

# Electric Scooter Purchase Intentions: The Influence of Environmental Concern, Price Consciousness, and Social Norms

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## Abstract

Scooters are a popular way to get around on your own in many places, such as Taiwan, India, Thailand, etc., because they are easy to move around in, small, and cheaper to buy than cars. On the other hand, traditional scooters that run on fossil fuels put some pollution into the air and add to problems like global warming and air pollution. Switching from scooters that run on fossil fuels to electric scooters can help clean up the air in cities with much pollution. To promote the use of electric scooters, it's important to know how consumers feel about them. The current study investigates consumers' purchase intentions for electric scooters. Based on the questionnaire survey results ( $n = 567$ ), we found that consumers' environmental concerns, price consciousness, and perceived subjective norms are associated with electric scooter purchase intention. Consumers with price consciousness may choose fossil-fuel-powered scooters because they consider electric-powered scooters more costly, although environmentally friendly. The study gives researchers and practitioners a glimpse into consumers' environmental concerns and subjective norms for a sustainable product.

Keywords : Sustainable Vehicle, Electric Scooter, Air Pollution, Subjective Norms, Purchase Intentions, Price Consciousness

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## 1. Introduction

The 2030 Agenda for Sustainable Development advocates 17 Sustainable Development Goals (SDGs) to call for action to ensure sustainability. The SDG target 11.6.2, "Annual mean levels of fine particulate matter in cities (population-weighted)," aims to improve air quality in the urban area to make cities and human settlements sustainable [Nations, 2015]. According to the World Health Organization (WHO), air pollution is one important environmental risk, killing around seven million people worldwide yearly. Almost all of the global population breathes air that exceeds WHO guideline limits and contains high levels of pollutants [WHO, 2018, 2021]. In the urban area, the street micro-environment has a high concentration of pollution that is primarily contributed by vehicle emissions. Daily commuting substantially contributes to total air pollution exposure, even though only a brief period is spent there [WHO, 2021]. Fossil fuel vehicles (internal combustion engine vehicles) cause poor air quality by emitting pollutants such as nitrogen oxides (NO<sub>x</sub>), hydrocarbons (HC), ammonia (NH<sub>3</sub>), PM<sub>2.5</sub> (particles smaller than 2.5 microns), and PM<sub>10</sub> (particles smaller than 10 microns) pollution. In addition, fossil fuel vehicles also contribute to fossil fuel dependence and global warming [Chen et al., 2021; Espey and Nair, 2005; Leung et al., 2018]. Reducing the usage of fossil fuel vehicles can enhance environmental sustainability by reducing air pollution, fossil fuel dependence, and global warming.

Battery-powered electric vehicles reduce greenhouse gas and air pollutant emissions in urban areas. Even when charging electric vehicles with electricity from hard coal and

all particle sources associated with electric vehicles are counted, electric vehicles still contribute fewer air pollutants than fossil-fuel scooters [Cox and Mutel, 2018; OECD, 2020; Smit, 2021]. Adopting electric-powered vehicles is a feasible solution for environmental sustainability and air quality improvement in urban areas [Calef and Goble, 2007; Ferrero et al., 2016; Rizza et al., 2021].

People ride passenger vehicles for commuter purposes. Buses, cars, and motorcycles are the major passenger vehicles for passenger transportation in urban areas. Buses are for public transportation, while cars and motorcycles are for private transportation. People in the United States and some western countries usually drive cars for personal transportation. However, there are cost-saving benefits to using motorcycles as commuter vehicles [Hagen et al., 2016]. In many countries, scooter-style motorcycles (hereinafter scooters) are used for passenger transportation, while other heavy motorcycles are used for goods delivery, racing, sporting, and recreational activities. Scooters are usually used for commuting purposes in urban areas.

Scooter ownership costs are as low as one-tenth or fewer than private passenger cars. Thus, scooters are frequently used as commuting vehicles in many Latin American [Hagen et al., 2016] and South and Southeast Asian countries, such as India [Shirgaokar, 2016], Vietnam [Jones et al., 2013], Thailand [Leong et al., 2002], Indonesia [Guerra, 2019], and Taiwan [Chen and Lai, 2011], etc. Due to cost considerations, fossil fuel scooters are usually less efficient emission reduction devices. Thus, although fossil fuel scooters are significantly smaller in size than cars, the air pollution of fossil fuel scooters is similar to or even greater than that of fossil fuel cars.

