Lex localis-Journal of Local Self-Government
ISSN:1581-5374 E-ISSN:1855-363X
Vol. 23, No. S5(2025)

ADOPTION OF ELECTRIC AUTOS IN BANGALORE: QUALITATIVE ANALYSIS USING GROUNDED THEORY APPROACH

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Abstract:
The shift toward electric mobility is becoming an essential component of sustainable urban transport in India, yet the pace of adoption of electric autorickshaws (e-autos) varies considerably across cities. This study examines the key behavioural factors shaping the uptake of e-autos in Bangalore, a leading hub of mobility innovation. The analysis is guided by the Grounded theory, while also incorporating locally relevant aspects like charging infrastructure, financial barriers, and regulatory incentives. Data were gathered through surveys and interviews with drivers of autorickshaws (both e-autos and ICE autos), complemented by secondary evidence. Microsoft 365 supported conversion of audio file to transcripts, while qualitative insights were developed through thematic coding in Taguette. The study extends the application of grounded theory approach within the Indian e-mobility context and offers practical recommendations for stakeholders. Strengthening infrastructure, providing targeted financial support, and enhancing awareness campaigns emerge as critical measures for accelerating e-auto adoption and advancing Bangalore's sustainable transport agenda.
Keywords: electric-autorickshaws, grounded theory, adoption behaviour, Qualitative analysis, Taguette
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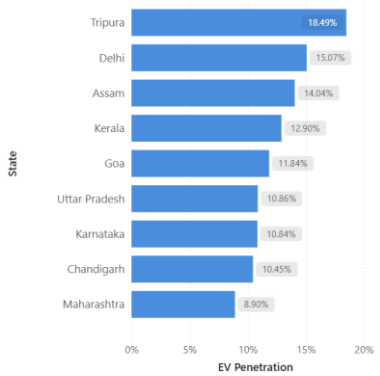
1. Introduction

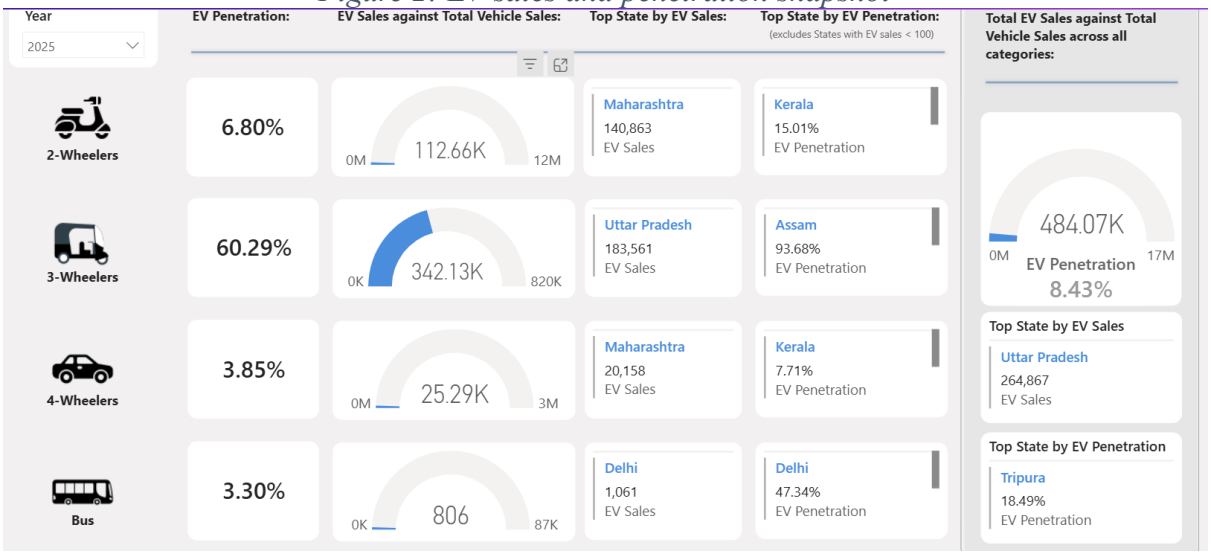
The growing concerns over fossil fuel dependency and environmental deterioration have accelerated the need for a transition toward sustainable modes of transportation (Sushil Kumar Dixit, 2022). People at large are concerned about the environment and are willing to adopt the electric vehicle as an alternative to the traditional ICE (Internal combustion engine) vehicles. (Umasankar Murugesan, 2023). Globally, EV sales contributed approximately 2.6% of the overall automobile market in 2019, indicating the nascent stages of a broader transformation in the automotive sector (Dmitry V. Pelegov, 2023). On the contrary in India especially urban hubs such as Bangalore—has witnessed relatively modest progress in EV adoption. This phenomenon is sparsely understood and requires further probing about the social, economic and behavioural factors contributing to thedoption behaviour (Imran Ali, 2022).

