

# ATTITUDE AND BEHAVIOURAL INTENTION OF DAILY COMMUTERS TOWARDS PUBLIC TRANSPORTATION SERVICES

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## Abstract

*Carbon emission is the largest contributor to the phenomenon of global warming and petroleum products are the largest source of carbon emission into the environment. Carbon emission cannot be eliminated, but it certainly can be reduced to a greater extent by way of efficient utilization of petroleum products for the regular commute. This can be attained by creating changes in the current public commuting system and also by a policy change in public transport system. This study has been formulated to examine the pattern of commuting, attitude and behavioural intention of daily commuter towards public road transport system in Tamil Nadu. A survey was carried out in the districts under Trichy and Salem - Tamil Nadu State Transport Corporation (TNSTC) zone. A sample of 770 daily commuters were surveyed in selected corridors of Ariyalur, Nagapattinam, Perambalur, Pudukottai, Ramanathapuram, Sivagangai, Thanjavur, Thiruvarur, Tiruchirapalli, Salem, Dharmapuri, Krishnagiri, Karur and Namakkal in Tamil Nadu. The Theory of Planned Behaviour (TPB) model was used to examine the behavioural intention of the daily commuters and to identify factors that contribute and influence commuters to use public transport. Results show that the attitude toward public transport is the most dominant factor compared with other constraints. Majority of the personal mode commuters agreed for switchover to the public transport if there are some improvements in certain aspects like additional bus service, routes and enhanced services, which shows an encouraging response for environmental consciousness. The outcomes of this study are significant as the results are showing a favourable possibility of less carbon emitting commuting system for Tamil Nadu.*

## Keywords:

*Environment, Carbon emission, TPB, Attitude, Intention, Public Transportation Services*

## 1. INTRODUCTION

To date many countries have endeavored to limit the utilization of two wheelers in favour of public transport [1]. United States Environmental agencies (USEPA) has initiated many countries to make changes in the public policies to maximize the utilization of the public transport [2]. In the past two decades India has witnessed a multifold growth in the personal vehicle population. It has left the people with more congestion on roads, increase in the pollution level, enormous demand for fuel and many other consequent impacts on the economy. India being a country with 1.27 billion population density, it faces a lot of challenges in satisfying the transport needs of its people.

In India due to the poor utilization of the public transit most of the cities are struggling with numerous consequences of rising personal vehicle (two wheelers) population [1] [3] and it accounted for the share of 72.4% of India's total vehicle population. The total number of registered two wheelers increased at a rate of 13.3% during 2015-16 (Ministry of Road Transport and Highway) and in 2013-2014, the sales of the two wheelers in India reached its multi fold growth.

On the other hand there is wide acceptance of the hypothesis that links growth of personal vehicle population to enormous demand of fuel and carbon emission [2] [5]. The two wheeler segment accounts for the highest consumption of the total petroleum product in entire India [6] and it accounts for around 25-30% of global carbon emission.

Also, a vast majority of people who were involved in accidents were personal vehicle users, and personal vehicle users in India are considered as the vulnerable users [15]. The prevalent share of 25.42% (28022 deaths) of the total fatal accidents occurred in India were accounted by two wheelers and it is also considered as the main component of the existing traffic congestion. World Health Organization (WHO) estimated that the road accident will increase by 80% in 2020, if this same situation persists [8].

Tamil Nadu ranks second highest in vehicle density and it constitutes 12% (85, 75,000) of total vehicle population of India [9]. Road transportation is the dominant mode of transport in Tamil Nadu. In recent years, due to increasing affluence, there has been a many-fold increase in the state's vehicle population [9]. Energy consumed in the transport sector in Tamil Nadu is quite high due to high road density and efficient transportation system. It is estimated that a mere one percent increase in MTS saves nearly Rs. 32000 on fuel cost for shifting commuters [11] and the level of carbon emission can be reduced up to 2.26% for a mere one kilometer run if additional 20% public mass road transit are introduced in Tamil Nadu [12]. Hence the outcome of this study will be more significant for the entire country for creating cost effective and environmental friendly road commuting system.

This research attempts to find out the daily commuters attitude towards public transport and intention of commuters to use public road transport for their daily commute. The Theory of Planned Behavior Model [13] was used in this research to estimate the intentions of commuters to use public transport for their daily commute, with the help of psychological factors like Attitude, Personal norms, Subjective norm and Perceived control. The Theory of Planned Behavior [13] predicts that attitudes have an influence on travel mode use of individuals. It has also been revealed that attitude needs to be examined to have a better understanding about the preference to use public transport and the intention to use the public transport [14].