As a result, fossil fuel scooters exhaust many air pollutants and are a major source of air pollution in many cities [Esmailirad et al., 2021; Gentner et al., 2017; Platt et al., 2014]. Promoting electric power scooters to replace fossil fuel scooters is a sustainable transport strategy to reduce the burden of air pollution in urban areas [Hwang, 2010; van Boven et al., 2017].

Electric scooters can be good substitutes for fossil-fuel scooters from the viewpoint of sustainability because they reduce air pollution in metropolitan areas, fossil fuel dependence, and global warming. Nevertheless, not all consumers choose electric scooters. Some people use the scooter as a commuter vehicle because of transportation cost savings considerations. The cost of electric scooters is higher than that of fossil fuel ones. As a result, cost concerns may be a barrier to adopting electric scooters. People with price consciousness may prefer fossil-fuel scooters to electric scooters since fossil fuel scooters have a lower cost than electric ones.

Subjective norms perception is another reason influencing electric scooter adoption. Previous literature revealed that subjective norms play a role in influencing sustainable consumption behaviors [Slocum et al., 2022], and pro-environmental values were perceived as shared subjective norms [Welsch and Kühling, 2018]. When people perceive social pressure from others to perform a behavior, they perceive the existence of social norms to conduct the behavior. Social norms can be used to promote green product consumption by affecting individuals' behaviors [Ge et al., 2020]. Thus, individuals' subjective perceptions of norms may be a factor influencing electric scooter adoption.

Not all consumers accept electric scooters.

Although many governments have undertaken actions to support electric scooters, the market share of electric scooters is still limited due to consumers' preferences [Scorrano and Danielis, 2021]. Some people value electric scooters less than fossil-fuel ones [Scorrano, 2021]. To develop a suitable strategy to promote electric scooters, we must understand the factors influencing consumers' purchase intentions. Therefore, the following research questions are proposed:

- RQ1: Would consumers' environmental concerns and price consciousness influence their purchase intentions for electric scooters?
- RQ2: Would consumers' perceptions of subjective norms associated with owning electric scooters influence their purchase intentions?

This paper is organized as follows: Section 2 reviews the literature relevant to the adoption of electric scooters. Then, the third section describes the survey conducted and the data sample used for this study. Section 4 provides the data analysis. Finally, the fifth section discusses the main findings, conclusions, and suggestions for future research.

## 2. Literature and Hypotheses Development

Scooters are frequently used in many countries due to ownership costs, energy costs, and mobility convenience considerations. However, fossil fuel scooters exhaust many air pollutants [Esmailirad et al., 2021; Gentner et al., 2017; Platt et al., 2014]. It is feasible to use electronic power scooters to replace fossil fuel scooters [Calef and Goble, 2007; Cox and Mutel, 2018; Ferrero et al., 2016; Hwang,

2010; OECD, 2020; Rizza et al., 2021; Smit, 2021; van Boven et al., 2017) to reduce air pollutants and maintain environmental sustainability in urban areas. However, not all consumers have already accepted and adopted electric scooters. Literature has worked on this topic to foster electric scooter adoption.

Shared scooters are a relatively new way to get around in some US and European cities, as well as on college campuses, for the last mile or short distances. The literature discussed consumers' attitudes and behavior toward shared scooters [Buehler et al., 2021; Clewlow, 2019; Fang et al., 2018; Hollingsworth et al., 2019; Kopplin et al., 2021; Ma et al., 2021; Sanders et al., 2020; Smith and Schwieterman, 2018]. Few studies, however, focused on the purchase of electric scooters. People own scooters in many Latin American and Asian countries [Chen and Lai, 2011; Guerra, 2019; Hagen et al., 2016; Jones et al., 2013; Leong et al., 2002; Shirgaokar, 2016] rather than just riding shared scooters. The attitude toward shared scooters differs from the attitude toward owning scooters. When discussing shared electric scooters, battery recharge or replacement is not a critical issue that consumers need to consider; they only need to choose a shared electric scooter with enough battery power for their trips. Riding a shared electric scooter does not require much battery recharge effort. Also, customers of shared electric scooters need not consider the ownership cost of the scooter. Instead, customers of shared electric scooters only need to consider the usage cost and convenience of a single-ride trip. Electric scooter owners, however, need to consider battery recharge convenience and ownership cost.

