

# The Impacts of Environmental Education and Product Cognition on Consumers' Purchase Intention on Lithium Battery-Powered Electrical Motorcycles

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*Abstract—Nowadays the global environment has suffered severe destruction. The cost of acquiring resources has gradually increased. The globally economic recession has kept spreading as well. Accordingly, energy savings and carbon reduction along with green products and green consumption have increasingly become important issues. This study examines the impact of the government's low-carbon policies, environmental education, environmental knowledge, product cognition, perceived value, and consumers' environmental attitudes towards the purchase intention on a lithium battery-powered electrical motorcycle. By exploring the mainly theoretical basis of knowledge-attitude-behavior patterns, employing Structure Equation Model (SEM), and conducting 416 valid samples this study investigates whether consumers' environmental knowledge and attitudes from advocacy of environmental education are indirectly associated with their purchase intentions. The results indicate that environmental knowledge, environmental attitudes, and environmental behaviors are positively and indirectly related with consumers' purchase intentions. This study also finds that the government's low-carbon policies are associated with consumers' purchase intentions.*

**Keywords:** Low-carbon Policy, Environmental Education, Product Cognition, Purchase Intention

## I. INTRODUCTION

Rapidly economic development has resulted in the excessive consumption on the resources of the Earth and broken the balance of the ecological environment [1]-[2]. Global warming, damage to the ozone layer, water and air pollution, extinction of species and so on have become the key issues for human being [1]-[3]. In 1987, the concept of sustainable development proposed by World Commission on Environment and Development (WECD), United Nations is in hopes of satisfying modern needs and avoiding repercussions on the capacity of future generations. "Green Environmental Protection" has become a universal value and created a win-win situation by achieving the goals of increasing energy-efficiency through reduction of resource consumption, balance of economic development and, environmental protection [2], [4]-[5]. These are common

challenges for people inevitably facing and taking in the 21<sup>st</sup> century. Taiwan has been ranked as the first in the growth of carbon dioxide emissions. For global initiatives of carbon reduction, the government has proposed several low-carbon environmental measures including promotion of environmentally-friendly electrical motorcycles. By employing lithium battery-powered electrical motorcycles as the research sample this study investigates Taiwanese consumers' purchase intention on such products. Specifically there are three research objectives in this study: 1) consumers' cognition on green products; 2) impact of environmental education on consumers' purchase intention; 3) impact of the government's low-carbon policy on consumers' purchase intention.

## II. LITERATURE REVIEW

### A. The government's low-carbon policy

To fully implement the low-carbon policy relevant government departments and agencies give whole supports for the developments of electrical motorcycles. In 2009 the Ministry of Economic Affairs planned a budget of NT\$ 1.6 billion dollars over four years to subsidize the purchase of electrical motorcycles. Meanwhile the ministry announced a sales target of hundred and sixty thousand electrical motorcycles to be achieved within four years. To ensure the performance and safety of the electrical motorcycles the Industrial Development Bureau formulated a series of test standards for their manufactures. The Industrial Development Bureau would also grant a certified mark for those electrical motorcycles which passed the test standards of TES. According to the existing policies from the Environmental Protection Bureau under the Executive Yuan transforming a two-stroke motorcycle with high-polluting into an electrical motorcycle is entitled to a subsidy of NT\$ 3,000 dollars. An extra purchase of a lithium-powered electrical motorcycle certified by the Industrial Development Bureau is entitled to a further subsidy of NT\$ 8000 dollars (small lightly type) or NT\$ 11,000 dollars (light type). Numerous local governments have also provided additional subsidies between NT\$ 2,000 and 15,000 dollars. Consumers entitled to these subsidies are

able to purchase the electrical motorcycles at almost half of the original price. Moreover, there are lots of free electrical charging services provided throughout Taiwan. In 2011 the Environmental Protection Bureau formulated the “subsidy methods for the battery exchange system of electrical motorcycles” in a bid to encourage industry players to build a battery exchange system for electrical motorcycles through subsidies and to subsidize the expenses of battery changing at exchange stations as well. An approximate 5000 users would gain subsidies of NT\$ 10,000 dollars each. In 2012 the local governments also implemented measures which exempted electrical vehicles from licensing taxes, parking fees, and fuel taxes in a bid to increase public’s purchase intention on electrical vehicles.

