Mapping the Factors Influencing the Adoption of Electric Vehicles: A Literature Synthesis

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Abstract

The increasing popularity of conventional automobiles propelled by internal combustion engines exacerbates the ongoing crisis related to energy and the environment, leading to greater reliance on petroleum and coal and higher emissions of carbon dioxide and other greenhouse gases. Shifting towards electric vehicles (EVs) presents a viable strategy for reducing environmental damage and enhancing energy sustainability. Despite a consistent rise in EV sales globally, they still represent less than 14% of total vehicle sales. Therefore, this research aims to unveil the factors affecting consumer decisions to purchase EVs, thereby suggesting avenues and strategies to promote a quicker adoption of electric mobility, towards fostering a more sustainable future. The study adopts the PRISMA framework and reviews 62 articles, to identify the antecedents of EV adoption in India. Further, the study suggests a conceptual model grounded in research themes identified in the literature and presents a comprehensive view of antecedents to EV Adoption.

Introduction

The extensive utilisation of diesel and petrol has resulted in a significant rise in greenhouse gases. These gases have been identified as a major contributor to the escalation of global warming and climate change (Ju, Lee & Kim, 2021; Zhao et al., 2022). Among the prominent sectors of the economy, transportation stands out as a significant contributor to air pollution (Higueras-Castillo et al., 2019). Electric mobility is facilitating the transition to more environmentally friendly and sustainable transportation by loweing air pollution and reliance on fossil fuels (International Energy Agency, 2020). More precisely, electric vehicles (EVs) encompassing and battery EVs (BEVs) and plug-in hybrid EVs (PHEVs) have emerged as a prospective substitute for internal combustion engine vehicles (ICEVs) (Patil, Kazemzadeh & Bansal, 2023). The benefits offered by electric vehicles compared to internal combustion engines include reduced maintenance costs, zero tailpipe

emissions, improved fuel efficiency, no dependency on petroleum, and enhanced driving experiences. Moreover, when powered by renewable energy, electric vehicles provide a practical way to reduce overall emissions of greenhouse gases and decarbonise transportation on roads. The significance of this decarbonisation potential lies in the restricted availability of substitutes for liquid fossil fuels (Muratori et al., 2021). The multiple benefits that EVs offer have been exhaustively detailed in the existing literature (Shafique et al., 2022; Abo-Khalil et al., 2022; Albatayneh et al., 2020).

As stated by the International Energy Agency (IEA, 2023), Electric car sales have been increasing at an exponential rate; from 2012 to 2017, sales increased from 100,000 to 1 million while the sales increased even more from around 1 million to more than 10 million units in 5 years, from 2017 to 2022., yet the electric vehicle market has only a 14% share of the market. Further, there has been a global car market contraction, with total car sales in 2022 declining by 3% compared to 2021.

Consumers' intentions to purchase EVs are influenced by many factors. Few studies suggest that social networks may affect the rate of electric vehicle uptake. The acceptance of electric vehicles may be significantly affected by the views held by one's social circle (Jansson et al., 2017; Axsen & Sovacool, 2019). While, according to He, Zhan & Hu (2018) an increase in disposable income is associated with a greater propensity to purchase electric vehicles, according to some research. Smith et al. (2017) reported that those who have a concern for the environment are more inclined to adopt EVs. Further, adopting EVs can be predicted by one's level of personal inventiveness in terms of apparent financial rewards and decreased perceived risk (He et al., 2018). Attitude and emotions were found to be the primary factors affecting an individual's decision to buy electric vehicles (Huang & Ge, 2019). Skippon & Garwood (2011) emphasised the necessity of a pollution-free environment drives consumers to purchase electric vehicles. While, in the context of Malaysia, Hong, Khan, & Abdullah (2013) found that perceived behavioral control, pro-environmental concern, relative advantage, and compatibility have significant and direct relationships with the adoption intention of hybrid automobiles. Further, the study found perceived behavioral control and attitudes of individuals as significant factors for the adoption of hybrid vehicles. Several studies have found that offering incentives such as purchasing subsidies, tax relief from the government, free parking, and charging can increase consumers' intents to adopt EVs (Sierzchula et al., 2014; Bunce, Harris, & Burgess, 2014; Huang & Ge, 2019). Zhang et al. (2011) highlight that buyers from households with several cars are very unlikely to purchase electric vehicles in the near future, on the other hand, Axsen, et al., (2016) found that the likelihood of a family's behavioural intention to purchase EVs increases as the number of automobiles in the household grows. EVs can further diminish the harmful effects on the environment when electricity is generated from renewable resources like wind, solar, biomass, etc., (Breuer et al., 2021; Faria et al., 2013; European Environment Agency, 2018).