Electric scooters can be considered a new technology product. The Technology Accep-

tance Model (TAM) [Chen et al., 2021; Ho and Wu, 2021; King and He, 2006] and the Unified Theory of Acceptance and Use of Technology (UTAUT) model [Haryanti and Subriadi, 2020; Khechine et al., 2016; Ratan et al., 2021] are frequently used to explain new technology adoption and acceptance. However, electric scooters are not only new technology products but also green products. Electric-scooter adoption is not just another instance of new technological product adoption; it is about riders' social responsibility to reduce air pollution. Environmental sustainability is one major advantage of electric-powered scooters.

## 2.1 Environmental Concerns

Environmental concerns refer to an evaluation of or an attitude towards facts, one's own behavior, or others' behavior with consequences for the environment [Fransson and Gärling, 1999; Sjoberg, 1989; Weigel and Weigel, 1978]. People with environmental concerns are aware that the overuse and destruction of natural resources pose a serious environmental threat. Literature has reported that consumers' environmental concern is one of the influencing factors for green product purchase intention [Albayrak et al., 2013; Jaiswal and Kant, 2018; Mainieri et al., 1997; Paul et al., 2016].

Electric scooters are environmentally friendly. Literature has reported that people with environmental concerns have positive attitudes towards using electric scooters [Ionescu and Cazan, 2020; Scorrano, 2021]. Consumers with environmental concerns may switch from fossil-fuel scooters to electric ones.

However, most literature focused on shared electric scooters [Buehler et al., 2021; Clewlow,

2019; Fang et al., 2018; Hollingsworth et al., 2019; Kopplin et al., 2021; Ma et al., 2021; Sanders et al., 2020; Smith and Schwieterman, 2018]. Few studies have focused on exploring the role of environmental concerns in electric scooter adoption [Chen et al., 2021]. Since electric scooters are green products and caring about the environment makes people more likely to buy green products, we can say that environmental concern affects the decision to buy an electric scooter.

Based on what we've talked about so far, we think that a consumer's decision to buy should be based on their concerns about the environment. Thus, the following hypothesis 1 is proposed:

Hypothesis 1: Environmental concerns would positively influence electric scooter purchase intentions.

## 2.2 Price Consciousness

Environmental concern is not the only factor influencing green product consumption behavior. Fossil fuel scooters are mature products, while electric scooters are developing ones. Thus, it makes sense that the price of fossil fuel scooters is higher than that of electric ones. Although electric scooters can help reduce urban air pollution, the cost of owning an electric scooter is still high. Some consumers value electric scooters less than fossil fuel ones due to technical (range, power, speed) and economic reasons (price, fuel costs, circulation tax, insurance premium) [Scorrano, 2021]. Literature advocates that there is almost certainly a market for electric scooters, but their price and performance will have to be competitive with low-cost fossil fuel ones

[Guerra, 2019].

Cost factors, like the purchase price, fuel economy, the cost of the annual circulation tax, and the cost of insurance, are found to affect the decision of whether to buy an electric or fossil fuel scooter [Scorrano and Danielis, 2021]. Fossil-fuel scooters provide an inexpensive transportation solution. Thus, the cost of electric scooters is a barrier to electric scooter purchases [Guerra, 2019]. Due to cost issues, not all consumers have satisfactory electric scooters.

Individuals' price consciousness is relative to their cost consideration. The original idea of price consciousness by Gabor and Granger [1961] refers to individuals' awareness of prices. The concept of price consciousness refers to an individual's preference of being unwilling to pay a higher price or hoping to pay a low price for a product [Lichtenstein et al., 1993; Sinha and Batra, 1999].

