

Examining the Factors Influencing the Intention to Use Electric Bikes by Young Adults: Using Extended Theory of Planned Behavior Model

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Abstract

The study aims to examine the factors impelling young adults' intention to use electric bikes (EB) to promote sustainable transportation in India. In this research, the theory of planned behavior (TPB) model is extended with environmental knowledge (EKL), environmental concern (ECN), and government policy support (GPS) to understand the intention to use (ITU) of young adults on electric bikes. Using a stratified random sampling technique, the survey was conducted among 354 electric bike users across major cities from Tamil Nadu, India. The PLS-SEM was used to analyze the conceptual model of the research. The findings of the research support that ECN, EKL, and GPS have a significant positive direct influence on young adults' attitude (ATT) and an indirect effect on the intention to use (ITU) e-bikes. Among the three mediating variables, ATT and SJN mediate the relationship between ECN, EKL, and GPS on ATT and ITU of e-bikes. The study offered insightful recommendations to broaden the scope of research on electric bike sellers and manufacturers to plan sales and marketing strategies, for the government to make policy decisions, and ultimately to increase consumer interest in sustainable transportation.

Keywords: Young adult, Electric bike, Environmental concern, Environmental knowledge, Government policy support, Extended theory of planned behavior.

Introduction

According to the Global Climate Budget 2022, unveiled at the COP27 United Nations Climate Change Conference, India would experience a higher increase in carbon emissions than other large nations (Jayanta Basu, 2022). According to the analysis, India's carbon dioxide emissions are predicted to increase by 6% in 2022 compared to last year. A shift to renewable energy is crucial to accomplishing this aim (Aathira, 2022). In 2030 transportation sector will be accountable for 50% of greenhouse gas emissions (Birol, 2009). The current transportation model is unsuitable for the environment and requires a new model for protecting the environment (Jansson et al., 2017). The most important issue for the sustainable growth of a country is sustainable transportation (India, 2015). There are still numerous obstacles to overcome. India requires sustainable and energy-efficient vehicles to help the country achieve the global sustainable development goals by 2030. Revamping the energy efficiency of vehicles and growing the stake of renewables in fuel assortment would be vital to attain the goals set out in Sustainable Development Goals -7 (SDG, 2019).

After thorough research, it has been found that electric vehicles (EVs) will be a better alternative (Onat et al., 2015; Ehsani et al., 2021). Electric bikes are considered the best and less harmful than their counterparts (Jansson et al., 2017). The Government of India has set the ambitious aim of EV sales dispersion of 40% aimed at buses, 30% for private automobiles, 70% for commercial automobiles, also 80% for two- and three-wheelers in 2030 after discovering that EVs are going to be the future alternative (Irfan, 2022). According to the Indian Ministry of road transport, NITI Aayog encouraged 25 States to develop EV policies, 15 of which have already made their state EV policies public as part of the EV mission (NITI Aayog, 2021). The Indian e-bike market is estimated to be worth USD 2.1 million in 2022 and USD 12.3 million in 2027, growing at a CAGR of 37.75 percent. In recent years, there has been a rise in the demand for e-bikes in India. As a result, India has experienced increased e-bike (EB) demand over the past several years. However, like most other industries, the EB market declined during and after the COVID-19 pandemic because of the complete shutdown of manufacturing facilities, strict manufacturing standards, disruption of supply networks, and other causes (Haneesh & Venkateshwar, 2021).

Many startups have started selling e-bikes in India. The demand for e-bikes has increased globally recently, and manufacturers want to expand their facilities to reach target areas. Leading international manufacturers have also entered the Indian market to satisfy growing demand (Gode et al., 2021). Due to their superior fuel efficiency, two-wheelers are one of the main development catalysts in the transportation industry. As the nation's expanding population and quickly escalating traffic congestion, motorized vehicles, particularly two-wheelers, are utilized by travelers of all ages, making them the most well-liked and practical method of transportation in both urban and rural locations (Ken Research Private Limited, 2022). However, despite government announcements, the percentage of EVs in the Indian vehicle market remains negligible. These factors indicate that government intervention and policy support (GPS) is necessary for EV penetration, yet the investigation is getting to the full phase. However, EV growth in India is comparatively slow (Singh et al., 2021).

This study is restricted to the state of Tamil Nadu, India, for three reasons: firstly, apart from the Government of India's initiatives to promote the purchase and use of EVs

through various schemes, the state government of Tamil Nadu has also taken a lot of initiatives to manufacture and sell the electric vehicle across the state. For example, they announced the exemption of payment of road tax, registration charges, and permit fees for early adopters of EVs in Tamil Nadu Electric Vehicles Policy 2023 (evreporter.com, 2023). Secondly, the number of registrations of EVs in Tamil Nadu during January-August 2022 increased from 6300 EVs to 14366 EVs, out of which 95% are two-wheelers due to frequent petrol price hikes and non-availability of public transportation during pandemic lockdowns (Times of India, 2021). Thirdly, the north-western belt of Tamil Nadu state, namely Hosur, Dharmapuri, and Krishnagiri, becoming as a hub for electric vehicle manufacturing in the state because of the setting up of manufacturing facilities by reputed electric vehicle companies like Ola Electric, Simple Energy and Ather Energy due to ready-made EV ecosystem of the state which attracts the new players and also motivates the manufacturers of fossil-fuel vehicles to transition to EV manufacturing (Businessline, 2022).