Governments around the globe are making a move towards EV adoption by introducing various attractive policies and incentives (Martins et al., 2023; Gong, Ardeshiri & Rashidi, 2020). Norway targets 100% EV sales by 2025, while France and the UK aim for the same by 2040 (Plotz et al., 2019). India intends to transition to EVs by the year 2030. To lower energy prices and cut emissions by 37%, the government is encouraging automakers to produce more electric vehicles. This would not only lessen reliance on fuel imports from other nations, but it will also protect the nation from changes in oil prices and currency volatility. To top it all off, the Indian government has officially announced that all cars must be electrified by 2030. Further, according to the Society of Indian Automobile Manufacturers (SIAM, 2017), it is estimated that 40% of new automobile sales will be of EVs by 2030, and this percentage is expected to reach 100% by 2047.

However, consumers are skeptical regarding the real environmental benefit of EVs. Therefore, a comprehensive understanding of consumer purchasing behaviors is essential for enhancing the uptake of EVs. The overarching goal of this study is to strengthen and fill gaps in the understanding of the variables influencing consumers' intentions to buy EVs. Therefore, the study's goal is to address the underlying research question:

RQ1 What are the antecedents that influence the intention to purchase electric vehicles?

To reflect on the subject, the paper employs a systematic literature review, which not only answers the research question posed but also summarises the topic at hand by addressing several related questions (Paul & Criado, 2020). Consequently, this study details the following: the definition of EVs in different studies; the source of publication; methodological approach; theoretical perspective; analysis techniques, research themes, and the antecedents impacting the intention to purchase EVs. The study contributes significantly to both theory and practice by providing answers to these problems. At an academic level, it surveys the literature on the subject, highlights important points, and introduces a new framework for researchers to build upon. From a practical standpoint, this paper adds to the existing body of knowledge by shedding light on the antecedents that influence EV purchase intentions.

The paper is organized into five different sections. Section 1 presents the introduction; Section 2 outlines the methodology used to review the literature. Section 3 outlines the results and the major findings. Section 4 outlines the proposed hypothesis and research model. Section 5 outlines the conclusion and provides the potential areas for future investigation.

Methodology

The study employs a systematic literature review (SLR) approach as the method helps in reinforcing policy and practice and directing future studies in this area. Further, the study adopted the PRISMA framework i.e. preferred reporting items for systematic reviews and meta-analyses protocol, upholding its core values of reproducibility, openness, and rigor (Pickering & Byrne, 2014; Mallett et al., 2012).

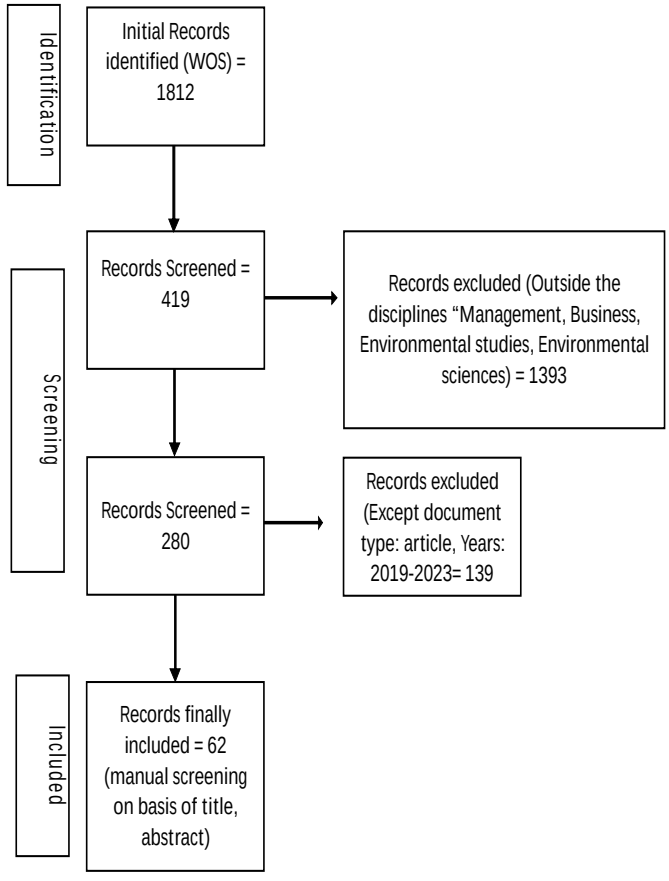
To achieve the objective of the paper, a search in the Web of Science (WOS) database was carried out. Thereafter, Documents obtained from the search were evaluated by dividing them into the following phases (Figure 1):

Data Collection Phase- To retrieve records from the WOS database and for their final selection and refinement, a definition of search criteria was provided; which can be called as data collection phase.