### ***B. Environmental education, environmental knowledge and environmental attitude***

Environmental education is a process for the public to understand more about the relation between human being and the environment through the educational methods [6]-[7]. People can then gain skills, emotions, and cognition. By exploring the relations between human being and the environment, human being and living things, and human being and the society the environmental education not only advocates respect and appreciates the natural environment but also calls for the solutions to environmental problems [1]-[3], [6]-[7]. Environmental knowledge refers to the relevant knowledge of ecology and human being survivability owned by individuals. These include the cognition and concern for environment and its relevant issues, understanding responsibility and environmentally-friendly behavior as well as the sustainable development of the ecology [1], [8]-[9]. Environment knowledge enables the public to change their attitude and behavior and thereby carry out environmentally responsible behavior. The effectiveness of environmental knowledge in cognitive domains can be realised through measurements. Environmental attitude refers to the psychological reaction of people through the learning of natural knowledge or experiencing of the ecological environment [10]. These include the level of concern for the environment, awareness on environmental problems and willingness to engage in environmental protection work [11]-[12]. Environmental attitude also includes the factor of the environmental conservation. Environmental attitude can be referred to the individual attitude and environmental awareness on green products [11]-[13].

### ***C. Product involvement and product cognition***

Reference [14] defines involvement as “the extent of knowledge a consumer own on a particular product or service due to individual needs, values, and interests”. Based on this perspective the different consumers hold different extents of involvement for the same product [15]. Reference [16] suggests that the consumers can realise more about the product by involvement. Their consuming decisions are then affected. Reference [17] indicates that the cognition is a process of experience and explanation. Specifically, these are how an individual recognises and understands an external

event upon stimulation by transmission and digestion of information. Product cognition refers to the degree of understanding or knowledge consumers own on a product and the consumer’s self-confidence towards the product through memory [18]-[19].

### ***D. Perceived Value***

Reference [20] mentions that the consumers will pursue the maximum value and engage in purchasing when they feel the maximum perceived value of the product or service. Reference [21] documents that the consumers’ perceived value is the evaluation result of the consumers on a product or service based on the balance between their perceived gain and sacrifice. Accordingly, the purchase decision of the consumers resulted from their perceived value on product or service. In fact that is a choice between the consumer’s perceived benefit and cost. Most consumers use the function of a product to gauge its value [22]: the performance of a motorcycle, for instance. Consumers frequently compare the actual price of the product with a psychologically perceived price [21]-[22]. The consumers’ perceived value of the product increases with an actually lower price and higher predicted price. Their purchase intention is then on rise. Accordingly, the consumers never blindly chase the highest quality of the product when purchasing. Instead, they will go for the highest perceived value of the product whose price does not exceed the amount consumers are willing to pay.

### ***E. Consumers’ purchase intention***

Reference [23] defines the purchase intention as the possibility of a consumer to purchase a particular product. The higher the purchase intention is the higher the purchase probability will be. Purchase intention is the subjective probability of buying a particular product or brand. The predictable behavior of the consumers and their buying decisions is then reflected in the foreseeable future [24]. Reference [21] utilises the perceived value to measure the purchase intention. He also employs the Likert scale to evaluate the degree of purchase intention by examining variables such as the possibility of purchasing, wanting to purchase, and considering to purchase. He finds that the consumers’ purchase intention depends on the perceived value of the product. The greater the consumers’ perceived value of the product is the higher their purchase intention is [21]-[22]. Reference [23] investigates whether the consumers choose a particular product in next time by using the options of “would definitely buy”, “would possibly buy”, “not certain of buying”, “not certain of not buying”, “would possibly not buy”, and “would definitely not buy”. The consumers choosing the options of “would definitely buy” and “would possibly buy” reflect a stronger purchase intention.

