

VEHICLE CHOICE BEHAVIOUR ON “ON STREET” PARKING

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Abstract -Population growth plays a vital role in the urban traffic systems. Due to the budding population on the streets, traffic congestion is an inevitable scenario. One of the main factor which leads to this traffic congestion is the improper parking system followed by vehicle obstruction, road capacity reduction, careless accidents due to parking, etc on the streets. Parking has become the critical problem for urban areas, because there are limited areas for parking vehicles. An understanding of parking behaviour is important for city planners to design parking facilities and draw parking policy. This paper describes the parking choice behaviour of vehicles on “on street” parking system. The data were collected from Thrissur town area in 2018. The observations included 250 interviews with individuals who choose bike or car on street parking. The characteristics of individuals choosing the vehicles were presented. The resulting observations were used to estimate binary logit model with various utility functions. The utility functions included some factors that influences the choice behaviour are distance, time, condition of parking space, road width, purpose, etc. The analysis was done by using SPSS software. The predicted model helps to designer to make suitable parking choice model.

Keywords - Binary logit model, parking choice model, licence plate method, parking volume.

1 INTRODUCTION

In urban areas, especially in town areas, there is strong competition for the use of space among the various urban activities like housing, economic activities, green space, traffic and parking. The main urban congestion is created by drivers looking for parking. Parking is one of the major problems that are created by the increased demand for parking space especially in central business area. This affects the mode choice also. This has great economical impact.

2 STUDY AREAS

As the vehicle ownership rapidly increasing, parking is becoming a serious problem in Thrissur. In this paper we conduct a survey of the parking lots around the Thrissur temple round of about 2 km. The study area consisted of Thrissur temple, Puthanpali, Zoo, Park, etc, This area is mainly for tourism, commercial purposes also there is resident and business..

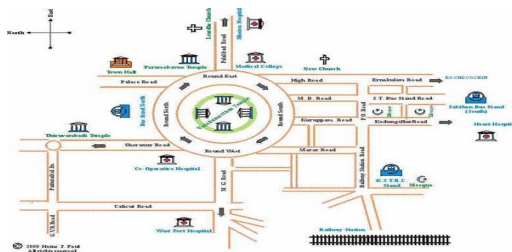


Fig.1 study area

The study sections chosen mainly the five different locations in Thrissur, The main criteria were set in selecting these parking locations. It is the availability of both types of vehicles used in the areas. The second criterion is the variability in land uses and activities among the selected parking locations in order to study the effect of trip purposes on individual's choices. The selected parking locations are in the following areas:

1. Near SIB bank, control room junction
2. Near East police station
3. Chettiyangadi parking area
4. Pooram hotel (Near kuruppam road)
5. Marar road (opp. swedessi auto mobiles)

These locations were used for work, recreational and commercial trips, respectively.

3 OBJECTIVES

- Evaluation of present condition of parking system.
- Determine the parking choice behaviour model.

4 LIMITATIONS

The survey has been carried out only on the working days in the middle of the week. A detailed parking study spread over longer duration of time would have yielded more reliable results. Adequate width of road is less is the main problem of parking.

5 NEED FOR THE STUDY

Thrissur is considered to be an industrial and commercial center. Every car owner would wish to park their car as closely as possible to his destination so as to minimize his walking. High volume of traffic consisting of both fast and slow moving vehicles is plying through the road. Major traffic comes from commercial centers, shopping centers, bank, residential, government office,

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hospitals, bus stop, near railway station etc. In the non availability of adequate off-street parking facilities, vehicles are parked hazardly along curb causing traffic congestion. No parking bay is marked; hence people parks their vehicles on the on-street. With the growing population of motor vehicle, the problem of parking has assumed serious proportions. A systematic study of parking characteristics, demand, behaviour choice and regulatory measures that are possible for controlling is of great help to town planners. Parking survey and questionnaire survey is intended to supply all these kind of information.

