

How to weigh in on sustainability trends? Sustainable consumption by electric scooter customers and its implications for green marketing

如何搭上永續發展時代潮流？探討電動機車顧客對永續消費與綠色行銷的影響

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Abstract: The United Nations' carbon neutrality goal has accelerated the transition from fossil fuel-powered vehicles to green ones, and this issue has gradually attracted the attention of young people in Taiwan to electronic scooters. Therefore, it is important to understand how to popularize the use of electric scooters under this sustainable trend, because the use of green product (e.g., the electric scooter) is an important source of environmental sustainability. In this study, the effects of environmental consciousness, green absorptive capacity, environmental attitude, government subsidy policy, and green product information asymmetry on responsible environmental behavior and sustainable consumption are studied. It developed an environmental responsibility model and obtained by surveying 551 responses to model the environmental behaviors of electric scooter users in Taiwan, which has a high motorcycle density, and

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develop strategies for reducing the usage of motorcycles running on fossil fuels. In this study, evidence was found for the influences of all the aforementioned factors except green product information asymmetry. Thus, the results of this study support the applicability of the environmental responsibility model to electric scooter users. Consumer cognition and personal factors have crucial influences on responsible environmental behaviors and intentions. Moreover, government subsidies are the key to enhance the popularity of electric scooters. The results of this study, which examines the environmental behaviors of many scooter users in Taiwan, can help governments better promote green vehicles in particular and sustainable consumption in general.

Keywords: Responsible environmental behavior model, green absorptive capacity, environmental consciousness, green purchase behavior, government subsidy policy.

摘要：聯合國碳中和目標加速了從石化燃料機車向綠色機車的轉變，致使這問題逐漸受到台灣年輕人對電動機車的關注。因此，如何在永續發展的趨勢下普及電動機車是非常重要的，因為使用綠色產品（例如電動機車）是推動永續環境重要的來源。本研究探討環境意識、綠色吸收能力、環境態度、政府補貼政策和綠色產品資訊不對稱對環境責任行為和永續消費的影響。研究人員蒐集 551 份有效問卷，闡述高機車密度的臺灣環境中，提出一個關於購買電動機車的消費者環境責任行為模型，以有效改善石化燃料機車現況。在本研究中，統計結果顯示綠色產品信息不對稱的調節效果不顯著，其餘假設均獲得支持。因此，研究結果支持電動機車消費者對於環境責任模型的適切性。消費者認知和個人因素對環境責任行為和意圖具有至關重要的影響。此外，政府補貼是電動自行車普及的關鍵。本研究調查了台灣許多電動自行車消費者的環境責任行為，特別在永續消費的議題上，可以協助政府推廣綠色車輛。

關鍵詞：環境責任行為模式、綠色吸收能力、環境意識、環境態度、綠色購買意願、綠色購買行為、政府補貼政策

1. Introduction

Climate change has brought the issue of sustainable development into sharp relief worldwide, particularly as it relates to sustainable energy consumption, the greenhouse effect, and air pollution. Reducing carbon emissions is a major goal of all countries. The exhaust emitted by vehicles running on fossil fuels contain carbon monoxide (CO), carbon dioxide (CO₂), nitrogen oxide (NO_x), hydrocarbons, and fine suspended particles (particulate matter 2.5 [PM_{2.5}]). These substances cause the greenhouse effect, acid rain, and serious hazards to the human respiratory system (Darby and Stefanini, 2018;). Therefore, countries worldwide have set deadlines to ban the sales of vehicles running on fossil fuels. Norway has planned to ban petrol and diesel vehicles by 2025, and Germany, the Netherlands, Belgium, Ireland, Iceland, and Denmark have set a deadline of 2030 for banning the sale of diesel vehicles. At the 75th Session of the United Nations General Assembly, China announced its goal to achieve carbon neutrality by 2060, which is expected to inject new vitality into green revitalization efforts worldwide in the post pandemic era. This announcement also represents China's long-term policy of transitioning to a low-carbon economy. Carbon neutrality refers to the achievement of net-zero-carbon emissions. The replacement of vehicles running on fossil fuels with vehicles running on green energy is a major trend in sustainable global development. The promotion of electric scooters worldwide has become a crucial strategy for achieving carbon neutrality, a trend for industry, and a business opportunity for enterprises.

As of 2021, Taiwan has a population of approximately 23.52 million people. According to the Highway Administration of the Ministry of Communications of Taiwan, up to 14.139 million scooters are in use in Taiwan; thus, Taiwan ranks first in the world in terms of scooter density. According to the Pollution Investigation Report published by the Environmental Protection Administration in 2013, among different types of emissions in Taiwan, including industrial emissions, scooter emissions have the highest concentrations of PM_{2.5} and

nitrogen oxides (NO_x); thus, scooter emissions have become one of the major sources of air pollution in Taiwan. With the increasing popularity of electric scooter use in advanced industrialized countries, the investigation of methods for encouraging electric scooter use has become crucial. Currently, the Taiwanese government subsidizes electric scooters, which has encouraged environmentally friendly consumption (Wan and Shen, 2013; Young *et al.*, 2010) in relation to electric scooters. The electric scooters of the company Gogoro have become popular among young people in Taiwan due to their aesthetically pleasing design. However, information asymmetry may be present in the purchase of electrical scooters, which hinders the promotion of green purchasing behaviors among consumers (Chang *et al.*, 2021). Currently, increasing the use of electric scooters in Taiwan is crucial for reducing the scooter density and the exhaust emissions from scooters running on fossil fuels in Taiwan. Thus, the present study investigated the influences of a government subsidy policy and green product information asymmetry on the promotion of sustainable consumption, which have been rarely investigated in the literature.

Consumers who are concerned about the environment are willing to purchase green products (Choi and Kim, 2005). The awakening of environmental consciousness worldwide has led to the growth of the green economy. Gaining the attraction and favor of green consumers is crucial for green enterprises to survive and thrive in the market (Chang *et al.*, 2021). Green consumption has gradually become mainstream, and green commodities have become diversified. Consumers with strong environmental consciousness tend to purchase environmentally friendly green products and are willing to pay relatively high prices for these products (Kim and Damhorst, 1998). According to the study of Amoah *et al.* (2018) on consumers who purchase energy-saving light bulbs, personal environmental consciousness has a strong influence on green purchasing behaviors because consumers with high environmental awareness not only focus on short-term interests but also long-term ones. The adoption of a suitable fiscal policy (subsidy policy) by the government can enhance the environmental consciousness of and promote green purchasing behaviors among

individuals with low income. Mohiuddin *et al.* (2018) indicate that environmental consciousness has a strong influence on the green vehicle purchasing intentions of customers. In particular, a strong environmental consciousness must be developed in people to promote the purchase of green vehicles by them. In summary, a strong environmental consciousness and appropriate subsidies are major factors influencing the green product purchasing behaviors of consumers. However, the purchaser and seller have different degrees of information on (i.e., an information asymmetry in relation to) green products (Chang *et al.*, 2021). Thus, consumers may pay higher than what is fair for a substandard green product. Leonidou and Skarmeas (2017) indicate that consumers can cope with doubts toward the environmental benefits of a green product that they are about to purchase if they have personal environmental knowledge. Therefore, the abilities of consumers to acquire, absorb, transform, and utilize environmental protection knowledge influence both their environmental knowledge and the information asymmetry between them and sellers in the green market. Most previous studies have examined the green absorptive capacity from the corporate perspective to explore the influence of a company's ability to understand, analyze, and interpret environmental knowledge on its performance (Chen *et al.*, 2014). Limited studies have examined this capacity from the consumer perspective. To address this research gap, the current study examines the green absorptive capacity from the perspective of consumers. In addition, the information asymmetry between the purchaser and the seller during the transaction of green products is investigated.

