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ECONOMIC BENEFITS AND EASE OF USE IN E-BIKE ADOPTION: EVIDENCE FROM TIRUPATTUR DISTRICT

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ABSTRACT

The transportation plays as wheel of economy which evolved from fuel based to sustainable transportation. The electric bicycle (E-Bike) is an eco-friendly and cost-effective transportation and become as alternative transportation solution in urban areas. The adoption of e-bike depends on various factors like economic benefits, ease of use, environmental awareness, Government policy, Incentives, Infrastructure availability, and Technology features. However, the most crucial influencing factors towards adoption of e-bike are economic benefits and ease of use. Hence, the study investigates the influence of economic benefits and ease of use in E-Bike Adoption. The study adopts a descriptive research design to investigate the role of economic benefits and ease of use in the adoption of e-bike. Primary data were collected from the 120 respondents in Tirupattur District, Tamil Nadu under convenience sampling method. The study found that e-bikes saves money and serves as cheapest mode of transport for daily commuters. However, there is a discomfort in riding e-bike for long distance. The test results of Independent Sample t-Test and Analysis of Variance depicts that gender and age have no significant impact on the ease of use of e-bike whereas, it has significant impact on the economic benefit of e-bike. Further, there is high positive relationship among ease of use, economic benefits and adoption of e-bike. The regression analysis of study identified that Economic benefit is a crucial factor in adoption of e-bike than ease of use. Hence, the stakeholders of e-bike market should focus significantly to improve the economic benefit aspect of e-bike to enhance the adoption of electric vehicle in India.

KEYWORDS: E-Bike, Economic Benefits, Ease of Use, Government Policy, Adoption.

INTRODUCTION

The transportation plays as wheel of economy which evolved from fuel based to sustainable transportation. The electric bicycle (E-Bike) is an eco-friendly and cost-effective transportation and become as alternative transportation solution in urban areas. The adoption of e-bike depends on various factors like economic benefits, ease of use, environmental

awareness, Government policy, Incentives, Infrastructure availability, and Technology features. The adoption of e-bikes is increasing in the Morden world due to environmental concerns, attraction on technology, government incentives, convenience, economic benefits and ease of use. It was observed and proved in the studies of Andersson, D., & Ahlbom, J. 2019^[1], Sankari, J., Senthilnathan, D. et al., 2022^[18], Thamocharan, M. K., Kenny Raj, I. L., et al., 2023^[21]. The electric bike offers various benefits to consumers like government incentives, reduced fuel dependency, lower operating costs, reduced maintenance, long battery life, and advanced technology. However, it has hindrance like lack of adequate charging infrastrure, battery life, high cost of battery, discomfortness in long drive, designs so on. Hence, the study is conducted to examine the level of economic benefits, ease of use and level of adoption of e-bike.

OBJECTIVES OF THE STUDY

1. To investigate the impact of selected demographic variable on the economic benefits and ease of use of E-bike.
2. To measure the impact of price of vehicle on the level of economic benefits of e-bike.
3. To examine the relationship between Economic benefits, Ease of use and adoption of e-bike, and to identify the significant influencing factor on adoption of e-bike.

REVIEW OF LITERATURE

The adoption of e-bike is influenced by various factors and demographic attributes of buyers. The incentives and subsidies offered by the government influenced to adopt the e-vehicle (Popescu, G. H., Andrei, J. V., 2024; Béresné, B. M., & Maklári, E. 2023; and Andersson, D., & Ahlbom, J. 2019). The eco-friendliness of e-vehicle influences the adoption than the fuel price (Sankar, J. G., & Kumar, H. G. 2020) and quality of the vehicle (Pathavi, D., Rizky Adam, M. R. et al., 2021). However, Thamocharan, M. K., Kenny Raj, I. L., et al., (2023) observes that ease of drive, mileage, environmental benefits, and eco-friendly products are the main influential factors for buying the e-bike. The growth of electric and hybrid cars depends on income of the customer, government incentives (Popescu, G. H., Andrei, J. V., 2024 and Selvi, P., & Gideon, J. S. 2023).

