A Study on the Economic Benefits of E-Vehicle Usage in Kollankoil Village of Erode District

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Abstract
Electric vehicles (EVs) are gaining attention as cleaner and more cost-effective alternatives to traditional petrol vehicles, especially in the face of rising fuel prices and environmental concerns. Developing and developed countries are focusing more on the adaptation of renewable sources such as EV and solar energy. Rural areas were the beginners in the adaptation of resources. The Kollankoil village of Erode district have been chosen for this study. This study aimed to determine the environmental benefits, satisfaction level,s and suggestions for improving the adaptation of EV. The primary data will be collected for this study and the snow ball sampling method will be used. The primary data was collected from 42 respondents in the Kollankoil village, Erode district. The collected data were analysed using basic statistical tools such as percentage, mean, and chi-square method. Result thus, the EV offers a notable environment benefit, many of the respondents were happy to use the E-Vehicles but many of them facing charging problem and other mechanical problems. The government should focus on subsidies, charging areas, and proper knowledge of using renewable energy.

Keywords: Electric Vehicles, Environmental Benefit, Economic Benefit and Affordable Mobility

Electric vehicles (EVCs) may be considered a new phenomenon; however, their history stretches for more than a hundred years. Practical electric cars were first made in the late nineteenth century, prior to the dominance of petrol-powered cars in the road. At that time, EVs were chosen because they were cleaner, quieter, and easier to drive than steam- or gasoline-powered cars (Berezan, Kruger, and D'Alessandro, 2013). Nevertheless, the discovery of large oil deposits and the emergence of mass production, spearheaded by such companies as Ford made the gasoline cars more affordable and convenient, placing EVs in the sidelines throughout several decades.

Going to the 21 st century, the world is undergoing grave problems due to climate change, pollution and the declining nature of fossil fuel reserves. Such problems have returned electric vehicles to the limelight - not as an alternative form of transportation, but as a more environmentally friendly and eco-friendly option in the future. EVs are being encouraged across the globe as a means of reducing carbon emissions, air pollution, and reliance on foreign oil. Norway, China, and the United States have been on the forefront to provide tax breaks, constructing the charging infrastructure, and motivating manufacturers and consumers to abandon gasoline-powered mobility in favor of electric mobility (International Energy Agency [IEA], 2023).

India is among the fastest-growing economies in the world and has also joined the initiative of encouraging the use of EV. The central government has initiated programs such as the FAST programs (Faster Adoption and Manufacturing Hybrid and Electric Vehicles), which provide subsidies and assistance to EV consumers and producers. Tamil Nadu especially has come to be one of the most EV friendly states in the country. The policy of the State Electric Vehicle Policy 2019 is a prospective measure promoting the production of EVs, building infrastructure, and creating jobs in the industry (Government of Tamil Nadu, 2019). The state is already emerging as an electric mobility hub since several international and national firms have already invested there.

Although most of the focus is usually on urban areas and industrial belts, rural areas are also undergoing the same shift in their fashion. Erode district especially in Kollankoil village, people are slowly moving towards electric vehicles, in this case, electric two-wheelers. Some of the most important factors that led to this change include rising petrol prices, reduced running costs of EVs, and rising environmental awareness. Electric vehicles also require less maintenance than traditional vehicles, and it is convenient and economical to charge them at home. To the rural families, such benefits are enormous, particularly where the transportation chores tend to consume daily income earned. This study aims to understand how the utilisation of electric vehicles is delivering economic outcomes to households in Kollankoil village. To date, no research studies have addressed the economic benefits, level of satisfaction, and awareness of the same in the Kollankoil village. The current research is going to be the one taking the key in unlocking the insights into how they use them, how they charge them, and how much money they save, and it will give a precious understanding of how the concept of electric mobility can contribute to the rural development and help to create a greener future, not only in cities, but also in the centre of the village of Tamil Nadu.