The promotion of green energy in the face of the abnormal global climate, air pollution, energy depletion, and rising environmental consciousness has led to the trend of replacing vehicles running on fossil fuels with electric vehicles. The responsible environmental behavior patterns of consumers should be investigated to promote the use of electric scooters for achieving the 2015 United Nations Sustainable Development Goals regarding sustainable production and consumption. The current study adopts the responsible environmental behavior pattern model, which has been widely adopted to examine issues related to

environmental responsibility, including responsible environmental behaviors, environmentally responsible purchasing behaviors, sustainable environmental strategies, and environmental attitude (Barr, 2003; Cottrell, 2003; Follows and Jobber, 2000; Handriana and Ambara, 2016; Hsu, 2004; Hunecke *et al.*, 2001; Vaske and Kobrin, 2001). However, this model has been rarely applied to research on green marketing for electric scooter users. Therefore, the current study examined the responsible environmental behaviors of electric scooter users. According to Hines *et al.* (1987), responsible environmental behaviors mainly originate from intentional actions performed by individuals. The cognition and personality of individuals influence how they intend to act, and situational factors influence responsible environmental behaviors. In this study, we develop a research model based on green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, green purchase behavior, government subsidy policy, and green product information asymmetry. This model is developed to explore the sustainable consumption of electric scooter users. Seven hypotheses are proposed according to the developed model. The final section of this paper includes the findings of this study, the implications of this research, possible directions for future research, and the conclusions of this study.

2. Literature review and hypothesis development

2.1 Background of the responsible environmental behavior model for electric scooter users

According to Hines *et al.* (1987), responsible environmental behaviors mainly originate from intentional actions performed by individuals. Knowledge on problems and the competence to act are the prerequisites for action. Actors must have relevant knowledge. The combination of knowledge on environmental issues and action strategies and the competence to act enables individuals to perform pro-environmental actions. When capability exists but no action is performed, desire becomes the main force that influences actions. An

individual's expectations are affected by personality-related factors, including attitude, controlling beliefs, efficacy perceptions, and individual accountability. The developed research model indicates that human beings are influenced by intentional behaviors, personality factors, and situational factors. The influencing factors of intentional behaviors include the competence to act, the action strategy, and knowledge. Situational factors include economic and health conditions, pressure from stakeholder groups, and other environmental factors. The following aspects of the research model are described in the following text: cognitive variables, personality factors, behavioral intention, responsible environmental behavior, and situational factors.

Cognitive variables: Cognitive variables include knowledge on action strategies, the competence to act, and knowledge on an issue. Individuals must use their knowledge on action strategies to understand the vision and intention of business operations. Moreover, they must possess strategic knowledge, working skills, and other knowledge relevant to the organization and promotion of business activities by enterprises. Therefore, this study focuses on the competence to act and knowledge regarding an issue. Considering the responsible environmental behaviors of electric scooter users who are aware of environmental issues, this study takes the competence to act and knowledge regarding an issue to be representative of green absorptive capacity and environmental consciousness, respectively.

Personal factors: Personal factors include attitude, controlling views, and individual accountability. Personal behavior is a key indicator for action evaluation. The influences of individuals on the environment can be examined from multiple perspectives. The current study argues that intrinsic motion is the main factor that predicts individual behaviors. Therefore, this study focuses on attitude and selects an individual's environmental attitude as one of the main observation items for emphasizing environmental issues.

Behavioral intention: Behavioral intention is an intrinsic factor for directly evaluating an individual's behaviors. It mainly focuses on an individual's tendency toward a particular action and enables their behavior to be predicted.

Therefore, this study examined the tendency of consumers to purchase electric scooters and selected green purchase intention as one of the main observation items.

Situational factors: Interfering factors affect individuals' perceptions and behaviors, and individuals are influenced by environmental factors. The use of electric scooters is a new trend that has not yet been fully popularized; therefore, this study considers government subsidy policy and green product information asymmetry as the main factors affecting green purchase behavior.

Responsible environmental behavior: Individual behavior is a key evaluation indicator in the developed research model. When people possess appropriate knowledge, ability, and attitude related to environmental issues, they participate in solving environmental problems. Given that people are aware of the environmental damage caused by vehicles running on fossil fuels, the purchase behavior for electric scooters is selected to represent environmental responsibility to evaluate the research model. Moreover, green purchase behavior is selected one of the main observation items.

2.2 Influence of consumers' cognitive variables on their behavioral intention

According to the absorptive capacity theory proposed by Cohen and Levinthal (1990) from the perspective of enterprises, enterprises must possess absorptive capacity to acquire, absorb, transform, and utilize knowledge as changes occur in the environment. However, the biggest challenge for an enterprise is to convert knowledge into capability. Operation capabilities vary among enterprises, and the absorptive capacities of enterprises may vary with the knowledge that they possess. Tushman (1977) used organizational range and technological territory as the threshold for reference and stated that the innovative ability of an organization must evolve from collecting information to transforming information into externally realizable technology. Thus, the larger the organizational range, the broader is the range of collected information and the more reliable is the transformed technology. Szulanski (1996) indicated that

absorptive capacities vary among industrial backgrounds and corporate cultures, and the degrees and methods of knowledge accumulation vary among enterprises in different industries. For example, high-tech companies, which are influenced by scientific and technological advances, require research capabilities and innovative technologies, which can enhance their competitiveness and performance. Knowledge helps an enterprise become more competitive. An organization's performance depends on its constituent individuals. An individual with the capability to transform and utilize knowledge in the workplace can develop various other capabilities.

Individuals must develop a broad range of absorptive capacities to implement and integrate potentially valuable external knowledge (Cohen and Levinthal, 1989). In the process of developing capabilities, individuals must not only adopt suitable methods to learn continuously and apply knowledge but also use creativity, adopt an innovative thinking path, and possess sufficient ability to collect information and transform knowledge (Daghfous, 2004; Fichman, 2004). In the green economy, absorptive capacity effectively counteracts consumer dilemmas arising from green product information asymmetry. The concept of green absorptive capacity proposed by Chen *et al.* (2014) focuses on enterprises. The aforementioned authors have defined the green absorptive capacity of enterprises as their capacity to acquire, absorb, transform, and utilize knowledge on environmental protection and to obtain environmental knowledge and transform it into usable technology. According to Chen *et al.* (2014), enterprise staff must expend considerable effort during the collection of environmental information. Dierickx and Coll (1989) indicated that the current absorptive capacity of an organization is highly correlated with its accumulated professional knowledge regarding collecting and summarizing information, acquiring applicable knowledge, and implementing techniques. According to Nelson and Winter (1982), the absorptive capacity of an enterprise depends on the degree of integration among the capabilities of its members. The higher the absorptive capacity of employees, the higher is the importance attached by an enterprise to environmental issues. With the accumulation of environmental knowledge, an

enterprise can propose solutions to environmental problems and even develop capabilities to use green products. The green absorptive capacity of consumers refers to their ability to acquire, absorb, transform, and use environmental protection knowledge when facing environmental issues. According to Hines *et al.* (1987), the higher the green absorptive capacity of consumers, the higher is their individual green purchasing intention. Therefore, the following hypothesis is proposed:

Hypothesis 1: Green absorptive capacity has a positive influence on green purchase intention.