Screening Phase- The retrieved articles were screened for their inclusion and the articles that were Outside the disciplines “Management, Business, Environmental Studies and, Environmental sciences were excluded from the study. Further, documents were also excluded from the study based on article type, year, title of the paper, and abstract.

Data analysis Phase- This phase involves analysing the data to extract key themes that are being discussed in existing literature pertaining to EVs.

Inclusion-exclusion criteria: Figure 1:



The search was carried out on WOS using the keywords mentioned in Table 1. Subsequently, a sequence of filters was implemented to facilitate the identification of the most pertinent papers (see Table 1).

Table 1. Search strategy implemented.

Filter	Description
Topic	"electric vehicl*" OR "electric car*" AND "purchas* intention" OR "purchas* behavi*" OR "intention to purchas*" OR "willingness to buy" OR "intention to buy"
Subject area	Management, Business, Environmental studies, Environmental sciences
Document Type	Article
Years	2019-2023
Source type	Journal
Language	English

A total of 62 publications were considered for inclusion in the study after applying the filters outlined in Table 1. However, to strengthen our findings we have also considered some of the other seminal studies as well.

Results

The analysis results and a summary of the data from the chosen 62 articles are shown in this section.

Table 2. Definition of Electric Vehicles in different studies

S.No.	Study	Definition of Electric Vehicles
1.	King (2010)	Electric vehicles (EVs) can be defined as the vehicles having electric power train that only funct ion on a battery, and they represent technological innovation and development that provide solution to increasing CO 2-emissions emitted by automobiles.
2.	Chan & Wong, (2004)	The study defines EV as vehicles that have electric motor and hence it doesn't r equire to depend completely on fossil fuels and an internal combustion engine for its operation.
3.	Larson et al., (2014)	Electric Vehicles are those vehicles that use electrical grid for supplying energy, which is to be used for motive operation and such vehicles include battery electric vehicles (BEVs), and plug-in hybrid electric vehicles (PHEVs).
4.	Beise & Rennings, (2005)	Electric vehicles can be defined as an eco -innovation, that is, a recent and modern product, making use of electric motor that h elps in diminishing environmental harms and problems compared to traditional vehicles.
5.	Buekers et al., (2014)	The study defines electric vehicles as the ones that have the potential for preserving urban transportation with added benefit of reduced oil dependence, air pollution, producing various health and environmental benefits.

Source: Author's Compilation

Methodological Approach

After analysing the methodological approach of the pertinent studies, it became clear that quantitative methods predominated (46). Comparatively, only 15 publications employed qualitative

Table 3. Methodological approach.

	Method	The total amount of Articles
Quantitative	Survey	34
	Secondary data analysis	7
	Simulation	3
	Optimization techniques	2
Qualitative	Case Study	4
	Interview	4
	Literature Review	7
Mixed Methods		1

Source: Author's Construction

Main Publication Sources.

The current study drew on 62 articles published in 23 scholarly journals. The most popular Journals that have published more than one article are listed in Table 4. Out of all the publications considered for this study, approximately 78% are published in these nine scholarly journals, with a total of 54 studies. The highest number of papers is found in the journal of Sustainability (Switzerland), with eighteen research (or 29.03 percent of the total) published there, it is by far the most prolific.

Table 4. Sources of Publication.

Journal	No of Articles	%
Sustainability (Switzerland)	18	29.03
Energy Policy	9	14.51
Journal of Cleaner Production	9	14.51
Transportation Research Part A: Policy and Practice	5	8.06
Transportation Research Part F: Traffic Psychology and Behavior	5	8.06
Transportation Research Part D: Transport and Environment	2	3.22
International Journal of Electric and Hybrid Vehicles	2	3.22
Transport Policy	2	3.22
Clean Technology Environmental Policy	2	3.22

Source: Author's Construction

Theoretical Perspective

The following are the main theories that are found in the literature:

The Theory of Planned Behavior (TPB) was developed by Ajzen (1985). The main aim of this theory is to know about the determinants and factors that influence an individual behavior. TPB is centered on three core constructs- attitude, subjective norm and perceived behavioral control, these constructs act as predictors of the behavioral intentions of an individual, which subsequently guide their behavior and actions (Du et al., 2018). Attitude has been termed as the beliefs that arise from the perceived repercussions of engaging in a particular behaviour. Subjective norm refers to the normative ideas i.e. the beliefs that are induced by social pressure (including friends and family) from the decision of specific behavior; Perceived behavioral control (PBC) is an individual's view about their capability to

conduct a specific behaviour, based on their assessment of how difficult or easy it is to do so (Mohamed et al., 2016; Ajzen, 1991).