Review of Literature

However, recent research highlights the increased relevance of electric vehicles (EVs) in the context of combating severe air pollution in India, which is mostly due to transport and industrial industries (Saroja et al., 2023). Despite the efforts of the government to promote cleaner transport, the real uptake of EVs has been low because of the lack of consumer confidence and infrastructure shortages (Stephen, 2023; Kumar, 2022). According to studies, consumer perception is the limitation, as interest in environmentally friendlier alternatives is increasing, but issues such as affordability, charging availability, and performance remain barriers to such usage (Souvik et al., 2022; Kotigari et al., 2022). The market segmentation and the necessity of policy assistance, enhanced awareness, and technological advancements are also studied to increase the rate of acceptance (Duggal, 2022; Harish, 2021). Additional studies indicate that the growth of EVs is dependent on government incentives, battery innovation, and service quality, particularly in Tamil Nadu and Maharashtra (Savita et al., 2022; Imthiyaz et al., 2022). More comprehensive policy evaluations indicate the suitability of EVs to the sustainability policy of India and the possibility of integration into smart cities (Palaniswamy et al., 2022; Chaturvedi et al., 2022). Moreover, the perceived value, environmental concern, and infrastructure readiness are also emphasized as important and supported by structural models and behavioral research (Prateek et al., 2021; Ritu et al., 2021). Generally, the literature highlights the potential and realistic difficulty of EV adoption in India,

and it requires concerted action by stakeholders to make the transition successful. The research (Krishna, 2025) conducted in Coimbatore district offer practical lessons to policymakers, manufacturer, and stakeholders to steer consumer anxieties, increase the popularity of EVs, and promote their acceptance as the new transportation mode.

Objectives

1. To know the socio-economic conditions of the selected electric vehicle users in the study area.
2. To investigate the environmental benefit and satisfaction level of using the E-vehicle users in the selected study area.

Methodology

The Kodumudi Taluk of Erode district has been chosen for this study. Kodumudi Taluk, Kollankoil village was selected for this study. In Erode district, Kodumudi taluk was one of the major user of the E-vehicle consumption. The sample has collected from those who are using E-vehicle in the village. The snowball sampling method has been used for this study. In the selected area 42 samples have been collected. The primary data obtained from the interview schedule were well-structured questionnaires and were collected directly from the households. This study used primary data for the analysis. The data were analysed using the percentage, mean, and chi-square methods.

Data Analysis

Table 1 Social condition of the respondents

Particulars	Percentage
Gender	
Male	33 (78.6)
Female	9 (21.4)
Age	
21-30	8 (19.0)
31-40	12 (28.6)
41-50	12 (28.6)
Above 51	10 (23.8)
Occupation	
Government Job	10 (23.8)
Private Job	20 (47.6)
Daily wages	6 (14.3)
Coli	2 (4.8)
Farmer	3 (7.1)
Home Maker	1 (2.4)
Education	
Primary	4 (9.5)
Secondary	5 (11.9)
Higher Secondary	4 (9.5)
Graduate	18 (42.9)
Diploma	9 (21.4)
Illiterate	2 (4.8)
Marital Status	
Married	34 (81.0)
Unmarried	6 (14.3)
Widow	2 (4.8)
Family Type	
Nuclear	30 (71.4)
Joint Family	12 (28.6)

Source: Primary Data (2024)

The respondents' socioeconomic status suggests a varied but well-defined demographic profile, as discussed in Table 1. The sample group appears to be dominated by men, as the vast majority of respondents 78.6 Percent are men and only 21.4 Percent are women. According to the age distribution, the majority of participants are between the ages of 31 and 40 and 41 and 50 both at 28.6 Percent, closely followed by those over 51 23.8 Percent and the youngest group, those between the ages of 21 and 30 19.0 Percent. This indicates that the majority of responders are of working or late working age, which is a crucial demographic for decision-making and income generation. The occupation of the respondents shows that majority 47.6 percent of the respondents were going to private job, followed by 23.8 percent of the respondents were in the government job, 14.3 percent of the respondents were working as a daily wage, 7 percent of the respondents were farmers followed by 4.8 percent of the respondents were working as coli and 2.4 percent of the respondents were home makers. The education qualification of the respondents stated that 42.9 percent of the respondents were graduates, 21.4 percent of the respondents completed a diploma, 11.9 percent of the respondents completed secondary