Brand image, peer influence and environment benefits have impact on the adoption of e-car (Globisch, J., Düttschke, E., et al., 2018) whereas, the study of Pelsmacker, et al., (2017) reveals that personal value, green self-identity and ecological care have significant impact on e-car adoption. Convenience and brand name are the crucial factors of e-bike adoption while compared to the quality and economy (Kaushal, S. K., & Anand, S. 2011).

The previous studies exposes that the adoption of e-vehicle is significantly influenced by cost efficiency and low Maintenance (Mayank Bhatia et al 2024), price, driving range, and charging range (Aksen, J., & Kurani, K. S. 2019), and smoothness, style, and design (Sakthivel, N., & Senthilkumar, S. 2016). Further, influenced by the environmental concern and fuel price whereas, the least influencing factors are Government policy, battery performance, and charging speed are the least influential factors, (Subaash, S., & Srinivasa Kumar, V. 2024).

The adoption of electric vehicle is influenced by gender, age and income; the level of adoption of higher among middle aged and older customers than the youngsters (Trinh, T. T., & Pham, T. T. H. 2019). However, the age, education, occupation, income, family type and marital status do not have impact on the adoption of e-vehicle (Sakthivel, N., & Senthilkumar, S. 2016). Further, the study of Verma, J. P., & Sakharkar, R. R. (2024) observed that the adoption depends on income, gender, comfort and features.

The e-vehicle consumers have positive perception over the style and design of the vehicle (Andersson, D., & Ahlbom, J. 2019). The customers of e-bike have satisfied with the weight of vehicle, charge stations, battery life and cheaper price (Sankari, J., Senthilnathan, D. et al., 2022). However, battery life, speed and mileage issues affects the consumers

(Sakthivel, N., & Senthilkumar, S. 2016). The adoption of e-vehicle could be enhanced by better service quality and marketing strategies (Themba, O. S., Razak, N., et al., 2019). The e-vehicle consumers expect the improvisation in the logo, website, and slogan to attract the customers (Phan, M. D., Ngoc, D. H. et.al, 2022).

RESEARCH METHODOLOGY

The study adopts a descriptive research design to investigate the role of economic benefits and ease of use in the adoption of e-bike and to describe the phenomenon of e-bike adoption, economic benefits and ease of use. The study is primarily based on the primary data collected from 120 respondents in Tirupattur District of Tamil Nadu, India during the month of February 2026 under the convenience sampling method. The structured questionnaire with demographic variables, Ease of use, Economic benefits and adoption of e-bike framed under Likert scale. The reliability and validity of the questionnaire is tested and proved (Cronbach's $\alpha = 0.772$). The primary data were analysed by Simple Percentage analysis, Independent Sample t-Test and Analysis of Variance, Correlation and Multiple Regression Analysis in SPSS. Further, the study considers the secondary data from reputed books and journals.

RESULTS AND DISCUSSION

Demographical Attributes, Economic Benefits, Ease of Use and Adoption of e-bike

Table 1
Demographic Details of the Respondents (N=120)

Demographic Factors	Variables	Frequency	Percentage
Age	Above 18 Age	4	3.30%
	18 to 38 Age	87	72.50%
	38 – 58 Age	24	20.00%
	Above 58 Age	5	4.20%
Gender	Male	102	85.00%
	Female	18	15.00%
Educational Level	SSLC	13	12.50%
	HSC	9	7.50%
	UG	39	31.70%
	PG	19	15.80%
	Professional	34	11.60%
	Diploma	6	5.00%
Occupation	Self Employed	25	20.80%
	Business man	27	22.50%
	Private Employee	38	31.70%
	Government Employee	9	7.50%

	Former	3	2.50%
	Student	15	12.50%
	Teacher	3	2.50%
Income Per Month	Below Rs. 10,000	18	15.00%
	Rs. 10,001 – Rs.20,000	26	21.70%
	Rs.20,001 – Rs.30,000	39	32.50%
	Rs.30,001 to Rs. 40,000	5	4.20%
	Above Rs. 40,000	32	26.70%
Marital Status	Married	77	64.20%
	Unmarried	43	35.80%
Family Size	Upto 3 Members	31	25.80%
	4 to 6 Members	79	65.80%
	Above 6 members	10	8.30%

Table 1.1**Descriptive Analysis of Economic Benefits and Ease of Use in E-Bikes**

