

# Electrifying Urban Transport: A Study on Tamilnadu Government's Sustainable Bus Initiative in Chennai

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**Abstract:** This study examines public perception and passenger satisfaction towards electric bus services in Chennai. Urban transportation systems are significant contributors to environmental degradation. With the transition to electric buses becoming a priority in the metropolitan areas, the research aims to understand the key factors such as comfort, technology, sustainability, and perception of the Tamil Nadu Government initiative and how these factors influence overall satisfaction and usage behaviour among the commuters. Primary data was collected through a structured questionnaire administered to 152 respondents, capturing insights across demographics and consumer attitudes. The findings of the study reveal that the majority of the users are female, young and environmentally conscious. While technological and sustainability aspects are important, passenger satisfaction is largely driven by comfort and confidence in government initiatives. The study concludes that while awareness is high due to personal experience, operational barriers such as limited route availability remain significant hurdles.

**Keywords:** Electric buses, Passenger satisfaction, Urban transportation, Sustainable mobility, Chennai.

## INTRODUCTION

Sustainable development has transitioned from a theoretical concept to a critical operational priority in the Metropolitan areas. Urban transportation plays a vital role in the economic development of cities. In Chennai, with rapid urbanization and increasing population, the shift toward electric transportation is a fundamental necessity to combat growing challenges such as air pollution, noise pollution, and rising fuel consumption. Under the Electric Vehicle Policy 2023, Tamil Nadu Government has introduced electric buses primarily manufactured by Ashok Leyland's electric mobility arm, Switch Mobility to modernize the Metropolitan Transport Corporation (MTC). This study aims to explore the public perception and passenger satisfaction of the e-buses in Chennai by examining the consumer behaviour, service effectiveness, and brand perception to identify whether the government's strategic investment in green technology aligns with the expectations of the bus commuters in Chennai.

## THEORETICAL BACKGROUND OF THE STUDY

Understanding the potential of electric buses requires a framework combining sustainability science and marketing theory. The customer satisfaction theory (Expectancy Disconfirmation Theory) suggests that satisfaction occurs when perceived performance of a service meets or exceeds the user expectations. The theory of planned behaviour (TPB) is crucial in analyzing how consumer attitudes towards the environment influence the intention to transition from diesel-powered transit to electric buses. The technology acceptance model (TAM) is essential in assessing how perceived usefulness and perceived ease of

use impact user satisfaction. Additionally, the service quality model helps in evaluating service gaps such as reliability, assurance, and tangibles. Service quality, in public transportation, is reflected through aspects such as comfort, punctuality, safety features, and cleanliness. These factors directly impact passenger experience and their satisfaction towards electric bus services.

## REVIEW OF LITERATURE

Recent studies highlights a shift toward technological integration and consumer psychology. In 2021, IEA (International Energy Agency) has studied the global electric vehicle trends. The research has highlighted that rapid adoption of electric vehicles is driven by government initiatives and environmental concerns. Jabeen et al. (2021) explored the sustainable public transportation systems in developing countries, and identified that electric buses improve environmental sustainability and urban mobility. Similarly, Kumar & Alok (2020) in their study, emphasized that in India, environmental awareness and government incentives are crucial for the success of e-mobility initiatives. Furthermore, Li et al. (2018) in their paper, intended to study how the global adoption of electric buses significantly decrease greenhouse gas (GHG) emissions and improve energy efficiency in public transport systems. Finally, Solomon et al. (2012) examined the importance of consumer psychology, and their study revealed that modern commuters are increasingly driven by subconscious "green" motivations when choosing public transit.