According to Indian National Youth Policy Document (2021), the “Youth” age group is 15-29 years old. The survey’s target respondents are young adults aged between 18-29 years because across the globe, in different survey results, it is declared that millennial and Gen Z consumers are more interested in adopting EVs. For example, according to the survey by Jerry (2022) among American drivers, millennial (ages 25-40) is most eager to purchase electric vehicles, followed by Gen Z (ages 16-24). In another survey conducted by Skuola.net (2022) among 2800 young people to know about their perception towards EVs, most of them opined that EVs are trendy and focus on the social value of the product and environmental sustainability. Further, the second publication of the EIB Climate Survey (2022) released by the European Investment Bank (EIB) exposed that 82% of young Italians preferred to purchase EVs to combat climate change by changing their lifestyle.

According to the 2021 World Population Review, India has a population of 137 billion, and 65% of Indians are under 35 years (Times of India, 2023a). As per Tamil Nadu State Youth Policy (2019), 50% of the total population are youths (i.e. The Tamil Nadu State Youth Policy covers the age group of 15-35 years under the youth category). The younger generation has the potential to become the future working population and acquire their first vehicle. However, there hasn’t been any dedicated research or survey conducted among young adults in Tamil Nadu to understand their inclination toward purchasing and using electric vehicles (EVs). Therefore, this research aims to address this gap and provide insights into bridging it.

The younger generation largely drives the EV market, and they are the largest users of e-bikes in India (Bhat et al., 2022; Myers, 2016; Prajapati et al., 2014). Earlier research on electric vehicles (EVs) focused on a general consumer perspective, a growing body of research is now focusing on the preferences and behaviors of young adults. (Ehsani et al., 2021; Singh et al., 2021).

Ajzen (1991) created the TPB framework to describe, predict, and influence consumer behavior. The TPB holds that intention determines actual behavior. In turn, a person’s attitude concerning the behavior’s execution, the observed social stimulus of the person’s subjective norm (SJN), and the perceived behavioral control (PBC) all contribute to determining intention. Additionally, Taufique and Vaithianathan (2018) hypothesized that if consumers are unaware of and uninformed about green vehicles,

there will be a disconnect between their sentiments toward the environment and their purchasing practices. As mentioned earlier, the difference could significantly impact consumers' buying intentions and forecast sustainable spending patterns. Therefore, it is thought that young adults' decisions to purchase environmentally friendly bikes are significantly influenced by both environmental knowledge (EKL) and environmental concern (ECN) (Aman & Harun, 2012; Scott & Vigar-Ellis, 2014). Also, the GPS could impact buying intention more (Nasri & Charfeddine, 2012).

Indeed, one major factor assumed to influence young adults' behavior is their attitude and intention. The study findings revealed a positive correlation between environmental attitudes and consumer behavior, indicating that environmental attitudes have a beneficial influence on consumer behavior (Fontes et al., 2021). According to the Indian viewpoint, prior studies have shown a strong relationship between young adults' eco-friendly attitudes and customer behavior towards eco-friendly goods and their intention to buy them (Khare, 2015). The administrators and EV producers can determine whether the EV is marketable by comprehending young adults' attitudes, intention and behavior.

These justifications serve as the foundation for this study's incorporation of the constructs of EKL, ECN, and GPS as antecedents of the intention of young adults to use electric bikes into the TPB theoretical framework.

Theoretical Background

Theory of Planned Behavior (TPB)

The TPB, an addendum to the theory of reasoned action (TRA), can predict and explain individual actions (Chen & Chao, 2011). This TPB model is being used extensively to investigate the intentions behind environmental consciousness, such as youth commuters' intentions to drive electric bikes (EB) (Sigurdardottir et al., 2013). (Ajzen, 1991, 2020) advocated extending the TBP conceptual framework by increasing the variable sequences and structure and including new variables in response to specific research problems. As a result, in studies of various problems, researchers added several new factors following TPB to study the interaction among variables. When forecasting the propensity of adults to buy green products in emerging nations, (Yadav & Pathak, 2016) discovered that ECN and EKL have substantial impacts based on readiness to buy environmentally friendly goods among young adults.

In the context of young adults' literature, attitude acted as a predictor of behavioral intention. TPB was additionally utilized to gauge young people's pro-environmental behavior. According to Xiao (2008), young individuals' attitudes toward prospective future actions on their purchasing and usage behaviors of EVs are supported by the Theory of Planned Behavior (TPB). Although it is known that attitude can influence behavior (Ajzen, 2015), this stems from the core notion that young consumers' intentions and attitudes may be applied to explain their behavior.