Price is an important criterion for consumer perceptions and behavior [Ahmetoglu et al., 2014]. However, green products are usually more expensive than traditional ones. For some companies, higher sales and margins are key goals for retailers promoting green products [Bezawada and Pauwels, 2013]. The high price may hinder green product adoption, especially for individuals with price consciousness. The price premium of eco-friendly products is one reason a low proportion of respondents frequently purchase them [Lea and Worsley, 2008]. Individuals with price consciousness might not be willing to buy green products due to the perceived high cost [Sun and Wang, 2019]. The literature revealed that price consciousness negatively affects the purchase of green products [Arce Salazar and Oerlemans, 2016; Sun and Wang, 2019].

Based on the discussion above, electric

scooters are costly compared to fossil fuel scooters. Thus, we argue that individuals' price consciousness would negatively influence their intention to purchase an electric scooter, as hypothesis 2:

Hypothesis 2: Price consciousness would negatively influence electric scooter purchase intentions.

### 2.3 Subjective Norms

Subjective norms are social influences recognizing others' normative behavioral ideas [Ajzen, 1991]. The influence of subjective norms on predicting behavioral intention is determined by the value placed on the normative ideas and individuals' willingness to conform to them [Kamalanon et al., 2022]. According to the theory of planned behavior [Ajzen, 1985, 1991], subjective norms are an antecedent for individuals' intentions to engage in a behavior.

When individuals believe others hold a normative idea about behavior, they experience subjective norms. The subjective norms will lead individuals to do or not do the behavior. Green consumption is a kind of behavior that may influence normative ideas. People may conduct green consumption to conform to others' expectations. The literature revealed that subjective norms positively affect purchase intentions for green products [Sun and Wang, 2019]. Arce Salazar and Oerlemans [2016] revealed the existence of peer effects on consumers' willingness to pay for sustainable products. Social influence variables significantly increase the explanatory power of green product purchase behavior. Chan [2001] found that others' opinions influenced heavy green

consumers.

Choosing electric or fossil-fuel scooters is a dilemma. From the prosocial viewpoint, electric scooters are more environmentally friendly than fossil fuel ones: despite this, from the self-interest viewpoint, fossil fuel scooters provide a low-cost and convenient point-to-point transportation solution [Guerra, 2019]. Subjective norms may influence consumers' choice of fossil-fuel scooters or electric ones. People who perceive high subjective norms about green consumption may conform to others' normative ideas and purchase electric scooters. Based on the discussion mentioned above, we proposed the following hypothesis 3:

Hypothesis 3: Subjective norms would negatively influence electric scooter purchase intentions.

## 3. Methodology

### 3.1 Data and the Sample

In order to collect the information that was required for this study, an online survey in the form of a self-reporting questionnaire was used. The participants were either scooter riders or scooter passengers. In Taiwan, The scooter is a popular transportation vehicle. There are more than 14 million scooters registered in Taiwan, according to data from the government registration system (<https://stat.motc.gov.tw/>), which contributes to Taiwan having the highest density of scooters of any country in the world. Taiwan's population is approximately 23 million. The study posted advertisements on Facebook to recruit volunteer subjects since Facebook is the largest social media site in Taiwan, with a more than 90 percent pene-

tration rate. Because the living area (urban or rural) may be an influential factor for the adoption of electronic scooters, the study dispersed the geographic distribution of the targeted audience of Facebook advertisements. The study tried to ensure the samples represented the whole population of Taiwanese scooter users. The subjects are citizens of all counties and cities in Taiwan.

The study employed an online questionnaire for one week. Participants in this study were voluntarily recruited, and the questionnaire took approximately 5 minutes to complete. All volunteers were recruited through Facebook ads to access the online questionnaire. We offered a lottery to participants who completed the online questionnaire. The prize was one NT\$1,000 (about US\$35) and sixty NT\$100 (about US\$ 3.5) cash offered by bank wire.

