



An exploration on consumers' intention to participate in sustainable consumption through the shipping packaging mechanism of e-commerce platforms

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Abstract— With modern society's increasing emphasis on environmental protection and sustainable development, an increasing number of consumers have begun to pay attention to their consumption behavior. Particularly in the process of e-commerce shopping, the environmental impact of delivery and packaging mechanisms has attracted considerable attention. Governments, drawing on the United Nations Sustainable Development Goals (SDGs), especially Goal 12 "Responsible Consumption and Production," have promoted policies to reduce unnecessary packaging waste, such as requiring e-commerce operators to reduce packaging material use, increase the proportion of recycled materials, and promote circular packaging mechanisms. However, current policy measures are mostly led by enterprises and pay less attention to consumers' participation willingness and behavioral patterns. This study uses the Value-Attitude-Behavior hierarchy model (VAB Model) as its theoretical basis to examine the effects of consumer values (altruistic and egoistic), perceived effectiveness (PEC), and self-confidence on sustainable consumption behavior. Values are regarded as important factors influencing consumption behavior, and different values lead to different environmental attitudes and purchase decisions. It also examines whether consumers' perceptions and attitudes toward environmentally friendly packaging and sustainable delivery mechanisms in e-commerce shopping affect their actual participation intention. A total of 261 online questionnaire samples were collected. The results show that altruistic and egoistic values have significant positive effects on consumer perceived effectiveness; altruistic values also have a significant positive effect on sustainable consumption; and consumer perceived effectiveness also has a significant positive effect on sustainable consumption. However, the moderating effect of self-confidence is not significant.

Keywords— Sustainable consumption behavior, Value-Attitude-Behavior Hierarchy, Perceived consumer effectiveness (PCE), Altruism, Egoism.

I. INTRODUCTION

1.1 Research Background and Motivation

In recent years, changes in consumer patterns and the impact of the pandemic have driven the rise of the stay-at-home economy, leading to the vigorous development of e-commerce and, consequently, the generation of large amounts of packaging material waste. According to statistics from the Ministry of

Economic Affairs, Taiwan's online retail sales have increased year by year, from approximately NT\$228.3 billion in 2017 to NT\$430.3 billion in 2021, equivalent to approximately 3,134 metric tons of plastic packaging waste and 54,182 metric tons of paper packaging waste. Paper packaging materials are estimated to consume 13,000 metric tons of oil equivalent and 160,000 to 380,000 metric tons of water resources. Overall carbon emissions from

online shopping packaging amount to 78,000 metric tons of CO₂ equivalent [1]. Thus, while e-commerce industry revenue has nearly doubled, the environmental pollution and energy consumption caused by massive packaging waste, as well as greenhouse gas emissions, are environmental burdens that cannot be ignored.

As consumers begin to understand that their consumption behavior can have a significantly negative impact on society and natural ecosystems, sustainable consumption behavior has emerged as a new form of consumption behavior. It emphasizes that people's consumption patterns should not focus solely on immediate personal interests; rather, they should view potential future environmental threats from a long-term perspective. Consumers should hold clear attitudes and behaviors toward environmental protection and value the sustainable coexistence of future generations and natural ecosystems [2]. To achieve sustainable development and a high quality of human life, countries have also introduced measures to reduce and eliminate unsustainable production and consumption patterns.

To pursue national sustainable development, the government established the National Council for Sustainable Development, Executive Yuan in 1994 to promote sustainable consumption. According to the National Council for Sustainable Development, Executive Yuan, Taiwan has formulated the Taiwan Sustainable Development Goals report with reference to the United Nations Sustainable Development Goals (SDGs), comprising 18 core goals. Core Goal 12 corresponds to SDG 12, "Responsible Consumption and Production," and is formulated as "Promote a green economy and ensure sustainable consumption and production." Its specific goals include promoting domestic sustainable consumption and production, encouraging enterprises to produce green and low-carbon products, and promoting the sustainable use of raw materials. For example, in response to the rapid growth of the e-commerce industry and the large amount of waste it generates, some online shopping platforms engage in excessive packaging, even placing small boxes inside large boxes and wasting large quantities of cardboard boxes and plastic packaging materials. In 2023, the Ministry of Environment announced the "Targets and Implementation Methods for Restrictions on Internet