### ***F. Analysis for the variables of lithium-powered electrical motorcycles***

**1. Correlation** analysis for the impact of low-carbon policy, environmental attitude, product involvement, and product cognition on consumers’ purchase intention Reference [25] finds that most people remain no idea about the currently

implemented programs they highly support low-carbon policy though. The situation results in the low of consumers' purchase intention [2]-[5], [21]-[22]. Reference [26] investigates the relation between consumers' purchase intention and loyalty on electrical motorcycles. She documents that the existing policies and incentives towards the electrical motorcycles are not really beneficial to the consumers. The consumers, thus, only have the very lower level of purchase intention towards the electrical motorcycles. Moreover, [27] examines the impact of bio-hydrogen fuel-powered generation system on the consumers' purchase intention. He indicates that the government's policies are significantly related with the consumers' purchase intention [2]-[5]. By investigating the relation between FSC certified green marketing, the consumers' environmental attitude, environmental cognition, and purchase intention [28] suggests that the environmental attitude towards the dimension of "ecological crisis" is positively associated with the consumers' purchase intention [1]-[2], [10]. Furthermore, the results by [29] show that there is a significantly positive correlation between consumers' purchase intention, green product cognition, and attitude towards buying green products [15]-[16], [18]-[19]. Reference [30] explores the influenced factors of the consumers' purchase on foldable bicycles. He demonstrates that the product involvement is significantly and positively associated with the consumers' purchase intention. Reference [31] examines the degree of involvement, perceived value, and consumers' purchase intention towards the organic products. She finds that the degree of the consumers' involvement in the organic products is significantly and positively related with their purchase intention.

## 2 Correlation analysis of the environmental education, environmental knowledge, product cognition, and perceived value on the environmental attitudes

Reference [32] integrates the environmental education with the outdoor learning and then investigates their impact on the environmental knowledge of the junior high school students. Her results indicate that there is a positive relation between the relevant knowledge and attitudes of those students. Reference [33] examines the effectiveness of implementing water environmental learning for elementary school students. She documents that there is a positive association between the environmental knowledge and attitudes of those sample students. The results are consistent with the findings by [34]-[35]. In addition, [36] suggests that the cognition of the carbon reduction is positively related with the attitudes. The higher education level the consumers hold the more substantial environmental knowledge they gain. By analyzing the knowledge and attitudes of elementary school teachers towards the air pollution and related behavior [37] finds that the environmental education is significantly and positively associated with the environmental knowledge and attitudes. His findings are also consistent with the results by [34]-[35]. Reference [38] employs the example of a sustainable campus

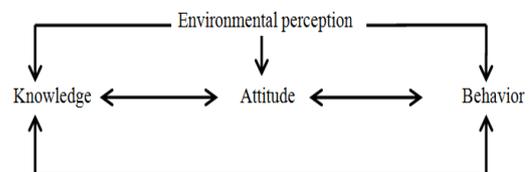
to examine the relation between the water environmental facilities and the environmental education at elementary school. Consistent with [34]-[35] he demonstrates that the teachers' cognition is insignificant associated with their attitudes. Reference [39] uncovers that the students' cognition towards the green energy is statistically and positively associated with their corresponding attitude. Reference [40] reveals that the consumers' attitude towards the environmental protection is significantly associated with their corresponding perceived values. Finally, [41] investigates how the environmental policies, environmental education, and energy management methods used by Taiwanese green universities in response to the climate changes are related with the environment. Consistent with [6] her results show that there is a significantly positive association between the environmental policies adopted and the environmental education.

### III. RESEARCH DESIGN

This study aims to investigate the subjective cognition and understanding of the public towards the lithium-powered electrical motorcycles after the government proposes the low-carbon policy for the electrical motorcycles. By the investigation this study further explores the consumers' purchase intention towards the product. This study conducts the correlation analysis of the eight dimensions including the low-carbon policy, the environmental education, the environmental knowledge, the product involvement, the product cognition, the perceived value, the environmental attitude, and the consumers' purchase intention.