Figure 1: State wise EV penetration in India



Source: https://cleanmobilityshift.com/ev-dashboard/

Figure 2: EV sales and penetration snapshot



Source: https://cleanmobilityshift.com/ev-dashboard/

It is observed that, till August 2025, the overall contribution of EV towards total sales of automobiles is approximately 8.43%. Top state for EV sales is Uttar Pradesh and Top state for EV penetration is Tripura (shift, 2025).

Various factor have contributed to the increase in the penetration of the EVs. Environmental concerns and word of mouth along with perceived barriers and policies framed by the respective governments affect the usage intention of the customers (Shantanu Gupta, 2024). Despite having launched the financial incentive programmes like the FAME India scheme, to support EV ecosystem, the share of electric cars in India's automobile market remained the least among all the personal vehicle category (shift, 2025) (Dmitry V. Pelegov, 2023). This gap between policy initiatives and consumer response can possibly indicates a critical mismatch between supply-side measures and demand-side behaviour (Prateek Bansal, 2021). In this scenario, the present study attempts to study the probable factors shaping adoption behaviour toward electric autorickshaw in Bangalore, a city that stands for India's technological leadership as well as persistent environmental concerns.

2. Literature review

2.1 Electric mobility in India

e transport sector in India is undergoing a major transition, with electric mobility emerging as a main strategy to achieve sustainability in the long run. This change is mainly driven by concern about the environment, particularly, increase in greenhouse gas emissions and deteriorating air quality in many Indian cities, where road transport vehicles are a major source of pollution (IEA, 2025). Also, India's dependence on imported crude oil can possibly be a risk to the nation's economic stability. Hence adopting the electric vehicles (EVs) is critical for ensuring energy security (Apoorva Bhandari, 2018). In 2019, total carbon dioxide emissions in India was estimated to be at around 2.9 billion tonnes, of which the transport sector alone contributed nearly 10%, or 290 million tonnes annually. Within the transport sector, road transport is the main source of greenhouse gas emissions. Heavy-duty vehicles like trucks and buses and personal transport, including two-wheelers (2Ws), three-wheelers (3W) and four-wheelers (4Ws) are major contributors to the emission. According to recent studies, the electrification of vehicles offers one of the most practical solution to reduce greenhouse gas emissions from transportation (e-Amrit, 2025). A study

conducted by the Centre for Study of Science, Technology and Policy (CSTEP) emphasized that, beyond reducing CO_2 emissions, a transition to electric mobility could substantially reduce other harmful pollutants such as particulate matter (PM), nitrogen oxides (NOx), and black carbon (BC), which are established as major contributors to urban air quality deterioration (Emissions., 2023). EVs also promise economic benefits like lower operational costs, generate employment opportunities by boosting domestic manufacturing, and growth in green technology innovation (e-Amrit, 2025).

The current scenario of e-mobility in India reflects a promising future, Moreso in the two-wheeler and three-wheeler segments, which have gained traction due to affordability and adaptability to urban travel (SIAM, 2025). In contrast, the adoption of e-passenger cars has been slower, affected by high upfront costs and impaired charging facilities, though consistent improvements are evident (Economics, 2019). The Government of India has launched a range of initiatives to support EV adoption, the most important being the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) programme, launched under the National Electric Mobility Mission Plan (Industries, 2025).