Shopping Packaging" targeting large e-commerce operators such as momo, PChome, and Shopee Mall, as well as online retailers with e-commerce official websites or apps through which consumers place orders. The regulations prohibit the use of PVC (polyvinyl chloride) in online packaging materials and require a certain proportion of recycled materials. Large e-commerce operators must comply with requirements on packaging material weight reduction rates and circular packaging material usage rates. Taking the well-known operator PChome as an example, during shipping it has optimized its order-picking and carton-matching system and added packaging weight inspection procedures to replace large boxes with smaller ones. It has also optimized its shipping system to consolidate goods from different warehouses into the same shipment, thereby reducing wasted space.

In response to legal requirements, most online shopping e-commerce operators have adjusted packaging materials, such as redesigning cartons and cushioning materials and designing and adopting cartons that do not use tape. However, these measures are implemented unilaterally by e-commerce operators and do not consider consumers' willingness to participate in sustainable consumption or their behavior. Consumption behavior is no longer merely a process of pursuing material goods; it is also the practice of an idea. Peattie argues that consumers are the main actors in consumption behavior, and that developing sustainable consumption and production patterns that achieve environmental protection depends on consumers' willingness to participate in sustainable consumption behavior. Therefore, investigating consumers' willingness toward sustainable packaging mechanisms after shopping on e-commerce platforms is one of the motivations of this study.

Values provide a way to understand individual decision-making because values appear to be more consistent with consumers' beliefs and behaviors [3]. Therefore, values can be used to explain different consumption behaviors; for example, people with different values have different brand preferences and different purchase behaviors. Values are regarded as having a strong influence on human attitudes and behaviors. The Value-Attitude-Behavior hierarchy model proposed by Homer and Kahle has been

widely applied in research on consumers' green purchasing behavior [4-7]. However, research on sustainable consumption behavior that incorporates social and humanitarian concern issues in addition to ecology and environmental protection has less frequently applied the Value-Attitude-Behavior model. Furthermore, Chang and Hsiao, in examining obstacles to the practice of sustainable consumption in daily life, mentioned that consumers may have weak willpower and may be unable to self-regulate and persist in practicing sustainable consumption. Therefore, this study intends to use altruistic and egoistic values, together with consumer perceived effectiveness (PEC) as a mediating variable of attitude, to jointly examine their relationships with sustainable consumption behavior. This is the second motivation of this study.

The degree of consumer self-confidence has been used as a moderating effect between attitude and green purchasing behavior. For example, when consumers perceive that their own sustainable consumption behavior will reduce environmental pollution and maintain environmental sustainability, the likelihood of performing that consumption behavior is high. Therefore, using the degree of confidence as a moderating variable to measure the influence of values on sustainable consumption behavior can more dynamically and realistically reflect consumers' attention to actual conditions. This is the third motivation of this study.

Given concerns about the continuous destruction of the environment and the growing awareness of environmental protection, sustainable consumption behavior will help balance the distribution of natural resources, increase the opportunity for sustainable coexistence between the earth and humanity, and serve as a consumption model actively promoted in Taiwan. Consumers' consumption behavior has a considerable impact on the environment and will also affect the environmental conditions of future generations. Therefore, engaging in environmentally protective consumption behavior is imperative. Although previous studies have examined some factors influencing sustainable consumption behavior on e-commerce platforms—for example, Peng used the Theory of Reasoned Action as a framework and added environmental concern as an independent variable, focusing on e-commerce platform

consumers' consumption decision-making process regarding circular and reusable packaging mechanisms—few studies have examined sustainable consumption participation behavior regarding e-commerce platform packaging mechanisms among Asian consumers using the Value-Attitude-Behavior hierarchy model. Therefore, this study considers it important to investigate the antecedent factors of sustainable consumption behavior.

1.2 Research Purpose

Based on the above research background and motivation, the research purposes of this study are summarized as follows:

1. Examine the effects of altruistic and egoistic values on consumer perceived effectiveness.
2. Examine the effects of altruistic and egoistic values on consumers' sustainable consumption intention toward e-commerce platform delivery and packaging mechanisms.
3. Examine the effect of consumer perceived effectiveness on consumers' sustainable consumption intention toward e-commerce platform delivery and packaging mechanisms.