Variables	Mean	Std. Deviation	Rank
E-Bike Saves Money	4.00	1.123	1
E-Bike suitable for daily ride	3.93	1.342	2
Cost of E-Bike is Cheaper	3.88	1.245	3
Fuel Price induced the shift Shifted to E-Bike	3.86	1.355	4
E-Bikes enable a Cleaner City	3.85	1.186	5
E-bike improves the environment by reducing pollution	3.81	1.225	6
E-bikes are the future of mobility	3.76	.961	7
E-Bike suits to drive in congested urban roads	3.72	1.161	8
Maintenance cost of e-bike is minimal	3.68	1.250	9
Speed and range is good in E-Bike	3.63	1.244	10
E-bike suits in hill ride	3.50	1.277	11
Use E-Bike for Vacation trip	3.10	1.253	12
E-Bike minimises Traffic Issues	3.08	1.131	13
Use E-Bike for Long distance with Comfort	3.00	1.384	14
Shifted to E-Bike due to Subsidies of Government	2.90	1.344	15

The present study found that majority of the respondents are youngster as they are early adopters of new technology, and new changes in their life. Majority of them are male (86.7%), undergraduates (31.70%), salaried (39.20%) and middle income people (32.50%).

They perceived that e-bike saves money (M=4.00), cheapest mode (M=3.88) and uses in their daily life (M=3.93). Further, they shifted to e-bike due to fuel price hike (M=3.86). However, the customers of e-bike perceived that lack of comfort in long drive (M=3.00) and their shift to e-vehicle from traditional is not due to Subsidy provided by the Government (M=2.90). The majority of the findings were correlated with the findings of previous studies of Popescu, et al., (2024), Thamotharan, et al. (2023), Popescu, et al., (2024), Graham Rowe, et al., (2012)., and Klöckner, C. A., et al., (2013).

Selected Demographic Attributes and Ease of Use

Table: 2

Results of Independent Sample t-test - Gender and Ease of Use of E-Bikes

Factor	Male		Female		t	sig. (2-tailed)	Remark
	Mean	SD	Mean	SD			
Ease of Use	1.99	.554	1.75	.775	1.521	.130	Not significant

Table: 2.1

Descriptive & Result Analysis of ANOVA – Age and Ease of Use of E-Bikes.

Factor	Above 18 Age		18 to 38 Age		38 – 58 Age		Above 58 Age		F	Sig .	Remark
	M	SD	M	SD	M	SD	M	SD			
Ease of Use	2.00	1.155	1.95	.569	2.21	.415	2.00	0.000	1.316	.273	Not significant

The test results of Independent Sample t-Test and Analysis of Variance reveals that male (M=1.99) have higher level of ease of use than female (M=1.75). Further, middle age customers (M=2.00) have higher level of ease of use than others. However, gender and age do not have significant impact on the ease of use of e-bike ($p \geq 0.05$). These results supports the results of Ling, Z., Cherry, C. R., & Wen, Y. (2021), Verma, J. P., & Sakharkar, R. R. (2024). Hence, the level of ease of use of e-bike does not vary based on the age and gender of the respondents.

Selected Demographic Attributes and Economic Benefits

Table: 3

Descriptive & Result Analysis of ANOVA – Age and Economic Benefits of E-bike

Factor	Above 18 Age		18 to 38 Age		38 – 58 Age		Above 58 Age		F	Sig.	Remarks
	M	SD	M	SD	M	SD	M	SD			
Economic Benefits	1.50	.577	1.83	.533	2.50	.511	2.00	0.000	11.543	.000	Significant

Table: 3.1

Results of Independent Sample t-test – Gender and Economic Benefits of E-bikes

Factor	Male		Female		t	sig. (2-tailed)	Remark
	Mean	SD	Mean	SD			
Economic benefits	1.99	.554	1.75	.775	1.521	.005	Significant

Table: 3.2
Results of Independent Sample t-test – Marital status and Economic Benefits of E-bikes

Factor	Married		Unmarried		t	sig. (2-tailed)	Remark
	Mean	SD	Mean	SD			
Economic benefits	2.08	.452	1.88	.697	1.848	.067	Not significant

Table: 3.3
Descriptive Analysis & Results of ANOVA - Income and Economic Benefits of E-bikes

