



What drives purchase behavior for electric vehicles among millennials in an emerging market

Thanh Tiep Le^{a,**}, Fauzia Jabeen^{b,c}, Gabriele Santoro^{d,*}

^a Ho Chi Minh City University of Economics and Finance, Ho Chi Minh City, Viet Nam

^b College of Business, Abu Dhabi University, Abu Dhabi, United Arab Emirates

^c Burgundy School of Business, Dijon, France

^d Department of Management, University of Turin, Corso Unione Sovietica 218bis, Turin, Italy

ARTICLE INFO

Handling Editor: Cecilia Maria Villas Bôas de Almeida

Keywords:

Electric vehicles (EVs)
Millennials
Self-identity
Purchase orientation
Purchase behavior

ABSTRACT

The transport sector is recognized as a crucial source of emissions. In this regard, electric vehicles (EVs) are a promising technology that can address this issue. Although EV are introduced as an optimal alternative, how to convince people to adopt EVs is still a challenging question. Therefore, further research on how to promote EVs adoption is necessary. Given this context, this study responds to the call by examining whether self-identity has an impact on EVs purchase orientation and behavior amongst millennials in Vietnam, an emerging market. Particularly, the Unified Theory of Acceptance and Use of Technology (UTAUT) framework plays a key part in this study's moderating process. Utilizing primary data gathered through a survey with a questionnaire, this study takes a quantitative method. The survey yielded 485 legitimate replies. The findings indicate that self-identity has a direct and indirect impact on EVs purchase behavior. In this relationship, purchase orientation plays a mediation role and UTAUT measures (consumers' expectancy and objective motivation) play a moderation role. By presenting a fresh strategy for accelerating EVs adoption in practice, the study greatly adds to the body of literature already written in this field. Therefore, academics, researchers, decision-makers, experts, and expounders could find this contribution interesting.

1. Introduction

Global warming and emissions are constantly increasing, causing environmental issues such as climate change and worsening air quality (Degirmenci and Breitner, 2017). In this regard, an important source of emissions is the transportation industry (Statista, 2020) that accounts for nearly a quarter of worldwide carbon dioxide (CO₂) emissions which is an important component of greenhouse gases that significantly contributes to global warming (International Energy Agency, 2016). In particular, road transport accounts for approximately three-fourths of them (International Energy Agency, 2016). In this context, boosting the production and adoption of electric vehicles (EVs) can be an alternative to internal combustion vehicles which in turn can reduce emissions and thus improve environmental quality (Degirmenci and Breitner, 2017; Anwar et al., 2023). However, how to foster EVs adoption remains challenging at the industry and government levels due to the nature of this product (Salari, 2022). In an effort to lessen the negative

environmental effects of transportation, western countries have taken steps to phase out conventional automobiles and encourage electric vehicles (Hasan, 2021). Unlike developed countries, EVs in emerging markets such as Vietnam are still in the early stages (Hoang et al., 2022).

Salari (2022) emphasizes that since EVs are introduced into the consumer market, the most challenging task for the industry and government is how to convince people to adopt EVs. From the consumer's perspective, studies on the purchase intention for EVs are only recently emerging. For instance, a recent study by Vafaei-Zadeh et al. (2022) explores the variables influencing consumers' intention to purchase electric automobiles, focusing on Generation Y in Malaysia. This study found that factors (attitudes, personal concepts, cognitive behavioral control, price, and self-image of the environment) positively affected the desire to purchase EVs, while the perceived danger element produced the reverse result. In addition, earlier research by Degirmenci and Breitner (2017) studied the factors that predicted purchase intention and discovered that an EV's environmental performance was the

* Corresponding author.

** Corresponding author.

E-mail addresses: tieplt@uef.edu.vn (T.T. Le), fauzia.jabeen@adu.ac.ae (F. Jabeen), gabriele.santoro@unito.it (G. Santoro).

strongest predictor of attitude leading to purchase intention compared to price and confidence range. Likewise, Plananska and Gamma (2022) examined the factors affecting the prospective Swiss users of EVs and detected that the bundles of EVs and charging services could increase their purchase willingness. Furthermore, a recent study by He et al. (2022) explained how attitudes, cognitive behavioral control, and emotional components (positive emotions for environmental benefits and negative emotions for environmental risks) favorably and effectively affected purchasing desire. Although purchase intention has been explored from such different angles (Jabeen et al., 2023), purchase behavior (PB) appeared to be insufficiently investigated by current research (Hoang et al., 2022). In this sense, only when PB is formed, the goal of promoting EVs adoption is achieved, and reducing the burden on the environment can become a reality (Hoang et al., 2022).

In the field of research on consumer intentional behavior (Talwar et al., 2021), self-identity (SI) is primarily used to explain the intentional behavior of consumers towards a particular product or brand (Patel et al., 2020; Legere and Kang, 2020; Bharti et al., 2022). For instance, a recent study by Mishra et al. (2023) expressed that environmental SI had an influence on the intention to buy sustainable products (Mehmood et al., 2023) concerning apparel. Likewise, the outcomes of Zaman et al. (2022) showed that ethical SI influenced consumer purchasing behavior for biodegradable bags. Further, Sharma et al. (2022) analyzed the factors affecting the green buying behavior of consumers in India and observed that SI had an influence on the formation of the green purchase intention process of consumers. Despite this, to the best of our knowledge, SI has never been related to EVs purchase behavior.

SI should be important in explaining the propensity to buy EVs, considering specifically millennials, based on the following reasoning. It is assumed that the transportation system matters to millennials in making decisions about where to work and where to live (Fisher and Skopec, 2019) (cited in Ju and Kim, 2022b). Through the lens of Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), acceptance of technology is a fundamental factor that can enable the shift from intentional to behavioral to adopt products applying accepted technology. Millennials are seen as sensitive to technology in today's technological age, particularly cutting-edge technology. In addition, this generation is predicted, in the future, to be the primary consumer of electric vehicles (Carzone, 2020; Ju and Kim, 2022b).

Further, according to the Norm Activation Model (NAM) (Schwartz, 1977), an individual's normative behavior is shaped by his or her sense of responsibility when a particular behavior is performed and by self-awareness about what he or she ought to and should not do. According to this strategy, self-identity is represented in self-awareness and a sense of responsibility as a way for consumers to position themselves as socially and ecologically conscious users. In essence, they describe themselves as being attentive to society and environmental challenges. Accordingly, they are aware that they have to share with the general community about these issues through their consumption behavior (Ashfaq et al., 2023). Therefore, in this context, self-identity should be highly relevant to explain the propensity to buy EVs, especially millennial-centric consumers. But more research is needed, particularly on millennial adopters, according to the literature currently available on the subject of consumer behavior and EVs uptake (Ju and Kim, 2022b).

In response to the above gap, this study focuses on examining how to boost consumers' behavior towards EVs in emerging markets as an attempt to bridge the existing void between knowledge and practice. The primary purpose of this study is therefore to explore the mechanism driving purchase behavior in the EVs sector in one of the emerging markets in Southeast Asia region. In this regard, this study focuses on millennials in Vietnam for the following reasons. First, Vietnam is an emerging market where millennials generation accounts for about 30% of the total population of Vietnam (UNESCAP, 2019). Second, Vietnam is a country in which people still prefer private vehicles rather than public transport. This practice contributes significantly to the intensity of emissions, adversely affects the environment and contributes greatly

to the climate change problem (Salari, 2022).

In response, this study explores whether millennials' self-identity (SI) affects their purchase orientation (PO) and purchase behavior (PB) in emerging countries. Along with that, this study assesses whether age, gender, income, education, or profession, affects purchase orientation. Coupled with SI, ownership psychological theory (POT) is used to underpin the explanation of one's behavioral intention towards an ecofriendly product (Mishra et al., 2023). In addition, in the field of technology-based products such as EVs, customers' buying intentions and behavior are thought to be influenced by the Unified Theory of Acceptance and Use of Technology (UTAUT) paradigm (Hoang et al., 2022). In the present research, UTAUT is used to scrutinize if its components vary the transition from PO to PB. In other words, this study further probes whether the UTAUT model moderates the relationship between PO and PB. Along with that, the current study also uses the Norm Activation Model (NAM) (Schwartz, 1977) to explain the benevolent and green conduct of EVs users. In this research scenario, we focused on millennials because this generation is identified as sustainability-loving (Deloitte Report, 2019).

The goal of this study, therefore, is to scout the mechanism by which SI may influence PO and PB, with the moderation role of the UTAUT model in the transition between PO and PB. Along with that, this research aims to evaluate if age, sex, income, education, or profession affects purchase orientation. The following issues must be covered by the current study in order to achieve the goals stated:

RQ1. How does self-identity affect purchase orientation and purchase conduct regarding electric vehicles?

RQ2. How does the UTAUT model affect the relationship between purchase orientation and purchase actions concerning electric vehicles?

RQ3. Do demographic factors of millennials impact purchase orientation in the context of electric vehicles?