Examine the moderating effect of self-confidence on the relationship between consumer perceived effectiveness and consumers' sustainable consumption intention toward e-commerce platform delivery and packaging mechanisms.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 Value-Attitude-Behavior Hierarchy

Values are influenced by individual, family, and social factors. At the same time, they form psychological constructs and influence various attitudes and behaviors. In addition, values are also enduring beliefs that lead individuals or societies to prefer a particular mode of behavior or end-state of existence. Values have also been described as "the most fundamental elements in the consumer world, ... the concrete manifestation of an individual's psychological state or traits". Thus, values should be regarded as beliefs representing a person's psychology, and these beliefs will influence or guide individual behavior [8].

Attitude refers to value judgments, feelings, and action tendencies toward people, things, objects, institutions, or ideas in life. Krech and Crutchfield regarded attitude as a persistent structure formed through stimulus-induced emotional, perceptual, and cognitive processes in certain environment-related aspects. Many scholars have indicated that behavior is formed by values and attitudes. Homer and Kahle [9] argued that values are the developmental basis of individual attitude formation and further influence certain decision-making behaviors. In a given situation, Homer and Kahle theoretically explained the influence of abstract values on general attitudes and specific behaviors. This sequence of processes is referred to as the Value-Attitude-Behavior Hierarchy.

MaCarty and Shrum used the relationship between values and attitudes to examine waste recycling behavior. Their results showed no direct relationship between values and behavior; however, values influenced recycling behavior through attitudes regarding the perceived inconvenience of recycling and the importance of recycling. The findings of MaCarty and Shrum correspond with those of Homer and Kahle on values and natural food purchasing behavior. In addition, MaCarty and Shrum's 2001 study also showed that value orientation and economic conditions influence individual beliefs, which in turn influence recycling behavior.

Kim and Choi integrated previous related studies and used the Value-Attitude-Behavior Hierarchy as a basis to examine the relationship between values and green consumption behavior. In their study, environmental concern and perceived consumer effectiveness (PCE) served as attitude variables. The results showed that individuals whose values tend toward collectivism influence green consumption behavior through perceived consumer effectiveness. Using the same Value-Attitude-Behavior Hierarchy, Kim found that collectivist values influence green consumption behavior through self-enhancement, self-transcendence, and environmental attitudes.

In summary, according to the Value-Attitude-Behavior theory proposed by Homer and Kahle and MaCarty and Shrum, when consumers perceive the value of a product or service provided by a firm,

personal values will influence their attitude toward that product or service, and ultimately affect their willingness to purchase it [8].

2.2 Sustainable Consumption

Citing the definition adopted by the United Nations Commission on Sustainable Development (UNCSD) in 1995, Liao [10] defined sustainable consumption behavior as the use of services and products that meet basic human needs while minimizing the depletion of natural resources, the use of toxic substances, and the emission of waste and pollution, thereby bringing about a good quality of life, preserving the human living environment, not endangering the needs of future generations, and coexisting sustainably with the earth. Geels et al. [11] argued that the definition of sustainable consumption and production lies in its going beyond concerns about pollution control and green products; climate change and intensifying environmental destruction have prompted people to raise their awareness of sustainability. Tunn et al. combined the circular economy with the concept of sustainable consumption, arguing that it contributes to sustainable development; for example, replacing virgin materials with recycled materials in products and recycling and reuse constitute sustainable consumption behavior.

Wang et al. divided the content of sustainable consumption behavior into five major categories: improving the quality of human life, sustainably meeting basic human needs, improving the efficiency of natural resource use, reducing waste, and promoting the use of renewable energy. Rizkalla and Erhan indicated that environmental concern, self-efficacy, and environmental knowledge influence sustainable consumption behavior, among which environmental knowledge has the most significant effect. When consumers have a better understanding and awareness of the problems facing the environment, they are more inclined to engage in sustainable consumption behavior. Peattie argued that developing sustainable consumption and production patterns that achieve environmental protection depends on consumers' willingness to participate in sustainable consumption behavior, because consumers are the main actors in consumption behavior.

In summary, sustainable consumption behavior in this study refers to the consumption behavior of consumers shopping on e-commerce platforms who, with respect to product delivery and packaging, are willing to accept small packaging materials, simple packaging materials, recycling and reuse, consolidated shipping, support for merchants using environmentally friendly materials, and other economic models in order to meet consumer needs, improve the quality of human life, increase the efficiency of natural resource use, reduce resource waste, and promote the use of renewable energy.