Several works of literature have shown that consumers apprehensive about the environment prefer to purchase sustainable products even though they must pay more for the green initiative's efforts (Kim & Han, 2010; Wei et al., 2018). Individuals are more likely to adopt innovations if they consider the government supporting them (Nasri & Charfeddine, 2012). Also, despite considerable studies on low-carbon transportation, commuters' intentions to ride EB are positively influenced by ATT, SJN, and PBC (Cai et al., 2019). According to the findings of these investigations, the TPB model is a valid hypothesis for examining the intention behind environmentally friendly behavior. The analysis indicates that researchers occasionally added ECN, EKL, and GPS to the TPB model. It could be feasible to comprehend better the implications of several indicators on young adults' willingness to buy e-bikes by attempting to include ECN, EKL, and GPS variables in the study.

Environmental Concern (ECN)

The extent to which individuals are prepared to acknowledge and assist the solutions to ecological problems is their level of environmental concern (ECN) (McCright et al., 2014). ECN partake a substantial impression on consumer behavior and Purchasing decisions (Diamantopoulos et al., 2003). Former Studies demonstrated that consumers' propensity to purchase is significantly impacted by EC (Arisal & Atalar, 2016; Hartmann & Apaolaza-Ibáñez, 2012; Rhead et al., 2015). Users who are worried about environmental issues remain to buy more EVs, according to Sang & Bekhet (2015). Paul & others reported the positive effects of ECN on consumers' inclination to buy eco-friendly goods. As a result, EVs impact one's decision to purchase energy-efficient bikes (Arisal & Atalar, 2016). According to various studies, customers' attitude toward action is also influenced by their level of ECN. Buyers who favour the environment tend to have a good attitude toward it, enhancing their desire to take action (Geum et al., 2011). Furthermore, people that value the environment are often more inclined to invest in EB (Newton et al., 2015). Customers who care about the planet are highly interested in paying more to benefit the environment (Taufique & Vaithianathan, 2018).

Public awareness of environmental preservation gradually rises as the environment worsens (Wang et al., 2017). According to earlier research, people's attitudes and behavior toward the environment are positively connected with their level of ECN (Chen et al., 2022). ECN is linked to community knowledge of environmental issues that could be exposed in attitude, recognition, and behavior relating to natural problems (Weigel & Weigel, 1978). People who care deeply about climate issues are prone to a foothold on environmental causes and buy eco-friendly properties (Milakis, 2015). Maniatis (2016) concluded that people's perceptions of the environment will become more acute when they buy green products. Plentiful literature has exposed that people's attitudes and intentions to use (ITU) green items are significantly influenced by their concern for the atmosphere. Wang et al. (2016) reported the positive impact of ECN on SJN and PBC. Based on the above studies, the following hypotheses were developed,

- H1.** ECN significantly affects a) ATT, b) SJN, and c) PBC.
- H1a.** ATT demonstrates a mediating effect between ECN and intention to use EB.
- H1b.** SJN demonstrates a mediating effect between ECN and intention to use EB.
- H1c.** PBC demonstrates a mediating effect between ECN and intention to use EB.

Environmental Knowledge (EKL)

EKL is an individual's understanding and familiarity with the environment and associated issues (Chan & Lau, 2000). Consumers with EKN are more likely to perform positive environmental actions and have a positive attitude about environmental behavior. Flamm discovered that people with greater EKL are more likely to buy energy-efficient vehicles (Flamm, 2009). Researchers have shown that consumer sentiments toward green products are positively impacted by EKL (Mostafa, 2009). Sang & Bekhet (2015) demonstrated that people's views regarding green goods buying behavior are influenced by their EKL, influencing their propensity to buy green products. Studies emphasized the link between pro-environmental behavior and EKL and the degree to which customers are concerned about EKL (Lee et al., 2014). EKL gauges people's knowledge of environmental concerns and eagerness to discuss them (Arı & Yılmaz, 2017). According to Aman & Harun (2012), EKL is frequently a key driving factor for buying eco-friendly products (Yue et al., 2020). When coupled with feelings experienced personally, it may inspire customers to engage in pro-environmental activities (Prakash & Pathak, 2017). As Alshurideh et al. (2019) said, EKL has a significant effect on PBC and SJN. So, the study recommends the succeeding hypotheses,

H2. EKL has a significant effect on a) ATT, b) SJN, and c) PBC

H2a. ATT demonstrates a mediating effect between EKL and the intention to use EB

H2b. SJN demonstrates a mediating effect between EKL and intention to use EB

H2c. PBC demonstrates a mediating effect between EKL and the intention to use EB.

Government Policy Support (GPS)

GPS relates to how favorable government regulations are for electric bikes. Consumers can utilize green transportation wherever government regulations favor it (Chen, 2016; Chen et al., 2022). GPS may influence the intention to utilize electric bikes because it is a green travel behavior. Through various factors, policy support indirectly affects the intention to engage in green travel (Zhang et al., 2018). Literature also highlighted the effects of GPS on PBC and SJN (Li et al., 2021; Zhu et al., 2020).

According to (Goh, 1995; Tan & Teo, 2000), the government's level of support can impact how quickly new technologies are adopted. GPS can act as a catalyst and leader in the spread of innovation and adaption (Tan & Teo, 2000). It is feasible to gauge how much help people believe they are receiving. Individuals are more likely to use technology if they consider the government supporting them more. It is a problem for the government to constantly promote environmental consciousness, socialization, and education about the value of utilizing eco-friendly products to safeguard the environment and for entrepreneurs or marketing managers to give more reusable products (Paul et al., 2016a). Therefore, this study intends the succeeding hypotheses,

H3. GPS significantly affects a) ATT, b) SJN, and c) PBC.