#### A. Research Framework

This study employs two dimensions of the relevant government's low-carbon policies and the environmental education as the antecedent. This study also utilizes the environmental knowledge, the environmental attitude, and the environmental behavior of the knowledge-attitude-behavior model as the intervening variables so as to investigate the purchase intention of the public towards the green products (see Figure 1 [42]). The research model is shown in Figure 2.



Source: [42]

Fig 1: Environmental knowledge – attitude – behavior mode

#### B. Research Method

This study conducts analysis for the population statistical variables and overall structural equation model by using SPSS19.0 (narrative statistically analysis) and AMOS18.0 respectively.

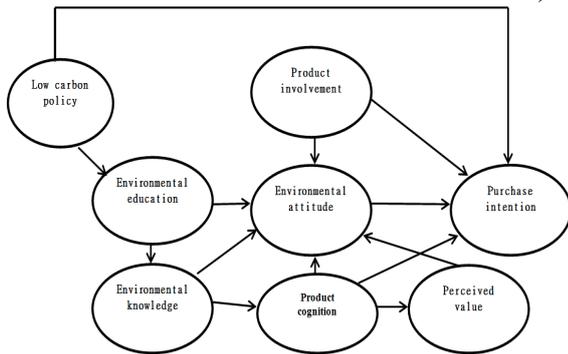


Fig 2: Research model Source: Compiled by this research

**C. Test subjects and sample recovery**

This study employs the populace who has or has not undergone the environmental education as the test subjects. This study then investigates the correlation between the variables such as the knowledge, education, attitude, behavior, government’s policy, and the consumers’ purchase intention on the green products via questionnaires. Finally, there are 416 valid samples out of 500 in total recovered in various counties and cities of Taiwan for the questionnaires.

**IV. ANALYSIS OF EMPIRICAL RESULTS**

This study firstly describes the basic information of the sample questionnaires before analyzing the narrative statistically information. This study then explains the structural equation model and the correlation between the reliability and validity and the variables of the questionnaire.

**A. Analysis of the basic information**

About 86.7% of the consumers are concerned about the message of the oil prices and tariff hike, whereas 72.6% of ones often pay attention to the relevant issues of the energy-related from the media. Whereas 73.5% of the consumers agree that the energy-related courses offered by schools contribute to increase their concept of the green energy, 53.3% of ones choose the energy-related courses offered by schools. 70% of students consider that the exhortations by schools promote the implementation of the green energy work. in addition, 86.3% of the test subjects agree with the government’s policy of using lithium-powered motorcycles. 80.5 % of the test subjects enjoy the policy of purchasing lithium-powered electrical motorcycles with the special subsidies, whereas 81.9% of ones support the purchase of lithium-powered motorcycles with tax cuts. 77.8% of the consumers appreciate the policy of regularly sending lithium motorcycles for free repairs in the numerous stations, whereas 75.7% of ones like the policy of actually assisting needy families by discounting half prices of lithium-powered motorcycles. 77.9% of the test subjects prefer the government to provide free monthly recharge of lithium-powered motorcycles. the interviews conducted exhibit that most test subjects appreciate the government’s strategy of tax reduction much more than other government’s low-carbon policies. 61.2% of the test subjects hope that the government assigns professionals to explain the advantages of

