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Understanding consumers' intention to switch to electric motorcycles: a transaction cost economics perspective

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ABSTRACT

In the context of global commitment to decarbonising the highly urbanising world, studies of consumer thinking regarding switching to electric motorcycles are lacking. Our study therefore attempts to provide a first illustration of a model drawing on transaction cost economics (TCE) theory. We hypothesise that consumers' intention to switch to electric motorcycles is based on perceived transaction costs (i.e. search and adoption costs), and transaction costs are determined by different types of uncertainty (i.e. branding, environmental, performance and behavioural uncertainty), and dependability. Given recent calls to develop our understanding of green consumption in different contexts, we use the Asia Pacific region as an illustrative context. Regression modelling is based on data collected from a sample of 1094 consumers in Taipei. Our findings confirm all of the proposed hypotheses. The implications of the findings are discussed as well as the limitations of the study and recommendations for further research.

KEYWORDS

Electric motorcycles; emerging markets; transaction cost economics; Green consumption; sustainability

Introduction

To decarbonise the economies in a highly urbanising world, consumers today seek ecologically responsible products (Gilg, Barr, and Ford 2005; Lu, Chang, and Chang 2015) and green consumption (Chan 2001). At its most fundamental level, the term 'green' represents 'recycling, purchasing and using environment friendly products that have minimal damage to the environment' (Dwyer 2009; Roberts 1996). Green consumption is a significant trend and has promising prospects. It is also a new paradigm shift toward access to environmentally friendly products as our opinions regarding consumption change. Consequently, there has been growing consumer interest in green consumption or switching to green technologies (Seyfang 2005). This movement is viewed as a business opportunity, leading to the development and introduction of more environmentally friendly products (Ng et al. 2013; Polonsky and Rosenberger 2001).

This trend has drawn scholars' attention (Chen 2008). The number of research publications on green consumption has rapidly increased over diverse domains (Chamorro, Rubio, and Miranda 2009), ranging from psychology (Akehurst, Afonso, and Martins

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Gonçalves 2012; Hansla et al. 2008; Lu, Chang, and Chang 2015; Vining and Ebreo 1990) and sociology (Akehurst, Afonso, and Martins Gonçalves 2012; Hopper and Nielsen 1991) to cross-cultural theories (Chan and Lau 2002; Kalafatis et al. 1999). Within this stream, important insights have emerged on specific marketing variables, such as branding effects (Mourad, Serag, and Ahmed 2012), advertising effects (Chan 2004; Roberts 1996), green product labelling (D'Souza et al. 2007), promotion (Seyfang 2005), consumer identification (Chen 2011), knowledge sharing (Cervellon and Wernerfelt 2012), customer satisfaction (Chen, Lin, and Chang 2014), and green brand equity (Chang and Chen 2013). Although numerous studies have investigated consumer responses to decarbonising the economies, no study has used transaction cost economics (TCE) theory to examine the issues involved. The present study aims to advance our understanding of green consumption by examining TCE theory in the context of the Asia Pacific region. TCE theory is a well-researched economics model that has been shown to predict the behaviour of consumers in the salesperson context (Anderson 1985, 1988), but few scholars have considered its application in the green consumption context. Therefore, the aim of the current study is to address this deficiency by explaining why consumers want to switch to electric motorcycles.

In summary, the current study attempts to build a framework by applying a TCE perspective to analyze the issues listed above. TCE theory is a widely accepted approach that explains the behaviour of technology adoption by considering the individual role. It postulates that branding, performance, behaviour, environmental uncertainty (Liang and Huang 1998; Teo and Yu 2005) and consumers' trust (i.e. dependability) in electric motorcycles are related to consumers' perceived transaction cost (i.e. search cost and adoption cost) (Coase 1937; Williamson 1975, 1985). Search costs refer to the costs incurred by consumers in searching for product information and price comparison among different products (Srinivasan and Ratchford 1991; Liang and Huang 1998). Adoption costs refer to costs incurred by consumers for adjustments, after-sale services and customer support during the switching period (Dahlstrom and Nygaard 1999; Liang and Huang 1998). In this study, we posit that both search costs and adoption costs further influence consumers' intention to switch to electric motorcycles.