H3a. ATT demonstrates a mediating effect between GPS and the intention to use EB.

H3b. SJN demonstrates a mediating effect between GPS and the intention to use EB.

H3c. PBC demonstrates a mediating effect between GPS and the intention to use EB.

Attitude (ATT), Subjective Norms (SJN), Perceived Behavioral Control (PBC), and Intention to Use (ITU)

Following the TPB model, ATT, SJN, and PBC directly affect consumer decisions to use electric bikes. The phrase “attitude” refers to how someone is perceived when traveling on electric bikes, either positively or negatively. The likelihood that someone will use electric bikes is expected to increase with how well they see them (Tu & Yang, 2019). The term “subjective norm” describes the support from the surrounding environment experienced by consumers when using electric bikes. The more help a person gets, the more probable it is that he will be inclined to adopt an electric bike (Haustein & Hunecke, 2007); PBC refers to how a person perceives the resources and options at their disposal when using an electric bike. The TPB has a great explanatory power, which can connect behavioral intention with social psychological variables, one of its key contributions (Chen, 2016).

According to a PISA study in 2009, most young European consumers feel that personal attitudes, intentions, and behavior about the environment seem essential for preserving the environment (Uddin & Khan, 2016). According to research by Meinhold and Malkus (2005), young consumers with a pro-environmental attitude seem more inclined to act in a pro-environmental approach. Researchers in an Asian study found that green buying attitudes, intentions, and behaviors might influence green satisfaction. Also, integrating SJN and PBC in a model to test the young consumer’s attitude, intention, and behavior will result in a thorough understanding of the study.

The variable explanation attitude towards PBC and SJN can predict different kinds of behavioral intention. As the result of a rationally based appraisal, attitude is the evaluation of a psychological state as either positive or negative (Ajzen, 1991). An individual’s perception that they can accomplish an inherently difficult assignment is known as PBC. Furthermore, it may be said that they had volitional control over the decision and did not make it on the spur of the moment (Paul et al., 2016b). Generally, a person’s behavior and internal locus of control decide their outcome, but a low PBC may give a person the impression that the possibilities are limited (Huang & Ge, 2019). The notion is that when people decide whether to buy hybrid vehicles, their SJN and ATT influence their intention. Plans to buy electric vehicles will benefit from SJN since locals’ remarks will exert social pressure and influence behavior (Shi et al., 2017a; Shi et al., 2017b). Also, PBC and SJN are crucial elements influencing people’s intentions to conserve energy (Ru et al., 2018). The influence of SJN and PBC on behavior was also studied by Montanaro et al. (2018). According to our research, customers will be more inclined to purchase if buying and operating electric vehicles is simpler. Hence the study proposes the following hypotheses,

- H6.** ATT has an impact on the intention to use EB.
- H7.** SJN has an impact on the intention to use EB.
- H8.** PBC has an impact on young adults’ intention to use EB.

Research Design and Methods

Participants and Research Methods

According to Tamil Nadu Electric Vehicles Policy 2023, the state government will promote Chennai, Coimbatore, Tiruchirappalli, Madurai, Salem, and Tirunelveli as pilot cities for implementing e-mobility solutions. Hence, the researcher has focused on collecting the responses from the young adults of the first four cities due to time and economic constraints by adopting a stratified random sampling technique (Times of India, 2023b). Among the six cities (i.e. Chennai, Coimbatore, Tiruchirappalli, Madurai, Salem, and Tirunelveli) mentioned in Tamil Nadu Electric Vehicles Policy 2023, four major cities were included in the sampling frame which includes representativeness of the sampling unit. The electric bike users are those who have purchased e-bikes in three months (i.e., August 2022 to October 2022) through authorized distributors of major brands of e-bikes namely Ather, Bajaj Chetak, Hero Electric, Ola, Revolt, and TVS iQub.

The TPB scale used in this research has seven latent variables and 25 items. There are three items used to measure the EKL, ATT, SJN, and GPS. Four items are used to measure ECN and PBC constructs and ITU is represented by five items. The determination of the minimum sample size for SEM according to Hair et al. (2010) is: $(\text{Number of indicators} + \text{a number of latent variables}) \times (\text{estimated parameters})$. Based on the guidelines, the minimum sample size for this study is: $\text{Minimum sample} = (25 + 4) \times 5 = 145$ respondents, however in this research, we have targeted to collect 400 samples and collected 354 valid responses (final sample size), which is more than the minimum sample size required, hence the sample size is sufficient to represent the target population. The target respondents were selected from Tamil Nadu since it is a leading state with a considerable proportion of urban people with middle-class incomes using electric bikes (Ramsundaram, 2021). Cross-sectional data were gathered due to its widespread use, low cost, speed, accuracy, and effectiveness (Zikmund & Babin, 2010).