lithium-powered motorcycles and related contents at the various counties and cities. However, only 42.8% of the consumers prefer the government to implement the daily lithium-powered motorcycle policy. Compared to other services and policies most of the consumers desire the government to provide the practical help such as the tax reduction or subsidies. For the environmental protection 86.2% of the test subjects are willing to conserve energy for the reduction of greenhouse gases emission, whereas 64.1% of ones willingly spend more buying motorcycles with the “energy saving” mark. 65.2% of the test subjects willingly travel by foot or the public transports for energy conservation, whereas 87.1% of ones care about the information of the rise in gas prices and electricity prices. However, only 71.8% of the consumers pay attention to the related energy reports. 20.7% of the test subjects think that Taiwan is not a member establishing the “outline convention on climate change”. Taiwan is unlikely to be affected by the Kyoto protocol. Accordingly, the public do understand the certain extent of the climate change issues. About 73.3% of the test subjects agree that the offering of the energy-related courses in schools promote the instillation of the environmental protection attitudes for the public. However, 58.1% of the test subjects state that they pay attention to the energy-related information merely the time when the schools arrange the activities and promotions of the environmental protection. 53.5% of the consumers would select the environmentally relevant courses if they were offered, whereas 74.4% of ones suppose that the emission inspection of the motorcycles conducted by the schools would help users for the regular inspection of their bikes. Most test subjects consent that the schools should offer environment-related courses. By these courses they could easily enhance the knowledge of environmental protection. Moreover, 64.4% of the test subjects consider that for the carbon reduction the lithium-powered electrical motorcycles are much better than the fuel-powered ones, whereas 62.7% of ones understand that the lithium-powered electrical motorcycles are better than the fuel-powered ones in technology. 54.3% of the consumers agree that the lithium-powered motorcycles are safer, whereas 34.2% of ones consent that the lithium-powered motorcycles comparatively stand the competition of the price. For carbon reduction, energy saving, technology, safety and quality 60% of the consumers willingly accept the lithium-powered motorcycles. Furthermore, 65.2% of the test subjects choicely buy the lithium-powered motorcycles, whereas 61.2% of ones do so for fuel price hike. 71.3% of the test subjects have heard about the green environmental motorcycles before the lithium-powered motorcycles were launched in Taiwanese market. However, only 48.3% of the consumers have seen the related advertisements in daily lives. There remains much space of the improvement for the policy promotion by both enterprises and governments. Based on the convenience of maintenance 79.6% of the consumers willingly purchase the lithium-powered motorcycles, whereas 77.6% of ones do so

due to the operation convenience. 69.8% of the test subjects buy the lithium-powered motorcycles for the reason of the fashionable trend. Finally 66.7% of the consumers purchase the lithium-powered motorcycles for gaining the related information of the environmental protection. The decision of most test subjects remains based upon the convenience of operation and maintenance when they come into such a new product at first time.

**B. Demographic Analysis**

In terms of the gender, there is a higher proportion of males (59.1%) than females (40.1%) in this study. For the marital status 90.6% of the test subjects are single, whereas 8.9% of ones are married. 63.2% of the consumers are under 30 years old. 92.8% of the test subjects have at least a degree of college, whereas 74.3% of ones are students. 71.2% of the test subjects earn less than NT\$ 20,000 dollars a month. For family members 87.3% of the test subjects are from families with more than 4 members. 44% of the test subjects have two or less than two motorcycles at home. For price 78.4% of the test subjects willingly buy the lithium-powered motorcycle when it is priced between NT\$ 60,000 and 80,000 dollars. Price certainly remains the most important factor for purchase. Finally, 58.7% of the test subjects only willingly buy such a new product with a subsidy of NT\$ 20,000 dollars. The government should subsidize as much as possible. The government is the principal supplier for the promotion of such green products.

**C. Reliability and validity analysis**

This study utilizes Cronbach's Alpha value to measure reliability. The measuring standard is proposed by [43]. A Cronbach Alpha coefficient over 0.7 represents the highly internal consistency amongst the measurement variables of the questionnaire. The validity coefficient is exhibited by conducting the communalities of factor analysis. The higher the validity coefficient is the higher the communality amongst the various variables is [44]. The overall reliability of the questionnaire is 0.965 with the various constructs meeting requirements. The communalities of various are over 0.5. The internal consistency of the questionnaire is acceptable.

**D. Correlation Analysis**

This study employs Pearson correlation to test the significant correlations between the various constructs such as the consumers' view of the government's low-carbon policy, the environmental education, the environmental knowledge, the product involvement, the product cognition, the perceived value, the environmental attitude, and the purchase intention. Results indicate that all constructs reached the  $p < 0.001$  condition with the exception of the government's low-carbon policy and the consumers' product involvement in the lithium-powered electrical motorcycles (see Table 1).

**E. Structural Equation Model**

Empirical results in this study demonstrate that the fit of the internal structure reaches a mostly significant level (see Table 2). The results also show that the consumers' environmentally relevant education towards the lithium-powered motorcycles

is improved by the government's implementation of the low-carbon policy [2]-[5], [21]-[22].