Three contributions are made by this study. Initially, this research adds to the existing literature on the relationships between psychology and emotions and consumer's intentional behavior by providing empirical evidence of a positive and significant impact of self-identity on consumer desires and behavior in the field of electric vehicles. This contribution is novel as the current literature has not sufficiently explored this area. The second way that this research contributes to the body of literature is by offering a multitheoretical approach that combines the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), integrated Theory of Planned Behavior (TPB) (Ajzen, 1991), Norm Activation Model (NAM) (Schwartz, 1977), and Psychological Ownership Theory (POT) (Pierce et al., 2003). Lastly, this research contributes to the body of literature by offering suggestions for inspiring and motivating millennials to embrace electric vehicles in the future. This is important for the socioeconomic climate as well as the environment.

2. Literature review and hypothesis development

2.1. Recent studies in the field of electric vehicle adoption

This section presents recent studies related to this research topic (a review is depicted in Table 1). This review shows that recent research in the area of intention and behavior of EVs consumption has increased, mainly approaching from a psychological, emotional, and normative perspective to find out the determinants that either promote or hinder consumer's intention and behavior to adopt EVs. Hence, further studies should be necessary to dive into specific determinants for specific contexts. By doing this, the deliverable implications should be deeper and, therefore, will be better in terms of value creation. In this regard, although self-identity (SI) is important to explain the propensity to buy EVs, the current literature indicates that it requires additional investigation employing a more thorough approach to allow for in-depth

Table 1
Overviewing of related studies

Year	Author (s)	Framework	Key findings
2023	Hu et al.	This study unpacks the influence of information overload on the intention to purchase EVs in the Chinese market using the frame of Stimuli Organism Response.	1. Consumer perception of value and effectiveness positively and significantly influences on EVs purchase intention. 2. Consumer perception of risk has a significant and negative effect on EVs purchase intention. Information overload (information quality) is significantly correlated with consumers' perception of value, effectiveness, and risk.
2022	Salari	This study examines the behavior of EVs adoption in the UK, approaching from synthesizing the technological readiness index with environmental protection values and instrumental attributes, theoretically anchored in value theory, utilitarian benefits theory, and innovation diffusion theory.	1. The technology readiness index significantly drives EVs' purchase intention alongside driving range, convenience, and fuel costs. 2. EVs are not necessarily aimed at environmentalist consumers by default.
2022	Ju and Kim	This study explores the relationship between environmental concerns and consumers' perception of EVs characteristics on resistance to EVs acceptance of millennials in US and Korean settings through the lens of innovation resistance theory.	1. There are significant country-to-country differences in the relationship between environmental concerns, perceived EVs characteristics, and consumer resistance to EVs. 2. Consumer's environmental concern is relevant to perceived EVs characteristics which associate with resistance to EVs adoption.
2022	Hu et al.	This study unpacks the influence of data excess on the intention to buy EVs in the Chinese market using the frame of Stimuli Organism Response.	3. Consumer perception of value and effectiveness positively and significantly influences EVs' purchase intention. 4. Consumer perception of danger significantly and critically affects EVs' purchase desire. 5. Information overload (information quality) is significantly correlated with consumers' perception of value, effectiveness, and risk.
2022	He et al.	This study investigated the role of emotions in EVs' purchase intention in China settings. Specifically, this study incorporated emotions (positive and negative) and moral norms into the Theory of Planned Behavior to examine how EVs' purchase intention is driven.	1. Positive emotions, attitudes, negative emotions, and perceived behavioral control have an influence (diminishing) on EVs' purchase intention. 2. In addition, there is a difference in the influence of these factors between the high-income sample group and the low-income sample group.
2022	Sriram et al.	This study evaluates the variables affecting the acceptance of EVs in India, grounded in planned behavior theory.	Barriers (tangible and intangible such as financial, vehicle functionality, dearth of charging infrastructure, ecological conservation, societal impact, and social

Table 1 (continued)

Year	Author (s)	Framework	Key findings
2022	Vafaei-Zadeh et al.	Based on the idea of planned behavior and the technological acceptance model, this study investigates Malaysia's Generation Y's intentions to acquire electric vehicles.	perception of EVs) are the factors influencing the adoption of EVs. 1. Customer impression, particularly in terms of usability and simplicity, has a favorable and considerable impact on customer sentiments. 2. Favorable attitudes, social pressures, personal beliefs about control, pricing, and self-perception related to the environment all contribute positively to the willingness to buy electric vehicles (EVs). 3. Consumers' perception of risk has the opposite effect on purchase intention behavior.
2021	Cui et al.	This study predicts determining factors affecting the purchase motivation of EVs users in China, using Maslow's Hierarchy of Needs.	EVs purchase motivation can be predicted by environmental considerations, cost awareness, adventure seeking, social impact, and self-worth. Importantly, environmental concern is the most crucial predictor.
2021	Asadi et al.	Grounded in the Norm Activation Model and the Theory of Planned Behavior, this study discusses the elements affecting consumers' wish to adopt EVs in Malaysia.	Perceived value, attitude, responsibility, norms (subjective, personal), and perceived effectiveness and consequences significantly and positively affect consumers' intention to buy EVs.
2019	Chu et al.	The adoption and happiness of users of electric vehicles in both Chinese and Korean contexts are evaluated in this study in terms of emotional and behavioral aspects.	1. The determinants of electric vehicle buying behavior of Chinese and Korean users are different. Specifically, environmental concerns are most important to Chinese users while the goal of minimizing operating costs is the most important deciding factor for Korean users. 2. Satisfaction is related to the initial purchase motive. Battery range and charging are the two most important factors that affect users' satisfaction.
2018	He et al.	Based on decision-making theory, this study investigated the valence framework incorporating three major variables, namely, personality (an independent variable consisting of two components: personal innovativeness and environmental concern), perception (a mediating variable consisting of two major components: positive utility and negative utility), and purchase intention (a dependent variable) in China settings.	1. Personality (personal innovativeness and environmental concern) directly affects EVs' purchase intention. 2. Perception (positive utility and negative utility) mediates the link between personality and purchase intention.

The authors' own work.

assessment. In response, the present research focuses on studying the relationship between SI, purchase orientation (PO), and purchase behavior (PB) grounded in a combination of theories: Unified Theory of Acceptance and Use of Technology, integrated Theory of Planned Behavior, Norm Activation Model, and Psychological Ownership Theory.

2.2. Theoretical background

Since the model of the present research is to measure psychological, cognitive, and intentional behavior factors, therefore, this study incorporates the theoretical models of Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), integrated Theory of Planned Behavior (TPB) (Ajzen, 1991), Norm Activation Model (NAM) (Schwartz, 1977), and Psychological Ownership Theory (POT) (Pierce et al., 2003) to explain the relationships between them. Specifically, UTAUT was created based on a fusion of well-known technological acceptance theories which is used in the present research to primarily explain why users accept to use EV. In this context, it explains the relationship between purchase orientation and purchase behavior of EVs users. This theoretical model is used in the existing literature to highlight the relationship between purchase intention and purchase behavior. In addition, NAM is used to primarily display consumer's self-identity in the field of EV. This theoretical model is currently adopted in the existing literature (Hoang et al., 2022). Lastly, POT is used to explain why SI affects PO and PB in this research context.

According to Samaradiwakara and Gunawardena (2014), UTAUT has a reliable analytical structure to examine the user's acceptance of technology. In this context, using the perspective of UTAUT can illustrate why customers decide to use EVs. In this respect, customers make the decision to use EVs because they accept technology adoption. The UTAUT theoretical model is quite commonly used in the domain of studying the intentional behavior of consumers and customers of technology-based products such as studies by Arif et al. (2018) for web-based service, Ronaghi and Forouharfar (2020) for IoT (Internet of Things), and Rahi et al. (2018) for online (internet-based) banking. Based on Venkatesh et al.'s study (2003), the UTAUT design includes four main components referring to performance expectations, attempt expectancy, social impact, and facilitating circumstances. Each of them implies a different influencing field that is expected to impact individual customers' intentional behavior (Hoang et al., 2022). In the context of the present study, UTAUT is examined as a moderator in the relationship between PO and PB. In this respect, UTAUT is approached including expectancy measures (performance and efforts) and objective motivational measures (social influence and favorable conditions).

The Norm Activation Model (NAM), developed by Schwartz in 1977, was initially intended to explain congenial behavior but was later expanded to include proenvironmental behavior. From this perspective, one's intentions are determined by their unique norms, which are dominated by their understanding of the issues affecting society and any potential repercussions as well as their sense of duty to face them (Asadi et al., 2021). According to Onwezen et al. (2013), the core of the NAM model is formed by personal norms which are used to predict individual behavior. Schwartz (1977) emphasizes that these personal norms are shaped by two main factors which are self-awareness (should or should not engage in a specific behavior that has specific outcomes) and a sense of responsibility for taking particular behaviors. In addition to this, TPB is a well-developed theory in the field of social psychology research which has been validated in the proenvironmental behavior context (Arvola et al., 2008). From the TPB perspective, viewpoints, individual norms, and cognitive behavioral control are factors that determine intention; sequentially, intention is an important predictor of behavior (Onwezen et al., 2013). In the present study context, TPB and NAM are integrated to reveal the conversion from PO to PB. Harland et al. (1999) emphasized that individual standards differed from the explained discrepancy of desire-behavior relationship in TPB. In this context,

integrating NAM and TPB can best reflect behavioral intention for EVs as a proenvironmental behavior (Asadi et al., 2021; Onwezen et al., 2013).