6 DATA COLLECTION

The purpose of data collection was to obtain the travel behaviour of the parkers & their response to proposed policies. Data collection was done by two survey methods as below:

The basic data required for the study are:

1. Parking survey data
2. Questionnaire survey data

This study of parking includes, parking load, parking duration, parking turnover, parking accumulation, etc. and also considered socio-economic characteristics, trip characteristics and location characteristics for the parking choice behaviour study.

Three types of characteristics need to be collected. First one is the parking facility's basic information such as parking charge, capacity, parking time, condition of parking location, distance of parking and the second one is the socio economic characteristics such as age, gender, income, family size, employed persons in a family, number of vehicle. And another one is the trip characteristics such as frequency of trip, purpose of trip. The performance data were collected on typical weekdays (Tuesday and Thursday). All the parking spaces were observed from 8:30 a.m. to 5:30 p.m. parking space. I conduct a face-to-face parking survey in three parking lots. Each interview lasted approximately 5 minutes. Totally, 250 drivers were interviewed.

Understanding how users select parking facility is curtail in parking planning and design. The objective of the interview was to investigate attitudes and behavioural patterns with regard to parking. The purpose of parking is illustrated in Figure 2, it shows that almost half of peoples parked their vehicles for work, and 60 % for shopping.

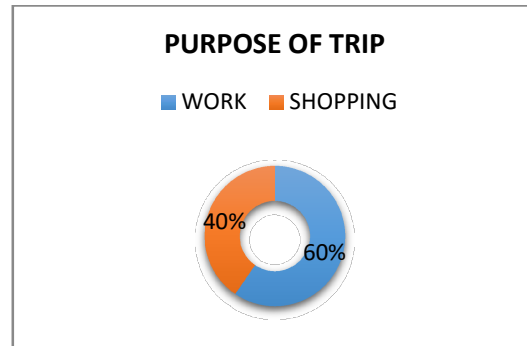


Fig.2 Purpose of trip

The frequency of trip is illustrated in Figure 3 shows that 48% of drivers parked vehicles daily, and 26% drivers for weekly.

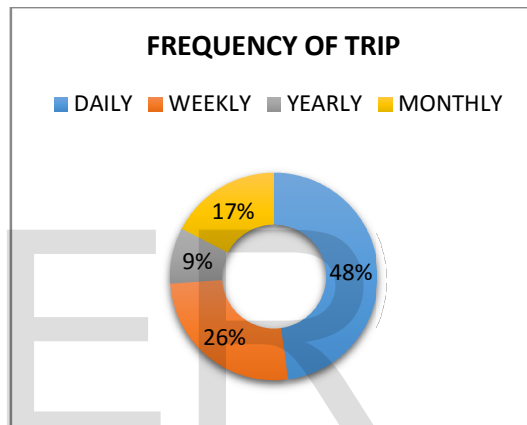


Fig.3 Frequency of trip

7 LOGISTIC REGRESSION ANALYSIS

The main objective of the analysis is to study the effect of parking decisions for car parking and bike parking. To understand the response of binary model was made.

7.1 Binary Logistic Model

The binary model estimates the probability of choosing car and bike parking. The variables included in the analysis were household monthly income, travel distance, trip length, purpose of trip, frequency of visit, parking duration, walking time, number of employed persons, age, gender, etc as all these variables affect directly or indirectly commuter's parking decision. The term significant refers to the coefficient being significantly different from zero at a 5% confidence level.

The regression equation 1 is:

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 \quad (1)$$

Y = Parking choice car/bike

α = The constant of the equation

β_1 = The coefficient of variable of parking time

β_2 = The coefficient of variable of income

The regression result is shown by Table.1

TABLE 1

Binary Logistic Model For car and bike parking drivers Response

Variables in the equations						
	B	S.E	WAL D	D F	Sig	Exp(B)
INCOME	-.035	.011	11.202	1	.001	.965
TIME SPEND FOR PARKING	-2.126	1.054	4.068	1	.044	.119
Nagelkerke R Square	.662					

The significant coefficients of parking time, income are both 0.000 (less than 0.05). From the modelling result, the regression equation 2 should be:

$$Y = -2.126 * \sqrt{\text{time spend for parking}} - 0.035 * \sqrt{\text{income}} \quad (2)$$

The table 1 represents the response of car and bike parking drivers, From the results it is seen that time spend for parking, income, has significance. It has negative β - coefficient, which shows that the time spend for parking and income affects negatively to the parking decision. it indicates that the peoples has changed their vehicle according to their income and socio economic characteristics.