The Technology Acceptance Model (TAM) was developed by Davis in 1989 and it has been widely used within technology acceptance research due to which, the model has been empirically tested and has even received Significant empirical support. The main constructs of TAM are—perceived ease of use (PEU) and perceived usefulness (PU). Perceived ease of use refers to the extent to which an individual anticipates that the target system will need minimal effort. Perceived usefulness refers to the user's personal belief that using a certain application system will enhance their job performance within an organisational setting. Despite its wide usage in technology acceptance research the model has not been extensively applied in the overall context of EV acceptance due to the novelty of this research topic, however the theory can elucidate user behavior over a wide spectrum of end-user computer technology and user groups. Further, the theory has seen its application to various technologies, contexts, and users, including the context of relatively recent technical breakthroughs such as augmented reality, artificial intelligence etc.

The Value-Belief-Norm theory (VBN) was put forth by Stern. It was developed and used to elucidate the impact of human values within an environmental framework. The theory assumes a connection between five variables: values, NEP, awareness of consequences (AC), ascription of responsibility (AR), and personal norms (PN), which are linked in a causal chain (stern et al., 1995, Stern, 2000). Three types of value orientation that has been identified in VBN theory are- egoistic, altruistic, and biospheric. According to VBN theory the association between values and actual behavior is mediated by some behavior specific beliefs and personal moral norms that govern an individual's action (Jansson, Marell, & Nordlund, 2011). The fundamental components of VBN consist of three main constructs:- (1) Values, (2) Beliefs, (3) Personal Norms. All these constructs are important and applicable for our research. However, personal moral norm is expected to play an important explanatory role in our research since previous research on adoption of EV has indicated support for this construct.

The Unified Theory of Acceptance and Use of Technology (UTAUT) model, which consists of six major constructs, namely performance expectancy, social influence, facilitating conditions, effort expectancy, behavioural intention, and usage behaviour has been demonstrated to be an effective theoretical model for forecasting consumers' attitudes towards new technology acceptance (Dwivedi et al., 2019). UTAUT constructs such as Performance Expectancy refers to the anticipated benefits that an individual expects to get from employing a particular technology and whether that technology will effectively enhance their performance. Effort Expectancy pertains to the amount of energy needed to employ the technology. If the technology demands excessive time and energy, it will not be embraced, regardless of its potential benefits for the individual. Social Influences focus on the thinking processes of individuals and propose that people externalise their obligation to others when making decisions. In other words, humans use rationality to decide whether or not to accept a technology. Finally, the extent to which technological infrastructures, like software or innovative technology, would aid individuals in utilising the technology is encompassed within the concept of Facilitating Conditions.

The Diffusion of Innovation Theory (DOI) was put forth by Rogers in 1962 for the purpose of explaining the process of diffusion or spread of ideas, products, and innovations originating from a particular social group (Rogers & Williams, 1983). According to Rogers & Williams, (1983) communication channels, innovation, time, and social systems are the main items that influence diffusion of innovation. The authors highlighted five characteristics that define the people perception of an innovation, which are-relative advantage which refers to the superiority of an innovation in relation to existing products and technology.While compatibility refers to the extent to which an innovative technology or product aligns with the existing technology or product experience, trialability refers to the ability for consumers to experiment with an invention by conducting a trial scenario that assesses

customers' acceptance or desire to buy the product or technology, complexity pertains to the degree of intricacy associated with utilising and comprehending the innovation and observability refers to the ability to observe or measure the impact or outcomes of an innovation after it has been used. The theory has been in the area of adoption of electric vehicles as EVs are an eco-innovation compared to conventional and fuel-based vehicles.

Our results revealed that 24 articles used the theory of planned behaviour, making it the dominant theory. Most studies that used the theory of planned behaviour to examine the effect of EV purchasing intention used a conceptual study model that was enhanced with a number of extra factors.