Two research questions form the basis of this study. First, what can the TCE approach uncover in relation to consumers' intention to switch to electric motorcycles in a highly urbanising world? Second, how can the TCE approach inform our understanding of the multifaceted and pluralistic nature of green consumption? The remainder of this study is structured as follows. First, the lack of a TCE perspective in previous studies is identified from a review of the extant green consumption literature. Second, a research model with several hypotheses based on TCE theory is derived from a review of the extant literature. Thereafter, the methodology, data collection, and measurement of the constructs are presented, and the results and findings, along with the theoretical and managerial implications, are presented. Finally, avenues for future research and the limitations of the study are discussed.

Theoretical background and conceptual model

Green consumption

Green consumption refers to the consumption of environmentally friendly products with minimal impacts on the environment (Roberts 1996). Extant studies on green

consumption behaviour have focused mainly on recycling behaviour (Granzin and Olsen 1991; Hopper and Nielsen 1991; Vining and Ebreo 1990), buying organic food (Gilg, Barr, and Ford 2005; Nuttavuthisit and Thøgersen 2015), buying green products/services (Hansla et al. 2008; Roe et al. 2001), the effect of green advertising (Chan 2004; Roberts 1996), and the effect of green marketing (Chamorro, Rubio, and Miranda 2009; D'Souza et al. 2007). However, it is important to note from the outset that while previous studies have explored the literature on green consumption, the topic of electric motorcycles is still under-researched, particularly in terms of how transaction costs may affect consumers' intention to switch to electric motorcycles.

TCE theory

Extant studies have considered the effects of TCE theory on environmental policies (Coggan, Whitten, and Bennett 2010; McCann 2013; McCann et al. 2005). TCE theory has attracted scholarly attention in the literature on electronic commerce (Teo, Wang, and Leong 2004; Liang and Huang 1998). Transaction costs are any costs derived in the transaction between a seller and a buyer. By extension, Williamson (1975, 1985) focused on three key dimensions of transactions: uncertainty, asset specificity, and transaction frequency. Uncertainty refers to the 'difficulty in predicting the action of the other transaction party due to bounded rationality and opportunism' (Teo and Yu 2005). Asset specificity refers to 'investments that are undertaken in support of a particular transaction' (Teo and Yu 2005). It is important to note from the outset that within the context of this research, asset specificity and transaction frequency are not discussed. Consumers need only two types of asset specificity when switching to electric motorcycles: physical asset specificity (i.e. the needs of the physical equipment) and human asset specificity (i.e. the specific human expertise needed to switch). Since consumers can charge their motorcycles at home or replace the battery at a battery station, there is limited physical asset specificity to be considered. Additionally, most consumers of electric motorcycles are already riders of motorcycles, and the riding skills and knowledge developed to ride motorcycles can be easily switched to electric motorcycles. Thus, these two kinds of assets are not considered. Additionally, electric motorcycles can be used for years. Thus, transaction frequency is not discussed. Figure 1 indicates the hypothesised relationships below.

Hypothesis development

The effect of branding uncertainty on transaction costs

Branding uncertainty is often understood as the difficulties faced by consumers in identifying manufacturer brands (Teo and Yu 2005). Consumers encounter some risk when switching to electric motorcycles since they may not be familiar with the brands of electric motorcycles. This may lead to more search time to determine whether manufacturers offer sufficient information about choices and after-sale services. Consumers may also be unaware of which brands have a good reputation (e.g. have existed for a long time). Unfamiliar brands may generate unexpected changes after switching to electric motorcycles. Altogether, these reasons could increase the perceived transaction costs of switching to electric motorcycles. Hence, the following hypothesis is proposed:

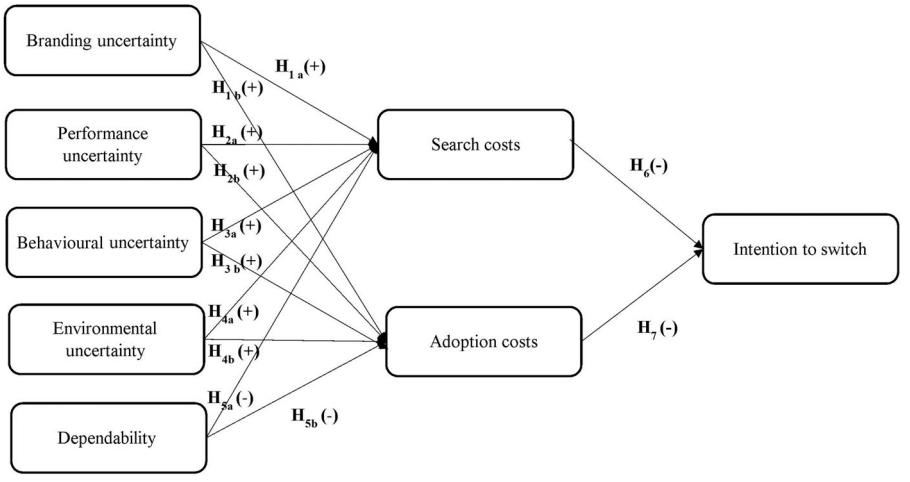

Figure 1. Research framework.