In line with Pierce et al. (2003), POT refers to the situation where a person attempts to connect his or her sense with the general common sense of a situation or item. By doing this, such individual attempts to build a close connection between themselves and a wider community. Mishra et al. (2023) emphasize that, regardless of legal ownership, psychological ownership emerged and evolved when one realized their right of control over their possession. So, a sense of positive ownership develops when a person is aware of their accountability for the results while also believing that their participation has an impact on those results (Fuchs et al., 2010). From a POT point of view, this study attempts to elucidate the connection between SI, PO, and PB of millennials for EV. Mishra et al. (2023) recently studied user-intentional behavior in the domain of sustainable products using the lens of POT to explore the relationship between environmental SI and purchase intention. They found that environmental SI had a direct relationship with purchase intention; simultaneously, POT partially moderates this relationship.

Overall, the framework of the present research is developed on the analytical ground of UTAUT, TPB-NAM integrated model, and POT. Grounded in TPB-NAM integrated theoretical model, a person's norms in society are tied to social norms and values; therefore, in the context of this research, people perceive that the EVs model is an appropriate alternative to reduce environmental issues from mobility activities. This perception is derived from their concerns for the environment and society. This is in the early stages of the decision-making process of EVs adoption. However, Ju and Kim (2022a) suggest that taking care of the environment does not necessarily translate into taking action like purchasing EVs. Therefore, this research incorporates POT and UTAUT theoretical models exploring SI as a form of self-identification in their concern for the environment and society, leading to the orientation to purchase EVs as technology-based environmentally friendly products. In this flow, UTAUT can participate to clarify the shift from purchase orientation to purchase behavior for EVs.

2.3. Conceptualizations

2.3.1. Self-identity (SI)

The key aspect of an actor's identity that is related to a specific behavior is referred to as SI. It illustrates how much a performer believes they meet the requirements for any given society function (Conner and Armitage, 1998). Oyserman et al. (2012) argue that SI involves sequential relationships in both personal and social identities, which systematically function towards the construction of an individual's behavioral sequence. Oyserman (2009) emphasizes that an individual's behavior, whether at the conscious or unconscious level, is influenced by many aspects of SI. Many aspects, among others, tend to lean towards proenvironmental actions. In the field of ecofriendly products, the role of SI has been mainly explored in buying behaviors (Patel et al., 2020; Legere and Kang, 2020; Dermody et al., 2018). In the field of EVs, White and Sintov (2017) claim that SI behavior has been established as one of the principal drivers of intention to promote EVs because EVs can match an individual's SI. In addition, Heffner et al. (2007) emphasize that adopting an EV is meaningful to society and people.

2.3.2. Purchase orientation

At an organizational level, Anderson et al. (2009) suggest that PO can be defined as a philosophy that guides managers in the process of making purchasing decisions. Along with that, Hedaa and Ritter (2005) consider PO as a set of established standards and criteria based on organizational norms and culture, as well as expected awareness and behavior. At the individual level, PO is conceptualized as a set of criteria and standards that govern intentional behavior and ownership psychology towards a particular object. According to Mahlamäki et al. (2014), PO is classified as a strategic level in the area of purchasing behavior. In this context, the primary audience is millennial individuals

who have been highlighted by previous studies for their likely resistance to EVs (Ju and Kim, 2022b); therefore, it is crucial to scout the role of millennials' PO in behavioral intention for EV.

2.3.3. Purchase behavior

Purchase behavior (PB) is a vital stage of the purchase decision-making operation which is viewed as a step forward after purchase intention (Hoang et al., 2022). PB is of high interest to stakeholders because, in reality, the intention-behavior gap is found significant (Moghavvemi et al., 2015). In the field of EVs, the current literature mainly prospects purchase intention rather than purchase behavior (Hoang et al., 2022). For instance, Degirmenci and Breitner (2017) forecast attitudes and intentions towards EVs through the environmental performance of EV; Habich-Sobiegalla et al. (2018) dig into purchase intention for EVs; Ju and Kim (2022) probe millennials' resistance to EVs in Korean and American markets. According to Salari (2022), PB can be driven by criteria associated with social norms. Based on the above arguments, understanding the factors driving PB is crucial to the success of the EVs industry especially in the emerging market (Hoang et al., 2022).

2.4. Hypothesis development

2.4.1. The relationship between self-identity, purchase orientation, and purchase behavior

In the field of consumer behavior, Kahn (2007) debates that one's behavioral intentions are often prompted by others in their community and social norms (Araghi et al., 2014). Pierce et al. (2001) underline that a sense of psychological ownership towards an object arises when individuals are able to establish an intimate connection with and comprehend the object. Previous studies stress that SI can be used to predict behavioral intentions (Charng et al., 1988). In addition, as articulated by Liao et al. (2017), EVs adoption is driven by environmental concerns; thus, individual norms in ecofriendly behavior are considered the most relevant in driving the decision. Barbarossa et al. (2017) observed that green SI had a direct and indirect influence on the intention to adopt EV. In this context, personal values, environmental self-identity, and ethical-related motives are perceived as predictors of proenvironmental behavior.

On the other hand, He et al. (2018) claim that the behavioral intention to buy and adopt EVs significantly depends on consumers' perceptions and beliefs. In agreement with Wang et al. (2016), as consumers gain more control over factors such as their perception of the technology, pricing, availability, and understanding of how to use electric vehicles (EVs), their likelihood of developing a behavioral intention to purchase an EV increases. From the TPB and NAM perspective, the stronger the intention to associate self with environmental issues and social norms, the higher the self-identity towards proenvironmental behaviors. As a result, this process leads to transforming that intention into buying action (Secinaro et al., 2022; Hoang et al., 2022). In this context, millennials are focused as this generation is perceived as sustainability-loving (Deloitte Report, 2019). In addition, Doster (2013) pinpoints that environmental SI influences the intention to purchase proenvironmental products, being considered an important factor for millennial consumers. Grounded in the integrated theoretical framework of NAM and TPB, the role of SI is assumed to boost PO which in turn promotes PB. Therefore, these relationships can be hypothesized as follows:

Hypothesis 1. (H1). SI positively affects PO.

Hypothesis 2. (H2). PO positively affects PB.

Hypothesis 3. (H3). SI positively affects PB.

Hypothesis 4. (H4). PO mediates the relationship between SI and PB.

2.4.2. The role of the UTAUT theoretical model in the link between purchase orientation and purchase behavior

In this research scenario, we primarily examine the role of UTAUT (Venkatesh et al., 2003) from the perspective of expectancy measures (performance and efforts) and objective motivational measures (social influence and favorable conditions) in the relationship between PO and PB. According to Venkatesh et al. (2003), performance expectancy denotes an individual's perception of how an object can be valuable in enhancing specific aspects of their performance. In this context, EVs are widely known for their benefits to users such as economic efficiency, reduced air pollution and emissions, and low noise (Jain et al., 2022; Degirmenci and Breitner, 2017). Liao et al. (2017) clarify that, in the field of EVs consumption behavior, consumers are intrinsically attracted to technology and boosted by technical-related attributes and preferences. In this regard, sociodemographic characteristics, usage profiles, and social impact are the determinants that govern the behavioral intention of consumers (Liao et al., 2017).

Kahn (2007) argues that one's behavioral intentions are often guided by others in their social community. Grounded in the theoretical model of UTAUT and POT, the extent to which purchase intention for an EV is converted into EVs buying behavior depends on the degree of technology acceptance (Samaradiwakara and Gunawardena, 2014) and the desire to own an EV (Pierce et al., 2001). This study focuses on scrutinizing the behavioral intentions of millennials for EVs because they are perceived as sustainability-loving (Deloitte Report, 2019); however, Ju and Kim (2022a) elucidate that this generation does not prefer EVs and finds that about 70% of millennial consumers are not interested in buying an EV. Mishra et al. (2023) posit that consumers establish an emotional connection with an object when they have knowledge and understanding of it, when they experience it, when they perceive its efficiency, and when they make psychological and physical efforts towards it.

Research by Hoang et al. (2022) found that customer's expectancy (performance and effort) had a positive relationship with purchase intention in the field of battery electric vehicles. According to the theories of POT and SAM, customer expectations play a crucial part in the relationship between PI and PB. If individuals perceive a product as valuable not only for themselves but also for society and the environment, and they feel in control of their decision, they are more likely to act on their purchase intention and make the purchase, in line with their moral values (Asadi et al., 2021). According to millennials' characteristics, their understanding of sustainability has a significant influence on their purchase intentions and decisions (Su et al., 2019).

Given the above arguments, the involvement of UTAUT in the connection between PO and PB can be supposed as follows:

Hypothesis 5. (H5). Expectancy measures moderate the relationship between PO and PB.

Hypothesis 6. (H6). Objective motivational measures moderate the relationship between PO and PB.