### 3.2 Measures

The questionnaire consisted of two parts. First, we asked participants to report their previous scooter experience and demographic data. Second, the participants answered questions about their environmental con-

cerns, price consciousness, subjective norms about the electronic scooter, and intention to purchase it.

The scale used to measure price consciousness consisted of three items derived from the works of Ailawadi et al. [2001], Noh et al. [2013], and Lichtenstein et al. [1993]. This study used a three-item scale from Paul et al. [2016] and Balderjahn et al. [2013] to measure environmental concerns. Subjective norms were measured using a three-item scale adapted from Paul et al. [2016]. The detailed items for price consciousness, environmental concerns, and social norms are in the appendix. We revised the item statements to fit the context of the current study.

### 3.3 Sample

⟨Table 1⟩ shows the demographic profiles of the respondents who participated in Study 1. This study recruited 707 participants. However, among them, 140 (19.8%) subjects did not hold scooter driver licenses or did not ride scooters for the past year. Subjects who do not ride scooters as a transportation vehicle are not potential customers of electric scooters. The remaining 567 subjects were in-

⟨Table 1⟩ Demographic Profile

Gender		Age					Not disclosure	Total
		18-29	30-39	40-49	50-59	60 and above		
Male	Count	34	33	72	67	37		243
	%	6.1 %	5.9 %	12.9 %	12.0 %	6.6%		43.5 %
Female	Count	29	68	87	84	36		304
	%	5.1 %	12.0%	15.3%	14.8%	6.3%		53.6 %
Not disclosure	Count	0	2	6	7	4	1	20
	%	0.0 %	0.4 %	1.1 %	1.2%	0.7 %	0.2%	3.5%
Total	Count	63	103	165	158	77	1	567
	%	11.1 %	18.2 %	29.1 %	27.9 %	13.6 %	0.2%	100.0 %

cluded in the study.

Among the 567 subjects, 304 (53.6%) participants were female, 243 (43.5%) were male, and the other 20 (3.5%) did not disclose their gender. 165 (29.1%) of the subjects were between the ages of 40 and 49; 158 (27.9%) were between the ages of 50 and 59; 103 (18.2%) were between the ages of 30 and 39; 77 (13.6%) were over 60 years old; and 63 (11.1%) were between 18 and 29 years old. In Taiwan, the legal age to obtain a scooter driving license is 18. As <Table 1> reveals, the current study subjects were not restricted to a specific gender or age. The gender ratio and age distribution of the current study were both acceptable.

### 3.4 Reliability, Validity, and Common Variance Bias

The current study used multi-item scales to measure how the subjects felt about the

environment, prices, and subjective norms. To measure the reliability of the measurement scales, we calculate Cronbach's  $\alpha$  and composite reliability. As revealed in <Table 2>, Cronbach's  $\alpha$  are .907, .803, and .905 for environmental concern, price consciousness, and social norm, respectively. The composite reliability coefficients for environmental concerns, price consciousness, and subjective norms are .900, .803, and .908, respectively. All Cronbach's  $\alpha$  and composite reliability (CR) values exceed 0.70, demonstrating acceptable reliability for the measurement scales.

The study assessed the convergent validity by examining each dimension's average variance extracted (AVE). The results showed that all the constructs' AVE values were above the cutoff value of 0.5 suggested by Fornell and Larcker [1981] and Straub et al. [2004]. Therefore, we confirmed the acceptable convergent validity of the measurement scales.

<Table 2> Reliability and Validity

Constructs	Indicator	Factor Loading	Cronbach's $\alpha$	CR	AVE
Environmental Concern	Environ 1	.828	.907	.900	.750
	Environ 2	.900			
	Environ 3	.869			
Price Consciousness	Price 1	.777	.803	.803	.577
	Price 2	.723			
	Price 3	.777			
Subjective Norms	Norm 1	.755	.905	.908	.769
	Norm 2	.941			
	Norm 3	.922			

Note: CR stands for composite reliability; AVE stands for average variance extracted.

<Table 3> Correlations and Discriminant Validity

	Environmental Concern	Price Consciousness	Subjective Norms
Environmental Concern	0.866		
Price Consciousness	0.123	0.759	
Subjective Norms	0.543	0.177	0.877

Note: Diagonals represent the square root of the average variance extracted (AVE) while the other entries represent the correlations.



