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# EXPLORING CONTINUANCE INTENTION TO USE ELECTRIC MOTORCYCLES AMONG STUDENTS IN HANOI USING EXPECTATION CONFIRMATION THEORY

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**Abstract.** To sustain the development of urban transportation, electrifying private motorized vehicles is a top goal besides the development of public transport. This study aims at investigating the influential factors of continuance intention to use electric motorcycles based on an extension of Expectation Confirmation Theory (ECT). To empirically test the proposed conceptual framework, Partial Least Squares Structural Equation Modeling (PLS-SEM) and the data of 394 students in Hanoi collected in August 2022 are used. The results show that perceived usefulness and satisfaction directly facilitate the continuance intention while perceived ease of use and expectation confirmation have indirect positive effects. Female students tend to have less intention to continue using electric motorcycles while those living in non-urban districts seem to have a higher continuance intention. The prediction capacity of the model is high with over 65% of the variance of continuance intention being explained by (independent) constructs. Based on the findings of influential factors, the authors propose practical implications for triggering the use of electric motorcycles among students.

**Keywords:** PLS-SEM, students, electric motorcycles, developing countries, expectation confirmation theory.

## 1. INTRODUCTION

Environmental challenges have been increasingly serious with the more frequent occurrence of disasters such as flood and long waves of scorching heat worldwide. One of the biggest contributors to greenhouse gas emission, which results in the long-term warming the earth's temperature, is transportation [1]. This emphasizes the importance and necessity of making travel activities less polluted. Habits play a critical role in mode choice for individuals [2]; therefore, it is important to modify fossil fuel-reliant mobility and form green travel patterns. According to [3], adult travel habits are so consistent that breaking them takes time and money, not to mention the under-expected results. However, it is more economical and easier to formulate the habit in using electric modes or performing active transport (walking and cycling) among the young generations, particularly students [3]. Owing to high exposure to the programs of raising awareness and the practical observation of disastrous consequences of climate change, students are more willing to do pro-environmental behaviors [4]. In addition, the income of students may be limited, leading to their utilization of public transport or free/low-cost modes such as cycling or walking [5]. A habit in travelling by green modes at the young age is found to translate totally or partly into the later stages of the life. As such, the encouragement of students' sustainable mobility is a path towards the sustainability of urban transportation development.

Pupils (school students) are widely demonstrated to use transportation modes on their parents' advice or decision [7], whereas university students are more independent when it comes to choosing travel modes due to their maturity in physical and mental capacity. Furthermore, students have complex connections with increasing travel demand, such as travel to school, (part-time) work, and recreational places. As a result, public transport, walking and cycling are not the appropriate options. Buses may have limited schedule and catchment coupled with long waiting time; meanwhile, active transport is not suitable for travelling on a medium/long distances and requires much physical efforts, which may lead to tiredness and inconvenience for users at destinations [6]. Moreover, public transport and active transport may attach to a low social status while students would have a strong sense of self-demonstration. Consequently, students may desire to have a private motorized mode. Many empirical studies have reported the students' leave of public transport to drive or ride a motorcycle, and Vietnamese cities are not an exception [4]. The rise in the motorization levels among students is surely bad news for researchers, practitioners, and transport authorities. To respond to this matter, the idea of electrifying private motorized modes has obtained growing popularity. While developed countries have exerted concerted efforts to foster the acceptance of electric cars in campus contexts, developing countries, particularly motorcycle-dependent ones, have made attempts to promote the prevalence of electric motorcycles among students.

As a basic principle in nature, understanding the factors associated with the choice of a travel mode is a prerequisite for successfully proposing effective measures to trigger its usage. Most existing studies on students' mode of choice have concentrated on traditional modes, including cars, public transport, and active transport. However, little is known about the determinants of adopting electric motorcycles. Furthermore, developed countries have been the focus of previous research, whereas developing countries have received little attention.

Desiring to fill the abovementioned gaps in part, this study aims at investigating the influential factors of continuance intention to use electric motorcycles based on an extension of Expectation Confirmation Theory (ECT). To empirically test the proposed conceptual

framework, Partial Least Squares Structural Equation Modeling (PLS-SEM) and the data of 394 students in Hanoi collected in August 2022 are used.