The first phase of FAME aimed at providing initial incentives for the purchase of the vehicle. The second phase has been provisioned with larger budget to encourage demand, build charging networks, and promote manufacturing. These efforts are complemented by policy measures such as reduced GST on EVs, income tax rebates for EV loans, and the Production Linked Incentive (PLI) scheme to foster battery manufacturing within India. (Industries, 2025). In addition, several state governments have introduced their own EV policies, offering purchase subsidies, tax waivers, and support for infrastructure development. Taken together, these national and state-level measures reflect India's commitment to scaling up sustainable mobility, even though challenges related to affordability, charging access, and consumer awareness continue to shape the pace of adoption (e-Amrit, 2025).

2.2 Role of passenger 3 wheelers in Indian scenario.

Tushar Rajendra Bagul et al, opine that "Auto-rickshaw is a three-wheeled motorized vehicle (which is either used as a shared mode multiple passengers with multiple drops and pick-up locations along the fixed routes) or on-call mode with mobile application or at stand (single passenger traveling from one point to another)". Over the past two decades, the number of auto-rickshaws has grown rapidly across developing nations. In India, they function as part of the Intermediate Public Transport (IPT) system, providing flexible services that operate either as shared rides or on-demand trips. By 2016, the country had 74,75,147 auto-rickshaws on its roads—roughly the same as the entire vehicle fleet of the Netherlands—and nearly 800,000 new units continue to be sold annually in the Indian market. (Tushar Rajendra Bagul, 2020). 3 wheelers are one of the dominant modes of transport in the ASEAN countries (Huong Le, 2022). Auto-rickshaws, particularly three-wheelers, make up a significant share of the public transport system in developing nations such as India, offering commuters an affordable and easily accessible means of travel. Gasoline and natural gas remain the primary fuels powering the automotive industry, yet their widespread use is a major driver of greenhouse gas emissions. According to the study, the auto-rickshaw fleet operating in Bengaluru releases nearly 1,200 tonnes of carbon dioxide, 4 tonnes of nitrogen oxides (NOx), and 0.5 tonnes of PM10 each day. Of this total, two-stroke rickshaws alone account for about 282 tonnes of CO_2, 0.1 tonnes of NOx, and 0.3 tonnes of PM10. To offset the daily carbon emissions produced by these vehicles, an estimated 1.92 acres of forest would be required for sequestration (Ms Palak Thakur, 2018). This environmental impact has accelerated the shift of the transportation sector toward electric vehicles. In addition, the continuous rise in petroleum prices is increasingly viewed as a

challenge, posing risks not only to economic stability but also to broader social well-being. (Vaidehi, 2021).

2.3 Contribution of 3- wheelers towards pollution

Vehicular emissions remain one of the leading contributors to air pollution in India, posing serious risks to public health. Several metropolitan cities in the country are in pressing need of adopting cleaner transport technologies to improve air quality and safeguard human well-being. Transforming vehicle fleets on a large scale has the potential to significantly lower air pollution levels and reduce the number of premature deaths linked to poor air quality. (Haseeb Hakkim, 2022). Haseeb Hakkim et al, conducted a study to analyse the effect of replacing all the ICE two and three wheelers into electric vehicles and found that switching to electric vehicles results in emission reduction of 76% (Haseeb Hakkim, 2022). Average levels of PM2.5 and PM10 were observed to surpass permissible standards across multiple transport modes, with the highest concentrations recorded in rickshaws and minibuses (Md. Mehedi Hasan Masum, 2025). These data indicate that transition of three-wheeler to electric vehicles can contribute significantly to the reduction of air pollution.

2.4 Importance of the transition to e-3 wheelers.

In 2015, three-wheelers running on LPG recorded the highest pollutant emission potential, with a total NMVOC emission factor of 62.3 ± 18.2 gL−1, followed by petrol-based two-wheelers at 52.0 ± 15.4 gL−1. In comparison, CNG three-wheelers emitted 9.3 ± 4.4 gL−1, while diesel counterparts registered 6.7 ± 1.3 gL−1. Looking ahead, LPG-powered three-wheelers are expected to be nearly phased out by 2030, as the market increasingly shifts toward more cost-effective electric and CNG alternatives (Haseeb Hakkim, 2022).