Fornell and Larcker [1981] looked at the discriminant validity of the construct by comparing the square root of AVE to the correlation values between the construct and the square root. The results showed that all the square roots of AVE were greater than the correlation coefficient of the latent constructs. Hence, the measurement scales of the current study exhibited favorable discriminant validity.

Since all scales were measured at the same point in a self-reported online questionnaire survey, common method bias could strengthen the relationships between the variables. To find the common method bias, we used Harman's one-factor test. This test is based on the idea that the common method bias exists if exploratory factor analysis [Podsakoff et al., 2003] shows that most of the covariance between measures can be explained by a single factor. Based on EFA with Promax rotation for nine items of environmental concern, price consciousness, and subjective norms, there are three distinct factors rather than a single factor with an eigenvalue greater than 1.0. The three factors together accounted for 70.7% of the total variance; the largest factor accounts for only 41.8% of the variance, below the 50% level. According to Podsakoff et al. [2003], this study was free from the common method bias.

#### 4. Results

In this study, structural equation modeling (SEM) was used to look at and test the research hypotheses. To evaluate the adequacy of the research model, some indicators were used: Goodness-of-Fit Index (GFI), Normed Fit Index (NFI), and Non-Normed Fit Index (NNFI). Generally, GFI, NFI, and NNFI

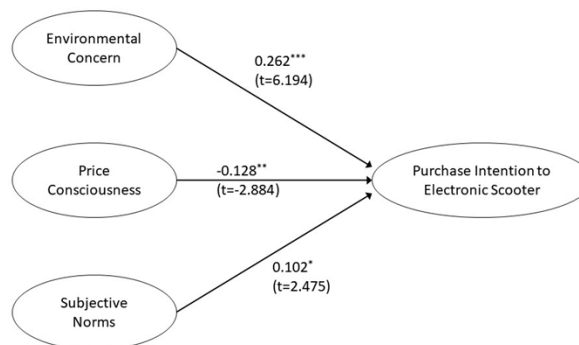
greater than or close to 0.90 are strong evidence that the overall tested model fits the data very well [Hair et al., 1995]. The SEM model has a GFI of 0.921, an NFI of 0.917, and an NNFI of 0.900. Figure 1 summarizes the results of the SEM analysis. The model shows that environmental concern has a positive effect on the purchase intention of electric scooters (coefficient = 0.262,  $p < 0.001$ ), price consciousness has a negative effect on the purchase intention of electric scooters (coefficient = -0.128,  $p = 0.004$ ), and subjective norms have a positive effect on the purchase intention of electric scooters (coefficient = 0.102,  $p = 0.013$ ). All three hypotheses were confirmed based on the empirical analysis results. The study concluded that consumers' purchase intentions for electric scooters are positively influenced by their environmental concerns and subjective norms and perceptions about choosing electric scooters. Nevertheless, consumers' price consciousness is an obstacle to electric scooter adoption. People with price consciousness may have a lower intention of choosing electric scooters due to cost considerations, which is a barrier to the adoption of electric scooters.

To realize if subjects with different levels of environmental concerns, price consciousness, and subjective norms have varying intentions of purchasing, we divide the subjects into high and low groups for each environmental concern, price consciousness, and subjective norm and use a t-test to test the difference. Nevertheless, the median splitting approach to dichotomizing a continuous independent variable has some weaknesses. Fitzsimons [2008] advocated a "spotlight" analysis of the subjects with some standard deviations above and below the mean value. In the study, the authors followed the sugges-

tion by Fitzsimons [2008] and divided subjects into groups with high or low levels of environmental concern, price consciousness, and subjective norms. Subjects were assigned to the high-level groups when their environmental concern, price consciousness, and subjective norms scores were 0.5 standard deviations above the mean. Subjects were assigned low-level groups when their environmental concern, price consciousness, and subjective norms scores were 0.5 standard deviations below the mean. Subjects were not included for analysis when the differences between their scores and the means were less than 0.5 standard deviations.