Robert and Bacon (1997) considered environmental consciousness as the reflection of the environment in the human mind. According to Chang (2012), environmental consciousness is a psychological tendency to engage in environmental protection behavior, which is influenced by personal cognition, value judgment, and behavioral intention toward environmental protection behavior. Amoah *et al.* (2018) indicated that environmental consciousness is the extent to which individuals, families, or societies acquire local or global environmental knowledge. They also stated that environmental knowledge can be transformed into environmental behavior, which is an external factor, and environmental attitude, which is an internal factor. Therefore, environmental consciousness can be defined as the degree of personal concern about environmental protection in terms of personal cognition. The higher the concern of individuals regarding environmental protection, the higher is their environmental consciousness (Dunlap and Jones, 2002).

Environmental protection issues have become focuses of commercial development strategies to avoid social, economic, and environmental damage (Devi *et al.*, 2018). The public has begun to realize the importance of environmental protection (Chang *et al.*, 2019) and are generally in favor of green products (Chen *et al.*, 2015; Krause, 1993). Green management benefits enterprises and enables them to accelerate their development and production of green products (Chen *et al.*, 2015; Chuang and Huang, 2018). Consumers' environmental consciousness is gradually increasing, and they are willing to pay

relatively high prices for environmental products; thus, green products have become a source of competitive advantage for enterprises (Bhat, 1993). However, due to limitations in the research, development, and manufacturing of green products, these products are relatively costly. The only competitive advantage of green products is that they endow consumers with a feeling of engaging in environmental protection. The higher the environmental consciousness of consumers, the higher is their intention to purchase and value perception of green products (Amoah *et al.*, 2018; Mohiuddin *et al.*, 2018).

In summary, consumers' environmental consciousness represents their concerns regarding environmental protection at the cognitive level. The higher the environmental consciousness of consumers, the more environmentally responsible they would be, which would promote their environmental protection behavior (Amoah *et al.*, 2018; Dunlap and Jones, 2002; Kaiser *et al.*, 1999; Mohiuddin *et al.*, 2018; Schlegelmilch, 1996). The aforementioned finding conforms to the view of Hines *et al.* (1987). Thus, enhancing the environmental consciousness of consumers leads to an increase in green purchase intention. Consequently, the following hypothesis is proposed:

Hypothesis 2: Environmental consciousness positively influences green purchase intention.

2.3 Influence of consumers' personal factors on their behavioral intention

An attitude, which is a feeling of like or dislike, is not only a feeling of closeness or aversion to situations, things, individuals, and groups but also a view on the environmental aspects of an abstract concept or a social policy (Atkinson, 1983). An individual's environmental attitude refers to their degree of personal support and belief toward people involved in and materials facilitating environmental protection (Caron, 1989). An individual's environmental attitude reflects their attitude toward supporting or opposing and liking or disliking the environment or things related to the environment (Hines *et al.*, 1987). According to Milfont's (2007) views on psychological tendency, people may hold different

ideas or beliefs regarding the environment.

Under the trend of environmental sustainability, more people believe that we only have one Earth and ought to cherish it. Realizing that environmental deterioration has worsened their quality of life, consumers have begun to use green products. Consumers with environmental awareness consider ecology and environmental protection and not simply price or functionality when buying products (Peattie, 1992). Most consumers have realized the importance of environmental protection. They tend to take direct action against enterprises act irresponsibly toward the environment and urge enterprises to integrate environmental concerns into their development of new products (Pujari *et al.*, 2003) and manufacture green products for effectively coping with environmental challenges (Albino *et al.*, 2009). Green products are mostly costlier than corresponding nongreen products but are still favored by consumers because of consumers' support and positive belief toward people involved in and materials facilitating environmental protection. Such an environmental attitude can enhance green purchase intention.

In conclusion, environmental attitude refers to an individual's attitude toward supporting, liking, opposing, or disliking a view or belief related to environmental issues. Studies have indicated that environmental attitude is a crucial antecedent of purchase intention (Chan and Lau, 2000; Chen and Tung, 2014; Choi *et al.*, 2009; Liu *et al.*, 2020; Perrea *et al.*, 2014; Prete *et al.*, 2017; Trivedi *et al.*, 2018). These findings agree with Hines *et al.* (1987). Thus, enhancing the environmental attitude of consumers leads to an increase in green purchase intention. Consequently, the following hypothesis is proposed:

Hypothesis 3: Environmental attitude positively influences green purchase intention.

2.4 Influence of consumers' personal factors on their behavioral intention

Many enterprises conduct green marketing to become more competitive through their green products. When consumers realize how their well-being is

entwined with that of the environment, they engage in green consumption (Peattie, 1992), which is a concept that covers multiple aspects, such as environmental protection, pollution reduction, renewable resource adoption, and animal conservation (McEachern and McClean, 2002). Green purchase intention is a key predictor of green consumption behavior (Ajzen and Fishbein, 1980; Chan and Lau, 2000). Peattie (1992) indicated that the rise in responsible eco-environmental behavior has led people to want to leave a smaller ecological footprint in how they consume. According to Ali and Ahmad (2012), green purchase intention refers to an individual's willingness to purchase green products over corresponding nongreen products to achieve environmental protection.

Green purchase intention originates from an individual's cognitive support for green consumption. Studies have indicated that consumers' purchase behavior is based on a decision-making process. Consumers decide to purchase a product to meet their needs according to their experience and their evaluation of the information that they have collected from the external environment (Engel *et al.*, 1993). The product purchasing process involves the selection, procurement, use, and discarding of products and services by consumers through inner, emotional, and physical actions to meet their needs and desires (Wilkie, 1994). Therefore, understanding the factors intrinsic to individuals may be crucial for understanding their purchase behavior. Green purchase intention is influenced by consumers' cognition and attitude. The impulse to purchase green products increases consumers' purchase behaviors. When purchasing green products, consumers tend to accept positive information on environmental issues to stimulate their internal motivation. This positive information serves as a judgment basis for the consumption decisions of consumers.

On the basis of the studies of Pavlou (2003), Fu *et al.* (2020), and Chan (2001), the current study defines green purchase intention as the aspiration of consumers to think about, possibly purchase, and consider purchasing an electric scooter. According to the results of many empirical studies, a significant positive correlation exists between green purchase intention and green purchase behavior

(Ali and Ahmad, 2012; Beckford *et al.*, 2010; Chan, 2001; Chan and Lau, 2000; Chan and Yam, 1995; Han *et al.*, 2010; Maloney and Ward, 1973). This finding conforms to the environmental responsibility model proposed by Hines *et al.* (1987). Thus, increasing green purchase intention leads to an increase in green purchase behavior. Consequently, the following hypothesis is proposed:

Hypothesis 4: Green purchase intention positively influences green purchase behavior.