Among the 354 respondents, 70.3 percent were males, and 29.7% were females. The respondents' age ranges between 18-25 (64.3%) and 26-29 (35.7%) years. Regarding educational qualification, 39.2% of those surveyed have postgraduate degrees, one-third (48.5%) have graduate degrees, and 12.3% have completed school education. Most (60.2%) of e-bike users purchased through loans through financial institutions, and more than one-third (39.8%) purchased through full cash. On average, most e-bike riders (75%) cover less than 30 kilometers daily.

Research Framework

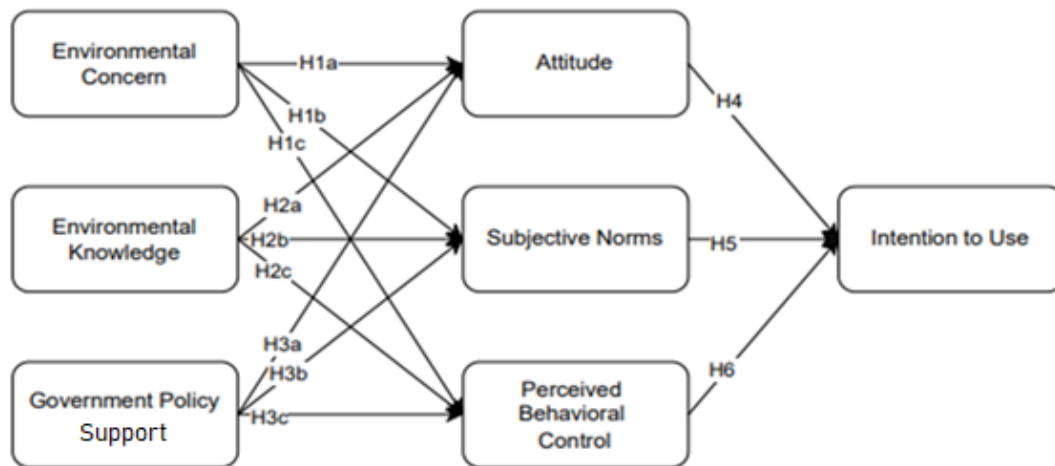
The study model that is displayed here was intended to evaluate the hypotheses. ECN and EKL are considered the precursors of ATT, SJN, PBC, ITU, and buying decisions of e-bikes. Figure 1 depicts the theoretical framework of the research.

Constructs Measurement

Measures of the factors that influence electric bikes or electric vehicles' intention to use (i.e. purchase decision) were adapted from similar prior studies. Five-point Likert scales were used for the measurement items, with 1 representing 'Strongly Disagree' and 5 representing 'Strongly Agree'. After consulting with professionals and conducting

small-scale tests, the preliminary questionnaire was modified to create the final questionnaire. The TPB scale has seven latent variables. The items for each construct have been adapted from various studies. There are three items used to measure the EKL constructs (Mostafa, 2007), GPS (Zhang et al., 2018), Attitude (ATT) (Wang et al., 2016), and SJN (Ajzen, 2006). There are four items considered for the ECN construct (Wang et al., 2016; Zhu et al., 2020), and PBC (Kim & Han, 2010). ITU is represented by five items (Wang et al., 2016).

Figure 1: The Theoretical Framework of the Research



Results

Model Assessment

The constructs' consistency, convergent, and discriminant validity were examined through the measuring approach. First, Cronbach's Alpha and composite reliability were analyzed using construct validity. Table 1 summarizes the results of the measurement model. The composite reliability of the constructs varies between 0.832 and 0.909, while the range of Cronbach's Alpha is 0.70 to 0.851. The composite reliability (CR) and Cronbach's Alpha values are higher than 0.6 (Hair et al., 2017), which shows that the measurements are accurate.

Additionally, the internal consistency of the scales was confirmed by Dillon-rho Goldstein's values which ranged from 0.705 to 0.864 and more than the threshold value of 0.7. Next, the convergent validity was measured from item loading, CR, and AVE. According to Hair et al. (2010), the item should be kept if the factor loading has a value larger than 0.50 (ideally 0.7 or higher), demonstrating the scale's construct validity is satisfactory. Similarly, the composite reliability (CR) values range between factor loading, CR, and AVE stood more than 0.50, 0.70, and 0.50, respectively, confirming that the constructs used in the research have convergent validity.

The bias in common method bias (CMB) could emerge from using a cross-sectional design (MacKenzie & Podsakoff, 2012). First, all variables were entered into a principal component factor analysis using a Harmon one-factor test (Podsakoff et al., 2003). The

one-factor test's explained variance is less than 50% in the unrotated solution at 36.29%. These findings imply that CMB levels are still within permissible limits. The further tests that were performed are shown in the subsequent sections.