H1a: Branding uncertainty is positively related to search costs.
H1b: Branding uncertainty is positively related to adoption costs.

The effect of performance uncertainty on transaction costs

Consumers spend large amounts of time searching for product information, comparing prices, and then deciding whether to purchase a product (Teo, Wang, and Leong 2004). From the TCE perspective, this is due to performance uncertainty (i.e. the difficulty in ensuring the quality of purchased products) (Teo, Wang, and Leong 2004; Liang and Huang 1998). In the context of global commitment to decarbonising, consumers may wonder whether electric motorcycles are reliable, perform as well as they are supposed to, or perform as well as traditional motorcycles. They need to spend extra time and effort searching for information regarding electric motorcycle performance, which increases their search costs. They may also need to deal with unexpected changes in switching, which could increase the adoption costs. Hence, performance uncertainty may increase perceived transaction costs.

H2a: Performance uncertainty is positively related to search costs.
H2b: Performance uncertainty is positively related to adoption costs.

The effect of behavioural uncertainty on transaction costs

Behavioural uncertainty, a type of opportunism, is often understood as difficulty in evaluating the opportunist behaviour of sellers (Teo and Yu 2005). It is a crucial construct for understanding consumer feelings toward goods and services (Anderson 1988). In the green context, consumers may worry about false claims made by manufacturers (Chen and Chang 2013) as well as poor after-sale services (Berrone, Fosfuri, and Gelabert 2015; Chen, Lin, and Chang 2014). This leads to higher transaction costs, as consumers spend more time and effort searching, clarifying and cross checking for information and

dealing with unexpected changes, such as poorer than expected after-sale services. Therefore, we propose the following hypothesis:

H3a: Behavioural uncertainty is positively related to search costs.
H3b: Behavioural uncertainty is positively related to adoption costs.

The effect of environmental uncertainty on transaction costs

Electric motorcycles are in the early phase of their existence, and many components, such as batteries, still lack industry standards. This leads to higher perceived environmental uncertainty. In the green context, the batteries of electric motorcycles must be charged before riding, but there are no universally accepted battery recharging stations yet. Consequently, consumers need more time to search for and adjust to battery stations, after-sale services and maintenance compared to their experience with traditional motorcycles. Both scenarios (i.e. environmental uncertainty) lead to higher transaction costs (Liang and Huang 1998). Thus, we propose the following hypothesis:

H4a: Environmental uncertainty is positively related to search costs.
H4b: Environmental uncertainty is positively related to adoption costs.

The effect of dependability on transaction costs

As past research has shown, dependability refers to the ability of the seller to provide the buyer with outcomes that match the seller's claims (Swan et al. 1988; Teo and Yu 2005). Consumers rely on sellers for functions such as after-sale services and maintenance. In the green context, if consumers perceive that green products are not trustworthy or are less dependable (Chen 2010; Chen and Chang 2012), they spend more time and effort in information search, maintenance and repair, thus increasing transaction costs.

H5a: Dependability is negatively related to search costs.
H5b: Dependability is negatively related to adoption costs.

The effect of search costs on switch intention

Although consumers may embrace the idea of sustainability (Rakic and Rakic 2015; Roberts 1996), green products are usually more expensive, and consumers lack trust in them (Nuttavuthisit and Thøgersen 2015). Consequently, green consumption increases the time spent searching for product attributes and comparing prices (Nuttavuthisit and Thøgersen 2015). Since electric motorcycles are considered a greener alternative, perceived transaction costs may increase in consumers' minds. As such, consumers may be less willing to switch to electric motorcycles.

Hypothesis 6: Searching costs are negatively related to consumers' intention to switch.

The effect of adoption costs on switch intention

As previously noted, an electric motorcycle is a green alternative to traditional motorcycles (Gilg, Barr, and Ford 2005) that takes time for consumer orientation. For

example, an electric motorcycle is powered by a rechargeable battery rather than gasoline. Recharging the battery before riding takes time. One consequence has been a growing consensus that the perceived transaction costs will increase, which may decrease consumers' intention to switch. Based on this notion, we hypothesise that adoption costs are negatively related to consumers' intention to switch.