3. Research model, constructs, and items

3.1. Research model

As stated by the aforementioned discussions and arguments, the model of the present study is modified encompassing one independent variable (self-identity), one mediating variable (purchase orientation), one dependent variable (purchase behavior), and 2 moderating variables (user's expectancy and objective motivational measures). In addition to this, control variables are also employed to prospect their impact on purchase orientation. In this context, the control variables comprise five measures which are age, gender, income, education, and profession. Given these characteristics, the model of this research is proposed as shown in Fig. 1 as follows.

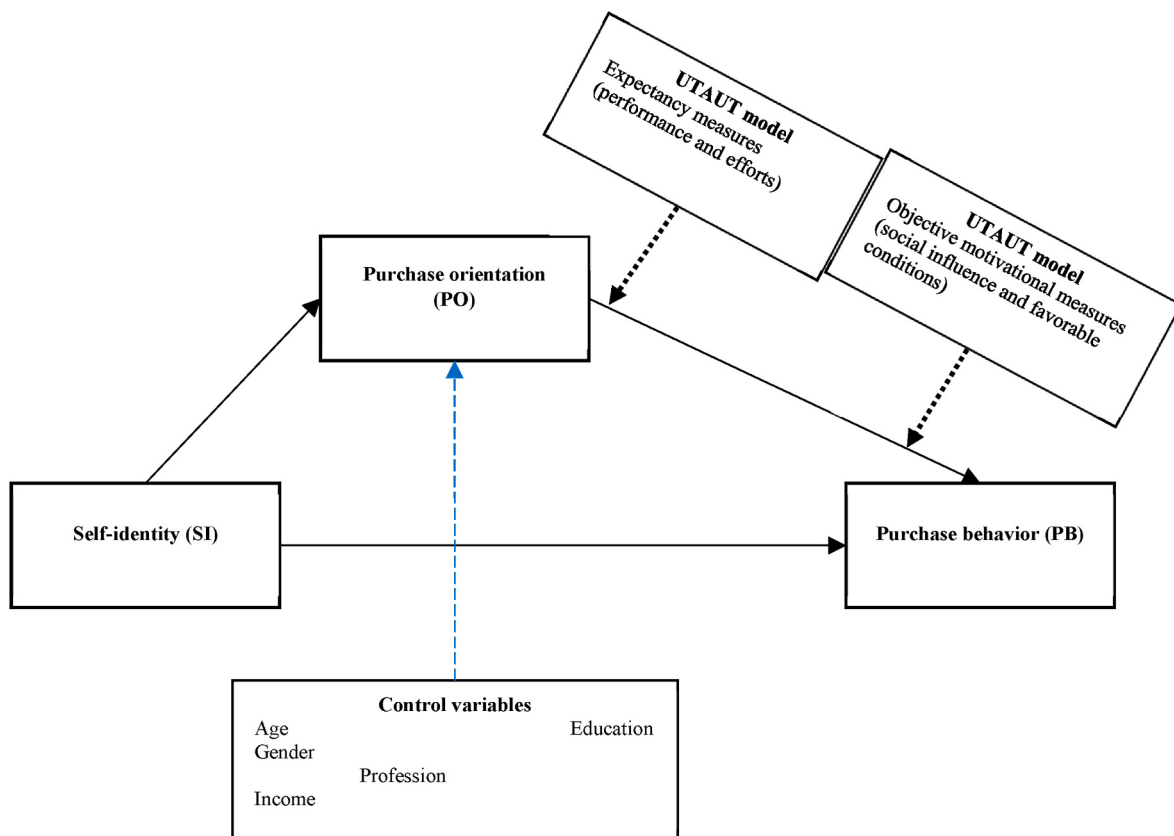


Fig. 1. The proposed research model.

3.2. Variables and items

Based on literature reviews and the research context, constructs' items were developed to best suit this research's framework. Specifically, self-identity has five items that are adopted from Mishra et al. (2023) and Verplanken and Holland (2002); purchase orientation encloses four items that are embraced by Zhou et al. (2021) and Lindgreen et al. (2009); purchase behavior consists of 5 items that are acquired from Zhou et al. (2021) and Adnan et al. (2017); consumer's expectancy and objective motivation entail eight items each that are, respectively, approved from Secinaro et al. (2022), Jain et al. (2022), Globisch et al. (2019), Zhou et al. (2021), Globisch et al. (2019), and Liao et al. (2017). Table 2 exhibits the specifics of elements, items, and sources. In addition, their measures are presented in Appendix 1 below.

4. Methodology

4.1. Research design

The main objective of this research is to dig into the mechanism driving purchase behavior in the EVs sector in one of the emerging markets in the Southeast Asia region. In this regard, this study focuses on millennials in Vietnam for the following reasons. First, Vietnam is an emerging market where the millennials generation accounts for 30% of the total population of Vietnam (UNESCAP, 2019). Second, Vietnam is a country in which people still prefer private vehicles rather than public transport. This practice contributes significantly to the intensity of emissions, adversely affects the environment, and contributes greatly to the climate change problem (Salari, 2022).

The research focuses on millennials who were born between 1981 and 1996 (Dimock, 2019) and are highlighted for their preference for adopting ecofriendly, ethical, and durable products (Mishra et al., 2023). Compared to previous generations, millennials are more attuned

to sustainability-related issues that have a substantial influence on their buying intentions and actions (Su et al., 2019). Furthermore, millennials differ from previous generations in terms of lifestyle, thinking, and behavioral patterns (Twenge et al., 2012; Casalegno et al., 2022). It is interesting to note that, somehow against expectations, millennials do not like EVs (EY Global, 2020), even tending to resist adopting EVs (Ju and Kim, 2022b). Given the above highlights, this context is worth researching.

As a field of scientific research, this study employs a quantitative methodology and young EVs customers in imminent markets. Therefore, the intended audience of this research is EVs users aged in a range of 26 and 41 years old (up to the year 2022). In this study, the sample was chosen on a probability ground. The probability ground was adopted to enable generalization of what is found in the study to the target population. This research employs key information obtained from a questionnaire-based poll. The survey was conducted on an online platform. In this regard, a survey link was sent to the target population groups through trade unions. Through the executive committee of trade unions, participants were reached to for taking the survey. Specifically, union members were sent a survey link that designed with screening steps to find out the right audience in accordance to the purpose of this study. Along with that, a summary was attached to summarize this research and introduce the steps to participants. The flow of the questionnaire process was initiated by screening questions to identify the right participants. The initial query in this flow checks to see if the respondent belongs to the millennial generation. Are you born between the years 1981 and 1996, specifically? The respondent was asked to select one of the two available answers, "Yes" or "No." The scenario for the "Yes" answer is that the respondent was asked to specify their actual year of birth. This step ended the screening stage. The flow was then shifted to the next screening question regarding EVs adoption. Specifically, whether the responder made the decision to purchase an EV was the question posed to them. With this question, the EVs concept was

Table 2
Constructs, items, and sources.

Variables	Items	Description	Sources
Self-identity (SI)	SI1	Purchasing an EV makes me feel like I am an ecoresponsible person	Mishra et al. (2023); Verplanken and Holland (2002)
	SI2	I feel proud to be an ecoresponsible consumer	
	SI3	Driving an EV makes me feel I am contributing to the environment protection	
	SI4	Adopting ecofriendly products makes me feel like my intentional behaviors are rooted in central environmental values	
	SI5	My self-identified values are tied to proenvironmental and prosocial behavioral decision	
Purchase orientation (PO)	PO1	I love to purchase technological-based & ecofriendly products	Zhou et al. (2021); Lindgreen et al. (2009)
	PO2	I like to use EVs for personal transportation	
	PO3	I will continue to purchase EVs in the future when a more technologically advanced version is available	
	PO4	I always thought of introducing EVs to the community around me	
Purchase behavior (PB)	PB1	Deciding to purchase an EV is a pleasant experience	Adnan et al. (2017); Zhou et al. (2021)
	PB2	I believe that making an EV purchase is a right choice	
	PB3	When purchasing a vehicle, an EV is the top of my mind	
	PB4	Whenever there is a chance, I will persuade my acquaintances to use EVs	
	PB5	I believe that EVs adoption is a proenvironmental and prosocial behavior	
Consumer's expectancy	EX1	An EV is useful for my life in general	Secinaro et al. (2022); Jain et al. (2022); Globisch et al. (2019)
	EX2	Adopting an EV helps reduce emissions and air pollution	
	EX3	Adopting EVs enhances my transportation performance	
	EX4	Economical operating costs and acceptable travel distance per charge are considered	
	EX5	Learning to drive an EV is easy	
	EX6	Maintaining EVs is convenient and cost-conscious	
	EX7	The charging system is convenient	
	EX8	An EV controller is understandable and easy to use	
Objective motivation	OB1	People who are influential on me recommend that I should purchase an EV	Zhou et al. (2021); Globisch et al. (2019); Liao et al. (2017) (20)
	OB2	People who are influential on me think that adopting an EV is a good idea	
	OB3	People who are important to me tell me that driving an EV is considered ecofriendly	
	OB4	The community around me all think that owning an EV is a wise decision	
	OB5	Financial support from the government is regraded	

Table 2 (continued)

Variables	Items	Description	Sources
	OB6	A good customer care policy is offered by EVs brands	The authors' own work.
	OB7	There is an advanced technology application	
	OB8	There is supportive infrastructure, especially widely spread charging stations	

The authors' own work.

described for the respondent's accurate response. To address this question, the respondent was asked to choose 1 of the 2 options: "Yes" or "No" by clicking on the box that matches their answer. For the answer "Yes," the system would be shifted to the demographical questions and then key survey questions. For the answer "No," the screening stage ended with a line thanking the participant for their time.