## 2. METHODS AND MATERIALS

A survey was carried out in the districts under Trichy and Salem - Tamil Nadu state Transport Corporation (TNSTC) Zone. A sample of 770 daily commuters were surveyed in selected corridors of Ariyalur, Nagapattinam, Perambalur, Pudukottai, Ramanathapuram, Sivagangai, Thanjavur, Thiruvarur, Tiruchirapalli, Salem, Dharmapuri, Krishnagiri, Karur and Namakkal in Tamil Nadu.

The Districts under Trichy and Salem - Tamil Nadu State Transport Corporation (TNSTC) zone are the most populated districts in Tamil Nadu. Transportation plays a vital role in the economic growth of the people in the districts. Based on the above mentioned factors these districts were considered as the real representative district for this research.

The survey was carried in selected corridors of afore mentioned districts where there is high personal vehicle usage, and public transport availability. The respondent's demographical status, social status, professional status, regular commuting pattern, mode of transport, preference towards the present mode and awareness on transport impact were measured. Majority of the respondents are households, working people, college going students and others, who use either public or personal transport for their daily commute. The eligible respondents of this research were the daily commuters within the age category of 18 to 58 with minimum travel distance of 5km and maximum travel distance of 25km.

The profile of survey conducted and the demographic classifications of the daily commuters of the 15 districts are exhibited in the Table.1 and Table.2. 52.3% of the respondents were female and the 47.7% of the respondents were male. Nearly 60% of the respondents belong to the age group of 18 to 35. Regarding the regular commuting pattern, 54% of the respondents are using the public transport for their regular commuting and 46% of respondents using personal transport for their daily commuting.

Table.1. Profile of survey conducted among the daily commuters

Districts covered	No. of Respondents
Ariyalur	21
Nagapattinam	46
Perambalur	16
Pudukottai	46
Ramanathapuram	38
Sivagangai	38
Thanjavur	68
Thiruvarur	36
Tiruchirappalli	77
Salem	60
Dharmapuri	60
Karur	42
Krishnagiri	75
Namakkal	69
Salem	139
<b>Total Sample Size</b>	<b>770</b>

Table.2. Demographic classifications of respondents

Demographic Classifications		No of Respondents	(%)
Gender	Male	403	52.3
	Female	367	47.7
Age	18-25 years	191	24.8
	26-35 years	276	35.8
	36-45 years	195	25.3
	46-55 years	89	11.6
	Above 56 years	17	2.2
Marital Status	Married	425	55.3
	Unmarried	345	44.7
Daily Commute	Public Mode	438	56.9
	Personal Mode	332	43.1

Behavioural Intention to use public transportation was measured with a single question asking about the level of intention to use public transportation for daily commute. Responses ranged from very weak to very strong, and the higher scores indicating the intention to use public transportation for daily commute is stronger.

Awareness of negative environmental consequences due to increase in personal vehicle utilization were measured using 2 items namely: I am aware about that 'Increase in personal vehicle population is the major source of air pollution' (EA1), 'Air pollution due to personal vehicle is the major cause of global warming' (EA2) is (7) aware to (1) unaware.

Attitudes towards public transport mode use were measured by using 8-items related to the respondent's evaluation of the use of public transport for the daily commute. The responses on attitude towards Public transport system was sought on a semantic differential scale whose bipolar differential response were Good – Bad (A1), Pleasant – Unpleasant (A2), Important – Unimportant (A3), Negative – Positive (A4), Comfortable – Uncomfortable (A5), Fast – Slow (A6), Punctual – Irregular (A7), Safe – Unsafe (A8), Cheap – Costlier.

Subjective norm is measured using 2 items namely: 'My Family Members/Friends always encourage me to use public transport for daily commute' (SN1) and 'My Family Members/Friends always support my decision to use public transport for daily commute' (SN2) is (1) unlikely to (5) likely. Perceived control [16] was measured with two items 'Public transport for my daily commute would overall be' (PC1) is (1) very difficult (7) very easy and 'My choice of public transport for daily commute is' (PC2) (1) very low to (7) very high.

In addition to the above-mentioned measures demographic variable like gender (PN1), age (PN2), education (PN3) and gross income (PN4) of the daily commuters were included in the questionnaire.

Structural Equation Modeling (SEM) analysis was conducted using the IBM SPSS AMOS 18.0 software to examine attitudes and behavioural intentions of daily commuters. The Root Mean Square Error of Approximation (RMSEA) and the Comparative Fit Index (CFI) were used as the fit indices. A RMSEA of 0.05 or

less and a CFI around 0.90 or above have been considered to estimate the model fit and the data validity [17].