Hypothesis 7: Adoption costs are negatively related to consumers' intention to switch.

Research methodology

Questionnaire design

Based on the research model and a detailed review of the related literature, a self-administered questionnaire was developed as a measurement scale. Previously published items were modified to fit our study. The questionnaire consisted of a scenario regarding consumers' intention to switch to electric motorcycles, a number of relevant measures that aimed to elicit the respondents' answers to the scenario, and demographic information. The questionnaire was developed in English and subsequently translated into Chinese. Linguistic equivalence was ensured by back-translation.

The measurement of the constructs

The questionnaire items were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Prescreening questions ensured that all the respondents were motorcycle riders. Only respondents who had experience riding motorcycles were qualified for this survey since we wanted to measure their intention to switch to electric motorcycles. Details of these items are summarised in Table 1.

Administration of the survey

The Asia-Pacific region is characterised by a high number of motorcycle riders for reasons such as convenience, time savings and easily affordable prices. Taipei City is considered in this study because the total number of motorcycles on the island is high. The local government encourages commuters to ride electric motorcycles more than their traditional counterparts to minimise air pollution. Two researchers in the field of this study were invited to review the questionnaire to ensure content validity. During the review process, some minor revisions were made based on their suggestions. Subsequently, a pre-test was conducted with a convenience sample of a dozen motorcycle riders to ensure the reliability of each construct. These respondents were excluded from participating in the main study.

Sample profile

A survey was conducted among a sample of motorcycle riders in Taipei City between March 2019 and April 2019. Respondents were chosen following non-probabilistic sampling as riding motorcycles is a common practice amongst Taipei residents.

Table 1. Questionnaire items and sources.

Constructs	Items	Sources
Branding uncertainty	*Based on electronic motorcycles' brand name, it is difficult to determine whether vendors:* a. offer adequate information about choices available b. provide sufficient information about services available. c. are easy to contact. d. have a good reputation. e. have been around for a long time.	Dodds, Monroe, and Grewal 1991; Landon and Smith 1997
Performance uncertainty	*When switching to electric motorcycles, it is difficult to ensure that*: a. the product is reliable. b. the product will perform as well as it is supposed to. c. the product will perform as well as others.	Liang and Huang 1998; Shimp and Bearden 1982
Behavioural uncertainty	*When switching to electric motorcycles, it is difficult to:* a. return purchases made. b. exchange the defective product. c. get after sale service.	Devaraj, Fan, and Kohli 2002; Eastlick and Feinberg 1999
Environmental uncertainty	*When electric motorcycles are available in the market, it is:* a. difficult to find the desired product. b. time consuming to find the desired product. *When a manufacturer redesigns or launches a model revision in the market, it is:* a. difficult to find the desired product. b. time consuming to find the desired product.	Teo and Yu 2005
Dependability	*What is your assessment of the dependability of electric motorcycles?* a. Electric motorcycles can't be relied on (R). b. Electric motorcycle are undependable (R). c. Companies that manufacture electric motorcycles often make false claims (R).	Teo and Yu 2005
Adoption costs	*It takes time and effort to:* a. make changes to ride electric motorcycles. b. maintain or readjust to ride electric motorcycles. c. deal with any unexpected changes.	Dahlstrom and Nygaard 1999
Search costs	*To what extent do you agree with the following statement about the cost related to using electric motorcycles:* a. I spend a lot of time looking for information before using electric motorcycles. b. I spend a lot of effort getting information that would be helpful in decision-making about electric motorcycles. c. Usually, there is so much to do that I wish I had more time to look for information before using electric motorcycles. d. I usually find myself pressed for time in searching for information before switching to electric motorcycles.	Liang and Huang 1998; Teo and Yu 2005.
Intention to switch	*Please indicate the likelihood that you would switch to electric motorcycles from traditional motorcycles:*	Dodds, Monroe, and Grewal 1991

(*Continued*)

Table 1. Continued.