4.2. Content validation of the measurement items

In order to start this procedure, a form to validate the content was created. Appendix 2 presents a content validation form which is helpful to make expectations clear to the expert review panel, thereby facilitating the assessment. A review panel consists of six members who are experts and professionals in the field. In this regard, the domains and corresponding items are reviewed and scored according to its relevance to the scenario of this study. The assessment practice was adopted from previous studies (Polit and Beck, 2006; Polit et al., 2007; Lynn, 1986). The scores used are "1" and "0". In this regard, score "1" represents "high relevance" rating and score "0" represents "low relevance" rating. Based on the scores gained, content validity index (CVI) including item-level content validity (I-CVI) and scale-item content validity (S-CVI) were computed. Compared with the CVI acceptance threshold (0.83) for a six-expert review panel (Polit and Beck, 2006; Polit et al., 2007; Lynn, 1986), the calculated CVI (both I-CVI and S-CVI) are greater than the suggested acceptable threshold (1). Therefore, contents (both at item and scale levels) are validated.

4.3. Instrument for survey

This research uses questionnaires to collect primary data through surveys. The questionnaire was developed based on measures to address the research questions. The questionnaire was originally presented in English. The initial questionnaire was evaluated by six experts and professionals in the field. Based on their assessments and comments, the questionnaire was adjusted and refined to be more concise and relevant to the research context. It was then interpreted into Vietnamese by a professional who is an expert in both Vietnamese and English. The main component of the questionnaire is structured into two parts that covered demographic questions and survey questions. The completed questionnaire was prechecked by 50 persons who have homogeneous backgrounds to the desired audience. This pretesting procedure was intended to assess the clarity of the survey content and the respondent's answerability. The survey was created using a Likert scale with a maximum score of 5, with 1 denoting "strongly disagree/absolutely no" and 5 standing for "strongly agree/absolutely yes." On a scale from 1 to 5, respondents were inquired to select just 1 of the points that best matched their answers.

4.4. Data collection and analysis

The questionnaire was carried out from mid-August 2022 to mid-December 2022. The answer sheets were collected and carefully checked to exclude inappropriate sheets (e.g., missing or inappropriate answers). The collected data was used for analysis using SEM (structural

equation model) software and SmartPLS (partial least square) technique. As reported by Sarstedt and Cheah, 2019, compared with VisualPLS and PLS-Graph, SmartPLS is rated excellent for ease of use, user-friendly interface, safety, and high reporting quality. In quantitative research, PLS-SEM is the most recommended because of its advantage over other methods (Chin, 1998), particularly suitable for models that have complex relationship structures (direct, indirect, mediation, and moderation) (Hair et al., 2019). This technique is widely used in the scope of social science studies in which this research is relevant. This method is also used in the current literature such as studies by Sharma et al. (2022) to probe the relationship between green SI and green purchase intention, Ju and Kim (2022b) to investigate the factors associated with EVs resistance of millennials' generation, and Degirmenci and Breitner (2017) to evaluate the role of environmental performance, relative to price value and confidence ranges in relation to consumer purchase intentions for EVs.

4.5. Control variables and their relationship with purchase orientation

Sociodemographic characteristics have an impact on consumers' behavioral intentions for choosing EVs and adopting EVs (Secinaro et al., 2022). For instance, Ning et al. (2020) noticed that workers aged over 40 were less likely to choose EVs than younger workers. Besides, male consumers with a great level of education (bachelor, doctorate) are more seemingly to buy EVs (Secinaro et al., 2022). Meanwhile, regarding the income factor, the current literature shows that there are conflicting views on how income can determine the choice of EVs (Yang and Tan, 2019). In addition, Liao et al. (2017) highlight that consumer's behavioral intention is driven by sociodemographic characteristics. Based on this argument, it can be assumed that demographic characteristics (age, gender, income, education, and profession) influence consumers' purchase orientation. In the research, these control variables should be part of the study because they are essential for deeper analysis in domains of behaviors and emotions, especially for target population, millennials, with the settings as discussed above. Furthermore, in a context where, contrary to expectations as highlighted by EY Global (2020), millennials tend to dislike EVs, and even tend to resist adopting EVs (Ju and Kim, 2022b). Therefore, employing sociodemographic characteristics as control variables for the PO variable.

5. Results

5.1. Demographic characteristics

The sociodemographic information of the participants is summarized in Table 3 as follows. In this section, tests were performed for equality of variances and equality of means to assess whether there is any differential effect between groups in the control variables on PO. The results unveil that respondents of different genders do not have different effects on PO. In contrast, respondents of different ages have differences in relation to PO. Through statistics and graphs, it is depicted that PO is the highest in the group of 31–35 age (at a mean of 3.645), followed by the 26–30 group, and finally the 36–41 group, at a mean of 3.4154 and 3.3139 respectively. Besides, the results expose that PO is distinct among various groups of income. Specifically, the statistical results and graphs unfold that the higher the income, the higher the PO. In this regard, the PO levels are listed in order from high to low; the income group over \$800 has the highest PO (at a mean of 3.5588), followed by the income group from \$500 to \$800 (at a mean of 3.5204), and finally the income group below \$500 (at a mean of 3.3045). Similarly, education level has divergent effects on PO. The test results display that PO is higher at the lowest education. Specifically, the results show that PO is the highest in the group with a bachelor's education level, followed by a master's education level, and finally above master's level of education, respectively at a mean of 3.5531; 3.5081; 3.3199. Similarly, diverse professional groups have discrepant PO. Statistical results and graphs

Table 3

Summary of demographic characteristics.

Characteristics	n = 485	Percentage (%)
Age		
26–30	133	27.4
31–35	219	45.2
36–41	133	27.4
Gender		
Female	288	59.4
Male	197	40.6
Income (USD)		
<500	101	20.8
500–800	184	37.9
>800	200	41.2
Education		
Bachelor	207	42.7
Master's	185	38.1
Above master's	93	19.2
Profession		
Officer	295	60.8
Worker	168	34.6
Others	22	4.5

The authors' own work.

demonstrate that the group of officers has the highest PO (at a mean of 3.5763), followed by the group of workers (at a mean of 3.4330), and finally the other group (at a mean of 2.7955). Overall, the above analysis expresses that middle age of millennials, bachelor's education, officers, and high income are very important segments strongly affecting PO towards EVs. This finding is very valuable for the development orientation of EV industry in an emerging market as Vietnam. In this respect, Vietnam is a country with a high proportion of young population, in which millennials account for almost one-third of the population. Therefore, providing an evidence-based analysis of the influence of demographic factors on EV purchase orientation expected to have a significant contribution on the future of the EV industry in Vietnam. Furthermore, this finding not only contributes to improving the potential for development of the EV industry in Vietnam (economically), but also re-establishes the decision-making pattern in relation to the types of transportation adopted in the Vietnamese market, characterized by a population that prefers private transport over public transport.

5.2. Measurement model assessment

The estimation model was assessed before predicting the structural model. The credibility and validity of the latent factors were estimated using the measurement items. First, the convergent validity for all latent variables was evaluated based on the factor loading values. As documented by Lehmann (1988), the convergent validity is confirmed when the achieved factor loading value is 0.7 or greater. In this study, the findings delineate that all factor loading values are higher than 0.7; thus, it can be deduced that the latent variables meet confluent cogency. Further, the internal consistency was evaluated. In this respect, Cronbach's Alpha (CRA) and composite reliability (CR) values were utilized (Nunnally, 1994). The results demonstrate that they all have values above 0.7; therefore, all variables achieve internal consistency and convergent validity (Fornell and Larcker, 1981). Table 4 presents the results that support the above analysis as follows.

Next, discriminant cogency was estimated by evaluating the average variance extracted (AVE) and the square root of AVE rates. The findings indicate that the AVE value and their square root are all greater than 0.5; furthermore, each square root value exceeds its connection with other latent factors in the model; thus, discriminant validity is verified. Given the above assessment, it can be concluded that the measurement model is consistent and rigorous. Table 5 represents the rates of the square root of AVE and their correlation that support the given analysis on

Table 4
Factor loading, CRA, CR, and AVE.