education, followed by 9.5 percent of the respondents completed primary education and higher secondary education, and 4.8 percent of the respondents were illiterate. The marital status of the respondents shows that majority 81 percent of the respondents were married, 14.3 percent of the respondents were unmarried and 4.8 percent of the respondents were widow. The family type of the respondents shows majority 71.4 were living as nuclear family and 28.6 percent of the respondents were living as joint family. The socio-demographic condition shows the potential awareness, willingness and adopt electric vehicles.

Table 2 shows the income and cost of the electric vehicles of the respondents. The respondents 21-30 age group were earning an average of ₹52,625, and their average cost of the e-vehicles was ₹114125. The 31-40 age group earned ₹30000, and the cost of e-vehicles was ₹120083. The age group 41-50, of the respondents were earning ₹25416.67, and their cost of e-vehicles were ₹118083.33. This indicates that even those with lower incomes are becoming more conscious of the financial and environmental advantages of e-vehicles. In contrast, those aged 51 and beyond earn somewhat more ₹28,500 than those aged 41 to 50, but they spend the least on e-vehicles ₹1,00,100 on average. This points to a more frugal spending strategy, perhaps brought on by retirement or a decrease in the demand for mobility.

Table 2 Income and Cost of the E-Vehicles of the Respondents

Age of the respondents	Statistics	Income	Cost of the vehicle
21-30	Sum	421000	913000
	Mean	52625.00	114125.00
	N	8	8
31-40	Sum	360000	1441000
	Mean	30000.00	120083.33
	N	12	12
41-50	Sum	305000	1417000
	Mean	25416.67	118083.33
	N	12	12
51 and above	Sum	285000	1001000
	Mean	28500.00	100100.00
	N	10	10
Total	Sum	1371000	4772000
	Mean	32642.86	113619.05
	N	42	42

Source: Primary data (2024)

Table 3 E-Vehicles Preference of the Respondents

	Preference					
Marital Status	**Friends & family recommendation**	**Comfort & easy**	**Subsidies are available**	**Automotive design**	**Technologically superior**	**Total**
Married	9	25	0	0	0	34
	(26.5)	(73.5)	(0.0)	(0.0)	(0.0)	(100.0)
Unmarried	0	0	0	4	2	6
	(0.0)	(0.0)	(0.0)	(66.7)	(33.3)	(100.0)
Widowed	0	0	2	0	0	2
	(0.0)	(0.0)	(100.0)	(0.0)	(0.0)	(100.0)
Total	9	25	2	4	2	42
	(21.4)	(59.5)	(4.8)	(9.5)	(4.8)	(100.0)

Source: Primary Data (2024)

The table 3 shows that among married respondents, 73.5% prefer E-vehicles for comfort and ease, while 26.5% are influenced by friends and family recommendations. None of these studies considered subsidies, automotive design, or technological superiority. For unmarried respondents, 66.7% prefer E-vehicles for their automotive design, and 33.3% due to technological superiority. Among the widowed respondents, 100% prefer E-vehicles because subsidies are available. Considering all respondents, 59.5% prefer E-vehicles for comfort and ease, 21.4% due to friends and family recommendation, 9.5% for

automotive design, and 4.8% each for subsidies and technological superiority. This indicates that comfort and ease are the most dominant preference factors.