According to the consumer decision model proposed by Howard (1989), after receiving information on a product, consumers hold a certain cognitive pattern, attitude, and confidence toward the product, which influence their purchase intention and purchase behavior. Consumers' purchase intention is influenced by personal cognitive value, objective value, internal and external characteristics, and quality (Zeitham *et al.*, 1996). Therefore, consumers' purchase behavior patterns are diversified and complex. In particular, green purchase intention may have a crucial effect on green purchase behavior. When consumers have weak motivation, their purchase intention is low, which affects their purchase behavior. Understanding how the intrinsic motivation of consumers influences green purchase behavior is crucial for determining their acceptance of green products. This study focuses on the influence of green absorptive capacity, which is affected by consumers' personal perception and personal environmental attitude, on green purchase behavior.

Consumers receive the same information on green products; however, they may have different cognition toward this information, which influences their final purchase behavior. The difference between knowledge transformation and application in the process of consumer purchase is a topic worthy of investigation.

Enterprises must possess absorptive capacity to acquire, absorb, transform, and utilize knowledge (Cohen and Levinthal, 1990), and individuals must possess absorptive capacity to apply external knowledge with potential value (Cohen and Levinthal, 1989). According to the responsible environmental behavior model (Hines *et al.*, 1987), consumers with the capacity to acquire,

absorb, convert, and utilize environmental protection knowledge in a market filled with information on green products exhibit high green purchase intentions and thus green purchase behaviors. Thus, green absorptive capacity influences green purchase intention through green purchase behavior. Consequently, the following hypothesis is proposed:

Hypothesis 5a: Green purchase intention has a mediating effect on the relationship between green absorptive capacity and green purchase behavior.

The awakening of environmental consciousness has resulted in the growth of the green economy (Chang *et al.*, 2021). Consumers with environmental consciousness tend to purchase environmentally friendly green products (Kim and Damhorst, 1998). Environmental awareness positively affects the cognition, value judgment, and behavior intention of individuals toward environmental protection behaviors (Chang, 2012). Oh (1999) indicated that consumers' cognition, knowledge, and values have significant influences on their purchase intention. Therefore, the higher the environmental consciousness of consumers, the higher is their intention to purchase green products (Amoah *et al.*, 2018; Mohiuddin *et al.*, 2018). Purchase intention is the most accurate predictor of purchase behavior (Morwitz and Schmittlein, 1992; Reynolds and Wells, 1977). Therefore, environmental consciousness enhances consumers' value perception toward the environment and drives them to purchase environmentally friendly products. This finding conforms to the responsible environmental behavior model proposed by Hines *et al.* (1987). Environmental awareness can influence green purchase behavior through green purchase intention. Therefore, the following hypothesis is proposed:

Hypothesis 5b: Green purchase intention has a mediating effect on the relationship between environmental consciousness and green purchase behavior.

Consumers make their final decision on purchase behavior according to their background, experience, knowledge, and evaluations (Runyon and Stewart, 1987). Consumers' attitude affects their behavioral intention. Consumer attitude is the most specific antecedent of environmental behavior intention, which can lead to actual environmentally friendly behavior (Fielding *et al.*, 2008; Kaiser *et*

al., 1999). Therefore, environmental attitude enhances the attention paid by people to environmental issues and environmental protection actions. A positive environmental attitude can act as a predictor of future environmental behaviors (Johnson *et al.*, 2004; Wiidegren, 1998). Studies have indicated that environmental attitude is a crucial antecedent variable of and has a significant influence on purchase intention (Chan and Lau, 2000; Chen and Tung, 2014; Choi *et al.*, 2009; Liu *et al.*, 2020; Perrea *et al.*, 2014; Prete *et al.*, 2017; Trivedi *et al.*, 2018). Green purchase intention is positively correlated with green purchase behavior (Ali and Ahmad, 2012; Beckford *et al.*, 2010; Chan, 2001; Chan and Lau, 2000; Chan and Yam, 1995; Han *et al.*, 2010; Maloney and Ward, 1973). Therefore, the following hypothesis is proposed:

Hypothesis 5c: Green purchase intention has a mediating effect on the relationship between environmental attitude and green purchase behavior.

2.5 Moderating effects of situational factors on consumers' behavioral intention and responsible environmental behavior

Government subsidy policy refers to the subsidies provided by the government to promote the electric vehicle industry and enhance green purchase intention. Government subsidy policy has a positive influence on consumer behavior (Wan and Shen, 2013; Young *et al.*, 2010). With the rise in environmental consciousness worldwide, consumers generally believe that the government should accept the greatest responsibility for achieving environmental sustainability and protection (Jan *et al.*, 2019). According to a study on electric vehicles in Europe by Fearnley *et al.* (2015), incentive measures can stimulate consumers to purchase electric vehicles. Moreover, a study indicated that if the purchase subsidy scheme for electric vehicles in China is completely abolished, the overall electric vehicle market in China would contract by 40.39% (Kong *et al.*, 2020). Thus, government subsidies and tax incentives are crucial for promoting the development of electric vehicles (Li *et al.*, 2015), including electric scooters. In summary, government subsidy policy has a strong moderating effect on green purchase intention (Fu *et al.*, 2020; Hong *et al.*, 2019;

Liu and Tsaur, 2020). According to the responsible environmental behavior model proposed by Hines *et al.* (1987), green purchase intention is affected by consumers' responsible environmental behavior and situational factors. Thus, government subsidy policy has a positive moderating effect on the relationship between green purchase intention and green purchase behavior. Consequently, the following hypothesis is proposed:

Hypothesis 6: The higher the subsidy provided, the higher is the positive correlation between green purchase intention and green purchase behavior. Thus, the higher the subsidy provided, the stronger is the positive moderating effect of government subsidy policy on the relationship between green purchase intention and green purchase behavior.

The purchaser and seller, who are two traders in the market, have different degrees of information on green products; thus, green product information asymmetry is observed in the green market (Chang *et al.*, 2021). When customers are in an environment with low information asymmetry, such as environments related to environment cleaning, laundry, and mail delivery, they can easily identify and compare products or services; therefore, market failure is unlikely to occur (Nayyar, 1993). By contrast, when consumers are in an environment with high information asymmetry, they find it difficult to identify and compare products and services (Lowendahl, 2000). The government can promote the public awareness of ecological labels through diverse public activities to increase consumer purchase behaviors (Mishra and Sharma, 2010). The information asymmetry experienced by consumers affects their identification and comparison of products and services and thus their purchase behaviors. In addition, according to the responsible environmental behavior model proposed by Hines *et al.* (1987), green purchase intention, which influences consumers' responsible environmental behavior, is affected by situational factors. Thus, green product information asymmetry has a negative moderation effect on the relationship between green purchase behavior and green purchase intention. Consequently, the following hypothesis is proposed:

Hypothesis 7: When green product information asymmetry is high, the

positive correlation between green purchase intention and green purchase behavior decreases in magnitude. Thus, the higher the green product information asymmetry, the stronger is the negative moderating effect of green product information asymmetry on the relationship between green purchase behavior and green purchase intention.

According to the aforementioned hypotheses and relevant studies, a responsible environmental behavior model is constructed in this study for electric scooter users. This model describes the influences of green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, green purchase behavior, government subsidy policy, and green product information asymmetry (Figure 1).