## RESEARCH METHODOLOGY

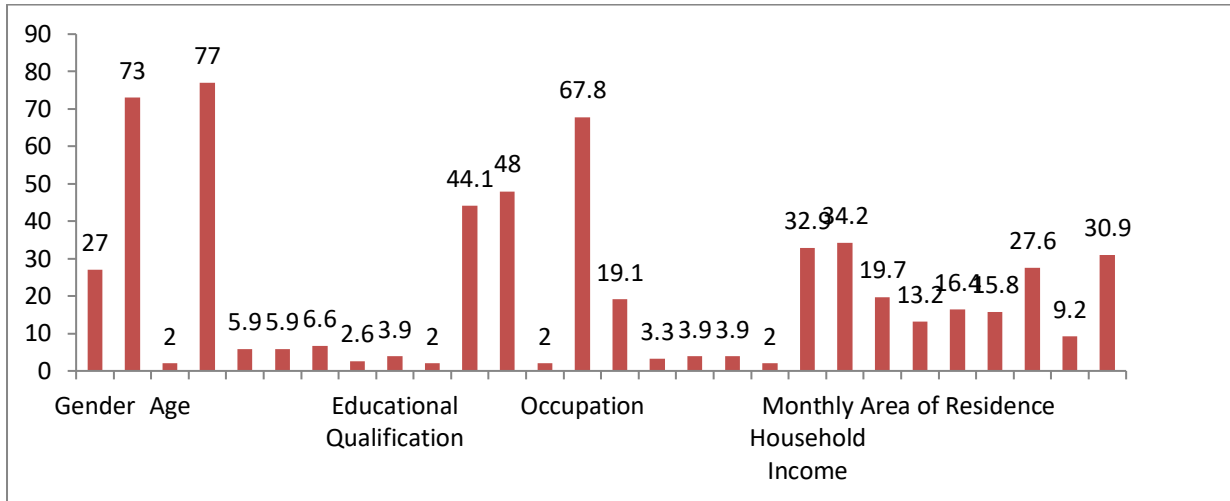
This study adopts a descriptive research design to analyze

the sustainability initiative by the Tamil Nadu Government in Chennai. Primary data was collected through a structured questionnaire targeting consumers residing in various parts of Chennai. The sampling method used is convenience sampling, with a total sample size of 152 respondents, ensuring a mix of different age groups, occupations and income levels to gain diverse insights. The questionnaire

consists of closed ended multiple choice questions using Likert scale, designed to capture buying behaviour, frequency of usage, and satisfaction levels. The data was analyzed using statistical tools such as ANOVA, correlation, and regression with the help of SPSS software. Percentage analysis was also used to interpret demographic characteristics and general response patterns.

**DATA ANALYSIS AND INTERPRETATION**  
**TABLE 1: Demographic profile of the respondents**

Demographic Profile		No. of Respondents	Percentage (%)
Gender	Male	41	27
	Female	111	73
Age	Below 18	3	2
	18-25	117	77
	26-35	9	5.9
	36-45	9	5.9
	46-60	10	6.6
	Above 60	4	2.6
Educational Qualification	School Level	6	3.9
	Diploma	3	2
	Undergraduate	67	44.1
	Postgraduate	73	48
	Doctorate	3	2
Occupation	Student	103	67.8
	Private Sector Employee	29	19.1
	Government Employee	5	3.3
	Self-employed	6	3.9
	Homemaker	6	3.9
	Retired	3	2
Monthly Household Income	Below ₹25,000	50	32.9
	₹25,001 – ₹50,000	52	34.2
	₹50,001 – ₹1,00,000	30	19.7
	Above ₹1,00,000	20	13.2
Area of Residence	North Chennai	25	16.4
	Central Chennai	24	15.8
	South Chennai	42	27.6
	West Chennai	14	9.2
	Suburban/Outer Chennai	47	30.9



