefer auto rickshaw. Public transport usage is not higher as compared to private vehicles from people. Trip length for km range made, by which mode of transport is as shown in Fig: 4.4

- Use of two wheelers dominates in the study area, due to the traffic congestion, lack of sufficient parking and travel distance.
- Each household (HH) irrespective of annual income, there is minimum one vehicle ownership. 61% of HH have only 2W. There are about 47% two-wheeler used for travelling to 5-6 km of daily trips. For short distance trips 2W is preferable. Every Household has at least one vehicle for their daily purpose trips.
- The observation indicates that the owning a car depends on the rise of

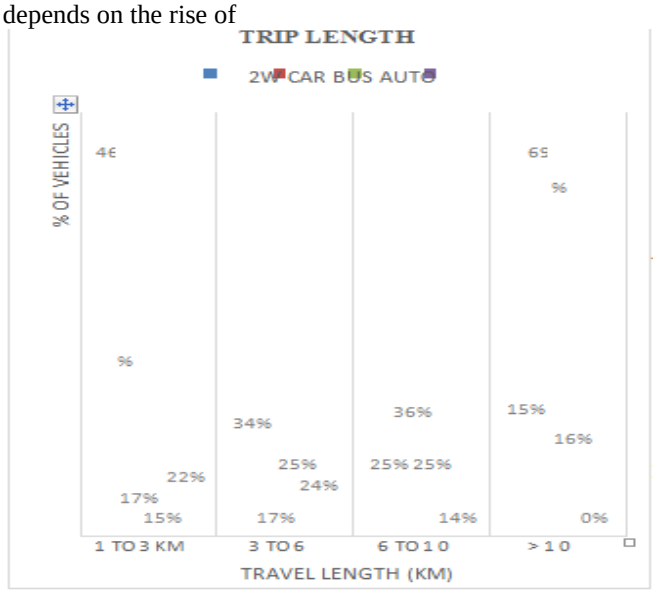

Fig. 4.4 Trip Length by Vehicle Categories

There are many household parameters responsible for increasing vehicle ownership. Household size, income of household, travel distance from the workplace, age of the household member which is included as tend to increase vehicle ownership.

Conclusion

- The data has been collected from four wards namely Naranpura,

Stadium, Ranip and Wadaj of West zone of Ahmedabad City by HIS. The study generates and gives a primary synthesis of the nature of travel mode choice and ownership of vehicle in the selected study area in Ahmedabad.

- The survey, analysis and study; investigates th e var ia bl es of household that gives directions to the ownership of vehicle in Ahmedabad city.
- On the basis of this survey income is the important factor which is influencing the vehicle ownership growth rate. As household income increases, it would also increase the private vehicle ownership rates.

the total travel number and distance, aged parents and kid

References

[1] Leong Lee Vien and Ahmad Farhan MohdSadullah(2005)

[2] "Modelling Motorcycle Ownership in Malaysia," Transportation (Amst)., vol. 2000, 2005.

[3] D. M. Priyantha Wedagama (2009) "The Analysis of Household Car and Motorcycle Ownerships Using Poisson Regression" 148163-EN-the-analysis-of-household-car-and-motorc.pdf

[4] K. I. WONG and H.-L. LIN (2011) "Modeling Household Car and Motorcycle Ownership: A Case of Macao," Proc. East. Asia Soc. Transp. Stud., vol. 2011, p. 81, 2011, doi: 10.11175/eastpro.2011.0.81.0.

[5] S. Dash, V. Vasudevan, and S. Singh (2013) "Disaggregate model for vehicle ownership behavior of Indian households," Transp. Res. Rec., no. 2394, pp. 55–62, 2013, doi: 10.3141/2394-07.

[6] R. Choudhary and V. Vasudevan, (2016) "Study of vehicle ownership for urban and rural households in India," J. Transp. Geogr., vol. 58, pp. 52–58, 2017, doi: 10.1016/j.jtrangeo.2016.11.006.

[7] Household Travel Survey Data Collection Plan, http://www.public.asu.edu/~rpendyal/HouseholdTravelSurveyDataCollectionPlan.pdf

[8] Road Transport Year Book (2016-2017) https://morth.nic.in/sites/default/files/Road%20Transport%20Year%20Book%20201617.pdf