Constructs	Items	Sources
	a. the likelihood of switching to an electric motorcycle is: b. the probability that I would consider switching to an electric motorcycle is: c. my willingness to switch to an electric motorcycle is:	

Participants were intercepted in several parking lots in a college town with approximately 25,000 students, where the majority were college students and the rest were local residents or college staff. The participants were asked to fill the questionnaire voluntarily and anonymously. Around 100 under-graduate students majoring in business in different classes (about 500 students asked) were recruited to distribute the hardcopy of the questionnaire in order to receive a small number of academic points. We asked each student to collect 10–15 responses each; 1094 were collected. The sample consisted of 66.9 per cent female participants. The majority of respondents were between 21–30 years old (42.2%). Ninety-three point nine per cent of respondents were single and 92.3 per cent of respondents are studying in a college or university or have obtained a university degree. In sum, the sample represents a younger generation dominated by female participants with higher education background.

The following conditions were checked to ensure that no common method bias existed (Podsakoff et al. 2003). First, the data collection and questionnaire design were separated. Second, a brief statement was inserted at the top of each section to ensure that the measurements were not interrelated. Then, the questionnaire was designed to be answered anonymously. The respondents were informed that there were no right or wrong answers and that they should answer the questions honestly. In the final step, all items were modified from prior research with syntax simplification. We defined ambiguous terms and avoided vague concepts (Tourangeau, Rips, and Rasinski 2000). Harman's one-factor test was applied to ensure that there was no potential common method bias. The possibility of common method bias is high if a single factor accounts for more than 50 per cent of the variance. Our results indicated that the first factor accounted for less than 40 per cent of the total variance, suggesting that common method bias is not a serious problem in the dataset.

Data analysis procedure

We used SPSS to analyze the data. We assessed our model via confirmatory factor analysis based on Gerbing and Hamilton (1996). As suggested by Hair et al. (1998), the criteria for acceptable psychometric properties require loadings exceeding 0.70. The results in Table 2 show that the factor loadings of all items were greater than 0.70.

Cronbach's α was applied to ensure the reliability of the scale. The results in Table 3 show that the internal reliability ranged between 0.88 and 0.98, exceeding the standard of 0.7 (Nunnaly, 1978) and indicating that the scales have good reliability. Moreover, all the measurement items in the questionnaire were modified from extant studies, which indicates that content validity was achieved. Based on the discussed reliability and validity analysis of the measurement model, the research model was assessed using the Hayes (2013) PROCESS macro, which follows Baron and Kenny's (1986) criteria. Bootstrapping

methods and ordinary least square regression were performed to test the hypothesised relationships among the constructs. The bootstrap resampling method was applied to reduce the probability of Type II error when mediation could not be claimed (Preacher and Hayes 2004). The bootstrapping techniques validate the results, suggesting that they are generalisable to the broader population and avoiding results specific to the sample (Hair et al. 2010).

Results

The path coefficient and significance of each hypothesis were examined. Table 4 shows the results with nonstandardised coefficients. H1-4 (a) examine the effects of uncertainties on search costs. Branding uncertainty ($\beta = 0.69$, $p < 0.001$, $R^2 = 0.37$), performance uncertainty ($\beta = 0.64$, $p < 0.001$, $R^2 = 0.38$), behavioural uncertainty ($\beta = 0.67$, $p < 0.001$, $R^2 = 0.44$), and environmental uncertainty ($\beta = 0.75$, $p < 0.001$, $R^2 = 0.63$) were significantly related to search costs. H1-4 (b) examine the effects of uncertainties on adoption costs. Branding uncertainty ($\beta = 0.62$, $p < 0.001$, $R^2 = 0.31$), performance uncertainty ($\beta = 0.64$, $p < 0.001$, $R^2 = 0.40$), behavioural uncertainty ($\beta = 0.58$, $p < 0.001$, $R^2 = 0.34$), and environmental uncertainty ($\beta = 0.75$, $p < 0.001$, $R^2 = 0.63$) were significantly related to adoption costs. Accordingly, H1-4 are supported. H5 examines the effects of dependability on search and adoption costs. The results show that dependability is significantly related to search costs ($\beta = 0.78$, $p < 0.001$, $R^2 = 0.57$) and adoption costs ($\beta = 0.69$, $p < 0.001$, $R^2 = 0.46$). Therefore, H5 is supported.