Factor	Below Rs. 10,000		Rs. 10,001 – Rs. 20,000		Rs. 20,001 – Rs. 30,000		Rs. 30,001 – Rs. 40,000		Above Rs. 40,000		F	Sig.	Remark
	M	SD	M	SD	M	SD	M	SD	M	SD			
Economic benefits	1.67	.485	1.81	.567	2.23	.667	2.60	.548	2.00	0.000	6.510	.000	Significant

The study found that Male (M=1.99), middle aged e-bike riders (M=2.50), married (M=2.08) and high income people (M=2.60) perceives that e-bike offers economic benefits than others. Further, the test results proved that the level of economic benefits of e-bike significantly vary among the various group of gender, age and income ($p \leq 0.05$). It is similar to the result of Ling, Z., Cherry, C. R., & Wen, Y. (2021). However, marital status ($p=0.130$) do not have significant impact on the customers perception towards economic benefits of e-bike as $p \geq 0.05$. It contradicts the result of Verma, J. P., & Sakharkar, R. R. (2024).

Price of E-bike and Economic benefits of E-bike

Table: 3.4
Descriptive & Result Analysis of ANOVA – Price of E-bike and Economic benefits of E-bike.

Factor	Below Rs. 50,000		Rs. 50,001 – Rs. 1,00,000		Above Rs. 1,00,000		F	Sig.	Remark
	M	SD	M	SD	M	SD			
Economic benefits	2.00	0.000	1.95	.379	2.05	.700	.362	.697	Not Significant

The price of e-bike does not have statistically significant impact on the level of perception of e-bike customers towards the aspect of economic benefits ($p=0.697$). However, the perception about economic benefit of e-bike is higher among the high end e-bike riders (M= 2.05) since, the low price e-bike has fewer features than high end models.

Regression analysis with adoption of E-bike

The multiple regression analysis is conducted to identify the most important factors that determines the adoption of E-bike. There is high positive correlation between Adoption of e-bike (dependent variable) and Economic benefits and Ease of Use (Independent Variable)

($p \leq 0.01$). The Tolerance test and Variable Inflation Index are in acceptable range ($ToI > 0.10$ and $VIF < 10$) as shown in Table.1. Hence, the multiple regression analysis is conducted.

Table: 1

Correlation Analysis and Tolerance Test - Determinants of Adoption of E-bike

Dimensions	Mean	SD	Correlations	Tolerance	VIF
Adoption of E-bike	1.98	.601	1.000		
Ease to Use	2.01	.558	0.503**	.678	1.475
Economic Benefits	1.96	.585	0.523**	.678	1.475

Table: 2

Regression Analysis- Determinants of Adoption of E-bike

	SS	df	MS	F	Sig.
Regression	14.415	2	7.207	29.578	.000^b
Residual	28.510	117	.244		
Total	42.925	119			

	Coefficients	Std. Error	T	P-value
(Constant)	.614	.184	3.344	.001
Ease to Use	.327	.099	3.319	.001
Economic Benefits	.359	.094	3.830	.000
Multiple R	.579^a			
R Square	.336			
Adjusted R Square	.324			
Std. Error of the Estimate	.494			
Durbin-Watson	2.130			

The ease to use and economic benefits are statically significant predictor of adoption of E-bike since there is a statically significant impact of independent variables on the dependent variable ($F=29.578$; $p < 0.01$). Further, the independent variables have high degree of positive correlation with dependent variable as R value of .579^a. Hence, they are interdependent and correlated.

The adoption of E-bike could be explained and varied by the changes in the level of ease to use, Economic Benefits ($R^2 = .336$). It means, 34% of the variance in the level of adoption of E-bike could be achieved by the changes in the ease to use of E-bike, Economic Benefits of E-bike.

The economic benefit from e-bike plays as predominant factor in determining the level of adoption ($Beta = 0.359$, $p < 0.01$). It means 36% improvement in the adoption of e-bike could be achieved by hundred percent positive changes in economic benefits of E-bike. Hence, adoption of e-bike could be achieved by improving the economic benefits and ease of use aspects of bike.