Variables	Items	Factor loading	VIF	CRA	CR	AVE
Self-identity	SI1	0.784	1.766	0.842	0.888	0.613
	SI2	0.772	1.700			
	SI3	0.817	1.940			
	SI4	0.778	1.739			
	SI5	0.761	1.633			
Purchase orientation	PO1	0.842	2.159	0.854	0.902	0.697
	PO2	0.848	2.251			
	PO3	0.781	1.664			
	PO4	0.864	2.217			
Purchase behavior	PB1	0.830	2.244	0.905	0.929	0.725
	PB2	0.833	2.222			
	PB3	0.879	2.729			
	PB4	0.834	2.202			
	PB5	0.880	2.812			
Consumer's expectancy	EX1	0.834	2.561	0.931	0.942	0.672
	EX2	0.810	2.339			
	EX3	0.799	2.340			
	EX4	0.818	2.538			
	EX5	0.839	2.582			
	EX6	0.798	2.398			
	EX7	0.844	2.675			
	EX8	0.814	2.160			
Objective motivation	OB1	0.801	2.586	0.931	0.941	0.666
	OB2	0.851	2.897			
	OB3	0.801	2.571			
	OB4	0.714	1.972			
	OB5	0.852	2.834			
	OB6	0.849	2.268			
	OB7	0.796	2.452			
	OB8	0.855	2.537			

The authors' own work.

Table 5
The square root of AVE rates and their correlation.

	EX	OB	PB	PO	SI
EX	0.820				
OB	0.194	0.816			
PB	0.159	0.082	0.851		
PO	0.182	0.074	0.781	0.835	
SI	0.115	0.125	0.637	0.708	0.783

The authors' own work.

discerning validity.

5.3. Model fit assessment

In this assessment, the following indicators were used according to the recommended thresholds of the current literature. The first is GoF (Wetzels et al., 2009), whereby there are 3 proposed thresholds corresponding to 3 levels of model fit. Specifically, the threshold of 0.36 represents a large-fit, a threshold of 0.25 symbolizes a medium-fit, and a threshold of 0.1 mirrors a small-fit. In this research, GoF obtains a value of 0.68; in comparison with the recommended thresholds by Wetzels et al. (2009), this model attains a large-fit. The NFI (Hair et al., 2019), SRMR (Henseler et al., 2016), and R2 (Falk and Miller, 1992) are commonly used indicators for assessing model fit. A good model fit is typically indicated by an NFI greater than 0.9, an SRMR lower than 0.08, and an R2 greater than 0.1. In this study, these values were obtained, respectively, 0.905 for NFI (>0.9), 0.049 for SRMR (<0.08), and 0.636 and 0.501 for R2 of PB and PO (>0.1). Therefore, the current model fits the data well.

5.4. Structural model assessment

The results of the bootstrapping analysis were used to estimate the structural model. Prior to this step, the multicollinearity was checked by evaluating the variance inflation factor (VIF). Hair et al. (2019) suggested that the ideal VIF value was lower than 3; then, multicollinearity is not problematic. The findings exhibit that the VIF values of all items are all fewer than 3 (as presented in Table 4 above); thus, it can be deduced that multicollinearity poses no issues in this research. In addition, R² and Q² (cross-validated duplication) were employed in this assessment to estimate the explanatory power and predictive accuracy. According to Hair et al. (2019), R² has a value from 0 to 1; the greater the R² value, the higher the explanatory power. According to Hair et al. (2011), when the R² of the endogenous variable reaches 0.20 or greater, the explanatory power is considered very high. As stated above, the obtained R² value of PB is 0.636 and that of PO is 0.501, revealing that the present model has a high explanatory power (Hair et al., 2011). In addition, considering Q² to estimate the anticipated accuracy of the structural design, as evidenced by Hair et al. (2019), in order to represent the structural model's predictive efficacy for a given endogenous construct, Q² for that construct must be higher than 0. In this study, Q² values obtained are 0.453 for PB and 0.345 for PO, indicating that the structural model has predictive accuracy.

Next, the relationships between the variables were evaluated using the results of the bootstrapping analysis. Table 6 describes the values used to evaluate the relationships according to the proposed hypothesis. Accordingly, the path coefficient between the variables is positive, showing that there is a positive relationship between them. Besides, p-value are less than 0.05 (from 0.000 to 0.034), showing that the relationship between them is significant. In this research, the results show that SI has a strong impact on PO, likewise, PO also has a strong impact on PB. In addition, the results show that the indirect influence of SI on PB is also quite strong through PO. In addition to path coefficient values, t-statistics, p-value, and confidence intervals (2.5%–97.5%) to evaluate the relationships between variables, the variance accounted for (VAF) was applied to evaluate the mediation level of PO in the relationship between SI and PB (Hair et al., 2014). In this regard, VAF values from 20% to 80% represent sectional mediation. VAF rates lower than 20% indicate no mediation; in contrast, VAF values larger than 80% imply full mediation (Hair et al., 2014).

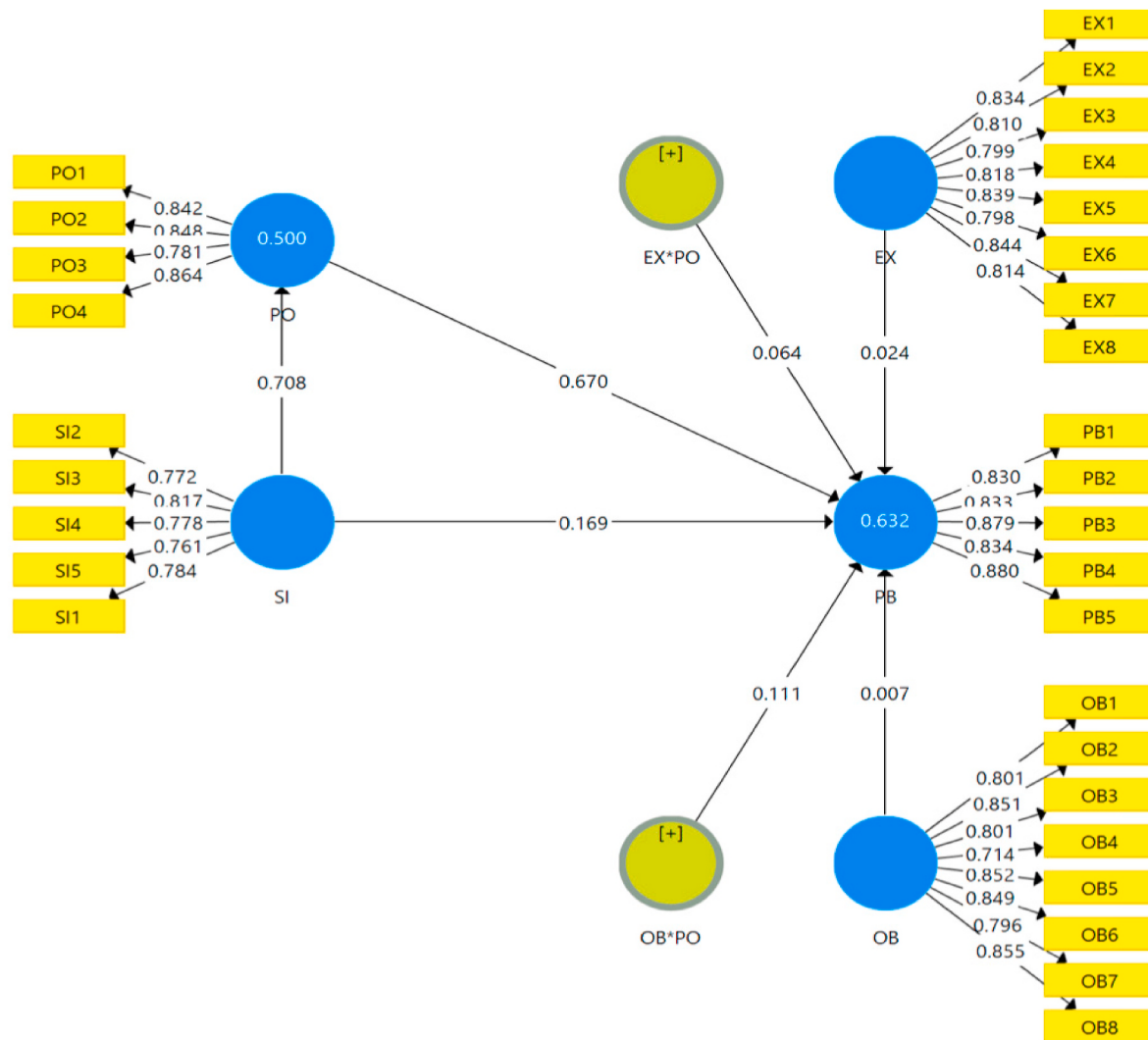
The results in Table 6 uncover that the proposed relationships are supported. Specifically, it is affirmed that SI has a favorable and effective link with PO and PB (+0.708, $t = 23.551$, and $p < 0.001$) (+0.167, $t = 3.747$, and $p < 0.001$); therefore, H1 and H3 are confirmed. This result reinforces the result of Barbarossa et al. (2017) whose study found that green SI positively and significantly affects (directly and indirectly) intention to adopt EV. However, the result of the direct effect of green SI on intention (considering the influences of different moderators) was not as high as the results of this study. It ranges from 0.16 to 0.23 versus 0.708 as this study's result. In addition, this result adds into the results of Vafaei-Zadeh et al. (2022) on the relationship between self-image (environmental-association) and intention to purchase EVs (positive and significant). However, in the present study, this result is higher than that reported by the study by Vafaei-Zadeh et al. (2022) (0.167 versus 0.123). Besides, the relationship between PO and PB is noted to be significant and positive; thus, H2 is supported. In the connection between SI and PB, PO plays a partial role (+0.474, $t = 12.429$; $p < 0.001$, and $20\% < \text{VAF} = 74\% < 80\%$); thus, H4 is confirmed. Further, the results exhibit that EX and OB moderate the effect of PO on PB (+0.064, $t = 2.122$, and $p < 0.05$) (+0.111, $t = 2.446$, and $p < 0.05$); thus, H5 and H6 are accepted. Fig. 2 elucidates the outcomes' diagram. Specifically, it shows that the factor loading values of all items are above the recommended threshold of 0.7 (0.714–0.880). The path from the independent variable (SI) to the mediator (PO) and the dependent variable (PB) are all positive. Likewise, the path showing the effect of the moderator (EX, OB) on the influence of the mediator (PO) on the dependent variable

Table 6

Bootstrapping analysis results.