**Table 1: Correlation analysis of the various researches constructs**

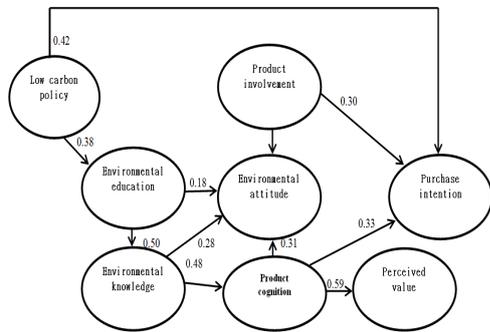
	Low-carbon policy	Environmental education	Environmental knowledge	Product cognition	Product involvement	Perceived value	Environmental attitude	Purchase Intention
Low-carbon policy	1	.422***	.166***	.510***	.273	.344***	.298***	.654***
Environmental Education	.422***	1	.579***	.533***	.509***	.362***	.505***	.528***
Environmental knowledge	.166***	.579***	1	.439***	.558***	.395***	.489***	.392***
Product cognition	.510***	.533***	.439***	1	.571***	.562***	.521***	.698***
Product involvement	.273	.509***	.558***	.571***	1	.496***	.416***	.586***
Perceived value	.344***	.362***	.395***	.562***	.496***	1	.330***	.485***
Environmental attitude	.298***	.505***	.489***	.521***	.416***	.330***	1	.389***
Purchase Intention	.654***	.528***	.392***	.698***	.586***	.485***	.389***	1

Note: \* $p < 0.05$  implies a significant level; \*\* $p < 0.01$  implies a very significant level; \*\*\* $p < 0.001$  implies a highly significant level

The coefficient between the environmental education and the environmental knowledge is the higher of 0.501. The environmental education is highly important to the environmental knowledge [1]-[3], [6]-[7]. The environmental knowledge drives the product cognition (0.476). The consumers' product cognition of the lithium-powered motorcycles is related with their perceived value (0.589) and in turn, their purchase intention. The results in Table 3 reveal that all indicators reaches the fit conditions<sup>1</sup> except for the root mean square error approximation and the adjusted goodness of fit index. Accordingly, the government's low-carbon policies are certainly related with the consumers' purchase intention towards the lithium battery electrical motorcycle. In addition, Figure 3 reveals that there is a positive association between the environmental education and the consumers' environmental knowledge (0.50). The environmental knowledge contributes to the consumers' cognition on the product (0.48) and the establishment of their environmental attitudes. The consumers' product cognition is associated with the perceived value of the lithium batteries motor vehicle (0.59) and then with the consumers' purchase intention. This study also examines the environmental education of the respondents (see Figure 4 and Tables 4-5). The results show that the government's low-carbon policy apparently stimulates the consumers to buy the lithium battery motor vehicles. The environmental educators enhance the environmental knowledge of the consumers. Accordingly, the environmental education plays a highly important role for the government's low-carbon policy. This study also finds the trained environmental educators can enhance consumers' attitudes towards the environment. The consumers' awareness

<sup>1</sup> According to the standards of the overall fit model the chi-square value / degree of freedom are required to be under 3. The ideal range of GFI, AGFI, NFI, CFI and IFI should be over 0.9. RMR and RMSEA should be smaller than 0.05 [45]-[46].

of the lithium batteries motor vehicle is significantly related with their purchase intention.