Existing literature on EV adoption-

The primary research conducted in the field of EV adoption are:

Table 5. Existing literature on adoption of EV-

S.No	Literature	Theory	Main factors
1	Chen, 2015	VBN	Altruistic values, biospheric values, and egoistic values, ecological worldview-NEP, Awareness of consequences , A scription of Responsibility, personal norm, Behavior
2	Moons & Pelsmacker, 2012	TPB (extended with emotions)	emotions towards the electr ic car, reflective , visceral, and behavioral emotions towards car driving, subjective nor ms, sociodemographic characteristics, perceived behavioral control, opinion leadership, environmental concern, intention to use an electric car, attitude towards the electric car.
3	Jansson, Marell & Norlund , 2011	VBN	Altruistic values, egoistic values, and biospheric values, ecological worldview-NEP, Awareness of consequences , A scription of Responsibility, personal norm, sociodemographic, AFV adoption
4	Sang&Bekhet, 2015	TPB	social influence, environmental concern, financial benefits, government policies, demographics, usage intentions of EV.
5	Jansson, Norlund & Westin, 2017	TRA, TPB, VBN	Personal norms, ecological attitudes(NEP), opinion leading (OL), social norms, EV adoption.
6	Jansson, 2011	VBN	Biospheric values, Ascription of responsibility (AR), personal norms (PN), socio-demographic variables, and willingness to adopt a so-called environmentally friendly car (WTA).
7	dwivedi et al, 2020	UTAUT AND EXTENDED UTAUT	Use behavior, perceived social pressure, and personal innovativeness in IT.
8	Schuitema et al, 2013	self-image congruency theory	self-identity (car -authority identity, pro -environmental), perceived hedonic attributes, perceived symbolic attributes, Intention to adopt.
9	GlobischaDütschke& Schleich, 2018	TAM 3	perceived ease of use, perceived usefulness, subjective norms , support for EV acquisition.
10	Degirmenci and. Breitner, 2017	TPB	Environmental performanc e, demographic variables , Intention to purchase EV.
11	Liao, 2022	TPB	financial incentives, non -financial incentives, subjective norms , personality (consumer innovativeness and environmental self -identity), perceived behavioral control, attitude, adoption intention of EV.

S.No	Literature	Theory	Main factors
12	HusseinSværen, 2020	TPB	perception of electric vehicles , environmental concern, subjective norms, Intention to buy EV.
13	Higueras-Castillo et al., 2020	Attitude-behavior-context theory	Attitude, environmental concern, social reputation, price, incentives , Intention to adopt.
14	Wu et al, 2019	TAM	Green perceived usefulness (GPU) , Perceived Ease of use (PEU), Environmental concern (EC) , Behavioral Intention to use AEV (Automatic Electric Vehicles)
15	Singh et al, 2023	UTAUT 2	performance expectancy, effort expectancy, facilitating condition s, social influenc e, Price value , Hedonic motivatio n, individual innovativeness, behavioral intention, usage behavior
16	Smith et al., 2017	TPB	purchase price, charging time, availability of charging stations, driving range, running costs, engine size, emissions, noise level, Environmental concerns, Excitement for learning new technologies, battery capacity, Perceived usefulness, Subjective norms, income, vehicles /household, age, education, utility, choice of vehicle
17	Smith et al., 2017	DOI	driving range, availability of charging stations, purchase price, running costs, charging time, engine size, Excitement for learning new technologies, battery capacity, noise level, emissions, Environmental concerns, Perceived usefulness, Subjective norm s, income, vehicles/household, age, education, utility, choice of vehicle
18	Sovacool, 2017	UTAUT	performance expectancy, facilitating cond itions, effort expectanc y, Price value , social influenc e, Hedonic motivation, Experience and, Habit.
19	Shalender & Sharma, (2021).	TPB	subjective norms, perceived behavioral control, moral norm, environment concern , attitude, adoption intention of EV , EVs actual adoption

Source: Author's Compilation

Analysis Techniques-

The most popular analysis technique adopted by more than one paper are listed in Table 4. Out of all the articles considered for this study, approximately 36% papers have employed structural equation modelling followed by regression analysis

Table 6.

Analysis Technique	No. of papers	%
Structural Equation Modelling	22	35.48
Regression Analysis	18	29.03
Factor Analysis	7	11.29
Descriptive Analysis	5	8.06
Analysis of variance	2	3.22

Source: Author's Compilation

Research Themes

There is a dearth of unified research on EVs despite the abundance of material available. The study attempts to classify research articles on the basis of themes. It also aims to assist researchers in discovering new ways to construct and validate theories.

Three overarching themes emerged after filtering 62 publications.

Namely:

1. Consumer characteristics and electric vehicle adoption.
2. EV characteristics and electric vehicle adoption.
3. EV-related policies and Electric Vehicle adoption.

Table 7.