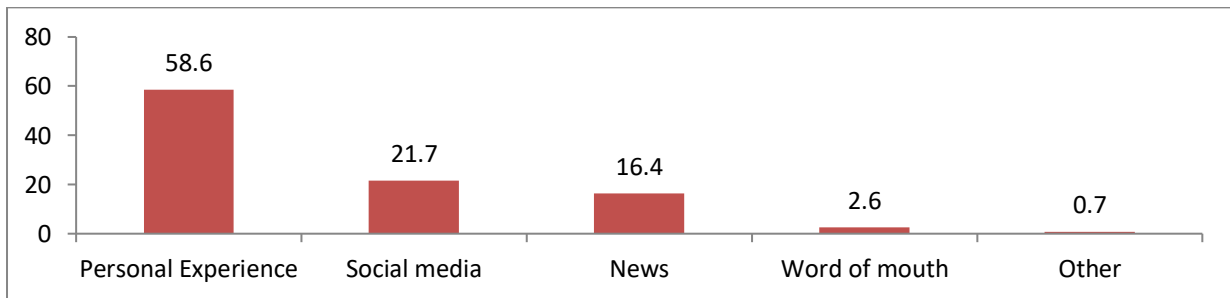
**CHART 1: Demographic profile of the respondents**

**Data Interpretation and Findings**

The demographic profile reveals a predominantly young population, with 77% falling within the 18-25 age group. This suggests the sample majorly consists of students and early-career individuals who are likely to be early adopters of the sustainability initiative. Higher proportion of females (73%) than males (27%) participated in the survey, indicating a slightly skewed gender representation. Most respondents are students, highlighting that the youth are the primary segment currently engaging with the electric bus initiative. In terms of income, most respondents fall in the ₹25,001 – ₹50,000 group (34.2%), followed closely by those earning below ₹25,000 (32.9%). The ₹50,001 – ₹1,00,000 group accounts for 19.7%, while 13.2% earn above ₹1,00,000. Most respondents are from Suburban Chennai (30.9%) followed by South Chennai (27.6%). North & Central Chennai account for 16.4% and 15.8% respectively, while West Chennai has the least representation (9.2%).

**TABLE 2: Sources of Awareness of Electric Buses**

Source of Awareness	No. of Respondents	Percentage
Personal Experience	89	58.6
Social media	33	21.7
News	25	16.4
Word of mouth	4	2.6
Other	1	0.7



**CHART 2: Sources of Awareness of Electric Buses**

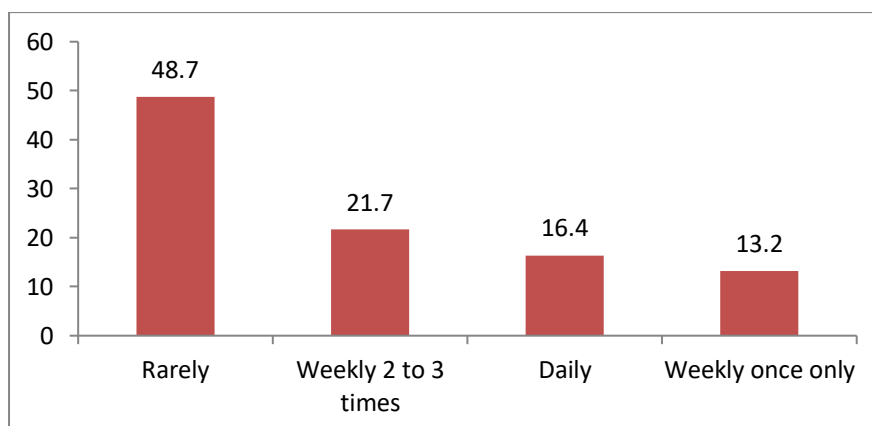
**Data Interpretation and Findings**

The above table shows that most respondents became aware of e-buses through personal experience (58.6%). Social media (21.7%) news (16.4%) are other key sources, while word of mouth (2.6%) and others (0.7%) contribute minimally. This indicates that physical presence of electric buses is the strongest marketing tool and that digital platforms play a secondary role in spreading awareness.