The Karnataka Transport Department has already issued a notification banning two-stroke auto-rickshaws. Projections suggest that under Scenario III, replacing these with electric autos could cut carbon emissions by about 0.11 million tonnes annually, while reducing PM10 by 114.5 million tonnes and NOx by 37.6 million tonnes per year. This transition would also save approximately 0.17 million grams of LPG, which could be redirected as subsidies for economically weaker sections. Alternatively, if the shortfall is addressed by substituting 24,000 two-stroke vehicles with four-stroke auto-rickshaws, PM10 emissions would fall by 62% and carbon dioxide emissions would decrease by nearly 0.02 million tonnes, though nitrogen oxide levels would rise by 21%. These findings underline that electrification of auto-rickshaws offers a more effective pathway for mitigating vehicular emissions compared to conventional replacements (Ms Palak Thakur, 2018).

2.5 Empirical evidence on adoption behaviour towards e-vehicles

Understanding the adoption of electric vehicles requires a holistic view of the diverse elements that shape consumer decision-making. These elements span across economic, technological, psychological, and infrastructural dimensions, each contributing to how individuals perceive the value and practicality of EVs. Collectively, they influence both the pace and depth of market acceptance. From an economic standpoint, aspects such as the upfront purchase cost, anticipated operating expenses, and the availability of subsidies are central to a buyer's cost-benefit evaluation. For example, many electric cars are introduced with competitive pricing strategies to encourage adoption, coupled with the advantage of lower running costs when compared to traditional fuel-based vehicles (M. Prabaharan & M, 2020). Government interventions, particularly through initiatives like India's FAME scheme, aim to stimulate adoption by offering financial support and promoting infrastructure development. However, studies suggest that their effectiveness may be limited by challenges in implementation or by household-level constraints (Imran Ali, 2022) (Lindsay Matthews, 2017). Recognizing the slow diffusion of EVs despite such measures, the government has also launched the National

Electric Mobility Mission Plan, designed to boost both consumer acceptance and domestic production capacity (Economics, 2019; Prateek Bansal, 2021).
Beyond economics, technological and infrastructural factors exert strong influence. Also, driving range in single charge, insufficient and inefficient charging facilities, and problems with integrating EVs into daily routines continue to be the significant barriers (Sriram K V, 2022), (Umasankar Murugesan, 2023). Purchasing behaviour is also majorly affected by the sustainability factors (Neupane & Sharma, 2023).
Customer's Risk to benefit trade off while adopting a new technology is believed to impact the positive adoption behaviour while lack of confidence on the performance of the electric vehicle has been proven as a major barrier to the adoption of electric vehicles (Paweł Bryła, 2023). High initial cost of EVs, largely due to the expense of lithium-ion batteries are the major barriers which discourages buyers despite the benefit of reduced lifetime expences (Umasankar Murugesan, 2023). The EV sector in India is still in a developmental stage, marked by limited product variants and low economies of scale, which keep upfront cost elevated (Umasankar Murugesan, 2023). These challenges emphasize that while supportive policies and consumer interest exist, the transition to electric mobility in India continues to face major barriers that must be addressed. People are opting for electric vehicles for short-range transportation due to increasing fuel prices and stricter emission norms in a few states in the country like Delhi. Auto Rickshaw is one of the major solutions for last mile connectivity in India. Auto-rickshaw's electrification is a practically sustainable consideration for a sustainable country (Vaidehi, Techno-economic assessment of various motors for three-wheeler, 2020).