Hypothesis	Links	Path coefficient	t-Statistics	p-Value	CI 2.5%	CI 97.5%	VAF %	Conclusion
H1	SI - > PO	0.708	23.551	0.000	0.645	0.763	n/a	Supported
H2	PO - > PB	0.670	17.105	0.000	0.595	0.748	n/a	Supported
H3	SI - > PB	0.169	3.747	0.000	0.076	0.249	n/a	Supported
H4	SI - > PO - > PB	0.474	12.429	0.000	0.402	0.553	74	Supported
H5	EX*PO - > PB	0.064	2.122	0.034	0.004	0.120	n/a	Supported
H6	OB*PO - > PB	0.111	2.446	0.014	0.001	0.182	n/a	Supported

The authors' own work.

**Fig. 2.** The diagram of results.

(PB) is also positive. The findings of this study suggest that the level of influence of PO on PB vary depending on the level of EX and OB. Specifically, PO has a higher impact on PB if EX and OB go from 0 to 1 (+) and vice versa.

6. Discussion and implications

The results indicate that SI has a direct and indirect relationship with PB through the mediating role of PO. This finding suggests that the higher the SI is towards environmental benefits and social norms, the higher the purchasing orientation towards EVs is, which ultimately leads to purchasing behavior for those products. This finding, to this end, supports the previous authors such as [Barbarossa et al. \(2017\)](#) and

[Doster \(2013\)](#) holding that millennials' environmentally oriented SI has an influence on their behavioral intentions for adopting EVs. The findings of this research reinforce the highlights of [Mishra et al. \(2023\)](#) and [Verplanken and Holland \(2002\)](#) asserting that values and SI are often intrinsically linked; additionally, [Secinaro et al. \(2022\)](#) emphasize that environmental sensitivity is the main reason for purchasing an EV. In addition, incorporating SI and POT may contribute to enriching the current literature using SI and POT in sustainable consumption because it seems limited ([Mishra et al., 2023](#)).

This study sheds light on the future philanthropy of millennials to the boom of the EVs industry in particular and the achievement of environmental protection goals in general. The current literature on exploring millennials' intentional behavior for ecofriendly products

manifests remarkable variance. For example, this study goes contrast with recent work by [Ju and Kim \(2022b\)](#). Specifically, the present study indicates that millennials' SI positively and significantly associates with environmental benefits and social norms, while [Ju and Kim \(2022b\)](#) examined the millennial generation's aversion to electric vehicles as well as proenvironmental behavior that does not always translate into an EV purchase ([Ju and Kim, 2022a](#)).

Overall, this study responds to the concern in the current literature on how to persuade people to adopt EVs since their commercialization ([Salari, 2022](#)). As proved by [Ju and Kim \(2022b\)](#) in a study on the intentional behaviors of consumers in developed countries (Korea and the USA), only about 2.2% own an EV while about 88.2% own conventional vehicles. To this end, the outcomes of this study offer relevant insights for the current literature on how to promote EVs adoption among millennials, the world's largest population segment, and even this generation in Vietnam context is larger than its global average. In addition, this study may complement the perceived limitation of [Asadi et al. \(2021\)](#) whose study points out that future studies should consider adopting other theories besides combining NAM and TPB theories, which might enclose the technology acceptance model to examine the impact of other factors, including users' expectancy (performance and ease of use).

6.1. Theoretical implications

Multiple theoretical implications are offered by this work. The first contribution made by this study is to the corpus of knowledge regarding customer intentions and behaviors in the area of EVs. In this regard, this study introduces a novel methodology on the behavioral intention of millennials for EVs by exploring how self-identity associated with environmental values and social norms drives the purchase orientation and behavior of millennials for EV. Theoretically, the contribution of this study is significant because, in the aspect of EVs, the present literature manifests that the research on exploring consumers' behavior related to their intention for EVs adoption is insufficient, especially for the millennials generation ([Ju and Kim, 2022b](#)). Furthermore, using consumers in an emerging market like Vietnam as the empirical field of research reinforces the novelty of the present study. In this sense, [Liao et al. \(2017\)](#) highlight that the consumers' behavioral intentions for EVs differ significantly in different markets because of the setting, culture, policies, and product cycle stage in reality. This is reaffirmed by [Ju and Kim's study \(2022b\)](#) whose findings found that US millennials were significantly distinctive from Korean millennials in relation to the relationship between environmental concerns, perceived EVs characteristics, and consumer resistance to EVs.

Second, this study complements previous studies on consumer intentional and behavioral areas in a variety of ways. Accordingly, this study contributes to enriching knowledge through multiple approaches. For instance, research by [Salari \(2022\)](#) reported that the technology readiness index was used to predict EVs' purchase intention by providing an understanding of technology adoption behavior. However, in this area, the four-dimensional technological readiness index (positivism, inventiveness, distress, and instability) confirms that very little empirical research has been conducted. Based on this ground, the present research may add to [Salari's study \(2022\)](#) by giving empirical evidence on driving purchasing behavior, using the Unified Theory of Acceptance and Use of Technology (UTAUT) which is perceived as a reliable analytical structure to examine the user's acceptance of technology through a clear measuring system (expectation measures (performance and efforts) and objective motivational measures (social influence and favorable conditions)). In instances when previous investigations used a single theory approach, this study enhances their usefulness. For instance, the research by [Sriram et al. \(2022\)](#) and [He et al. \(2022\)](#) was ground-breaking in terms of the idea of planned behavior.

Third, this study presents an extension of current theories of the

Theory of Planned Behavior (TPB), Norm Activation Model (NAM), Psychological Ownership Theory (POT), and Unified Theory of Acceptance and Use of Technology (UTAUT) by yielding an integrated theoretical framework of the stated theories to explain the orientation and behavior of millennials in the field of EV. Grounded in this integrated theoretical framework, the millennials' behavioral intention for EVs can be understandable. In this regard, proenvironmental orientation in consumption, purchase intention, and buying decisions for an EV can be driven by self-identity. In this way, one promotes themselves as part of the societal norms and environmental ideals. The present literature on this stream has not been thoroughly studied to this extent. To this end, this implication is particularly significant to TPB; as emphasized by [Asadi et al. \(2021\)](#), TPB has primarily relied on self-regard-related elements or rational choice rather than proenvironmental and prosocial behaviors.

Fourth, this study adds to the body of knowledge on consumers' behaviors by maintaining measures of variables that have not been sufficiently developed such as consumer-level self-identity and purchase orientation of the millennials generation in the field of technology-based proenvironmental products like EVs. In addition, this study implements measures for consumer's expectancy and objective motivation developed based on UTAUT. In the present study framework, incorporating these measures into a framework to empirically evaluate the role of self-identity in millennials' purchase orientation and purchasing behavior reinforces the novelty of this study theoretically. This incorporation introduces a comprehensive perspective of how to drive the behavioral intention flow of millennials towards adopting an EV in the new context.

6.2. Managerial implications

The following are some managerial ramifications of this study. To begin with, the findings of this research provide vision and empirical evidence demonstrating that self-identity embedded with environmental values and social norms significantly influences the responsibly intentional behaviors of the millennials generation. In this context, it affects the purchasing orientation that induces buying behavior for proenvironmentally friendly products. This recommends that EVs producers or EVs brands should take the initiative to educate consumers, giving the millennial generation priority, to increase their understanding of the reasons why EVs should be their alternative choice to conventional automobiles. More importantly, EVs brands should promote community activities to spread the proenvironmental messages, reinforce the self-identity of existing EVs owners as proenvironmental action people, and, more importantly, expand the community of "EVs adopters" to be stronger and wider. In this respect, such activities should be integrated with PR activities to boost the mentality of the community members. By doing so, people feel proud to be a part of the "EVs adopters" community so their self-identity is strengthened.