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Note: \*p < 0.5, \*\*p < 0.1, \*\*\*p < 0.001.  
(Figure 1) Structured Equation Modeling (SEM) Results

(Table 4) T-Test Results of Purchase Intention between High and Low Environmental Concern Subjects

	High Environmental Concern	Low Environmental Concern	t	df	P
Purchase Intention	Mean=2.86 (SD=1.17, n=130)	Mean=1.95 (SD=1.01, n=144)	6.89	272	< .001*

Note: \*Significant at p < .05.

<Table 5> T-Test Results of Purchase Intention between High and Low Price Consciousness Subjects

	High Price Consciousness	Low Price Consciousness	t	df	P
Purchase Intention	Mean=2.34 (SD=1.21, n=176)	Mean=2.59 (SD=1.03, n=147)	-1.98	321	0.05*

Note: \*Significant at  $p < .05$ .

<Table 6> T-Test Results of Purchase Intention between High and Low Social Norms Subjects

	High Subjective Norms	Low Subjective Norms	t	df	P
Purchase Intention	Mean=2.70 (SD=1.12, n=185)	Mean=2.06 (SD=1.09, n=83)	4.36	266	< .001*

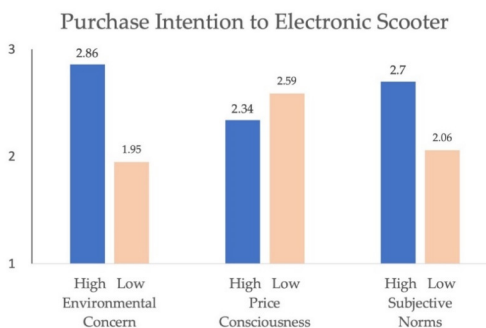
Note: \*Significant at  $p < .05$ .

<Table 6> shows the results of the t-test for how likely people are to buy an electronic scooter based on subjective norms. Subjects with a high subjective norm of purchasing electronic scooters have a lower intention to purchase electronic scooters ( $t = 4.36, p < .001$ ). We can advocate that subjective norms potentially facilitate electronic scooter diffusion. People will buy electronic scooters when they subjectively believe they should not buy fossil fuel scooters. Thus, creating a subjective social norm can help the diffusion of the electronic scooter. Consumers with high subjective norms will choose electronic scooters over fossil-fuel ones.

### 5. Discussion

Getting rid of fossil fuel cars and replacing them with electric cars could help reduce air pollution in cities. For countries like Taiwan, which depend on fossil fuel scooters as commute transportation vehicles, adopting electric scooters can help solve the air pollution issues caused by fossil fuel scooters. However, even though government agents and environmental organizations have strived to promote electric scooters, the penetration rate and market share of electric scooters are still not high. Thus, it is important to understand the factors influencing consumers' acceptance of electric scooters.

The study examines how environmental concern, price awareness, and subjective norms affect the purchase intention of an electric scooter. Based on the empirical study results, environmental concern is positively related to purchase intention. People with environmental concerns are with high intention to purchase electric scooters. Price consciousness is negatively related to purchase intention. Price consciousness consumers have a low intention to purchase electric



<Figure 2> Purchase Intention by Environmental Concern, Price Consciousness, and Social Norms

scooters. Besides, the current study also found that subjective norms positively impact individuals' purchase intentions for electric scooters. People who believe others have a normative idea about choosing electric scooters have a high intention to purchase electric scooters.

### 5.1 Theoretical Contribution

This study makes a theoretical contribution by figuring out how people's environmental concerns and price consciousness affect their purchase intentions for electric scooters. Understanding how environmental concerns affect the purchase of electric scooters can help prove that people's sustainability consciousness is a key factor in what green products they purchase. Understanding how price consciousness affects the purchase intention of an electric scooter can help to realize the barriers to promoting green products, especially when they cost more to own and use. This study also contributes to academic and practical knowledge by helping us understand how subjective social norms affect the purchase intention of an electric scooter. This can help us realize that some green product purchases are influenced by social norms rather than consumers' personal interests.