3. Methods and managements

3.1 Data collection and research sample

In this study, a questionnaire survey was administered to consumers from Northern Taiwan who purchased or used electric scooters. To improve the effective response rate of the questionnaire, the respondents were provided small gifts after answering the survey. We distributed questionnaires at different times and locations to reduce the effect of common method variance in this study (Podsakoff & Organ, 1986; Podsakoff *et al.*, 2003). At time 1, we investigated green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, and 786 customers completed questionnaires. At time 2, researchers conducted the survey for green purchase behavior, government subsidy policy, and green product information asymmetry after two weeks and collected 551 valid questionnaires, of which the effective response rate is 70.102%.

The distribution of respondents by annual household income is as follows: (1) <400,000 New Taiwan Dollars (NTD), 30.5% (168) respondents; (2) 410,000–1,000,000 NTD, 43.9% (242) respondents; (3) 1,000,001–2,000,000 NTD, 24% (132) respondents; (4) >2,000,001 NTD, 1.6% (9) respondents. The

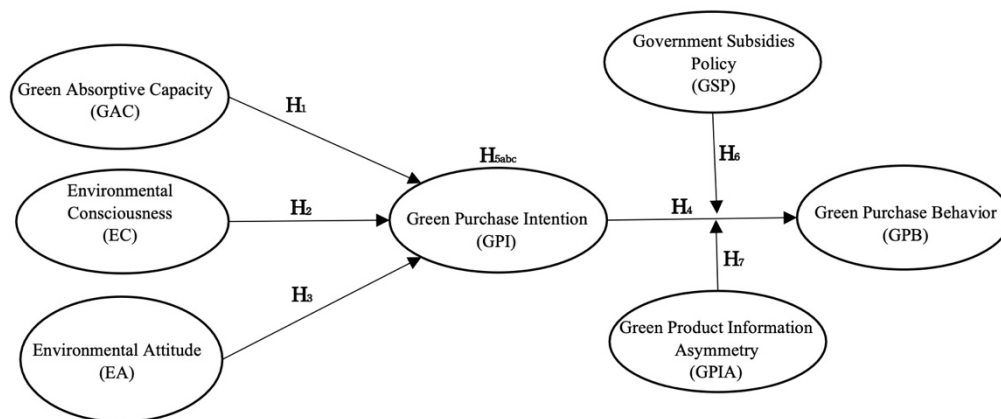


Figure 1

Proposed responsible environmental behavior model for electric scooter users

distribution of respondents by age is as follows: (1) <20 years old, 17.6% (97) respondents; (2) 21–30 years old, 35.2% (194) respondents; (3) 31–40 years old, 30.9% (170) respondents; (4) 41–50 years old, 12.7% (70) respondents; (5) 51–60 years, 3.3% (18) respondents; and (6) >61 years old, 0.4% (2) respondents. The distribution of respondents by education level is as follows: (1) high school, 12.2% (67) respondents; (2) university (or college) degree, 64.8% (357) respondents; (3) graduate degree, 21.4% (118) respondents; and (4) doctoral degree, 1.6% (9) respondents.

3.2 Definitions and measurements of the constructs

The questionnaire used in this study measures seven dimensions, namely green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, green purchase behavior, government subsidy policy, and green product information asymmetry, on a 7-point Likert scale ranging from 1 for “never” to 7 for “often.” A higher score indicates a higher purchase

frequency.

Green Absorptive Capacity : The five-item scale developed by Chen *et al.* (2014) is used to measure a participant' s capacity to acquire, absorb, transform, and utilize knowledge on environmental protection. A higher score indicates on this scale a higher green absorptive capacity level. The reliability of the aforementioned scale is 0.903, and the scale items are as follows: (1) "I have the ability to understand, analyze, and interpret external environmental knowledge;" (2) "I can communicate environmental knowledge to my friend;" (3) "I have the ability to combine existing environmental protection knowledge with newly obtained and assimilated environmental protection knowledge;" (4) "I have the ability to identify, evaluate, and acquire external environmental protection knowledge that is crucial to work or life;" and (5) "I have the ability to successfully commercialize external environmental protection knowledge."

Environmental Consciousness : The four-item scale developed by Han and Yoon (2015) is used to measure environmental consciousness in this study. A higher score on this scale indicates a higher level of environmental consciousness. The item reliability of the aforementioned scale is 0.940, and the scale items are as follows: (1) "The effects of pollution on public health are worse than we realize," (2) "Over the next several decades, thousands of species will become extinct," (3) "Claims that current levels of pollution are changing the Earth's climate are exaggerated" (reverse-coded items), and (4) "Environmental protection will provide a better world for me and my children."

Environmental Attitude : A three-item scale derived from the studies of Atkinson (1983) and Caron (1989) are used to assess environmental attitude. A higher score on this scale indicates a more positive environmental attitude. The reliability of the aforementioned scale is 0.827, and the scale items are as follows: (1) "I would like to use this product due to its environmental protection ability," (2) "I have a very good impression of this product in terms of its environment-friendliness," and (3) "My experience in using this product is very pleasant due to its environment-friendliness."

Green Purchase Intention : A three-item scale derived from the studies of

Pavlou (2003) and Fu *et al.* (2020) is used to assess green purchase intention. A higher score on this scale indicates a higher level of green purchase intention. The reliability of the aforementioned scale is 0.925, and the scale items are as follows: (1) "Given the chance, I intend to buy an electric scooter," (2) "Given the chance, I will buy an electric scooter in the future," and (3) "I will consider switching to an electric scooter that is less polluting and more energy-efficient to protect the environment."

Green Purchase Behavior : A three-item scale derived from the studies of Choi and Kim (2005) and Chang *et al.* (2021) and modified by Buaphiban and Truong (2017) is used to assess green purchase behavior. A higher score on this scale indicates more frequent green purchase behavior. The reliability of the aforementioned scale is 0.918, and the scale items are as follows: (1) "I will purchase an electric scooter from a manufacturer that implements corporate social responsibility," (2) "I will purchase an electric scooter for achieving environmental and ecology protection," and (3) "I will buy the product that is less harmful to people and the environment when I choose between two identical products."

Government Subsidy Policy : A three-item scale derived from the study of Wang *et al.* (2017) is used to assess government subsidy policy. A higher score on this scale indicates a higher level of government subsidy policy. The item reliability of the aforementioned scale is 0.964, and the scale items are as follows: (1) "The vehicle purchase subsidies provided by the central and local governments are useful and motivate me to purchase an electric scooter," (2) "The vehicle license tax exemptions provided by the government are useful and motivate me to purchase an electric scooter," and (3) "The vehicle fuel tax exemptions provided by the government are useful and motivate me to purchase an electric scooter."

Green Product Information Asymmetry : A four-item scale derived from the study of Chang *et al.* (2021) is used to assess green product information asymmetry. A higher score on this scale indicates a higher level of green product information asymmetry. The item reliability of the aforementioned scale is 0.952,

and the scale items are as follows: (1) “It is difficult for consumers to comprehend how green products are actually produced,” (2) “Customers cannot be sure of the amount of effort exerted by a company in making green products,” (3) “It is difficult for consumers to compare one green product with other similar green products,” and (4) “It is difficult for consumers to determine the quality of a green product before making a purchase.”