Secondly, this study proposes the fact that EVs brands should develop practical programs and initiatives for the "EVs adopters" community in order to maintain their self-identity with environmental values and social norms, and, at the same time, promote their preference to be engaged with the community and willing to introduce EVs to their relationships. In addition, EVs brands should offer more activities for users' experience and pay proper attention to utility services, quality of infrastructure, and support services. Due to the majority's habits and preferences in Vietnam, which include the use of personal vehicles, as well as the complicated state of the respiratory disease epidemic and the lack of certainty regarding the future, timely and appropriate strategies and actions to encourage EVs purchase behavior are very likely to be successful. This implies that EVs brands and the electric vehicle industry in general should be mindful of the suggested implications of this study. More importantly, stakeholders involved in the EVs industry should consider transforming the proposed implications into practical behaviors and actions.

Thirdly, the analysis of control variables indicates that middle age of

millennials, bachelor's education, officers, and high income are very important segments strongly influencing PO towards EVs. This result infers that EVs brands should develop initiatives and activities focused on this segment to maximize the possibility of success. With objectively facilitating conditions in this research context, for example, according to a report by [Kantar WorldPanel \(2019\)](#), millennials in Vietnam are not only highly educated and tech-savvy, but also open-minded and likely to adopt a healthy lifestyle very early; therefore, this can be viewed as an ideal ground and a necessity for the success of the EVs industry in general. In addition to this, millennial generation in Vietnam accounts for 30% of the total population of Vietnam ([UNESCAP, 2019](#)) adopting new consumption habits and added values, which translates into pro-environment purchase behavior. Globally, millennial generation accounts approximately for 27% of the world's population and represents the largest demographic group ([Mishra et al., 2023](#)). This generation in Vietnam is higher than its global average and may be willing to pay more for proenvironment-based products ([Nguyen and Nguyen, 2020](#)). This signifies that EVs brands, the EVs industry, should collaborate with relevant government agencies through a comprehensive multidimensional strategy between the micro- and macrolevels to stimulate a wider population to adopt EVs. As a result, this entices industry success and, more importantly, the reduction of emissions into the environment.

7. Conclusion, limitation and future scope of research

7.1. Conclusion

This research elucidated the role of SI in promoting PO and PB for EVs. This finding satisfies the purpose of this study that aimed to explore the mechanisms driving consumer purchasing behavior (millennial-centric) in the electric vehicle sector in the emerging economy. This finding connotes that the higher the SI, the higher the PO which ultimately leads to higher PI. In addition, this study infers that UTAUT framework measures moderate the relationship between PO and PI. Thus, shifting from EVs purchasing orientation to EVs purchasing behavior varies according to the extent to which consumers' perceived expectancy towards EVs efficiency and perceived ease of use. Likewise, this shift varies depending on the level of social influence and facilitating conditions. Overall, the outcomes of this research addressed the aforementioned research queries stated and, therefore, reached the research objective. This study significantly contributes to the body of information about consumer behavioral intentions from both a micro-

and macroperspective. It also has crucial implications for the viability of the EVs business and, most critically, the attainment of environmental protection goals.

7.2. Limitation and future scope of research

In addition to the important contributions, this work contains various shortcomings that could be exploited in other studies. To start, this research focuses on millennials in Vietnam, an emerging market; although context-specific consideration is necessary, future research should consider cross-markets. In this regard, it is recommended to compare the findings of this study with those of other emerging markets in the same region in order to identify parallels and differences. This may be meaningful for the universality of the study's outcomes. Second, this research mainly uses the quantitative method; hence, future studies may consider combining other methods to assess similarities and differences. Moreover, for future studies targeting populations other than millennials, including self-identity in the research model may require consideration of measuring social desirability bias using the Marlowe-Crowne Social-desirability Short Form C Scale ([Andrews and Meyer, 2003](#)) to assess whether or not response bias occurs amongst respondents.

Author contribution

Thanh Tiep Le (Ph.D): Conceptualization, Methodology, Software, Formal analysis, Resources, Data curation, Writing – original draft, Writing – review & editing. Prof. (Dr.) Fauzia Jabeen: Conceptualization, Writing – original draft, Writing – review & editing, Supervision. Gabriele Santoro: Conceptualization, Writing – original draft, Writing – review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Appendix 1. MEASURES

Variables	Items	Sources
Self-identity (SI)	SI1	Mishra et al. (2023) ; Verplanken and Holland (2002)
	SI2	
	SI3	
	SI4	
	SI5	
Purchase orientation (PO)	PO1	Zhou et al. (2021) ; Lindgreen et al. (2009)
	PO2	
	PO3	
	PO4	
Purchase behavior (PB)	PB1	Adnan et al. (2017) ; Zhou et al. (2021)
	PB2	
	PB3	
	PB4	
	PB5	
Consumer's expectancy	EX1	Secinaro et al. (2022) ; Jain et al. (2022) ; Globisch et al. (2019)
	EX2	
	EX3	
	EX4	
	EX5	

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(continued)

Variables	Items	Sources
	EX6	Maintenance: convenience and cost effectiveness
	EX7	Convenient charging system
	EX8	Easy to understand, easy to operate
Objective motivation	OB1	Motivated to make purchasing decisions
	OB2	Motivated to positively think about using electric vehicles
	OB3	Motivated to create value for the environment
	OB4	Motivated to become a wise consumer
	OB5	Motivated by financial support policy reforms
	OB6	Motivated by a good customer care policy
	OB7	Motivated to adopt advanced technology
	OB8	Motivated by a supporting infrastructure system

Zhou et al. (2021); Globisch et al. (2019); Liao et al. (2017) (20)

Appendix 2. CONTENT VALIDATION FORM

Dear Experts,

This study focuses on examining the mechanism linked to the electric vehicle purchasing behavior of millennials in an emerging market. Accordingly, this research framework includes 5 domains and 30 items. In order to optimize the value contributions of the present study drawing from its results, we need your expert judgment on the relevance of item to the respective measured domain. Please rate as objectively as possible and use the following scale:

Relevance degree:

1 = the item is highly related to the measured domain;

0 = the item is less related to the measured domain.

Domain 1: Self-identity (SI)

Definition: Adopter self-identification with environmental and social values from their decisions and behaviors on EVs.

Tested items	Relevance	
1. Purchasing an EV makes me feel like I am an ecoresponsible person	0	1
	☐	☐
2. I feel proud to be an ecoresponsible consumer	0	1
	☐	☐
3. Driving an EV makes me feel I am contributing to the environment protection	0	1
	☐	☐
4. Adopting ecofriendly products makes me feel like my intentional behaviors are rooted in central environmental values	0	1
	☐	☐
5. My self-identified values are tied to proenvironmental and prosocial behavioral decision	0	1
	☐	☐

Domain 2: Purchase orientation (PO)

Definition: Consumer orientation on supporting electric vehicles.

Tested items	Relevance	
1. Purchasing an EV makes me feel like I am an ecoresponsible person	0	1
	☐	☐
2. I feel proud to be an ecoresponsible consumer	0	1
	☐	☐
3. I will continue to purchase EVs in the future when a more technologically advanced version is available	0	1
	☐	☐
4. I always thought of introducing EVs to the community around me	0	1
	☐	☐

Domain 3: Purchase behavior (PB)

Definition: Consumer behavior in the decision-making process to purchase electric vehicles.

Tested items	Relevance	
1. Deciding to purchase an EV is a pleasant experience	0	1
	☐	☐
2. I believe that making an EV purchase is a right choice	0	1
	☐	☐
3. When purchasing a vehicle, an EV is the top of my mind	0	1
	☐	☐
4. Whenever there is a chance, I will persuade my acquaintances to use EVs	0	1
	☐	☐
5. I believe that EVs adoption is a proenvironmental and prosocial behavior	0	1
	☐	☐

Domain 4: Consumer's expectancy (EX)

Definition: Expectations of consumer about economic, social and environmental efficiency; in addition to convenience for using.

Tested items	Relevance	
1. An EV is useful for my life in general	0	1
	☐	☐
2. Adopting an EV helps reduce emissions and air pollution	0	1
	☐	☐
3. Adopting EVs enhances my transportation performance	0	1
	☐	☐
4. Economical operating costs and acceptable travel distance per charge are considered	0	1
	☐	☐
5. Learning to drive an EV is easy	0	1
	☐	☐
6. Maintaining EVs is convenient and cost-conscious	0	1
	☐	☐
7. The charging system is convenient	0	1
	☐	☐
8. An EV controller is understandable and easy to use	0	1
	☐	☐

Domain 5: Objective motivation (OB)

Definition: Consumer perspectives on the external factors that may affect decision making.

Tested items	Relevance	
1. People who are influential on me recommend that I should purchase an EV	0	1
	☐	☐
2. People who are influential on me think that adopting an EV is a good idea	0	1
	☐	☐
3. People who are important to me tell me that driving an EV is considered ecofriendly	0	1
	☐	☐
4. The community around me all think that owning an EV is a wise decision	0	1
	☐	☐
5. Financial support from the government is regraded	0	1
	☐	☐
6. A good customer care policy is offered by EVs brands	0	1
	☐	☐
7. There is an advanced technology application	0	1
	☐	☐
8. There is supportive infrastructure, especially widely spread charging stations	0	1
	☐	☐

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