The reminder of this paper is structured traditionally. Section 2 reviews the constructs of ECT and posit research hypotheses before Section 3 presents methods of data collection and data analysis. The next part provides the results and in-depth discussions. Subsequently, the last section concludes this paper.

## 2. FORMULATION OF CONCEPTUAL FRAMEWORK

The concentration of the current research is on continuance intention, which can be defined as one's aim to keep using or recycling a system. According to [7], an individual who declares a continuing usage for an activity or purpose is said to have a continuation intention. Similarly, the authors of [8] expressed that planning to make a decision to buy a certain item or service from the same company after weighing their present status and anticipated circumstances is known as continuation intention or repurchase intention.

The review [9] stressed that the most cited theories used for travel behaviour analysis encompass Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), and Theory of Reasoned Action (TRA). However, this paper utilizes ECT - an emerging theory that has been deployed to study post-purchase behaviours such as continuance intention [10–13]. The original version of ECT comprises four constructs, that is, Expectation Confirmation, Perceived Usefulness, Satisfaction, and Behavioural Intention. To better explore the intention to continue using e-motorcycles, we extend ECT by adding Perceived Ease of Use. Next, we review the considered constructs and propose the conceptual framework based on the combination of research hypotheses.

### 2.1. Perceived usefulness

As defined by Davis [14], perceived usefulness is the degree to which an individual believes that using a particular technology would enhance his or her job performance. This is derived from the meaning of the term "useful" as "able to be used advantageously". Perceived usefulness is posited to contribute to behavioural intention based on the Technology Acceptance Model. Previous research on the adoption of electric vehicles has found that the perception of benefits of using these vehicles plays an important role in impacting both the usage intention and the continuance intention to use [15]. In the original version of ECT, perceived usefulness is proposed to shape satisfaction. The more useful the product, the more satisfied the user will be. The extant literature has broadly found that satisfaction and usage continuance intention are directly impacted by perceived usefulness [16–19].

### 2.2. Satisfaction

Satisfaction can be understood as the level of state and feeling of the user obtained from comparing the results gained from using a product with the user's initial expectations [20]. As such, satisfaction involves the previous purchasing behaviour. Satisfaction is also indicated as a customer's emotional reaction to a particular experience in using a product. User's satisfaction is an important antecedent of loyalty; therefore, it has been rigorously researched in marketing research. Being dissatisfied with a service can trigger the process of seeking alternatives. The significant contribution of satisfaction to continuance intention is empirically validated in many contexts, such as websites, e-learning services, and transportation [10,11].

**2.3. Expectation Confirmation**

Before using the product, the user has formed in his/her mind an expectation about the elements constituting the quality of the product that the manufacturer can bring to them. After using the product, it will form the user's actual perception of the product's performance. ECT posits that confirmed expectations, which reflect an individual's achievement of expected benefits through the use of a product/service, result in a positive impact on his/her satisfaction. By comparing what they expect before and after using the product, users will have confirmation of the original expectation. Three main possibilities will take place as follows [21]. If the actual perception entirely coincides with the expectation, the user's expectation will be confirmed, leading the user to feel satisfied. If the actual perception is greater than the expectation, the confirmation will be positive and the user will be delighted. Conversely, if the actual perception is smaller than the expectation, the confirmation will be negative, thus making the user unsatisfied (disappointed). Much prior research has reported higher confirmation, higher satisfaction [10,12].

ECT also posits that perceived usefulness is affected and adjusted by confirmation expectation because the initial perception of usefulness of a product is not concrete and may be updated continuously based on the comparison between expectations and actual experience. On the basis of [22], if a product is not as helpful as initially expected, users will not appreciate its perceived usefulness or convenience. Whereas, if it is more valuable than expected, its usefulness will be perceived (more) highly. The positive link between expectation confirmation and perceived usefulness is well demonstrated [11,12]

**2.4. Perceived Ease of Use**

Perceived ease of use is defined as how much hard effort is needed for the use of a certain product [14]. To avoid the user's rejection of a product or service, it should be easy to approach or use [23]. Many studies showed that perceived ease of use is positively related to continuance intention. Users will be more likely to purchase an electric equipment if the functions are simple to control and use. Besides, according to the Technology Acceptance Model, an electric vehicle that is easy to use and control positively is perceived more useful. This is understandable because if the user has difficulty in recognizing the functions of each part that will interfere with the vehicle's interaction, (s)he will have to spend a significant amount of time learning how to use each function and appreciate the usefulness at a lower level [24].