4. Empirical results

4.1 Results of the developed measurement model

Table 1 presents the means, standard deviations (SD), correlation coefficients, and square roots of the average variances extracted (AVEs) for green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, green purchase behavior, government subsidy policy, and green product information asymmetry. The following sets of factors are not significantly correlated: green absorptive capacity and environmental attitude; environmental consciousness, environmental attitude, and green product information asymmetry; and environmental attitude, government subsidy policy, and green product information asymmetry. Fornell and Larcker (1981) stated that a construct has suitable discriminant validity if the square root of its AVE is higher than all the correlation coefficients between the considered constructs.

Hair *et al.* (1998) suggested that a construct has suitable reliability and explanatory ability if its Cronbach’s α value is higher than 0.7. The Cronbach’s α values obtained for green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, green purchase behavior, government subsidy policy, and green product information asymmetry in this study are 0.903, 0.940, 0.823, 0.925, 0.918, 0.964, and 0.9522, respectively. Thus, the Cronbach’s α values of all the considered factors meet the aforementioned criterion (Table 2).

We use the AVE, which indicates the percentage of variance caused by measurement error, to examine the convergent validity of each construct.

Table 1
Sample collection process

Constructs	Mean	SD	A	B	C	D	E	F	G
A.GAC	5.366	0.857	(0.818)						
B.EC	5.807	0.886	0.312**	(0.894)					
C.EA	5.239	1.033	-0.065	-0.047	(0.785)				
D.GPI	5.833	1.030	0.280**	0.506**	0.154**	(0.935)			
E.GPB	5.784	0.961	0.328**	0.592**	0.213**	0.825**	(0.888)		
F.GSP	5.956	0.931	0.327**	0.658**	-0.053	0.684**	0.696**	(0.948)	
G.GPIA	3.521	1.481	-0.135**	-0.043	0.010	0.117**	0.117**	0.092**	(0.913)

Note: (1) GAC, green absorptive capacity; EC, environmental consciousness; EA, environmental attitude; GPI, green purchase intention; GPB, green purchase behavior; GSP, government subsidy policy; GPIA, green product information asymmetry. (2) The diagonal elements are the square roots of the average variances extracted. *: $p < 0.05$, **: $p < 0.01$.

Table 2
Item loadings (λ) as well as the Cronbach's α coefficients and AVE values of the constructs

Constructs	Item Number	factor loading	Cronbach's α	CR	AVE	\sqrt{AVE}
GAC	GAC 01	0.838***	0.903	0.909	0.670	0.818
	GAC 02	0.826***				
	GAC 03	0.905***				
	GAC 04	0.870***				
	GAC 05	0.622***				
EC	EC 01	0.878***	0.940	0.941	0.799	0.894
	EC 02	0.895***				
	EC 03	0.893***				
	EC 04	0.908***				
EA	EA 01	0.827***	0.823	0.827	0.616	0.785
	EA 02	0.823***				
	EA 03	0.697***				
GPI	GPI 01	0.943***	0.925	0.954	0.873	0.935
	GPI 02	0.946***				
	GPI 03	0.914***				
GPB	GPB 01	0.921***	0.918	0.918	0.789	0.888
	GPB 02	0.900***				
	GPB 03	0.842***				
GSP	GSP 01	0.939***	0.964	0.964	0.899	0.948
	GSP 02	0.985***				
	GSP 03	0.920***				
GPIA	GPIA 01	0.926***	0.952	0.952	0.833	0.913
	GPIA 02	0.936***				
	GPIA 03	0.901***				
	GPIA 04	0.888***				

Note: ***, $p < 0.001$.

According to Fornell and Larcker (1981), a construct has suitable discriminant validity if its AVE is higher than 0.5 and the square root of its AVE is higher than the correlation coefficients between all the constructs. As presented in Table 2, the AVE values of all the constructs considered in this study are higher than 0.5 (0.670, 0.799, 0.616, 0.873, 0.789, 0.899, and 0.833 for green absorptive capacity, environmental consciousness, environmental attitude, green purchase intention, green purchase behavior, government subsidy policy, and green product information asymmetry, respectively). In addition, Table 1 indicates that each construct meets the criterion for discriminant validity. Therefore, the survey conducted in this study meets the standards and specifications proposed in the literature for reliability and validity.

Confirmatory factor analysis is conducted in this study to ensure that the variables are mutually distinct. The results and fitness values of four nested measurement models are evaluated. The chi-square differences of the baseline model and four alternative models are compared to identify the model with the best fit for the collected data (Hair *et al.*, 2006). The results indicate that the seven-factor model [$\chi^2 = 838.56$, $df = 254$, comparative fit index (CFI) = 0.958, and root mean square error of approximation (RMSEA) = 0.065] has an acceptable fit. Moreover, this model outperforms the other three models, namely a five-factor model in which green absorptive capacity, environmental consciousness, and environmental attitude are merged into a single factor; a four-factor model in which green absorptive capacity, environmental consciousness, and environmental attitude are merged into one factor and government subsidy policy and green product information asymmetry are merged into another factor; and a one-factor model in which all the constructs are merged. This result indicates that the respondents could discriminate the seven considered constructs. Furthermore, the one-factor model has poor fit with the data ($\chi^2 = 8258.17$, $df = 275$, CFI = 0.421, and RMSEA = 0.230).

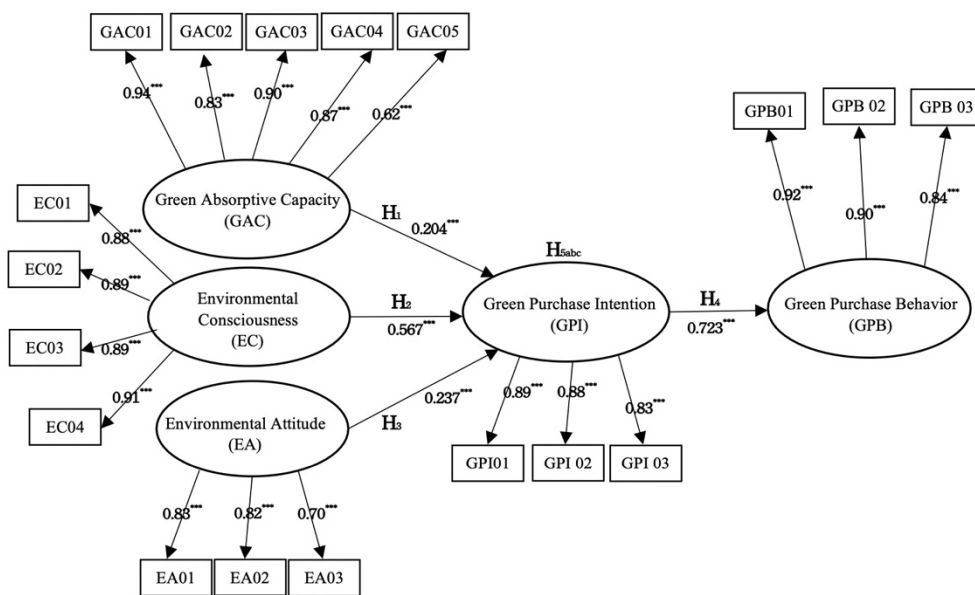
4.2 Hypothesis testing

4.2.1 Structural equation modeling analysis

The standardized path coefficients are estimated using the Amos 26 statistical analysis software. Figure 2 indicates that the expected and observed theoretical structures fit adequately, with the following results being obtained: goodness of fit index = 0.906, RMSEA = 0.073, and CFI = 0.957. The standardized parameter was normalized. To test hypotheses 1–4, we estimate the effects of three predictor variables on green purchase intention and green purchase behavior by using a manifest variable path analytic approach for modeling the main effects.