**TABLE 3: Frequency of Usage of Electric Buses**

Frequency of Usage	No. of Respondents	Percentage
Rarely	74	48.7
Weekly 2 to 3 times	33	21.7
Daily	25	16.4

Weekly once only	20	13.2
Total	152	100



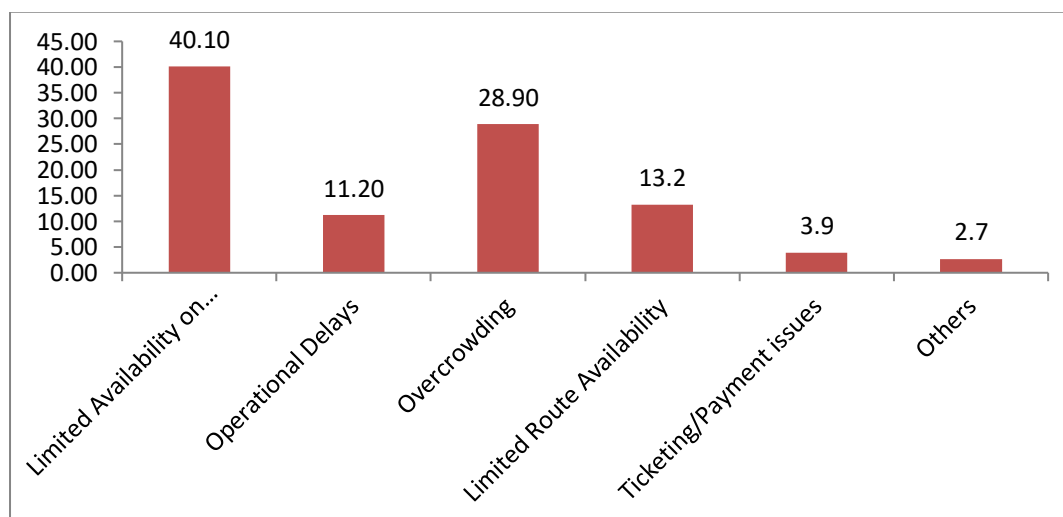
**CHART 3: Frequency of Usage of Electric Buses**

**Data Interpretation and Findings**

The table shows the usage frequency of electric buses in Chennai. Most respondents use electric buses rarely (48.7%). About 21.7% use them twice or thrice a week, while only 16.4% are daily users. This suggests that while many people are aware of the e-buses, most do not use them for their everyday travel and the most likely reason being limited availability on certain routes.

**TABLE 4: Issues Faced while Traveling in Electric Buses**

Issues Faced	No. of Respondents	Percentage
Limited Availability on Certain Routes	61	40.1
Operational Delays	17	11.2
Overcrowding	44	28.9
Limited Route Availability	20	13.2
Ticketing/Payment issues	6	3.9
Others	4	2.7
Total	152	100



**CHART 4: Issues Faced while Traveling in Electric Buses**

**Data Interpretation and Findings**

The major issue faced by respondents is limited availability on certain routes (40.1%), followed by overcrowding (28.9%). Limited route availability and operational delays account for 13.2% and 11.2% respectively. While ticketing/payment issues (3.9%) & others (2.7%) are minimal. This indicates that limited availability and overcrowding are major concerns. Hence, expanding routes and increasing the frequency are key to improving user experience.

**STATISTICAL ANALYSIS**

**ANOVA**

**Hypothesis 1:**

- H0: There is no significant association between occupation of respondents and their perception towards the interior features of the electric buses introduced by Tamilnadu government is modern and appealing
- H1: There is significant association between occupation of respondents and their perception towards the interior features of the electric buses introduced by Tamilnadu government is modern and appealing

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.355	5	2.671	3.332	0.007
Within Groups	117.040	146	0.802		

**Inference**

Since the P value (.007) are less than .005, we accept the alternate hypothesis and reject the null hypothesis. Hence, There is significant association between occupation of respondents and their perception towards the interior features of the electric buses introduced by Tamilnadu government.

**Hypothesis 2**

- H0: There is no significant association between occupation of respondents and their perception towards over all ambience of the electric buses introduced by Tamilnadu government.
- H1: There is no significant association between occupation of respondents and their perception towards over all ambience of the electric buses introduced by Tamilnadu government.