**2.5. Control variables**

Socio-demographic variables are widely demonstrated to have a significant impact on student's travel mode choice. A research based in Mexico expressed that female students are more likely to ride by public transport [25]. A study set in Hanoi [4] reported that older students and those from households having a higher income are more inclined to switch from the bus to motorcycles. Students living in high street densities (i.e., urban districts) tend to use the bus [26]. As presented in highly-cited reviews of factors governing intentions to use electric vehicles [15,27,28], personal characteristics such as age, gender, and income can be useful predictors; however, the effects may vary across research settings. Therefore, it can be expected that control variables (gender, age, income, and area) may influence the intention to continue to use electric motorcycles for students.

### 2.6. Conceptual framework

Based on the abovementioned discussions, eight hypotheses are proposed to formulate the theoretical framework for this paper (see *Figure 1*).

H1. Perceived usefulness is positively associated with continuance intention

H2. Perceived usefulness is positively associated with satisfaction

H3. Satisfaction is positively associated with continuance intention

H4. Expectation confirmation is positively associated with perceived usefulness

H5. Expectation confirmation is positively associated with satisfaction

H6. Perceived ease of use is positively associated with continuance intention

H7. Perceived ease of use is positively associated with perceived usefulness

H8a, b, c, d. Control variables including gender, age, income, and area are significantly associated with continuance intention.
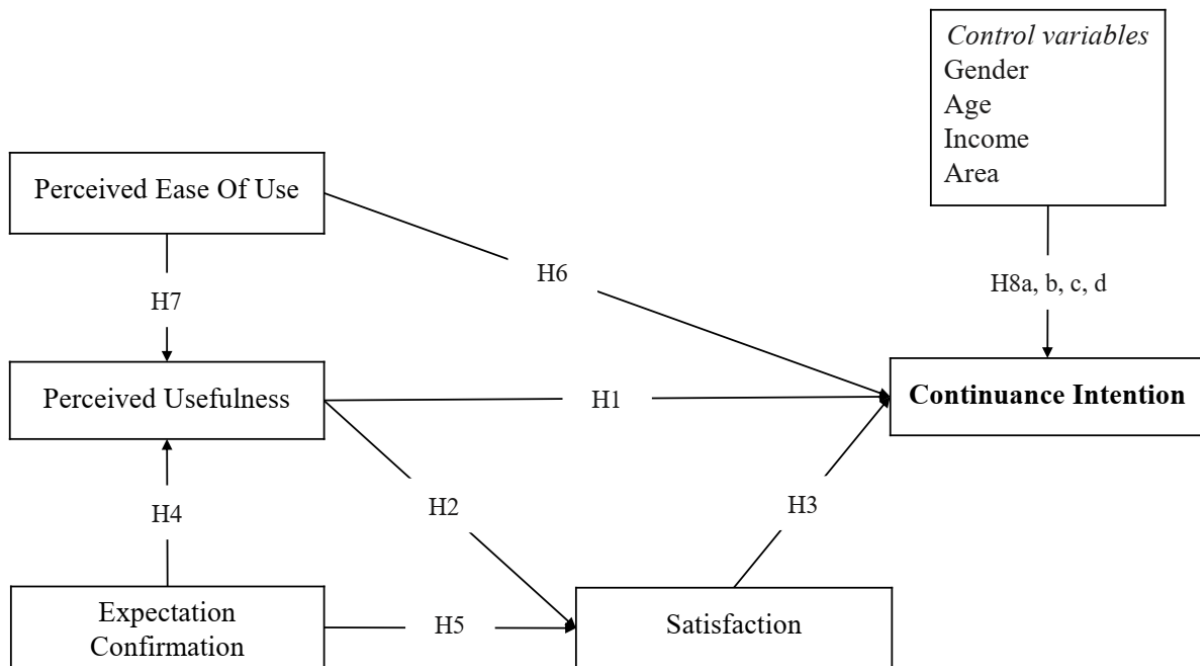


Figure 1. Proposed conceptual framework.