3. Research gap

Interest in electric vehicles is increasing steadily and several supportive policies have already been introduced. But there still exists a limited knowledge of the specific enablers and obstacles influencing e-auto adoption in Indian metropolitan cities like Bangalore (Reema Bera, 2021). This gap is more evident in research that diminishes the role of technological perceptions and environmental attitudes in determining consumer preferences, which can strongly influence their purchase intentions (Reema Bera, 2021) (M. Prabaharan & M, 2020). Likewise, the effect of subjective norms and perceived behavioural control, together, on adoption intention has not been adequately examined. leaving an important theoretical and practical implications gap (Prateek Bansal, 2021) (Dmitry V. Pelegov, 2023). To bridge this shortcoming, a methodological framework that combines attitudinal constructs with attribute-based choice models is essential. This can offer richer insights into consumer travel mode choice behaviour for EVs (Reema Bera, 2021). Integrated approach of this sort would capture how individuals balance perceived sustainability with technological uncertainties and practical concerns, including the accessibility of charging infrastructure (Huong Le, 2022) (Reema Bera, 2021).
Previous it has been established that concerns around battery durability, insufficient charging facilities, and range limitations continue to be the major deterrents for prospective users of electric vehicles (Umasankar Murugesan, 2023). This indicates the importance of strategies that go beyond addressing cost and infrastructure gaps and incorporate psychological and behavioural drivers of acceptance (Apurva Pamidimukkala, 2023) (Ardhy Lazuardy, 2024). Also, consumer's negative attitude towards electric vehicles is supported by perceptions of frail after-sales service and the lack of varients in EV models in the Indian market (Umasankar Murugesan, 2023).

4. Theoretical background

This section analyses the significant theoretical perspectives that guide the analysis of electric autorickshaw adoption in Bangalore. This offers a conceptual foundation for understanding the

factors that shape the consumer behaviour. Based on established adoption theories, it brings together the insights into how economic, technological, psychological, and environmental aspects coincide in influencing the electric vehicle uptake. Interdisciplinary approach of this sort allows for a sensible consideration of rational decision-making processes and the subjective perceptions that affect the purchase choices of consumer (Davis, 1993). One of the most used theories in this context is the Technology Acceptance Model (TAM), which emphasizes the importance of perceived usefulness and perceived ease of use in modelling technology adoption (L Kusdibyo, 2020).

Study of the adoption of electric autos (e-autos) in Bangalore requires a theoretical base that requires decision-making by individual customers and the broader social and infrastructural setup. Several models that are used in understanding the technology adoption —particularly the Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), and the Unified Theory of Acceptance and Use of Technology (UTAUT/UTAUT2)—offer considerable perspectives for analysing this subject matter.

The Technology Acceptance Model (TAM), proposed by Davis (1987), focuses on: perceived usefulness and perceived ease of use. These factors influence how individuals evaluate a new technology and hence influence their adoption intentions. In the case of e-autos, usefulness could be reduced fuel costs, operational efficiency, and environmental gains (Minakshi Patel, 2024) (L Kusdibyo, 2020). Although TAM has been applied widely in adoption studies, but critics opine that it does not fully consider the role of social context and external pressures (Lance Noel, 2019).

To address this gap, the Theory of Planned Behaviour (TPB) proposed by Icek Ajan expands the discussion by including subjective norms and perceived behavioural control alongside attitudes. He proposed that an individual's intention to adopt a behaviour, like as purchasing an e-auto is influenced not only by the evaluation of their behaviour but also by the respective social expectations and the extent to which they feel skilled of performing it (Ajzen, 1991). For e-autos, subjective norms can possibly include encouragement from peers or family, while perceived control could be financial resources, access to charging facilities, or trust in after-sales services (Md. Mokhlesur Rahman, 2024) (Hardik Gajera, 2025). Studies also show that perceived behavioural control can bridge external influences such as government subsidies or infrastructure expansion with adoption outcomes (Imran Ali, 2022).

Theory of Unified Theory of Acceptance and Use of Technology (UTAUT and UTAUT 2) was built on TAM and TPB, which provide a more holistic approach. Constructs like performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit, along with demographic moderators such as age, gender, and experience were added to TPB and TAM (Viswanath Venkatesh, 2012) (Elena Higueras-Castillo, 2023). In the study of e-auto adoption, these elements provide a holistic picture by explaining how expectations about performance, affordability, and enjoyment interact with infrastructure and demographic characteristics to influence consumer's intentions (Prateek Bansal, 2021) (Umasankar Murugesan, 2023).