H6 and H7 examine the effects of search costs and adoption costs on intention to switch. Table 5 shows that the factors relating to uncertainties had significant effects (Equations 1, 4, 7, 10, 13) on intention to switch. Furthermore, the factors relating to uncertainties significantly influence both search costs and adoption costs (see Equations 1–10 in Table 3). Last, search costs (Equations 2, 5, 8, 11, and 14) and adoption costs (Equations 3, 6, 9, 12, and 15) are significantly related to intention to switch. Therefore, H6 and H7 are supported. We used SPSS with a bootstrapping algorithm (10,000 resamples) to test the indirect effects. The bootstrapping results are summarised in the right column of Table 6. All the intervals are above zero, which again implies that H6 and 7 are supported.

Discussion and conclusions

This study provides a first illustration of how transaction costs are perceived by consumers from a TCE perspective. This perspective has been largely missing from the academic debate, particularly in the Asia and Pacific region. Our study confirmed that consumers' intention to switch to electric motorcycles is obstructed by perceived transaction costs, i.e. search and adoption costs. We also discovered that branding, performance, behavioural, and environmental uncertainty influence consumers' perceived transaction costs. Collectively, our findings are consistent with previous studies applying TCE theory in other contexts (Teo and Yu 2005). Our findings also indicate that higher perceived dependability leads to lower search and adoption costs. This result is consistent with the findings of past research on TCE theory (Teo and Yu 2005). It indicates that

Table 2. Results of factor analysis.

Construct	Brand uncertainty	Performance uncertainty	Behavioural uncertainty	Environmental uncertainty	Dependability (R)	Search cost	Adoption cost	Intention to switch
Number of items	5	3	3	4	3	4	3	5
Factor loading (Item 1)	0.84	0.82	0.92	0.83	0.93	0.92	0.89	0.95
Factor loading (Item 2)	0.86	0.87	0.93	0.90	0.93	0.94	0.89	0.92
Factor loading (Item 3)	0.89	0.84	0.85	0.89	0.90	0.90	0.89	0.96
Factor loading (Item 4)	0.86	–	–	0.92	–	0.91	–	0.97
Factor loading (Item 5)	0.84	–	–	–	–	–	–	0.96
Accumulated explained variance (%)	73.89	84.24	81.18	78.45	84.46	84.23	79.37	91.08

Table 3. Descriptive statistics for study variables[a].

	Variables	Means	S.D.	1	2	3	4	5	6	7	8
1	Branding uncertainty	4.26	0.83	(0.91)							
2	Performance uncertainty	4.16	0.91	0.66**	(0.91)						
3	Behavioural uncertainty	4.18	0.93	0.62**	0.67**	(0.88)					
4	Environmental uncertainty	4.04	0.99	0.59**	0.64**	0.63**	(0.91)				
5	Dependability	4.19	0.90	0.61**	0.66**	0.72**	0.73**	(0.91)			
6	Search cost	4.11	0.94	0.61**	0.62**	0.67**	0.80**	0.75**	(0.94)		
7	Adoption cost	4.09	0.93	0.56**	0.63**	0.58**	0.75**	0.68**	0.72**	(0.87)	
8	Intention to switch	2.48	1.33	−0.35**	−0.39**	−0.41**	−0.46**	−0.43**	−0.41**	−0.40*	(0.98)

[a]Internal reliabilities (Cronbach's α) are presented along with the diagonal in parentheses.
Two-tailed tests; ** $p < 0.01$.

Table 4. OLS regression results for H1-5 [a].

	Search cost					Adoption cost				
Hypothesis	1(a)	2(a)	3(a)	4(a)	5(a)	1(b)	2(b)	3(b)	4(b)	5(b)
Variable	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)	Equation (6)	Equation (7)	Equation (8)	Equation (9)	Equation (10)
Branding uncertainty	0.69***					0.62***				
	(0.03)					(0.03)				
Performance uncertainty		0.64***					0.64***			
		(0.02)					(0.02)			
Behavioural uncertainty			0.67***					0.58***		
			(0.02)					(0.02)		
Environmental uncertainty				0.75***					0.70***	
				(0.02)					(0.02)	
Dependability(R)					0.78***					0.69***
					(0.02)					(0.02)
Confidence interval [b]	0.64, 0.74	0.59, 0.69	0.63, 0.71	0.72, 0.79	0.74, 0.82	0.57, 0.68	0.59. 0.69	0.53, 0.62	0.65, 0.74	0.66, 0.74
R^2 =	0.37	0.38	0.44	0.63	0.57	0.31	0.40	0.34	0.56	0.46

[a]Unstandardised coefficients shown with standard errors in parentheses.
[b]bias-corrected bootstrap 95% confidence interval with 10,000 bootstrap samples.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 5. OLS regression results for H6 and H7[a].