Table 1: Measurement Model - Results

Construct	Loadings	Cronbach's Alpha (α)	Composite Reliability (CR)	AVE	Rho-A
ATT1	0.867	0.792	0.878	0.707	0.798
ATT2	0.857				
ATT3	0.797				
ECN1	0.723	0.838	0.892	0.674	0.854
ECN2	0.849				
ECN3	0.892				
ECN4	0.812	0.708	0.832	0.623	0.705
EKL1	0.782				
EKL2	0.810				
EKL3	0.776	0.789	0.877	0.706	0.820
GPS 1	0.891				
GPS 2	0.900				
GPS 3	0.717	0.786	0.861	0.608	0.793
PBC1	0.729				
PBC2	0.791				
PBC3	0.816	0.851	0.893	0.627	0.861
PBC4	0.780				
ITU1	0.758				
ITU2	0.830	0.851	0.909	0.77	0.864
ITU3	0.835				
ITU4	0.828				
ITU5	0.700	0.851	0.909	0.77	0.864
SJN1	0.886				
SJN2	0.855				
SJN3	0.891				

Two methods verified the discriminant validity of the constructs: 1. Intercorrelation matrix, and 2. HTMT indicators. Table 2 describes the outcome of Discriminant validity using the Correlation matrix, which compares the square root of the AVE values with the Pearson correlation coefficients between constructs. The inter-construct correlation coefficients are lesser than the corresponding square root of the AVE estimates, proving the constructs' discriminant validity.

Table 2: Discriminant Validity – Correlation Matrix

	ATT	ECN	EV	GPS	PBC	ITU	SJN	DVAL
ATT	0.841							Yes
ECN	0.553	0.821						Yes
EKL	0.544	0.502	0.789					Yes
GPS	0.611	0.367	0.405	0.840				Yes
PBC	0.375	0.296	0.385	0.328	0.780			Yes
ITU	0.585	0.430	0.420	0.490	0.592	0.792		Yes
SJN	0.429	0.300	0.392	0.411	0.503	0.541	0.877	Yes

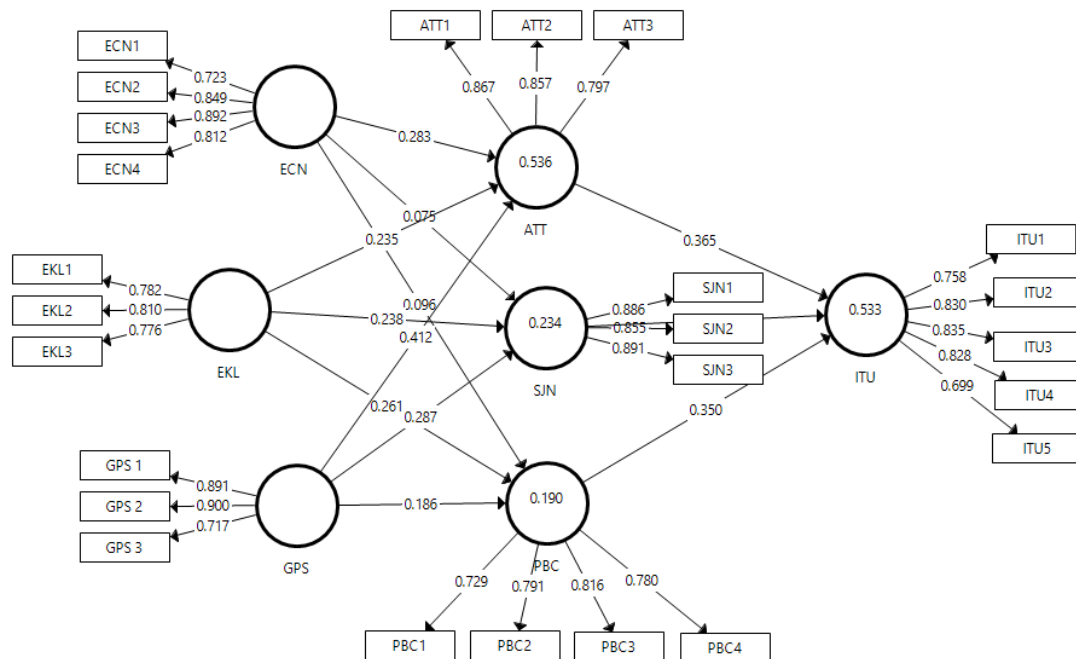
*Note: Diagonal values are the square root of AVE

Table 3 encapsulates the results of the verification of discriminant validity using HTMT indicators. The HTMT is a degree of correlation among the constructs and is comparable to the de-attenuated construct score. Because none of the HTMT indicators exceeded the cutoff value of 0.7, this study found no discriminant validity issues (Benitez et al., 2020). Therefore, the investigation typically means that the data's validity and reliability are sufficient.

Table 3: Discriminant Validity Using HTMT

	ATT	ECN	EKL	GPS	PBC	ITU	SJN
ATT	--						
ECN	0.670	--					
EKL	0.630	0.647	--				
GPS	0.665	0.437	0.546	--			
PBC	0.466	0.367	0.513	0.418	--		
ITU	0.603	0.501	0.539	0.598	0.611	--	
SJN	0.515	0.345	0.504	0.490	0.602	0.624	--

Figure 2: Structural Equation Model



Structural Model and Hypotheses Testing

Version 3.0 of Smart PLS was used to analyze the acquired data to investigate the direct effects described in the hypotheses. Bootstrapping resampling was employed to evaluate the structural model and examine the relationship between constructs. 5,000 bootstrapping sub-samples were generated (Hair et al., 2017).