Classification	Details
Consumer characteristics and Electric vehicle adoption.	Within this theme the papers discuss adoption of EVs by considering socio -demographics, environmental concern, ecological attitudes, values, beliefs, personal norms of consumers, innovativeness etc. (Moon, 2021; Ye, Kang, &Wang, 2021; Dash, 2021; Jansson, Marell & Nordlund, 2011; Jansson, Nordlund & Westin, 2017; Qian & Yin, 2017; He & Zhan, 2018 ; Barbarossa, De Pelsmacker & Moons, 2017; Jansson, 2011; Jakovcevic & Steg, 2013; Degirmenci & Breitner, 2017).
EV characteristics and Electric vehicle adoption.	Within this theme, the paper discusses factors related to EV characteristics that influence/inhibit EV adoption like instrumental attributes, etc. (Brinkmann & Bhatiasevi, 2023; Thananusak et al., 2017; Moons & De Pelsmacker, 2012; Golbabaei et al., 2020; Carley et al., 2012; Xu, Wang & Zhao, 2021; Sang & Bekhet, 2015; Tarei, Chand & Gupta, 2021 ; Rezvani, Jansson & Bodin, 2015; Higueras-Castillo et al., 2020; Coffman, Bernstein & Wee, 2017; Priessner, Sposatoa & Hampla, 2018; Ouyang et al., 2019, Egbue, Long & Samaranayake, 2017).
EV related policies and Electric vehicle adoption.	Within this th eme the papers discuss the effectiveness of various policy incentives given by government to increase EV penetration such as financial and non -financial benefits, charging infrastructure, pre and after sale services (Langbroek, Franklin & Susilo, 2016; Nar assimhan & Johnson, 2018; Sierzchula et al., 2014; Bjerkan, Nørbech & Nordtømme, 2016; Haustein, Jensen, & Cherchi, 2021; Li, Wang & Wang, 2020; Yang & Tan, 2019; Hinnüber, Szarucki, & Szopik-Depczyńska, 2019)

Source: Author's Compilation

Based on the identification of research themes, the study proposes a conceptual framework and research propositions.

Proposed Hypothesis-

The Theory of planned behavior (TPB) was put forth by Ajzen (1985). This theory overcomes the limitations of the theory of reasoned choice (TRA) by adding perceived behavioral control (PBC) to it. As per the theory, perceived behavioral control, Subjective norm, and Attitude act as predictors that might anticipate an individual's behavioural intentions. These intentions then influence their behaviour (Du et al., 2018). According to (Wang, Li & Zhao, 2017; Wang et al., 2018) attitude, subjective norm, and perceived behavioral control are significant factors that influence the EV adoption intention of consumers. However, Ajzen and Cote (2008) highlighted that a person's attitude with regard to a particular technology is the most reliable indicator of their intention to use that technology. Jansson, Marell, and Nordlund (2011) confirmed the findings of Ajzen and Cote (2008) stating attitude to be the most important factor to predict behavioral intention in case of eco-innovations. Further, Schmalfuß, Mühl, & Krems, (2017); Tu & Yang, (2019); Nosi et al., (2017) discovered that subjective norms exert a great influence on behavioral intention to use different kind of technologies and systems in different countries and contexts. Contrary to it, Pradeep, Amshala & Kadali, (2021); Huang & Ge, (2019) found no influence of subjective norms. Therefore, we hypothesize that-

H1: There is positive and significant impact of attitude on EV adoption intentions.

H2: There is positive and significant impact of perceived behavioral control on EV adoption intentions.

H3: There is positive and significant impact of subjective norm on EV adoption intentions.

Jansson, Norlund & Westin, (2017) findings highlight that opinion leadership is a significant factor in explaining EV adoption. While, (Keys, Thomsen & Smith, 2010; Moser and Mosler, 2008) study shows the significant role that opinion leaders hold in encouraging environmentally conscious attitudes and behaviours. On the other hand, according to (Moons and Pelsmacker, 2012) opinion leadership is not found to be correlated with usage intention EV adoption and purchase intention is a pro-environmental behavior, but we hypothesize that: The study conducted by Keys, Thomsen, and Smith (2010) and Moser and Mosler (2008) demonstrates the significant role that opinion leaders have in encouraging environmentally conscious behaviours and behaviours.

H4: There is positive and significant impact of opinion leadership on EV adoption intentions.