Source: Compiled by this research

Fig 3: The model of empirical results

Table 2: Internal Structural Fit

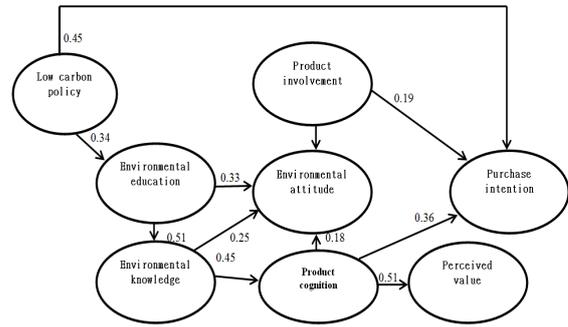
Item	Coefficient	Standard Deviation	Decision Criteria	P Value
Low-carbon policy → Environmental education	0.384	0.044	8.751	***
Environmental education → Environmental knowledge	0.501	0.036	14.042	***
Environmental knowledge → Product cognition	0.476	0.049	9.711	***
Environmental education → Environmental attitude	0.180	0.071	2.520	0.012
Environmental knowledge → Environmental attitude	0.284	0.114	2.501	0.012
Product cognition → Environmental attitude	0.305	0.050	6.101	***
Product cognition → Perceived value	0.589	0.043	13.848	***
Low-carbon policy → Purchase intention	0.417	0.034	12.399	***
Product involvement → Purchase intention	0.304	0.036	8.375	***
Product cognition → Purchase intention	0.328	0.040	8.217	***
Environmental attitude → Purchase intention	-0.032	0.034	-0.918	0.359
Perceived value → Environmental attitude	-0.018	0.045	-0.401	0.688

Note: 1. decision criteria (C, R) similar to t value larger than 2, implying a significant level

2. \*\*\*implies p value<0.05, implying a significant level

Table 3: Overall Fit Model

Evaluated item	Ideal evaluated result	Evaluated result of this research
Chi-square value	P>0.05	0.000
Chi-square value ratio CMIN/DF	<3	7.281
Goodness of fit index (GFI)	>0.9	0.903
Adjusted goodness of fit index (AGFI)	>0.9	0.708
Normed fit index (NFI)	>0.9	0.917
Comparative fit index (CFI)	>0.9	0.882
Incremental fit index (IFI)	>0.9	0.883
Root mean square residual index (RMR)	<0.05	0.054
Root mean square error approximation (RMSEA)	<0.05	0.192



Source: Compiled by this research

Fig 4: The model of empirical results- Environmental educated respondents

Item	Coefficient	Standard Deviation	Decision Criteria	P Value
Low-carbon policy → Environmental education	0.340	0.061	5.538	***
Environmental education → Environmental knowledge	0.517	0.047	11.063	***
Environmental knowledge → Product cognition	0.446	0.076	5.878	***
Environmental education → Environmental attitude	0.332	0.128	2.603	0.009
Environmental knowledge → Environmental attitude	0.254	0.215	1.178	0.239
Product cognition → Environmental attitude	0.180	0.064	2.792	0.005
Product cognition → Perceived value	0.512	0.061	8.436	***
Low-carbon policy → Purchase intention	0.450	0.050	9.025	***
Product involvement → Purchase intention	0.191	0.060	3.198	0.001
Product cognition → Purchase intention	0.361	0.060	6.018	***
Environmental attitude → Purchase intention	0.027	0.049	0.547	0.584
Perceived value → Environmental attitude	0.071	0.057	1.235	0.217

Note: 1. decision criteria (C, R) similar to t value larger than 2, implying a significant level

2. \*\*\*implies p value<0.05, implying a significant level

Table 5: Overall Fit Model- Environmental educated respondents

Evaluated item	Ideal evaluated result	Evaluated result of this research
Chi-square value	P>0.05	0.000
Chi-square value ratio CMIN/DF	<3	9.983
Goodness of fit index (GFI)	>0.9	0.886
Adjusted goodness of fit index (AGFI)	>0.9	0.658
Normed fit index (NFI)	>0.9	0.857
Comparative fit index (CFI)	>0.9	0.867
Incremental fit index (IFI)	>0.9	0.869
Root mean square residual index (RMR)	<0.05	0.063
Root mean square error approximation (RMSEA)	<0.05	0.207

F. Multi-regression

The stepwise multi-regression is employed in this study to get the robustness results. The results demonstrate that the consumers' purchase on the lithium battery motor vehicles is associated with the various factors such as the implementation of the government's low-carbon policy, the consumers' product cognition and product involvement. Moreover, the consumers think that the price of the lithium battery motor vehicles is reasonable because of the taxes reduction and subsidies. Accordingly, by frequently using the lithium battery motor vehicles the consumers can protect the

environmental quality and achieve the aims to reduce carbon dioxide.