The examination of the path coefficient for each hypothesis is presented in Table 4, and the Structural Equation Model (SEM) is depicted below in Figure 2.

Analysis of Direct Effects

Table 4 displays the evaluation of SEM and hypothesis results. According to the results, ECN positively and significantly impacts ATT ($\beta=0.283$; $t=4.98$) at a significance level of 0.01. However, the impact of ECN on SJN and PBC is not significant. Hence, H1b and H1c are not supported. The EKL has a positive impact on ATT ($\beta=0.235$; $t=4.607$), SJN ($\beta=0.238$; $t=3.645$), and PBC ($\beta=0.261$; $t=3.584$) at a significance level of 0.01. Therefore, H2a, H2b, and H2c are supported. Similarly, GPS has a significant influence on ATT ($\beta=0.412$; $t=8.364$), SJN ($\beta=0.287$; $t=4.785$), and PBC ($\beta=0.186$; $t=2.488$) at a significance level of 0.01. Thus, H3a, H3b, and H3c are supported. Likewise, the ITU of e-bike riders is influenced by ATT ($\beta=0.365$; $t=7.781$), SJN ($\beta=0.209$; $t=4.383$), and PBC ($\beta=0.350$; $t=6.567$) at a significance level of 0.01. So, H4, H5, and H6 are supported.

Table 4: Evaluation of SEM and Hypothesis Results

Hypotheses	Paths	β value	T-Value	P-Value	Results
H1a	ECN $\rightarrow$ ATT	0.283	4.938	***	Supported
H1b	ECN $\rightarrow$ SJN	0.075	1.209	--	Not Supported
H1c	ECN $\rightarrow$ PBC	0.096	1.244	--	Not Supported
H2a	EKL $\rightarrow$ ATT	0.235	4.607	***	Supported
H2b	EKL $\rightarrow$ SJN	0.238	3.645	***	Supported
H2c	EKL $\rightarrow$ PBC	0.261	3.584	***	Supported
H3a	GPS $\rightarrow$ ATT	0.412	8.364	***	Supported
H3c	GPS $\rightarrow$ PBC	0.186	2.488	**	Supported
H3b	GPS $\rightarrow$ SJN	0.287	4.785	***	Supported
H4	ATT $\rightarrow$ ITU	0.365	7.781	***	Supported
H5	SJN $\rightarrow$ ITU	0.209	4.383	***	Supported
H6	PBC $\rightarrow$ ITU	0.350	6.567	***	Supported

*Notes: ** $p < 0.01$; *** $p < 0.001$

Table 5: Hypothesis Results of Mediating Effects

Hypotheses	β value	T Value	Lower	Upper	P Values	Results
ECN $\rightarrow$ ATT $\rightarrow$ ITU	0.103	3.831	0.056	0.160	***	Supported
EKL $\rightarrow$ ATT $\rightarrow$ ITU	0.086	4.276	0.051	0.129	***	Supported
GPS $\rightarrow$ ATT $\rightarrow$ ITU	0.150	5.559	0.103	0.211	***	Supported
ECN $\rightarrow$ PBC $\rightarrow$ ITU	0.034	1.208	-0.017	0.092	--	Not Supported
EKL $\rightarrow$ PBC $\rightarrow$ ITU	0.091	3.098	0.041	0.158	***	Supported
GPS $\rightarrow$ PBC $\rightarrow$ ITU	0.065	2.204	0.013	0.131	***	Supported
ECN $\rightarrow$ SJN $\rightarrow$ ITU	0.016	1.127	-0.007	0.048	--	Not Supported
EKL $\rightarrow$ SJN $\rightarrow$ ITU	0.050	2.900	0.021	0.090	***	Supported
GPS $\rightarrow$ SJN $\rightarrow$ ITU	0.060	2.925	0.027	0.109	***	Supported

*Notes: ** $p < 0.01$; *** $p < 0.001$

Analysis of Mediating Effects

Table 5 exhibits the Hypothesis results of mediating effects. The current study used the bootstrapping technique with 5000 repeated samples and a 95% confidence interval to examine the effect. The findings indicated that all mediating path correlations are positive, except for (ECN→SJM→ITU) and (ECN→PBC→ITU), signifying that EKL and GPS indirectly impact the ITU of young adults towards e-bikes.

Discussion and Conclusion

Limited research has been conducted on the intention of young adults in India towards using electric bikes. This study aimed to fill this research gap by investigating young adults' intention to use electric bikes and incorporating variables from the Theory of Planned Behavior (TPB). The extended model was tested using PLS-SEM, and the results strongly supported the model. The findings revealed that perceived behavior control was a prominent factor influencing young adults' intention to use electric bikes. This implies that individuals' beliefs regarding their ability to overcome barriers associated with electric bike usage significantly shape their intention. Moreover, a positive attitude towards electric bikes, driven by the perceived benefits such as environmental friendliness and cost-effectiveness, significantly influenced the intention to use them. Government policy support was also identified as a crucial factor influencing intention. Supportive policies, including subsidies, incentives, and infrastructure development, played a vital role in shaping individuals' decisions to use electric bikes. The inclusion of these variables in the proposed model substantially increased the predictive power of young adults' intention to use electric bikes, indicating their significance in promoting sustainable transportation alternatives. The findings of this study provide valuable insights for policymakers, urban planners, and stakeholders who aim to encourage the widespread adoption of electric bikes. Focusing on infrastructure development, educational campaigns, and supportive policies can address the identified factors and promote a greener, more sustainable future. Overall, this study contributes to the existing literature by shedding light on young adults' intention to use electric bikes in India and the factors that influence their decision-making process.