The government of various countries including India has formulated policies to support penetration of EVs (Tornatzky, Fleischer, & Chakrabarti, 1990). Liao, (2022) and Gallaghar and Muehlegger (2008) discovered that government incentives significantly influence the uptake of Evs, whereas Diamond (2009) concluded that the correlation among government subsidies and electric vehicle adoption is relatively weak. The government has offered various incentives to the people in UK to increase penetration of EVs and encourage people to adopt eco-friendly alternatives, however they weren't sufficient to influence them and shift their behavior (Lane et al., 2006). According to Sang & Bekhet, (2015) government policies significantly affect usage intention of EVs in Malaysia. While, the results of (Tarei et al, 2021) indicate that financial barriers i.e. high initial cost of EVs acts as barrier in the penetration of EVs. Consequently, the implementation of government incentives is expected to enhance the penetration of EVs. Thereafter, (Coffman et al, 2016) findings show that government should offer incentives of financial nature (minimum of 2000 dollar) as anything less than it (minor incentive) won't be able to make any significant influence for EV adoption. While, (Langbroek et al, 2016) results indicate that policy incentives encourage the purchase of electric vehicles. However, use-based, policies that provide marginal benefits and are non-financial in nature (like free car parking, use of bus lanes etc.) rather than fixed benefits of subsidies are more effective. Furthermore, (Narassimhan & Johnson, 2018) findings indicate that two most imp factors that influence EV adoption are- tax incentives and public infrastructure. However, rebates have been reported to be more influential in comparison to tax credits as consumers prioritize immediate rewards rather than rewards that arrive afterwards and availability of public charging infrastructure has a powerful influence on vehicle purchase decision, particularly in case of PHEV that has limited driving range (very weak on BEV with increased range). Hence, early investment in infrastructural facilities will act as non-financial incentive for early adopters and will increase plug-in electric vehicles (PEV) adoption rate multiple times. Therefore, we hypothesize that-

H5: There is positive and significant impact of financial policy on EV adoption intentions.

H6: There is positive and significant impact of non-financial policy on EV adoption intentions.

When an individual adopts new ideas and technology earlier compared to others, it is termed as consumer innovativeness (Rogers & Shoemaker, 1971). Further, it has been observed that consumers with high innovativeness are more active information collectors of new technologies (He, Zhan & Hu, 2018). (He, Zhan & Hu, 2018; Jansson, 2011) found that electric vehicles will more easily capture the interest of consumers with high consumer innovativeness (CI) compared to others as they have more information on performance, product and policies of EVs. Singh et al, (2023) found that individual innovativeness has a favourable and substantial impact on behavioral intention. In technology acceptance models, such as the one proposed by Venkatesh et al. (2003), Consumer innovativeness has been employed as a moderator that influence the relationship among the antecedents of new

product uptake and behavioural intentions. According to Liao, (2022) consumers who have a high consumer innovativeness are more inclined to adopt EVs to showcase their desire to be leaders in consumer trends and technology. Therefore, we hypothesize that-

H7a: Consumer innovativeness moderates the relationship between financial policy and EV adoption intentions.

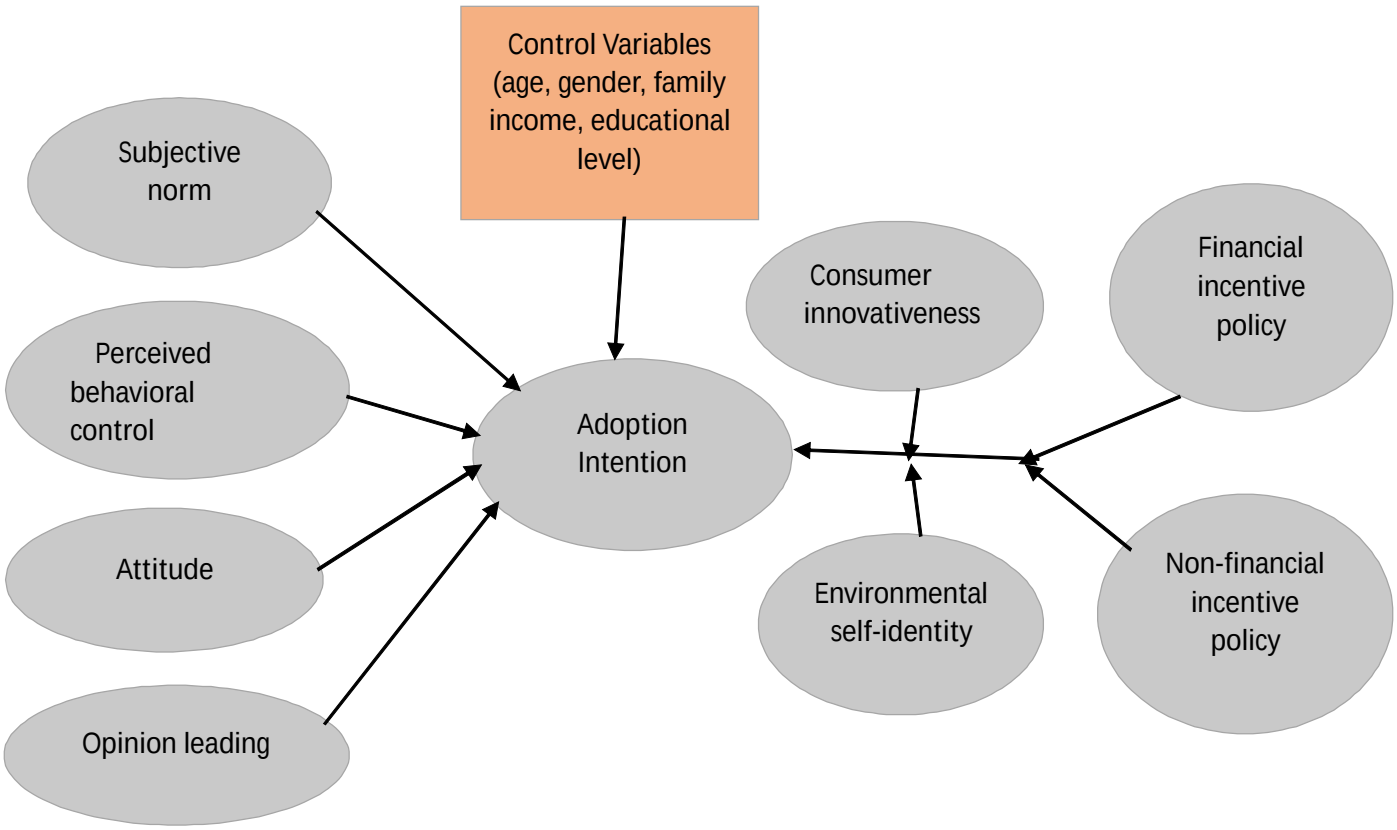
H7b: Consumer innovativeness moderates the relationship between non-financial policy and EV adoption intentions.