## V. CONCLUSION AND FINAL CONSIDERATIONS

“Green Environmental Protection” has become a universal value [2], [4]-[5]. People inevitably have to take this task in the 21<sup>st</sup> century. Taiwan has been ranked as the first in the growth of carbon dioxide emissions. The government has then proposed several low-carbon environmental measures including promotion of environmentally-friendly electrical motorcycles. In 2009 the Ministry of Economic Affairs planned a budget of NT\$ 1.6 billion dollars over four years to subsidize the purchase of electrical motorcycles. In 2011 the Environmental Protection Bureau formulated the “subsidy methods for the battery exchange system of electrical motorcycles” to encourage industry players building a battery exchange system for electrical motorcycles. The environmental education advocates respect and appreciates the natural environment [1]-[3], [6]-[7]. Environment knowledge enables the public to change their attitude and behavior. Environmental attitude is the individual attitude and environmental awareness on green products [11]-[13]. Product involvement is “the extent of knowledge a consumer own on a particular product or service” [11]. Product cognition refers to the degree of understanding or knowledge consumers own on a product [18]-[19]. Most consumers use the function of a product to gauge its value [20]-[22]. Moreover, purchase intention is the subjective probability of buying a particular product or brand [23]. The greater the consumers’ perceived value of the product is the higher their purchase intention is [21]-[22]. The government’s policies are significantly related with the consumers’ purchase intention [2]-[5], [27]. There is a significantly positive correlation between consumers’ purchase intention, green product cognition, and attitude towards buying green products [15]-[16], [18]-[19], [29]. Reference [31] also finds that the degree of the consumers’ involvement in the products is significantly and positively related with their purchase intention. Reference [33] documents that there is a positive association between the environmental knowledge and attitudes of those sample students [34]-[35]. Accordingly this study investigates Taiwanese consumers’ purchase intention on such products by employing lithium battery-powered electrical motorcycles as the research sample. Specifically, this study investigates whether the government’s low-carbon electrical motorcycle policy, environmental education, knowledge, attitude, and product involvement of the consumers are associated with their purchase intention towards the lithium electrical motorcycles. This study conducts the correlation analysis of the eight dimensions. This study also employs two dimensions of the relevant government’s low-carbon policies and the environmental education as the antecedent. Finally, there are 416 valid samples out of 500 in total recovered in various counties and cities of Taiwan for the questionnaires. Empirical results

suggest that the environmental education is related with the consumers’ environmental knowledge [1]-[3], [6]-[9], [35]. In other words, the consumers’ environmental knowledge can be enhanced by their environmentally education. This association contributes to the consumers’ product cognition of the lithium-powered motorcycles and in turn their purchase intention as well. This study also finds that the government’s low-carbon policy is associated with the consumers’ purchase intention. Highly existing price likely hampers the consumers to buy the lithium battery motor car. However, the environmental education advocacy and demonstration can stimulate the consumers’ purchase intention towards the lithium electrical motorcycles. This study also proposes some relevant recommendations such as using an information platform for the consumers to conduct the mutual communication and the exchange of information. Tax reduction measures by the government can helpfully stimulate the consumers to purchase the lithium electrical motorcycles at the initial stages. The method of the special scholarships by half price discounts for young consumers can assist needy families and motivate more students to use affordable green products. In addition, the governments and enterprises should provide monthly charging services. The consumers can then feel more convenient to use the product. Their purchase intention can be increased. The survey conducted in this study also finds that 60% of the consumers desire the government to provide the subsidies of at least NT\$ 20,000 dollars for buying the lithium-powered motorcycles. There are the advantages of saving energy and reducing carbon for the lithium battery electrical motive. Accordingly, this study recommends that the government should provide more subsidies for producers in research and development. The lithium-powered electrical motorcycles can then be produced on a larger scale with lower costs. The consumers can buy the green products at a lower price than or similar price to the traditional motorcycles.

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