Limitations and Scope of Research

Although the effort that this research makes, quite a few limitations would be considered. First, WhatsApp and in-person contact were made with the study's respondents. Self-evaluation can therefore result in subjective prejudice. A larger sample from various states, nations, cultures, etc., might be employed in future studies. It might improve study findings more generalizable.

The second problem is that it is impossible to rule out the possibility of other factors. Therefore, it is advisable to find more pertinent factors. Third, our sample had a higher proportion of respondents under 35 than respondents in other age groups, which could have caused a little bias in our research findings. Finally, the results were constrained to the respondent's engagement at a single moment due to a cross-sectional methodology. Future research can utilize a better engagement approach by employing a longitudinal design.

Practical Implications for Asian Business

The outcome of this research delivers some relevant corporate insights into Automobile companies in Asia. First, this study can aid in locating the most important e-bike Intention to Use predictors for decision-makers and the marketing department of e-bike firms. First, marketers need to understand the drivers and difficulties of e-bike purchasing. Marketers should consider how ECN, EA and GPS will affect ATT, SJN, and PBC. To support the Intention to Use (ITU), it is essential to encourage Asian customer concerns about the environment, government policy support, attitude, subjective norms, and behavior control. Businesses must take part in various marketing and sales initiatives relating to the environment to promote environmental concern, knowledge and awareness, which could encourage attitude, perception and intention to use. The ATT, SJN and PBC's mediation responsibilities are also essential for promoting customer values. E-bike providers can improve young adults' ECN and EKL via various information channels, such as television, print and especially social media like WhatsApp, YouTube, Instagram, Facebook, Twitter, LinkedIn, etc. The activation of ECN and EA is necessary to achieve the mediation effect of ATT, SJN, and PBC action on ITU. Therefore, the three primary topics marketers should focus on most to encourage green purchasing are ATT, SJN, and PBC from the customer, especially because young people make up a sizable share of purchases of e-bikes and are the primary target market for e-vehicle business.

Most motorcycles in Asia are now petroleum, but transportation experts claim that a significant shift to electric motorcycles is beginning to take hold. On the one hand, the research findings indicated that ATT, SJN, and PBC all influenced young people's intentions to buy e-bikes. On the other hand, the direct effect findings from the path coefficient suggest that government policy support is a major factor in influencing young people's attitudes regarding e-bike purchases. These results lead us to propose that marketers' standardized approach should concentrate on creating and providing effective electric motorcycles generally supported by governmental legislation. This study has various ramifications for those who work in the electric bike industry, particularly Asian businesses and multinational corporations. This study was especially helpful for the entire upstream and downstream supply chain partners like suppliers, manufacturers, managers, distributors, and retailers who create plans for localization and cross-country uniformity to encourage the electric bike market and sales. This study significantly advances the topic of e-bike adoption and provides insightful advice for Asian businesses. Unlike a few industrialized Asian countries like China, India, Vietnam, and Indonesia, developing Asian countries generally have low levels of hybrid vehicle adoption and face serious environmental problems (Ninh, 2021). This study offers practical methods to deal with these pressing problems.

First, since young adults are the main customers of bikes, e-bike companies should concentrate on them. E-bike companies should conduct promotional campaigns or awareness sessions in schools and colleges about the Eco-friendliness of e-bikes and the designs and models available. Once they begin utilizing e-bikes, they will continue to buy environmentally friendly goods, directly and indirectly, registering in their minds. As a result, the nation's carbon emissions could be greatly reduced. Second, the body design, style, comfort, speed, and accessibility to charging stations draw young people's attention toward e-bikes. Therefore, the e-bike company should focus on the abovementioned factors when manufacturing e-bikes. Third, concerning the reach of

many young adults, the advertising and sales promotion of the e-bike company should concentrate on social media and the e-WOM modality. The highlighted messages must be delivered to young adults through communication and promotion; otherwise, their knowledge of EVs typically becomes weak. Finally, increasing the rate of e-bike purchases and lowering complex environmental issues in developing Asian countries require a combination of creating basic infrastructure for e-bikes and enacting intelligent regulations.

Finally, the study offers several recommendations for government policymakers and suggestions for Asian e-bike manufacturing companies. Therefore, it is also crucial for Asian countries to implement national policies to encourage people to start utilizing e-bikes. While promoting subsidies, removing quotas and tax exemptions are official measures that might significantly boost e-bike sales in Asian countries (Ninh, 2021). Additionally, India's infrastructure has to be developed for electric bike consumers, making it easy by providing charging stations and service facilities in all possible locations. Asian businesses will be better able to adapt successfully to global markets and cross-cultural consumers by incorporating these insights into their business growth and marketing strategies.

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