Table 4 Environmental Benefit in using the E-vehicles

Environmental Benefit				
Age	**Concerned about Environment**	**Concerned about Social Health**	**To Reduce the Pollution**	**Total**
21 to 30	0	0	8	8
	(0.0)	(0.0)	(100.0)	(100.0)
31 to 40	0	0	12	12
	(0.0)	(0.0)	(100.0)	(100.0)
41 to 50	12	0	0	12
	(100.0)	(0.0)	(0.0)	(100.0)
51 and above	0	10	0	10
	(0.0)	(100.0)	(0.0)	(100.0)
Total	12	10	20	42
	(28.6)	(23.8)	(47.6)	(100.0)

Source: Primary Data (2024)

Table 4 shows the environmental concerns of respondents regarding E-vehicles based on their age. 100 percent All respondents aged 21 to 30 and 31 to 40 used E-vehicles to reduce pollution. Among those aged 41 to 50, 100 percent are concerned about the environment, while among respondents aged 51 and above, 100 percent are concerned about social health. Overall, 47.6 percent of respondents used E-vehicles to reduce pollution, 28.6 percent were concerned about the environment, and 23.8 perent were concerned about social health. This indicates that the majority of respondent's view E-vehicles primarily as a means to reduce pollution.

Table 5 Place of charging the E-Vehicles

Charging Place				
Occupation	**Home**	**Charging station**	**Agriculture charging**	**Total**
Government Job	10	0	0	10
	(100.0)	(0.0)	(0.0)	(100.0)
Private Job	20	0	0	20
	(100.0)	(0.0)	(0.0)	(100.0)
Daily Wages	0	0	6	6
	(0.0)	(0.0)	(100.0)	(100.0)
Coolie	0	2	0	2
	(0.0)	(100.0)	(0.0)	(100.0)
Farmer	0	0	3	3
	(0.0)	(0.0)	(100.0)	(100.0)
Homemaker	1	0	0	1
	(100.0)	(0.0)	(0.0)	(100.0)
Total	31	2	9	42
	(73.8)	(4.8)	(21.4)	(100.0)

Source: Primary Data (2024)

Table 5 reveals the places of charging e-vehicles. All the government employees were charging their e-vehicles in their house. The private employees were charging their e-vehicles in the home. This shows the problem of charging stations in that areas. Daily wage labourers used the agricultural charging areas. The respondents working as coolie were using the charging stations as a charging place. The farmers were using agricultural charging area as e-vehicles charging places. Home makers used their houses as charging places. This table represents the charging stations according to their occupation and the charging station used.

Table 6 Government Subsidies for the E-Vehicles

Charging Place				
Occupation	**Home**	**Charging station**	**Agriculture charging**	**Total**
Government Job	10	0	0	10
	(100.0)	(0.0)	(0.0)	(100.0)
Private Job	20	0	0	20
	(100.0)	(0.0)	(0.0)	(100.0)
Daily Wages	0	0	6	6
	(0.0)	(0.0)	(100.0)	(100.0)
Coolie	0	2	0	2
	(0.0)	(100.0)	(0.0)	(100.0)
Farmer	0	0	3	3
	(0.0)	(0.0)	(100.0)	(100.0)
Homemaker	1	0	0	1
	(100.0)	(0.0)	(0.0)	(100.0)
Total	31	2	9	42
	(73.8)	(4.8)	(21.4)	(100.0)

Source: Primary Data (2024)

The table 6 shows the subsidies for the E-vehicles received by the respondents on the basis of their education qualification. The respondents who were illiterates, 50 percent of the respondents have got the subsidies and 50 percent of the respondents were no getting the subsidies. The primary education respondents' majority, 50 percent of the respondents, were getting the subsidies and 50 percent of the respondents were not getting the subsidies. Among the secondary education-qualified respondents, 80 percent of the respondents were not receiving the subsidies and 20 percent of the respondents were receiving the subsidies. The higher education qualified respondents,' majority 75 percent of the respondents have not received any subsidies and 25 percent of the respondents were receiving the subsidies. The diploma completed respondents, majority 55.6 percent of the respondents were not receiving the subsidies and 44.4 percent if the respondents were receiving the subsidies. Among the graduate-qualified respondents, the majority (72.2 percent) were not receiving any kind of subsidy, while 27.8 percent were receiving subsidies. The table shows that the majority (66.7 percent) of the respondents were not receiving any kind of subsidies and 33.3 percent of the respondents were receiving the subsidies.