While TAM highlights the role of perceived benefits and usability, TPB focuses on social influence and control over behaviour, and the UTAUT and UTAUT2 models broaden the scope by introducing contextual and demographic factors. This combined view helps in understanding how economic, psychological, and infrastructural factors, together shape the adoption behaviour towards e-auto in Bangalore. One theory which can accommodate all the above-mentioned factors and more is the grounded theory proposed by Barney Glaser and Anslem Strauss. Grounded theory is a qualitative research approach that emphasizes generating theoretical insights directly from systematically collected and analysed data, rather than relying on pre-established frameworks. This method accommodates conceptual categories and

relationships to emerge progressively from observed behavioural patterns, making it especially useful for exploring and understanding new or complex phenomena such as e-auto adoption in Bangalore's urban context (Md. Mokhlesur Rahman, 2024) (Chara Makri, 2021) (Kufaine, 2024) (Timo Lajunen, 2004)

Grounded theory offers the flexibility to capture socio-economic, cultural, and infrastructural distinctions that existing models may overlook. This theory provides a basis for developing context-specific models that reflect the lived experiences and decision-making processes of stakeholders. This blended approach recognizes that electric vehicle adoption is influenced not only by practical and psychological considerations but also by wider societal values and environmental concerns (Elena Higueras-Castillo, 2023).

5. Methodology:

5.1 Sampling:

5.11 Method:

The method used for the study is "adaptable research strategy" which enables the exploration of unexpected factors that contribute to e-auto adoption. These factors are necessary for building a holistic understanding of the decision-making process (Udit Chawla, 2023). Qualitative inquiry emphasizes depth of knowledge over breadth of factors. It seeks to capture rich, contextual insights from a smaller, purposively chosen sample (Ahmed, 2025). The question of what constitutes an adequate sample size in qualitative studies, particularly in relation to code saturation, continues to be debated, with no universal consensus on a fixed number of interviews (Claudia M Squire, 2024). Nevertheless, applying the principle of data saturation is central to maintaining methodological rigor, as it ensures that collection ends once no new themes or perspectives are emerging, thereby reinforcing the credibility of the study's conclusions (Ahmed, 2025).

5.12 Size:

The concept of data saturation will be used to guide sample size decisions in this study. Interviews will continue until responses become repetitive and no further themes or insights are uncovered. Applying this principle helps ensure that the dataset is both comprehensive and robust, thereby enhancing the trustworthiness of the research outcomes (Juliane Reinecke, 2016). Overall, around 23 responses were collected before reaching the saturation point and the researcher found new factor to contribute to the study.

5.13 Data collection

Data was collected from the autorickshaw drivers in Bangalore. Location was carefully chosen to ensure the diverse work nature of these drivers. Responses were collected from drivers near metro stations, parked vehicles at popular junctions, residential localities and industrial localities. The respondents were sensitized towards the importance of their responses and the responses were collected only after obtaining their consent. The responses were collected in the audio format. Around 60 drivers were approached for responses. But 23 respondents agreed to respond and share their views and experiences.

6. Data Analysis

Microsoft 365 and Taguette software has been used in combination for the qualitative data analysis. By combining Microsoft 365 with Taguette, research can be conducted (both quantitative and qualitative analyses) in a complementary manner. Microsoft 365 tools such as Excel and Power BI support data visualization, statistical testing, and modelling, while Taguette enables systematic coding and thematic analysis of textual data. Together, this dual approach enriches the analytical process, providing deeper and more precise insights into e-auto adoption behaviours in Bangalore (Sukhov et al., 2023).

The audio files were converted to transcript using the Microsoft 365 tool. The data thus collected was analysed using the Taguette software. Taguette is an opensource software which generates detailed research outputs from qualitative data (Rémi Rampin, 2021). The data thus collected were analysed and coded for further analysis. Following is the snapshot of the analysis of the codebook. Highlights of the document can be found as the annexure 1.