Barbarossa et al, (2017) findings reflect that green self-identity directly influence consumer intention to purchase electric cars as they feel motivated to perform pro-environmental behavior. According to Schuitema et al. (2013) people that want to showcase environmentalist self-identity are more probable to hold a favourable attitude towards the different attributes of EVs. Further, it has been observed theoretically that environment -related policies of the government will grab more attention by people with high Environmental self-identity orientation compared to people with low Environmental self-identity and eventually there are more chances for people with high Environmental self-identity to adopt EVs when they believe that incentive policies are beneficial to them. To further intensify their environmentalist self-identity such consumers would be willing to adopt environmentally-friendly products even when they are not getting any surplus benefit from its adoption. Therefore, Environmental self-identity will enhance the influence that policy measures have on EV adoption intention (Liao, 2022). Hence, the following hypothesis are formulated:

H8a. Environmentalist self-identity moderates the relationship between financial policy and EV adoption intentions.

H8b. Environmentalist self-identity moderates the relationship between non-financial policy and EV adoption intentions.

Proposed Conceptual Framework -



As EV technologies advance and prices decrease, the market size of EVs is expected to expand. To accelerate sales, governments must provide compelling incentives that give EVs a competitive advantage in sizable market segments. The global electric vehicle market is projected to grow significantly as countries strive to meet emission reduction targets. Achieving a robust development path for EVs requires a strategic combination of government incentives, infrastructure improvements, and extended driving ranges to reduce vehicular emissions effectively.

Conclusion and Scope for future research:

This study offers a systematic review of literature concerning EVs. firstly, the study sourced journal articles from notable databases and meticulously reviewed them. Subsequently, a critical categorization of 62 selected studies was done based on various criteria. Additionally, the study provided a concise overview of Electric Vehicles fundamentals including definition, sources of publication, theoretical perspective, methodological approach, research themes etc. The review of literature on EV has been conducted in such a way to offer significant insights to researchers and practitioners, thereby enabling a thorough analysis of various aspects. The study is limited to selected peer-reviewed articles and does not encompass the complete body of related material. Consequently, there is immense potential for further research in the area from several perspectives. Most research studies primarily concentrate on factors influencing EV adoption. Future studies can focus more on the sustainability side. Additionally, one can create, implement, and evaluate the compatibility of various research frameworks with EVs. In light of the growing global demand for low-emission transportation options, it is indisputable that electric vehicles possess a promising future in terms of dominating the automobile industry. EVs will compete and capture larger segments of the market as advancements in corresponding technology continue and prices fall further. Until then, governments contemplating the expansion of electric vehicle usage will need to provide incentives that are attractive and compelling enough to provide electric vehicles a competitive advantage in a sufficiently sizable market sector to attract suppliers. There will likely be an increase in the size of the electric vehicle market worldwide. Countries around the world have set up targets for emission reductions according to their own capacity. The right blend of government incentives and infrastructure along with increased range would create a necessary and robust pathway for the advancement and widespread adoption of electric vehicles, which are essential for lowering vehicle emissions.

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