## 3. METHODS OF DATA COLLECTION AND DATA ANALYSIS

### 3.1. Questionnaire

In line with the conceptual framework proposed in sub-section 2.6, a structured three-part questionnaire was designed. The first part was an introduction to the research. The second part requested socio-demographics of participants while the last part asked about the responses to a range of attitudinal statements. Specifically, perceived ease of use and perceived usefulness were measured through 6 items adapted from [29]. Expectation confirmation and satisfaction were assessed using 6 items modified from [10]. Continuance intention was evaluated utilizing 3 statements based on [10] (see *Table 1*).

Table 1. Indicators of considered constructs.

| Code | Indicators |
|------|-----------|
| *PEOU* | *Perceived Ease of Use* |
| PEOU_1 | Learning how to ride e-motorcycles is an easy task |
| PEOU_2 | It is not difficult for me to become skilful at utilizing e-motorcycles |
| PEOU_3 | My interaction with an e-motorcycle does not require much mental effort |
| *PU* | *Perceived Usefulness* |
| PU _1 | I can reach almost anywhere by e-motorcycles |
| PU _2 | E-motorcycles can improve my travel efficiency (e.g., saving fuel cost) |
| PU _3 | E-motorcycles can improve my living quality |
| PU _4 | Overall, an e-motorcycle is useful for me |
| *EC* | *Expectation Confirmation* |
| EC_1 | My experience with riding my e-motorcycle is better than what I expected |
| EC_2 | The benefits of using an e-motorcycle are more than I expected |
| EC_3 | Overall, most of expectations from using an e-motorcycle are confirmed |
| **Satis** | *Satisfaction* |
| Satis_1 | I believe I make a wise decision on using an e-motorcycle |
| Satis_2 | I am satisfied by my e-motorcycle |
| Satis_3 | I am happy with my choice of e-motorcycle for daily travel |
| **CI** | *Continuance Intention* |
| CI_1 | E-motorcycles will continue being one of the most important modes for my travel |
| CI_2 | I will continue using e-motorcycles |
| CI_3 | I plan to keep using e-motorcycles |

The questionnaire was first composed in English and then translated into Vietnamese. Some pilot tests were undertaken to create the final version, which was used for the formal survey.

## 3.2. Research setting and survey

Data collection for this research was carried out in Hanoi – the capital of Vietnam. The city is the largest in area but ranks the second in terms of population. The mobility of residents is involved mainly in motorcycles but the (low) rate of car use increases significantly [30]. Walking and cycling are limited and related primarily to school transportation and recreational travel [31,32]. Le et al. showed that Hanoi is witnessing an increasing use of electric motorcycles [33].

Hanoi is an educational center to the north. Nguyen and Pojani [4] investigated travel of Hanoi students in the COVID-19 era. They focused on analyzing factors affecting the choice and end of using public transport among students under the impact of COVID-19; nevertheless, electric motorcycles were not taken into consideration.

Due to the wide coverage of COVID-19 vaccines, almost all daily activities in Hanoi have returned to the normal status (as the pre-pandemic time). This allowed us to carry out face-to-face interviews with students. To gather a diverse sample, we surveyed at four universities, including University of Transport & Communications, University of Foreign Trade, National University of Civil Engineering, and Thuongmai University. We conducted face-to-face interviews with students. To show the appreciation for respondents' support, each participant was received 20,000 VND (about US$ 1) after completing the survey.

At the end of the survey, we collected 402 responses. The elimination of uncompleted forms and unreliable ones resulted in the final sample of 394 responses, which were eligible for testing the proposed framework. As can be seen in *Table 2*, more female students (57%) were interviewed. The age ranged between 18 and 23 years old with an average age of 19.6 (standard deviation=1.085). Most participants (about 73%) came from households with a lower monthly income level (under 20 million VND). Slightly more than half of respondents (53%) were living in urban districts.