	Intention to switch								
Variable	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)	Equation (6)	Equation (7)	Equation (8)	Equation (9)
Brand uncertainty	−0.56*** (0.05)	−0.26*** (0.06)	−0.30*** (0.05)						
Performance uncertainty				−0.58*** (0.04)	−0.33*** (0.05)	−0.35*** (0.05)			
Behavioural uncertainty							−0.58*** (0.04)	−0.35*** (0.05)	−0.39*** (0.05)
Search cost		−0.44*** (0.05)			−0.38*** (0.05)			−0.34*** (0.05)	
Adoption cost			−0.42*** (0.05)			−0.36*** (0.05)			−0.35*** (0.05)
R^2 =	0.12	0.18	0.19	0.15	0.20	0.19	0.17	0.20	0.20

	Intention to switch					
Variable	Equation (10)	Equation (11)	Equation (12)	Equation (13)	Equation (14)	Equation (15)
Environmental uncertainty	−0.62***(0.04)	−0.49***(0.06)	−0.49***(0.05)			
Dependability (R)				−0.64***(0.04)	−0.43***(0.06)	−0.44***(0.05)
Search cost		−0.17**(0.06)			−0.27***(0.06)	
Adoption cost			−0.18**(0.06)			−0.28***(0.05)
R^2 =	0.21	0.22	0.22	0.19	0.20	0.21

[a]Unstandardised coefficients shown with standard errors in parentheses.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 6. Summary of results for H 6 and H7using multiple statistical methods[a].

				Baron & Kenny criteria	Bootstrapping[b]	Results
	Independent variables	Mediator	Dependent Variable	OLS	Un-weighted score	
H6	Branding uncertainty	Search Cost	Intention to Switch	✓	−0.38, −0.23	Supported
	Performance uncertainty			✓	−0.31, −0.18	Supported
	Behavioural uncertainty			✓	−0.31, −0.16	Supported
	Environmental uncertainty			✓	−0.22, −0.03	Supported
	Dependability (R)[a]			✓	−0.31, −0.12	Supported
H7	Brand uncertainty	Adoption Cost	Intention to Switch	✓	−0.34, −0.20	Supported
	Performance uncertainty			✓	−0.30, −0.16	Supported
	Behavioural uncertainty			✓	−0.26, −0.14	Supported
	Environmental uncertainty			✓	−0.21, −0.05	Supported
	Dependability(R)[a]			✓	−0.27, −0.12	Supported

[a]Reverse-coded items
[b]95% confidence interval

dependability is a key driver in significantly decreasing consumers' perceived transaction costs, which could further enhance their intention to switch to electric motorcycles.

This study also provides an interesting platform for further research avenues for theory development. First, it imports TCE theory into the green consumption context. We found that TCE has satisfactory power to explain consumers' intention to switch to electric motorcycles in the green context. In the current development phase of green consumption studies, most extant studies have focused on theories such as theory of planned behaviour and moral decision-making theories. Transaction costs have not yet been widely discussed, and our findings suggest that their power is strong enough to explain consumers' intention to switch. Another interesting finding is that uncertainty remains a significant factor in deterring consumers from switching. Policy makers could support the shift to decarbonise by focusing on reducing the transaction costs of consumers either by providing information or encouraging vendors to provide clearer information to potential consumers. Despite these contributions, this article has some limitations. Although the convenience sampling method used in this study could be justified for its purposes of illustrating the relevance of the TCE approach to analyse green purchase intensions, future research could use systematic sampling from a more diverse population. Second, a future study to investigate or compare the differences across cities within the Asia-Pacific region, would be more insightful for policy analyses. Last, this is a cross-sectional study, and consumers' perceived transaction costs may evolve and change over time.

Our research provides several relevant insights for planning and management. First, the findings can help companies selling electric motorcycles retain their customers and acquire new ones to consolidate and expand their customer bases. Four factors (i.e. branding, environmental, behavioural, and performance uncertainty) decrease consumers' intention to switch to electric motorcycles. Based on this finding, we recommend that electric motorcycle companies emphasise decreasing these uncertainties in their

marketing campaigns. They could reduce search and switching costs in the adoption process, and hence increase the dependability of electric motorcycles as an environmentally attractive mode of travel. In sum, the results indicated that when consumers perceive more dependability and less uncertainty associated with electric motorcycles, they will be more likely to switch to electric motorcycles.

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