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12.167	5	2.433	2.544	0.031
Within Groups	139.669	146	0.957		
Total	151.836	151			

Since the P value (.031) are less than .005, we accept the alternate hypothesis and reject the null hypothesis. Hence, There is significant association between occupation of respondents and their perception towards the overall ambience of the electric buses introduced by Tamilnadu government.

**Correlation**

**Hypothesis 3:**

- H0: There is no significant relationship between respondent’s perception towards Comfort, Sustainability and Technology in Electronic Buses introduced by Tamilnadu Government.
- H1: There is significant relationship between respondent’s perception towards Comfort, Sustainability and Technology in Electronic Buses introduced by Tamilnadu Government.

		Correlations				
		Comfort	Sustainability	Technology	Government_perception	Satisfaction
Comfort	Pearson Correlation	1	.626***	.552***	.613***	.546***
	Sig. (2-tailed)		<.001	<.001	<.001	<.001
	N	152	152	152	152	152
Sustainability	Pearson Correlation	.626***	1	.686***	.663***	.584***
	Sig. (2-tailed)	<.001		<.001	<.001	<.001
	N	152	152	152	152	152
Technology	Pearson Correlation	.552***	.686***	1	.671***	.570***
	Sig. (2-tailed)	<.001	<.001		<.001	<.001
	N	152	152	152	152	152
Government_perception	Pearson Correlation	.613***	.663***	.671***	1	.677***
	Sig. (2-tailed)	<.001	<.001	<.001		<.001
	N	152	152	152	152	152
Satisfaction	Pearson Correlation	.546***	.584***	.570***	.677***	1
	Sig. (2-tailed)	<.001	<.001	<.001	<.001	
	N	152	152	152	152	152

\*\*\*. Correlation at 0.001(2-tailed)

**Data Analysis and findings**

The correlation analysis of respondents’ perception towards electric buses in Chennai shows that all variables—comfort, sustainability, technology, government perception, and satisfaction—are positively

and significantly related ( $p < 0.001$ ,  $N = 152$ ). Comfort has a strong correlation with sustainability ( $r = 0.626$ ), government perception ( $r = 0.613$ ), technology ( $r = 0.552$ ), and satisfaction ( $r = 0.546$ ), indicating that increased comfort is associated with better perceptions across all

other factors. Sustainability is highly correlated with technology ( $r = 0.686$ ), government perception ( $r = 0.663$ ), and satisfaction ( $r = 0.584$ ), suggesting that respondents who value environmental benefits also perceive technological advancement and government efforts positively. Technology shows strong relationships with government perception ( $r = 0.671$ ) and satisfaction ( $r = 0.570$ ), highlighting the importance of modern features in shaping user experience. Government perception has the strongest correlation with satisfaction ( $r = 0.677$ ), indicating that trust and confidence in government initiatives play a key role in overall satisfaction. Since all relationships are statistically significant at the 0.001 level, it can be concluded that improvements in comfort, sustainability, technology, and government perception collectively enhance respondents' satisfaction, reflecting a strong and favorable attitude towards electric buses in Chennai. This indicates that as the ride comfort, sustainability efforts, bus technology, and the perceptions of the government's initiative improve, the overall satisfaction of the passengers increases significantly.

## CONCLUSION

The study concludes that the electric bus initiative in Chennai has significant growth potential, particularly among young, environmentally conscious bus commuters. The passenger satisfaction is influenced by a combination of service-related and perpetual factors. Elements like interior design and overall ambience contribute to a positive brand image. Comfort and Perception towards the Tamil Nadu Government initiative play a pivotal role in shaping overall satisfaction. Technology and Sustainability factors contribute positively but their impact is relatively less prominent. Overall, improving service quality and increasing public confidence in government initiatives are essential for enhancing user experience and promoting the adoption of the electric buses. However, operational barriers like limited availability on certain routes resulting in overcrowding must be addressed.

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