Table 7 Satisfaction level of the respondents in using the E-Vehicles

Charging Place				
Occupation	**Home**	**Charging station**	**Agriculture charging**	**Total**
Government Job	10	0	0	10
	(100.0)	(0.0)	(0.0)	(100.0)
Private Job	20	0	0	20

Private Job	(100.0)	(0.0)	(0.0)	(100.0)
Daily Wages	0	0	6	6
	(0.0)	(0.0)	(100.0)	(100.0)
Coolie	0	2	0	2
	(0.0)	(100.0)	(0.0)	(100.0)
Farmer	0	0	3	3
	(0.0)	(0.0)	(100.0)	(100.0)
Homemaker	1	0	0	1
	(100.0)	(0.0)	(0.0)	(100.0)
Total	31	2	9	42
	(73.8)	(4.8)	(21.4)	(100.0)

Source: Primary Data (2024)

Table 7 shows the level of satisfaction among the users of electric vehicles on the different dimensions of EV use. According to results, the respondents are the most satisfied regarding driving experience, mileage and speed, battery performance, the design and comfort of the vehicles. As an example, the driving experience is rated as satisfied by 57.1 percent of the users and highly satisfied by 14.3 percent. Likewise mileage and speed satisfaction is at 57.1 percent and 7.1 percent respectively. The battery performance also was observed to be favorable with 52.4 percent being satisfied and 14.3 percent being highly satisfied. EVs have an outstanding design and comfort, with 52.4 percent being satisfied and 47.6 percent being highly satisfied, indicating the vehicle is widely accepted in its building and looks. But there are some regions where the unhappiness is significant. Another issue is charging infrastructure with 28.6 being extremely dissatisfied and 40.5 slightly dissatisfied with the availability of charging stations. Similarly, 26.2 percent of the respondents expressed their dissatisfaction with the location of the service stations as highly unsatisfactory hence lack of proper infrastructure support. The provision of battery replacement and battery life receive poor feedback with the percentage of moderate and dissatisfied users being higher. As an illustration, 35.7 percent and 38.1 percent are not satisfied and moderately satisfied with battery replacement options respectively. Equally, half of them are not that satisfied with battery life, which indicates the necessity of improvement in durability and backup capacity. Storage capacity and convenience of charging are rated at moderate levels of satisfaction, but the satisfaction with government subsidies is rather low. This means that few people have high satisfaction with government support, with only 2.4 percent being highly satisfied and 11.9 percent being highly dissatisfied with the support. In general, the people who use EVs in the area are satisfied with the car in terms of its performance, comfort and efficiency, whereas external support mechanisms, such as charging stations, service shops and governmental incentives are reportedly dissatisfying. Improving these aspects may make the experience of using EV much better.

Table 8 Satisfaction of using EV

Charging Place				
Gender	**Low**	**Moderate**	**High**	**Total**
Male	8	18	7	33
	(24.2)	(54.5)	(21.2)	(100.0)
Female	1	6	2	9
	(11.1)	(66.7)	(22.2)	(100.0)
Total	9	24	9	42
		(57.1)	(21.4)	(100.0)

Source: Primary Data (2024):( ) – Row-wise percentage

The table presents the level of satisfaction with the use of electric vehicle EVs by gender in terms of 2024 results among 42 respondents. The moderate satisfaction among the users is the highest, with 54.5 percent of males and 66.7 percent of females falling in this category. Satisfaction is high almost equally in both males 21.2 percent and females 22.2 percent and low in males 24.2percent than in females 11.1percent. Overall, the percentages of moderate satisfaction prevailed in both sexes, and the percentages of high satisfaction among male and female users were relatively similar, which indicates that both male and female users have rather similar positive experiences with EVs.