Table 2. Sample descriptions (N=394).

| Variable | Value | Frequency | Percent |
|---|---|---|---|
| Gender | Male | 170 | 43.15 |
| | Female | 224 | 56.85 |
| Monthly household income | Less than 20 million VND | 286 | 72.59 |
| | At least 20 million VND | 108 | 27.41 |
| Live in urban districts | Yes | 210 | 53.3 |
| | No | 184 | 46.7 |
| Age | | 19.604* | 1.085** |
| * refers to mean; ** refers to standard deviation | | | |

### 3.3. Analytical method

Structural Equation Modeling (SEM) has been used most to analyze conceptual frameworks in academia [34]. Recently, an improved technique of SEM, that is Partial Least Squares Structural Equation Modeling (PLS-SEM), has been prominently popularized by transport researchers [35]. Several previous studies using ECT (like this current paper) have used PLS-SEM [10]. PLS-SEM is highly recommended for studies based on extensions of well-known theories [36–38]. An advantage of PLS-SEM is not to require a large sample with normal distribution thanks to the use of bootstrapping technique [39]. A rule of estimating the minimum size of sample of using PLS-SEM is that the number of observations should be at least equal to 10 times of the maximum number of inner or outer paths to a construct in the framework. Hence, 394 observations in this study are sufficient. SmartPLS 3.0 - a commercial professional software was used to conduct PLS-SEM in this research.

The results of PLS-SEM are a series of tests categorized into two main steps: Confirmatory Factor Analysis (CFA) for measurement models and Structural Equation Modeling for structural model. In the next section, this paper presents the results of these two steps and discussions about influential factors.

## 4. RESULTS AND DISCUSSIONS ABOUT FACTORS ASSOCIATED WITH CONTINUANCE INTENTION

### 4.1. Results of CFA

CFA is a form of factor analysis commonly used in social science for testing if measures of a factor are in line with knowledge on the nature of that construct. Three criteria need to be validated to ensure the appropriateness and reliability of CFA results. Factor loading of all indicators should not be less than the suggested level of 0.708 [40] while Cronbach's Alpha value and Composite Reliability should be at least 0.7 [40]. Finally, the

average variance extracted must be over 50%. *Table 3* shows that all indicators and constructs satisfied the afore-said criteria.

Table 3. Confirmatory Factor Analysis results.

| Variables | | Factor Loading | Cronbach's Alpha | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|---|---|
| Expectation Confirmation | EC_1 | 0.889 | 0.858 | 0.913 | 0.778 |
| | EC_2 | 0.876 | | | |
| | EC_3 | 0.882 | | | |
| Continuance Intention | CI_1 | 0.879 | 0.860 | 0.914 | 0.781 |
| | CI_2 | 0.866 | | | |
| | CI_3 | 0.905 | | | |
| Perceived Ease of Use | PEOU_1 | 0.864 | 0.865 | 0.917 | 0.788 |
| | PEOU_2 | 0.855 | | | |
| | PEOU_3 | 0.941 | | | |
| Satisfaction | Satis_1 | 0.921 | 0.886 | 0.929 | 0.814 |
| | Satis_2 | 0.886 | | | |
| | Satis_3 | 0.900 | | | |
| Perceived Usefulness | PU_1 | 0.764 | 0.886 | 0.921 | 0.746 |
| | PU_2 | 0.891 | | | |
| | PU_3 | 0.881 | | | |
| | PU_1 | 0.911 | | | |

To assess the convergent validity, the values of average variance extracted had to meet the minimum required value of 0.5 [41]. As expected, all found constructs gained a satisfactory degree of convergent validity.

The discriminant validity, which involves the level of statistical difference between two factors was evaluated utilizing the Fornell-Larcker criterion. As revealed in *Table 4*, the square root of each latent construct's AVE was greater than the inter-construct correlation values of that same construct and other measured constructs, demonstrating a good discriminant validity [40].