4.2.2 Mediation effects of green purchase intention

To ensure the accuracy of the results, 5000 bootstrap replications are performed. The percentile bootstrap and bias correction percentile bootstrap



Chi-square/df = 3.921, GFI = 0.906, RMSEA = 0.073, CFI = 0.957 Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 2
Results of structural equation modeling

models are implemented with 95% confidence intervals (CIs; Taylor *et al.*, 2008). The following results are obtained for standardized direct effects: (1) green absorptive capacity \rightarrow green purchase behavior = 0.126 ($z = 2.8, p < 0.01$), (2) green purchase intention \rightarrow green purchase behavior = 0.723 ($z = 12.684, p < 0.001$), (3) environmental consciousness \rightarrow green purchase behavior = 0.219 ($z = 3.842, p < 0.001$), and (4) environmental attitude \rightarrow green purchase behavior = 0.139 ($z = 3.390, p < 0.001$). The following results are obtained for standardized indirect effects: (1) green absorptive capacity \rightarrow green purchase intention \rightarrow green purchase behavior = 0.148 ($z = 2.96, p < 0.01$), (2) environmental consciousness \rightarrow green purchase intention \rightarrow green purchase behavior = 0.41 ($z = 8.542, p < 0.001$), and (3) environmental attitude \rightarrow green purchase intention \rightarrow green purchase behavior = 0.171 ($z = 2.803, p < 0.01$). Table 3 lists the mediating effects that are significant due to the absence of 0 between the lower and upper limits of the 95% CI for each indirect effect (Preacher and Hayes, 2008). The results support the three mediation relationships listed in Table 3 (i.e., green absorptive capacity \rightarrow green purchase intention \rightarrow green purchase behavior, environmental consciousness \rightarrow green purchase intention \rightarrow green purchase behavior, and environmental attitude \rightarrow green purchase intention \rightarrow green purchase behavior); thus, H5a, H5b, and H5c are supported.

4.2.3 Moderating effects of government subsidy policy and green product information asymmetry

The results of Model 4 (Table 4) indicate that interaction of green purchase intention and government subsidy policy has a significant correlation with green purchase behavior. Figure 3 depicts the simple slopes for the plot of green purchase behavior versus green purchase intention at high and low government subsidy policy for one standard deviation above and below the mean values of government subsidy policy. Simple slopes analysis (Aiken and West, 1991) reveals that green purchase intention and green purchase behavior are positively correlated ($b = 0.733, p < 0.05$) for green consumers who perceive a high level of

Table 3
Standardized direct, indirect, and total effects identified using the developed model

	Point estimate	Product of coefficients		Bootstrapping			
		S.E.	Z	Percentile 99% CI		Bias-corrected percentile 99% CI	
				Lower	Upper	Lower	Upper
Indirect Effect							
(1)GAC→GPI→GPB	0.148	0.05	2.96**	0.078	0.245	0.07	0.232
(2)EC→GPI→GPB	0.41	0.048	8.542***	0.337	0.495	0.333	0.491
(3)EA→GPI→GPB	0.171	0.061	2.803**	0.071	0.271	0.067	0.267
Direct Effect							
(4)GAC→GPB	0.126	0.045	2.8**	0.056	0.204	0.055	0.202
(5)GPI→GPB	0.723	0.057	12.684***	0.63	0.82	0.625	0.814
(6)EC→GPB	0.219	0.057	3.842***	0.125	0.313	0.128	0.316
(7)EA→GPB	0.139	0.041	3.390***	0.077	0.213	0.074	0.21
Total Effect							
(1)+(2)+(3)+(4)+(5)+(6) +(7)	1.936	0.114	16.982***	1.756	2.128	1.741	2.116

Note: (1) Standardized estimation of 5000 bootstrap samples; (2) ***: $z > 3.29$, **: $z > 2.58$, *: $z > 1.96$; (3) $N = 551$; (4) GAC, green absorptive capacity; EC, environmental consciousness; EA, environmental attitude; GPI, green purchase intention; GPB, green purchase behavior.

government subsidy policy; however, the aforementioned relationship does not significantly differ from 0 ($b = 0.660$, $p < 0.05$) for green customers who perceive low government subsidy policy. The two simple slopes are significantly different ($\Delta\beta = 0.073$, $p < 0.05$); thus, H6 is supported.

The results of Model 4 (Table 4) indicate that the interaction of green purchase intention and green product information asymmetry does not have a significant correlation with green purchase behavior. Green purchase intention and green purchase behavior are positively correlated ($b = 0.648$, $p < 0.05$) for green customers who perceive high green product information asymmetry; however, this relationship does not significantly differ from 0 ($b = 0.660$, $p < 0.001$) for green customers who perceive low green product information

asymmetry. The two simple slopes are not significantly different ($\Delta\beta = -0.012, p > 0.05$); thus, H7 is not supported.

5. Discussion

Consumers play a crucial role in the achievement of sustainable consumption and production targets. Taiwan has the highest scooter density worldwide. To analyze Taiwanese consumers' purchase intentions toward electric scooters, the current study uses the responsible environmental behavior model

Table 4
Regression results for moderator of government subsidy policy and green product information asymmetry

	GPB			
	Model 1	Model 2	Model 3	Model 4
Control variable				
annual household income	0.115	0.047	0.025	0.061
age	0.126*	0.043	0.030	0.037
education	0.128**	0.027	0.022	0.022
Independent variable				
GPI		0.800***	0.665***	0.794***
moderator				
GSP			0.260***	
GPIA				0.038
interaction				
GPI* GSP			0.075**	
GPI* GPIA				0.028
R2	0.092	0.690	0.720	0.692
$\Delta R2$	0.092	0.598	0.628	0.600
F	18.533***	303.636***	233.363***	204.063***

Note: (1) ***: $z > 3.29$, **: $z > 2.58$, *: $z > 1.96$; (2) $N = 551$; (4) (1) GPI, green purchase intention; GPB, green purchase behavior; GSP, government subsidy policy; GPIA, green product information asymmetry

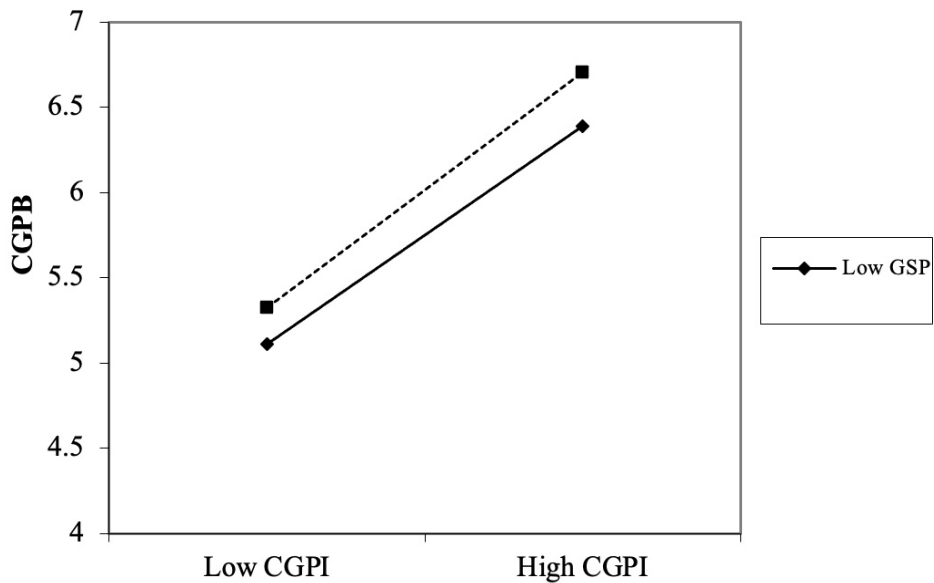


Figure 3

Correlation between the interaction of green purchase intention and government subsidy policy with green purchase behavior