FINDINGS OF THE STUDY

The crucial findings of the study are as follows:

- The majority of the respondents are male, youngsters, graduates, and employees having e-bike with the price tag of above rupee one lakh.
- The customers perceives that e-bike saves and serves as cheapest mode of ride on a daily basis. They shifted to e-bike mainly due to fuel price hike than the subsidies of Government. However, e-bike does not offers comforts in long drive.
- Male and middle age customers have higher positive perception on the ease of use of e-bike. However, the level of adoption of e-bike is not significantly vary on the basis of gender and age ($p \geq 0.05$).

- The perception of economic benefits of e-bike is vary based on the gender, age and income ($p \leq 0.05$) and does not vary by the marital status ($p = 0.130$). Further, Male ($M = 1.99$), middle aged ($M = 2.50$), married ($M = 2.08$) and high income people ($M = 2.60$) perceives that e-bike offers economic benefits than others.
- The level of economic benefits does not vary based on the value of e-bike ($p = 0.697$). The customers with high end e-bike have higher positive perception on the economic benefits.
- The economic benefits, ease of use and adoption of e-bike have significant positive correlation. The multiple regression analysis proves that the adoption of e-bike could be enhanced by the improvement in economic benefits and ease of use ($R^2 = .336$). Further, economic benefit is the main predictor of level of adoption of e-bike (Beta = 0.359, $p < 0.01$).

RECOMMENDATIONS AND IMPLICATIONS OF THE STUDY

The following suggestions are presented from the analysis and findings of the study to enhance the adoption of e-bike in congested Indian roads. It is recommended that the Government should provide and increase the amount of subsidy to electric vehicle. The various stakeholders and Non-Government organisation could create awareness about e-vehicle to minimise the pollution and to save the environment.

The e-bike companies should design their marketing strategy to attract the female, youngsters, lower income customers to increase the sale of e-bike. Further, the advanced features could be offered in low price e-bike in order to increase the sale adoption of e-bikes. The design and battery range could be enhanced for long drive as most of the customers have anxiety and discomfort to ride e-bike for long distance and hill areas.

The charging infrastrurcer could be increased across the national roads of India to enable the e-bike rides to charge without much hindrance. The life of battery and its maintenance could be improved to attract the new customers and similarly the battery refilling cost could be minimised. The present study is conducted in depth to measure the economic benefits and ease of use of e-bike and its impact on the adoption of e-bike. The results of the study could provide in depth insights to various stakeholders to identify the potential opportunity to enhance the adoption of e-bike and to protect the environment from pollution.

LIMITATIONS AND SCOPE OF FURTHER RESEARCH

The present study analysed the responses of 120 e-bike customers to measure the impact of economic benefits and ease of use of e-bike. The study does not have due representation from various group of e-bike riders in terms of various socio, economic and demographic aspects. It does not cover the customers in metropolitan cities and hills. Further, the study analysed the impact of only two factors namely economic benefits and ease of use on the adoption of e-bike.

Hence, the further studies could be conducted with large sample size with due representation from various demographic aspects. A detailed study could be conducted across the state or national level. Further, the detailed study on the adoption of e-bike with various factors such as awareness, attitude, and satisfaction. It could be suggested to conduct the detailed comparative study among the various types of electric vehicles. The problems and challenges in the adoption and riding of electric vehicle could be conducted to enhance the adoption e-vehicle and to create eco-friendly globe.

CONCLUSION

The Study on economic benefit and ease of use on the adoption of e-bike revealed that e-bikes saves money and serves as cheapest mode of transport for daily commuters. However, there is a discomfort in riding e-bike for long distance. The test results of Independent Sample t-Test and Analysis of Variance depicts that gender and age have no significant impact on the ease of use of e- bike whereas, it has significant impact on the economic benefit of e-bike.

Further, there is high positive relationship among ease of use, economic benefits and adoption of e-bike. The regression analysis of study identified that Economic benefit is a crucial factor in adoption of e-bike than ease of use. Hence, the stakeholders of e-bike market should focus significantly to improve the economic benefit aspect of e-bike to enhance the adoption of electric vehicle in India. Through intensive awareness campaign on electric vehicle, Government subsidy, long lasting battery, intensive charging infrastructure and improvised design for long ride could enable e-bike in the life every Indian and thereby, achieving pollutant free safer environment.

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