Table 4. Fornell-Larcker criterion.

| Variables | Continuance Intention | Expectation Confirmation | Perceived Ease of Use | Perceived Usefulness | Satisfaction |
|---|---|---|---|---|---|
| Continuance Intention | *0.884* | | | | |
| Expectation Confirmation | 0.733 | *0.882* | | | |
| Perceived Ease of Use | 0.282 | 0.319 | *0.887* | | |
| Perceived Usefulness | 0.723 | 0.770 | 0.380 | *0.864* | |
| Satisfaction | 0.733 | 0.669 | 0.296 | 0.666 | *0.902* |

## 4.2. Results of SEM model

The results of direct effects validated the hypotheses 1, 2, 3, 4, 5, 7 (*Table 5 and Figure 2*). Specifically, perceived usefulness was positively associated with both continuance intention and satisfaction. Satisfaction increased the continuance intention while expectation confirmation facilitated perceived usefulness and satisfaction. However, the path between perceived ease of use and continuance intention was insignificant, leading to a rejection of hypothesis 6. As hypothesized (H7), perceived ease of use was found to significantly

contribute to perceived usefulness. The hypotheses 8a and 8d were verified with the significant associations of continuance with gender and area but age and income were not the determinants of continuance intention, thus rejecting H8b and H8c. Being female and living in urban areas were more likely to have lower continuance intention.
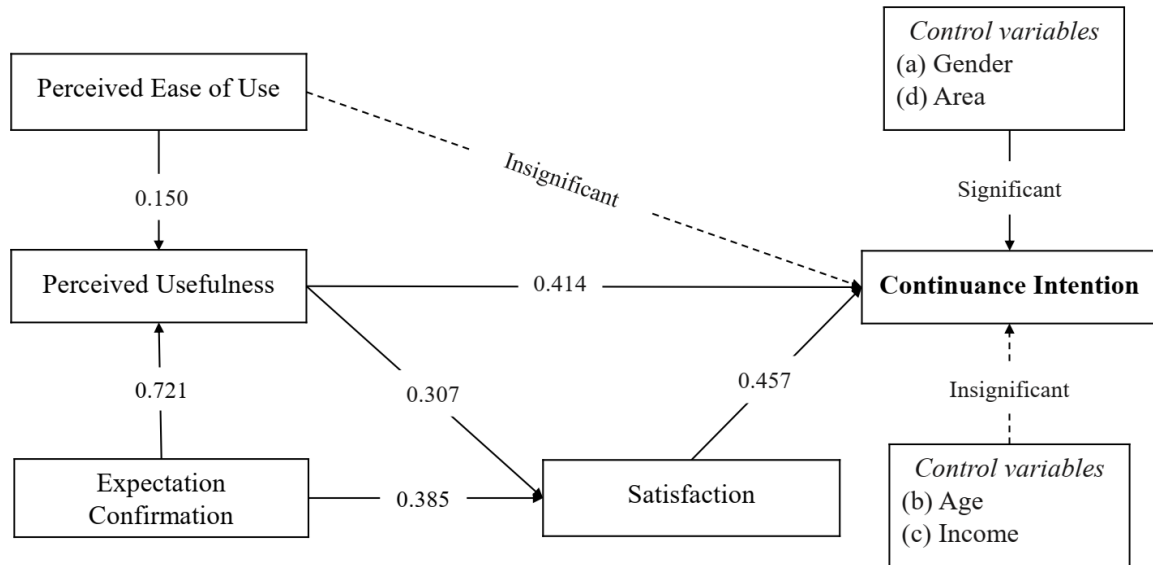


Figure 2. Results of testing research hypotheses.

As regards indirect effects, the positive impact of perceived usefulness on continuance intention was partly mediated via satisfaction. Meanwhile, the positive effect of expectation confirmation on the intention was fully mediated via satisfaction and perceived usefulness. Similarly, perceived usefulness fully mediated the positive influence of perceived ease of use on continuance intention.