proposed by Hines *et al.* (1987) to develop a responsible environmental behavior model for electric scooter users. The following aspects are examined in this study: factors influencing green purchase intention; effects of green absorptive capacity, environmental consciousness, and environmental attitude on green purchase intention and green purchase behavior; and influences of government subsidy policy and green product information asymmetry on green purchase intention and green purchase behavior. First, the empirical results of this study indicate that the positive effect of green absorptive capacity is consistent with those of the green absorptive capacity for innovative performance (Chen *et al.*, 2014) and the green absorptive capacity for individual performance (Chang *et al.*, 2014). High capabilities to acquire, absorb, transform, and use environmental protection knowledge help consumers to identify and handle relevant green product information. Second, significant improvements in consumers'

environmental consciousness and environmental attitude can result in an increase in green purchase intention. Third, green purchase intention has partial mediating effects on green absorptive capacity, environmental consciousness, and environmental attitude. Fourth, government subsidy policy significantly strengthens the significant positive effect of green purchase intention on green purchase behavior. However, the moderating effect of green product information asymmetry is not supported. To explore why this hypothesis is not supported, we have interviewed several consumers of electric scooters and they argued that although green product information asymmetry may reduce their actual purchase behavior, this effect is not more effective than government subsidy policy. Therefore, it is possible that government subsidy policy is a stronger moderating variable than green product information asymmetry, so the moderating effect of green product information asymmetry is not significant. That is to say, if consumers are willing to use electric scooters, the external moderating effect of government subsidy policy should be more effective than green product information asymmetry, which can significantly cause consumers' actual use behavior. The Model 3 in Table 4 also supports this assumption, because the coefficient of green purchase intention * government subsidy policy is significant instead of the coefficient of green purchase intention * green product information asymmetry. The aforementioned phenomena have reduced the interference effect of green product information asymmetry on the purchase of electric scooters in Taiwan. The theoretical contributions, practical implications, and limitations of this study as well as suggestions for future research are provided in the following text.

5.1 Theoretical contributions

The theoretical contributions of this study to academic research on sustainable development are described in the following text. First, this study extends the previous literature on the responsible environmental behavior model. This study explores the purchase behaviors of electric scooter users in Taiwan by incorporating cognitive variables (competence to act and knowledge on an issue),

personality factors (attitude), behavioral intention, responsible environmental behavior, and situational factors into the environmental responsibility model of Hines *et al.* (1987). The developed integrated research framework is used to examine the following aspects: (1) green absorptive capacity, (2) environmental consciousness, (3) environmental attitude (a personality factor), (4) green purchase intention, (5) green purchase behavior, (6) and government subsidy policy (a situational factor). The mediating and moderating effects indicated by the developed integrated model are also indicated by the responsible environmental behavior model; thus, the developed research framework is accurate and can be used as a basis for future studies.

Studies have investigated the psychological mechanisms of purchase intention and purchase behavior (Chan, 2001; Chan and Lau, 2000). However, few studies have examined the psychological mechanism of consumers' purchase of green products. To fill this research gap on sustainable consumption and sustainable production, the current study explores the aforementioned mechanism by investigating consumers' purchase of electric scooters under the trend of possible future bans on vehicles running on fossil fuels. The findings of this study indicate that the developed responsible environmental behavior model for electric scooter users is effective and feasible. All the factors considered in this study except for green product information asymmetry, which does not significantly affect the relationship between green purchase intention and green purchase behavior, can be adopted to measure the intentions and behaviors of consumers with regard to purchasing electric scooters.

The replacement of vehicles running on fossil fuels with vehicles running on green energy to achieve green transformation and zero-carbon emissions is a worldwide trend. Consumers have played a crucial role in the emergence of this trend. The current study examines the moderating effects of government subsidy policy and green product information asymmetry on the green purchase intention and green purchase behavior of electric scooter users in Taiwan. The findings of this study indicate that government subsidy policy considerably influences green purchase intention and green purchase behavior, whereas green product

information asymmetry does not significantly influence these factors. Understanding the moderating effect of government subsidy policy can help researchers understand green consumption from the situation perspective. The aforementioned contribution of this study enriches the literature on sustainable consumption.

5.2 Managerial implications

Realizing zero-carbon emissions to achieve sustainable development goals is crucial for governments, enterprises, and consumers. The management implications of this study are described in the following text.

The results of this study indicate that the mean value of government subsidy policy is 5.956, and this factor has a significant effect on green purchase behavior. From the government's perspective, subsidies are a suitable method for promoting the replacement of scooters running on fossil fuels with electric scooters. However, the government should formulate a flexible and appropriate subsidy policy according to the stage of electric scooter use, region, the penetration rate of electric scooters, and other characteristics. Enterprises should develop suitable product sales strategies according to the government's subsidy policy. Enterprises should conduct promotional activities to enhance the effect of government subsidy policy for stimulating the consumer demand for electric scooters.

The mean value of green product information asymmetry in this study is 3.521, and green product information asymmetry does not have a significant effect on green purchase behavior. This study conducted a subjective comparison of the environmental performance achieved when using scooters running on fossil fuels and electric scooters. Therefore, the government should enhance public consciousness regarding environmental protection labels and encourage consumers to compare the effects of using electrical scooters with environmental labels and scooters running on fossil fuels that do not have environmental protection labels. The government should also formulate product history norms and revise the penalties and fines for incidents of greenwashing by enterprises to

increase the popularity of green products.

The results of this study indicate that green absorptive capacity has a positive influence on green purchase intention and green purchase behavior. Developing the green absorptive capacity would enable consumers to identify genuine “green commodities” under the influx of misleading green advertisements. Consumers should improve their capabilities to acquire, absorb, transform, and use environmental protection knowledge and to identify environmental issues.

5.3 Limitations and directions for future research

Although this study makes many theoretical and practical contributions, it has certain limitations that must be addressed in future studies. First, although the items in the adopted questionnaire are modified according to the concept of “green absorptive capacity,” these items can be further modified in future studies to increase their suitability to the relevant research. Second, this study examines the green purchase intention and green purchase behavior of electric scooter users in Taiwan without considering the characteristics of electric scooters or the electric scooter industry. Future studies can consider the characteristics of a specific industry or product to verify the findings of this study, especially those related to the effects of green product information asymmetry on green purchase intention and green purchase behavior. Third, most of the respondents in this study belong to the age groups of 21–30 years old (35.2% of the respondents) and 31–40 years old (30.9% of the respondents). The findings of this study should be verified among samples with different age group distributions to that in this study. Moreover, future studies can examine the effects of the characteristics of the research sample on the factors and relationships investigated in this study.

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