Hypothesis I

H0: There is no significant association between socio-demographic condition and the environmental benefits and the satisfaction of the E-vehicles.

Table 9 Chi-Square

Test Variables		Chi-square Test		
Variable 1	**Variable 2**	**χ2**	**df**	**P-Value**
Age	Environmental Benefit	84.000	6	.000**
Occupation	Charging Place	89.000	8	.000**
Marital Status	Preference	86.000	10	.000**
Gender	Satisfaction	0.754	2	0.686
Education	Subsidy	2.025	5	0.846

Source: Computed data

** Significant at 1% level * Significant at 5% level

Table 9 The Chi-square test was employed to examine the relationship between particular demographic variables and factors influencing electric car usage. The results revealed that certain demographic characteristics were significantly associated with the variables under investigation. A significant correlation existed between Age and Environmental Benefit ($\chi^2 = 84.000$, df = 6, p = 0.000), Occupation and Charging Place ($\chi^2 = 89.000$, df = 8, p = 0.000), and Marital Status and Preference ($\chi^2 = 86.000$, df = 10, p = 0.000). The statistics indicate that respondents' age, employment status, and marital status significantly influence their perception of environmental benefits, preference for electric vehicles, and choice of charging locations. The associations between Gender and Satisfaction ($\chi^2 = 0.754$, df = 2, p = 0.686) and Education and Subsidy ($\chi^2 = 2.025$, df = 5, p = 0.846) lack statistical significance. This suggests that satisfaction levels regarding electric car performance and views on government subsidies are unaffected by gender or educational background. This result indicates that demographic factors such as age, occupation, and marital status greatly affect consumers' perceptions and behaviors regarding E-Vehicles, but gender and education do not exert any influence in this context. The null hypothesis is rejected in age, occupation and marital status, the alternative hypothesis was accepted. The null hypothesis was accepted for gender and educational qualifications.

Table 10 Suggestions to improve the E-Vehicles Usage

Suggestion	Frequency	Percent
No suggestion	20	47.6
To improved battery life	3	7.1
Government subsidy can be increased	7	16.7
Improve charging station	12	28.6
Total	42	100.0

Source: Primary data (2024)

Table 10 shows the suggestions given by the respondents to improve the usage of EVs. 47.6 percent of the respondents were stated that there is no suggestion to improve, majority of the respondents felt the they don't know the suggestions to improve, followed by 28.6 percent of the respondents felt to improve the charging station, because it is the rural area so they were moving to urban area to get charging. In total, 16.7 percent of the respondents needed government subsidies. The respondents felt that the government should provide more subsidies so that the purchasing power will increase. This was followed by 7.1 percent of the respondents who felt that the EV battery life was low, and suggested improving the battery life. Improving the battery life, will give more efficiency. This table conclude that notable portion of the respondents were satisfied, followed by the respondents needs financial support and better infrastructure.

Conclusion

The study analysed E-Vehicles. Electric motorbikes, also known as electric motorcycles or e-bikes, represent a revolutionary advancement in transportation technology. Unlike traditional gasoline-powered motorcycles, electric motorbikes are propelled by electric motors powered by rechargeable batteries. E-vehicles offer superior environmental benefits, emitting zero emissions and reducing greenhouse gas emissions. They have lower operating costs due to cheaper electricity and reduced maintenance needs. EVs provide rapid acceleration and a smooth driving experience. The study concludes that the E- Vehicle users benefited more economically because there is no fuel cost; however, the government needs to create more awareness among people, and there is a need for proper allocation of subsidy to E-Vehicle users. In this study, the government can provide a proper allocation of subsidies to E-vehicles because most of the respondents were not receiving the subsidies. Most of the respondents in the study area suggested improving charging stations. Further research needs to be conducted on the flaws and flows of electric vehicles from an economic perspective, with a focus on behavioural aspects.

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