Table 1: Codebook

Sl no	Code	Description	Number of highlights
1	Interesting	Further review required	0
2	Positive behaviour	Driver has switched from traditional ICE auto to electric autorickshaw	29
3	Barriers to adoption	Problems in suspension and passengers complain about it, government incentive of free bus ride for women, high loan interest rate, reducing battery performance,	36
4	Infrastructure facility	A charging facility is available at the residence, Loan facility is available to purchase the vehicle, for Rapido like rented auto, battery swapping stations are available.	19
5	Performance expectancy	I am able to earn more than my traditional vehicle. Which shows my performance is better using an electric auto	3
6	effort expectancy	Effort required to maintain the autorickshaw is avoided	1
7	Social influence	Peer group influencing the purchase decision,	11
8	Cost effective	Can make good revenue by driving the electric auto, save on fuel and maintenance expenses, subsidies from government can bring down the cost further	17
9	Cost ineffectiveness	High battery replacement cost, high cost of charging at an outside facility, and high interest rates on loans	6
10	Expensive	High upfront cost and high battery replacing cost.	2
11	Lack of infrastructure	Lack of charging station, lack of efficient service stations, poor response from the personnel at service stations	16
12	Negative behaviour	I do not wish to change over to electric autorickshaw	10
13	Misinformation	Wrong information about mileage, Loan interest rates, battery performance and charging infrastructure at public places	6

Source: Taguette software. https://app.taguette.org/project/157639/highlights/

7. Interpretation

The coding results highlight a mix of positive drivers and persistent barriers shaping the adoption of electric autorickshaws. Among the most frequently noted issues are barriers to adoption (36 highlights), which include mechanical problems such as suspension faults, declining battery performance, and financial concerns like high loan interest rates. These challenges appear to significantly influence driver dissatisfaction and reluctance to adopt.

"My passengers complained frequently about non functional suspension"- Chandrashekar

"where the charging for 5 1/2 hours at a stretch. Is a big hurdle"- Saravana

"I've heard the battery is very expensive. What if the battery lasts only for two years or three years?"- Govind

On the other hand, positive behaviour (29 highlights) emerged strongly, with many drivers indicating a successful shift from traditional ICE vehicles to electric ones, motivated largely by potential savings and operational benefits. Infrastructure facilities (19 highlights), such as access to home charging, loan availability, and emerging battery-swapping options, were also seen as supportive factors.

"I have referred this vehicle to a couple of my friends and they are purchasing it in the near future."- Sabanna

"I am driving auto since 15 years. Listen. Yeah. Earlier I was driving the old traditional auto"- Chandrashekar

"I will suggest people buy this vehicle as it is profitable"- Manje Gowda

"I charge my vehicle for 5 1/2 hours at a stretch at my residence"- Chandrashekar

"The battery performance is decent enough"- Faisal

"I bought the auto through a credit facility"- Suresh

Economic considerations play a dual role. While cost effectiveness (17 highlights) highlights perceived benefits through fuel savings, lower maintenance expenses, and subsidies, drivers also identified cost ineffectiveness (6 highlights) and expense-related concerns (2 highlights) linked to high upfront costs, expensive battery replacements, and costly external charging.

"I received a subsidy of ₹80,000 and I'm very happy about it."- Fayaz

"Earnings were pretty good"- Mallikarjun

"I drive around 130 to 140 kilometres every day. Compared to the traditional auto. The electric auto is quite profitable"- Chandrashekar

"In that case I have to buy a new battery, which is quite expensive"- Govind

Social influence (11 highlights) was found to positively impact decisions, showing that peer experiences and recommendations are important in shaping adoption choices. Conversely, negative behaviour (10 highlights) illustrates a subset of respondents who remain unwilling to switch to electric vehicles, reflecting hesitation or resistance.

"I got to know about electric cord too from my friend"- Chandrashekar

"This electric auto was referred to me by my friend and a lot of my friends are driving this vehicle currently"- Social influence

"A couple of my friends have purchased the electric auto and they referred me to purchase this vehicle for me and they are all satisfied and happy with the vehicle"- Manje Gowda

"I have no plans of shifting to electric auto"- Shekar

"Electric autos can prove problematic for such people who drive for longer period without taking a break as recharging is a problem and we do not have charging facilities frequently around"- Saravana

Finally, lack of infrastructure (16 highlights) and misinformation (6 highlights) highlight systemic issues, including limited public charging options, inefficient service support, and misleading information regarding mileage, loan terms, and battery performance. These aspects

suggest that improving infrastructure reliability and transparency in communication could significantly enhance user confidence.