Table 5. Results of direct, indirect, total effects.

| Paths | Direct effects | | | Hypothesis | | Indirect Effects | | | Total Effects | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | β | Std. | p | No. | Deci. | β | Std. | p | β | Std. | p |
| PU -> CI | **0.414** | 0.090 | 0.000 | H1 | Accept | **0.169** | 0.053 | 0.002 | **0.583** | 0.074 | 0.000 |
| PU -> Satis | **0.370** | 0.094 | 0.000 | H2 | Accept | | | | **0.370** | 0.094 | 0.000 |
| Satis -> CI | **0.457** | 0.086 | 0.000 | H3 | Accept | | | | **0.457** | 0.086 | 0.000 |
| EC -> PU | **0.721** | 0.042 | 0.000 | H4 | Accept | | | | **0.721** | 0.042 | 0.000 |
| EC -> Satis | **0.385** | 0.094 | 0.000 | H5 | Accept | **0.267** | 0.069 | 0.000 | **0.651** | 0.056 | 0.000 |
| PEOU -> CI | 0.000 | 0.043 | 0.950 | H6 | Reject | **0.087** | 0.032 | 0.006 | **0.087** | 0.032 | 0.006 |
| PEOU -> PU | **0.150** | 0.055 | 0.007 | H7 | Accept | | | | **0.150** | 0.055 | 0.007 |
| Gender -> CI | **-0.082** | 0.046 | 0.075 | H8a | Accept | | | | **-0.082** | 0.046 | 0.075 |
| Age -> CI | 0.033 | 0.040 | 0.419 | H8b | Reject | | | | 0.033 | 0.040 | 0.419 |
| Income -> CI | 0.020 | 0.044 | 0.641 | H8c | Reject | | | | 0.020 | 0.044 | 0.641 |
| Area -> CI | **0.105** | 0.045 | 0.019 | H8d | Accept | | | | **0.105** | 0.045 | 0.019 |
| EC -> CI | - | - | - | - | - | **0.600** | 0.048 | 0.000 | **0.600** | 0.048 | 0.000 |
| PEOU -> Satis | - | - | - | - | - | **0.055** | 0.023 | 0.017 | **0.055** | 0.023 | 0.017 |

*Note: No.* refers to the orders of hypotheses. *Deci.* Refers to a decision made for the hypothesis. *Std.* refers to standard deviation.
Bold values refer to a significant path with a p-value being less than 0.1.
CI=Continuance Intention; PEOU=Perceived Ease of Use; PU=Perceived Usefulness; Satis=Satisfaction; EC=Expectation Confirmation

Based on the total effects that are the sum of direct and indirect ones, the strongest factors of continuance intention were expectation confirmation (β=0.600) and perceived usefulness (β=0.583). The less important factors included satisfaction (β=0.457) and perceived ease of use (β=0.087).

For assessing the model fit, standardized root mean square residual (SRMR) and Normed Fit Index (NFI) were utilized based on the recommendation of [40]. In this paper, the SRMR value was 0.048 - lower than the threshold of 0.08 while the NFI value was 0.823 – higher than the cut-off value of 0.8. Therefore, the proposed framework fitted the data satisfactorily [42].

For assessing the predictability power of the structural model, this study used the coefficient of determination ($R^2$) value and the cross-validated redundancy ($Q^2$) value. *Table 6* illustrates that $R^2$ values of continuance intention, perceived usefulness, satisfaction ranged from 0.504 to 0.651, implying a moderate level of predictive capacity (0.5-0.75) [40]. Meanwhile, $Q^2$ values of these constructs ranged from 0.403 to 0.496 – higher than zero (i.e., the required minimum level). Thus, the estimated model had acceptable predictive relevance for all endogenous factors [40]. Among constructs, continuance intention had the highest values of both $R^2$ and $Q^2$.

Table 6. Evaluation of structural equation model.

| | $R^2$ | $Q^2$ |
|---|---|---|
| Continuance Intention | 0.651 | 0.495 |
| Perceived Usefulness | 0.613 | 0.447 |
| Satisfaction | 0.504 | 0.403 |
| *SRMR for model* | *0.048* | |
| *NFI for model* | *0.823* | |

## 4.3. Discussions and implications

Continuance intention to use electric motorcycles among students has never been explored before this paper. The $R^2$ value of continuance intention was at a high level of 0.651, demonstrating the suitability of the proposed conceptual model based on ECT.