3. ANALYSIS AND DISCUSSION

Cronbach’s Alpha was calculated to examine the reliability of factors included in the model. The coefficients  $\alpha$  obtained were greater than 0.7, indicating a valid factor reliability [18]. The factors were retained only if they had factor loading greater 0.5 and Eigen value greater than 1 [19] Means and standard deviations of all physiological factors of TPB model are displayed in Table.3. Overall the sample reported relatively high support and preferences for using public transportation. The perceived behavioural and Subject Norms for using public transportation were more moderate, whereas the awareness of environmental consequences due to high utilization of personal mode transport for daily commute was also relatively high.

Table.3. Means and standard deviations of the constructs included in the models

Parameters	Minimum	Maximum	Mean	Std. Deviation
Intention	1	7	4.68	1.762
Attitude	1	7	4.39	1.645
	1	7	4.38	1.698
	1	7	4.29	1.656
	1	7	4.36	1.689
	1	7	4.34	1.666
	1	7	4.24	1.696
	1	7	4.32	1.657
	1	7	4.29	1.697
	1	7	4.24	1.760
Subjective Norms	1	7	4.27	1.767
	1	7	4.19	1.703
Perceived Behavioural Control	1	7	4.25	1.766
	1	7	4.17	1.709
Environmental Awareness	1	7	5.49	1.204
	1	7	5.49	1.218

SEM results shows the isolated TPB model in Fig.1 had good fit to the data ( $p < .001$ , RMSEA = .050, CFI = .973) and explained 47% of the variance in intentions to use public transport. There is a significant relation between was subjective norms related to public transportation ( $B = .136$ ,  $p < .001$ ). Perceived control also associated with the intentions of using public transport ( $B = .131$ ,  $p < .001$ ). The strongest factor associated with intentions of using public transport is the attitude towards public transport ( $B = .652$ ,  $p < .001$ ). Based on the SEM results it has been evident that the Attitude towards public transport is the most important factor to determine choice of transport mode for daily commute.

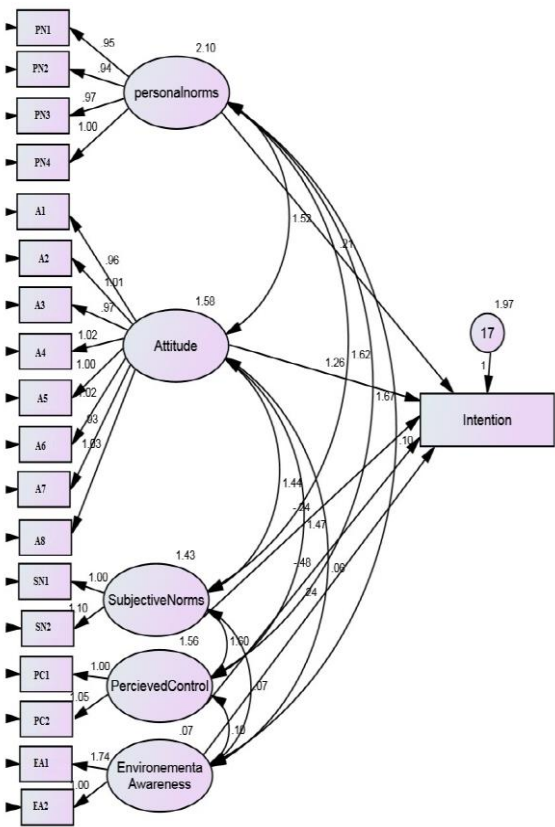


Fig.1. TPB model showing intention of daily commuter to use public transportation

4. CONCLUSIONS

The daily commuter’s preference towards mode of transport is highly influenced by the psychological factors like attitude, personal norms, subjective norm perceived control and environmental awareness. This study clearly indicated that there is a positive intention among the people, towards the public transport system. Attitude is a significant predictor of intentions to use public transportation, thus the promotion of more favorable attitudes towards public transportation is a potentially effective approach for modal shift of personal mode commuters to public transport, which would benefit them for a safe and healthy travel, for fuel savings, cost savings, and reduction of pollutant to the environment and less congestion on roads. These benefits will be not just for an individual but for the entire economy of the country. Because, it is estimated that a meager 2% to 3% fuel conservative would save a quantum of Rs.8000 Crores to Rs.10000 Crores foreign exchange to our country [7]. With these useful findings, it is concluded that there needs a small change in the public transport policy of the Government which will create a strong intention to use public transport among the daily commuters. This Intention would result in a sustainable transportation system in Tamil Nadu.

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