### 5.2 Practical Implications

The electric scooter is an eco-friendly product. Electric scooters attract consumers with environmental concerns since adopting electric scooters is a quick way to contribute to the clean air of the metropolitan area. Thus, we should persuade consumers with environmental concern that electric scooters are green products so that they can accept electric

scooters. Air pollution is not the only dimension of environmental concern. Thus, electric scooter manufacturers should adopt eco-friendly product designs and improve the manufacturing process to be more sustainable so that consumers with environmental concerns will choose electric scooters.

Cost-saving is a benefit of using scooters as commuter vehicles [Hagen et al., 2016]. In some developing countries, scooters are popular because of their low cost. However, the cost of owning an electric scooter is higher than owning a fossil-fuel scooter. Thus, for price consciousness consumers, the high price of electric scooters is a barrier to choosing electric scooters. Since electric scooters are just in the product development stage, the price is still high. Thus, a price incentive is important to promote electric scooters to price consciousness consumers. A subsidy for purchasing an electric scooter is a feasible alternative when trying to sell electric scooters to price consciousness consumers.

Subjective norms can help form a social consciousness. People with conformity traits tend to follow others' normative ideas. The perceived subjective norms are guidelines that direct people's behaviors. Since subjective norms would positively impact individuals' intentions to purchase electric scooters, we should try to form a social consciousness about electric scooters. Once people believe that adopting electric scooters is social consciousness, they will perceive subjective norms that require them to purchase electric scooters rather than fossil-fuel ones. Formal social pressure may be a way to promote electric scooters.

### 5.3 Limitations and Future Research Direction

The current study has several limitations

that should be addressed in future research. First, in the current study, we focus our research on three factors, including environmental concerns, price consciousness, and social norms. These three factors represent three different prospects for electric scooters. Some consumers with environmental concerns may consider electric scooters must-buy products to save our earth. Some consumers with price consciousness may consider electronic scooters high-priced products and not want to adopt them because of cost considerations. Some consumers buy electric scooters because of the social norm of scooter adoption. Future studies can consider other influencing factors for the adoption of electric scooter.

The current study does not include convenience considerations' influence on electric scooters. Convenience is a barrier for electric scooters. Fossil fuel scooters need gasoline refueling, while electric scooters need battery charging or exchange [Chen et al., 2018]. The popularity and location of battery charging or exchange stations determine electric scooters' convenience. Literature has found that if individuals consider the consequences of convenience important, they may not purchase green products because they are not as convenient as the traditional ones [Ramayah et al., 2010]. For many consumers, an energy supply's convenience or lack thereof is the main difference between electric scooters and fossil fuel scooters. Thus, future research may focus on the influence of convenience considerations.

In addition, the current study only discusses the purchase intentions of electric scooters. The current study does not include the purchase intentions of fossil-fuel scooters. People with environmental concerns may take

public transportation vehicles rather than buy new scooters, whether electric or fossil-fuel scooters, when their old ones need replacing. However, the current study only discusses electric scooters' purchase intentions. Future research may include the impact of the purchase intention of fossil fuel scooters to compare the difference between electric scooters and fossil fuel ones.

The current study discusses only purchase intention. The decision factors for owning a scooter differ from those for renting a shared one. Shared scooters are an option for last-mile transit or short-distance trips in some places. Future studies may include the intention to rent share scooters to compare the influence of environmental concern, price consciousness, and social norms on purchase and rental intentions.

## 6. Conclusions

Electric scooters are good for the environment and are seen as a sustainable way to reduce air pollution in metropolitan areas. However, fossil-fuel scooters are still mainstream products. It is important to understand the factors influencing consumers' adoption of electric scooters to increase the penetration rate. Based on the empirical survey results, we conclude that environmental concern, price consciousness, and subjective norms are three influential factors for electric scooter adoption. To improve electric scooter penetration, we should increase consumers' environmental concerns, reduce the price of electric scooters by providing subsidies or reducing product costs, and formulate subjective social norms for electric scooters. There is no single silver bullet for the popularization of electric scooters. We need to realize

consumers' considerations about electric scooters to adopt appropriate persuasive strategies to promote electric scooters.

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