TABLE.2

Classification table for Binary Logistic Model For onand bike parking drivers Response.

CLASSIFICATION TABLE				
OBSERVED		PREDICTED		
		PARKING		PERCENTAGE CORRECT
	CAR	BIKE		
Parking Response	CAR	36	9	80
	BIKE	11	119	91.5
OVERALL PERCENTAGE				88.6

The table 2 shows the classification of response. Here it is seen that the observed response by questionnaire and the

predicted response by modelling is validated by 88.6% accuracy. Also it is seen that out of 250 respondents 215 responses was positive.

The modelling was also done for knowing the response of car and bke drivers. In this model 82.35 % validation was obtained for observed and predicted response and the significant variables were time spend for parking, income, It affects the parking decision.

8 CONCLUSION

Parking takes considerable street space leading to the lowering of the road capacity. Hence, speed will be reduced; Journey time and delay will also subsequently increase. The operational cost of the vehicle increases leading great economical loss to the community. According to the parking study on existing traffic condition on the road network it is must and required to remove on street parking system for efficient transportation system. Careless manoeuvring of parking and un-parking leads to accidents which are referred to as accidents. Common type of parking accidents occur while driving out a car from the parked area, careless opening of doors of parked cars, and while bringing in the vehicle to the parking lot for parking. They also cause pollution to the environment because stopping and starting of vehicle while parking and un-parking results are noise and fumes to reduce the parking of vehicles we can implement the following.

- 1) For short term measures pay and park method will be done at peak hours to control and regulate the parking.
- 2) For long term measures off street parking have to be provided near CBD areas, within the radius of 1 Km.
- 3) Signed parking restrictions: Encourage short term parking and turnover
- 4) Angled parking: Can increase overall supply of on street parking, if the street wide enough.
- 5) Car pooling
- 6) Improve public transport

REFERENCES

- [1] A. Costa, C. Rocha and S. Melo (2014). "Parking Management Policies And The Effectiveness Of Public Policy Solutions", Procedia-Social and Behavioral Sciences, 111, 965-973.
- [2] A. Dogru, S. Malaitham, M. Okamura, A. Fukuda, and T. Fukuda (2017) "Parking Management Policies Based on Behavior Analysis at Fatih District in Istanbul, Turkey", Transportation Research Procedia, 25, 5205-5219.
- [3] Barter, P.A (2012). "Off-street parking policy surprises in Asian cities", Cities, 29, 23-31.
- [4] G. Antolin, A. Ibeas, B. Alonso and L. dell'Olio (2018). "Modelling Parking Behaviour Considering Users Heterogeneities", Transport Policy.
- [5] H. Lim, Williams, G.T, D. Abdelqader, J. Amagliani, Z. Ling, Priester, D.W, CheSrry, C.R (2017). "Alternative

Approach for Forecasting parking Volumes”,
Transportation Research Procedia, 25, 4171-4184.

[6].J.Golias, G.Yannis and M.Harvatis,(2002).“Off-
street parking choice sensitivity”, Transportation
Planning and Technology, 25, 333-348.

[7].Simićević, N.Milosavljević and G.Maletić(2012)”
Influence Of Parking Price On Parking Garage Users
Behavior”, Promet—Traffic &Transportation, 24, 413-
423.

[8].Kolhar,M.P,” Off street Parking Management Plan
for Dharwad City, Karnataka,India(2012).”Journal of
Engineering Research and Studies.

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