"They charge very heavy price for the same. Pause. The app shows. The the charging points. But when I visit the location. The charging points are locked, meaning they are not accessible"- Raju

"And I do not have a charger facility. At my residence."- Ramu

"I am put up in a rented place and I do not have charging facility at my residence. And there are no charging facilities in the public places" Ranganath

"The staff did not respond immediately and at a couple of stations we do not find the staff available at all. Hence the battery swapping takes time. This is a cause of concern and whenever there is a vehicle breakdown"- Mallikarjun

"the company had promised 250 kilometers in single charge. But the vehicle gives only 180 to 190 kilometers"- Chandrashekar

"They had wrongly advertised. That the mileage is around 170 to 180 kilometers. But the when I visited the showroom. They told the mileage will be around 130 kilometers. But in actual the mileage is not even 100 kilometres"- Raju

8. Discussion:

During the survey it was observed that the drivers are willing to adopt the electric autos and those who are already using them are satisfied. But the major hurdle for transitioning from traditional ICE auto to an electric auto is the lack of charging infrastructure. Some of the respondents opined that they do not reside in Bangalore but have chosen this city as their workplace. They return to their homes once in a week or more often. Lack of charging infrastructure is a major barrier for such drivers who do not have a residence for charging their vehicle. Those who riding the electric autos currently opined that usually commute within 8-10 kilometres from their residence as they always have a fear of battery draining out and not being able to find a charging facility on the go. Whereas those using the autos run on LPG and CNG feel stress free commute to any part of Bangalore as they can find the refuelling across the city. On an average, they travel around 140-160 Kilometres every day. On the contrary, those using electric auto are mostly able to cover 100-120 kilometres a day. Daily routine of most of drivers include break from work from 11 AM to around 3 PM. If the government can set up charging hubs at metro stations, BESCOM outlets or other popular destinations like shopping complex, the drivers can use this time to recharge the battery enough to last till the end of their wok hours. Some of the respondents also complained of BESCOM declaring to have charging infrastructure but in reality, it is not available. This can be misleading to the drivers. Also a few respondents mentioned that large scale apartments with charging facility are supposed to accommodate the autos for charging their vehicle, of course with a cost, but these drivers are denied entry into such apartment complexes. This generates the gap in charging infrastructure. While the drivers are denied of the facility, the charging point operators are denied of the business opportunity. Most of the respondents also opined that the free bus trip incentive offered by the Government of Karnataka to ladies has impacted the business of autorickshaw drivers. A detailed survey in this regard is required to map the actual versus projected charging points. They also expressed their dissatisfaction over the lack of service stations and poor response from the dealers when in case of any trouble. Contrary to this, the Government of India has taken measures to set up charging infrastructure though public private partnership. Some of the drivers expressed their concern about high interest rates on the loan availed. If the government can roll out loan facility for electric vehicles are lesser interest rate, it can definitely promote the adoption. These drivers suffer from asthma and breathing issues as they constantly on the road and are exposed to pollution. Hence most of them have realized

the importance of adopting the electric auto for the sake of the health of themselves and society at large. Some of them also opined that if the manufacturers can develop fast charging batteries, it can boost the adoption rate of electric autos as this won't affect their working schedule.

9. Limitations:

The current survey has adopted qualitative techniques as the area of research is nascent and fewer research material is available in this area. Shorter surveys and brief information could be collected as the respondents interacted during their working hours. It is known that ladies have started driving the autorickshaws in Bangalore. But for the current survey we couldn't locate a female respondent. Hence the survey has the opinion of only the male population. The efficiency of battery mentioned in the work is as reported by the respondents and has not been measured by the researcher. The results of this study have limited generalizability as this research is conducted in the urban part of Bangalore. Hence the results of the work cannot be extended to the rural Bangalore. The data is qualitative in nature. Further to this, quantitative analysis is required to reconfirm the results.

10. Recommendation

1. Develop a greater number of charging units along the major roads in Bangalore.
2. Make the charging available to the drivers at a discounted price.
3. Develop an app to locate these charging facilities.
4. Educate the drivers on using the using the vehicle efficiently to ensure that battery lasts longer.
5. Roll out credit facility for the electric autorickshaw drivers at a lesser interest rate.
6. Increase the number of service stations to ensure reduced wait time during the working hours.
7. Develop battery swapping business models like "rapido", which can motivate those who do not have charging infrastructure at their residence to adopt the vehicle.

11. Data availability

Data will be accessible on request

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