This study reinforced the positive association between perceived usefulness with intention, which has been consistently reported in the literature [24,29]. As perceived usefulness was found to be the 2nd strongest influential factor of intention, this paper emphasized the importance of how current users perceive usefulness of e-motorcycles for keeping using this mode. A source of perceived usefulness was also demonstrated to be expectation confirmation. It can be interpreted that when the respondents' expectations were achieved or even outweighed by practical experience, they were more likely to evaluate benefits of e-motorcycles more highly – validating previous findings [22].

Inconsistent with our initial expectation and some prior evidence [43], perceived ease of use did not have a direct effect on the continuance intention. This can be explained that after riding e-motorcycles and became familiar with it, the ease of (or difficulty in) using it was out of students' consideration. The insignificant impact of perceived ease of use was congruent with some previous research [24,29]. Interestingly, the effect of perceived ease of use was mediated on the intention via perceived usefulness due to a direct positive association between perceived ease of use and perceived usefulness. Specifically, the more easily e-

motorcycle can be ridden, the higher its perceived usefulness. This finding validated the report of [44].

As expected, satisfaction was found as a contributor to the intention. It is well-known that being more satisfied leads to higher continuance intention [10]. Our study found that satisfaction was formed by both perceived usefulness and expectation confirmation. As such, taking benefits and meeting expected aspects of e-motorcycles are key to gaining the satisfaction of current users.

Expectation confirmation, despite having only direct effects, was the strongest determinant of continuance intention. This can be interpreted that expectation confirmation took primary responsibilities for shaping perceived usefulness and satisfaction – two main direct contributors to continuance intention.

While most of our results were in line with previous theoretical findings, it is important to note that before our research, the literature could not confirm the relationships of continuance intention with perceived usefulness, perceived ease of use, expectation confirmation, and satisfaction in the context of e-motorcycles. Therefore, our paper has generated valuable contributions in analyzing the choice of green travel modes.

We found that the continuance intention to use e-motorcycles for female students was more inclined to be lower than that for male peers. This result was more or less surprising since e-motorcycles and e-bicycles have been reported to be more suitable and used more by females [33]. A possible explanation was the simple appearance of e-motorcycles while female young people pay much attention to fashion [45]. The lower continuance intention for persons living in urban districts can result from the frequent occurrence of flooded roads there in recent months, which can destroy the engines of e-motorcycles.

To enrich the intention to continue using e-motorcycles, some policy implications were suggested in accordance with the factor-specific results. The usefulness of e-motorcycles should be better demonstrated to be increased in the users' perceptions. While practical experience is the main basis for evaluation, the knowledge also plays a role. In fact, some existing research shows that knowledge can help to promote the perception of usefulness [46]. To increase the perceived ease of use, short training courses can be designed and provided freely. Manufacturers and sellers should measure the satisfaction of users and ask about the reasons for unsatisfied points. By this way, they can adopt solutions to boost satisfaction, and thus, strengthening the continuance intention to use e-motorcycles. In parallel with measuring satisfaction, it is necessary to understand the users' expectations. Consumers may have high expectations for e-motorcycles, which may deteriorate expectation confirmation and satisfaction. Confronting this situation, correcting users' expectations with careful explanation and practical experience would be essential.

As gender and living area were related to the continuance intention, such variables should be acted as basis for issuing customized initiatives and solutions. To give an illustration, more concentration should be placed on female students and those living in urban districts – who were more inclined to have a low continuance intention.

## 5. CONCLUSIONS

Maintaining the use of electric motorcycles among students is of importance for sustainable urban and transportation development. This study has found that perceived usefulness, satisfaction, and expectation confirmation have positive impacts on continuance

intention. Perceived ease of use indirectly encouraged the intention. Female students tend to have less intention to continue using electric motorcycles while those living in urban districts seem to have a higher continuance intention. Practical implications have been suggested to promote the prevalence of e-motorcycles among students.

The present study is among the first ones looking for electric motorcycle utilization. However, it is subject to several limitations. First, the sample size was large enough for conducting PLS-SEM; however, the sample was not necessarily representative to the student population in Hanoi. Second, previous analyses have demonstrated a wide array of influential factors, many of which could not be included in this paper, such as perceived risk. Third, the effects of influential factors are sensitive to the contexts. In this sense, the findings of this study may not be transferable fully to other settings. Therefore, more research is needed based on the extension of the study with better data collection strategies.

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