2.3 Values

Rogers argued that values can represent an individual's preferences and tendencies; values influence the direction or tendency of behavior and also affect behavior within groups. Schwartz pointed out that values are the goals desired by individuals, and these goals serve as indicators of an individual's life attitudes to a certain degree. Values are also enduring beliefs that lead individuals to prefer a particular mode of behavior or end-state of existence. A series of value types forms an individual's value system [12].

According to the explanation of Yang and Dong, altruism is a value belonging to the "self-transcendence" category, whereas egoists may choose to support environmental protection because they recognize the personal benefits of green and sustainable actions. Therefore, it is appropriate for this study to use egoistic and altruistic values to examine ethical consumption behavior. In summary, drawing on the perspective of Homer and Kahle, this study defines values as "beliefs or convictions that can represent an individual's ideas and that serve as fundamental elements in the formation of attitudes and behaviors."

2.3.1 Egoism

Egoism has played an important and multifaceted role in green consumption behavior. According to Stern and Dietz, egoists tend to focus on issues that directly affect their own environment and may choose to support environmental protection because they recognize the personal benefits of green actions. However, if green consumption leads to excessively high personal costs, they may also choose to oppose environmental action.

Although egoistic values are often regarded as contradictory to environmental action, in highly egoistic situations, when people realize that environmental degradation negatively affects their own health, quality of life, or economic interests, they also begin to pay attention to environmental issues and participate in green consumption behavior. For example, purchasing energy-saving appliances or environmentally friendly products can effectively reduce energy consumption or lower living costs, and such personalized benefits can usually attract more egoists.

The influence of egoism in the green consumption market is closely related to the design and promotion strategies of green products. For example, when firms emphasize that environmentally friendly products improve personal health (such as organic food or non-toxic packaging) or enhance convenience in daily life (such as durable goods or recyclable products), egoists are more likely to be attracted to participate. In addition, if the prices of green products can be reduced or discounts can be offered to further improve their affordability, egoists can also be encouraged to take environmental action more actively.

Although egoism is centered on personal interests, this does not mean that it is completely opposed to green consumption behavior. As long as environmental actions can be clearly linked to personal interests, such as saving resources, improving convenience, or improving health, egoists will also show concern for environmental issues and take positive action. Therefore, when promoting sustainable consumption, emphasizing the personal benefits of products is a key strategy for attracting egoists. This can not only increase participation in environmental action but also achieve a win-win situation for both the environment and personal interests.

2.3.2 Altruism

Altruism means considering the interests of others [13]. In other words, it involves taking into account the issue that one's personal behavior will affect the interests of others. According to Smith, Organ, and Near, altruism is a pro-social behavior directed toward other members of an organization, and they regarded altruism as a completely ethical intention

that ignores self-interest. Bar-Tal and Raviv considered altruists to be individuals who voluntarily benefit others without seeking external rewards. They proposed that altruism includes four elements: (1) altruistic behavior is performed voluntarily rather than in obedience to orders; (2) the actor deliberately performs behavior that benefits others; (3) behavior performed for the sake of reward should not be called altruistic behavior; and (4) altruists exhibit moral behavior that respects the dignity of others and cares about the welfare of others. Ji, Zhang, and Ren regarded altruism as pro-social behavior that people perform voluntarily, without expecting any reward or compensation, and that arises from sympathy for others or internalized moral standards.

Many studies have indicated that altruism leads people to adopt altruistic behaviors that benefit the public. Jouvet and Michel argued that altruism makes people stricter about environmental protection to ensure that future generations can still survive in the same environment. Some altruistic behaviors also affect the actor's mood. Grolleau, Ibanez, and Mzoughi [14] found that altruistic consumers are more willing to purchase green products. In summary, altruism influences consumer behavior.

Based on the above, this study defines altruism as "leading people to adopt altruistic behaviors that benefit the public in order to ensure that future generations can still have the same or a better environment."

2.4 Perceived Consumer Effectiveness (PCE)

Similar to the concept of self-efficacy in social learning theory, perceived consumer effectiveness (hereinafter referred to as PCE) refers to a belief that consumers' own actions, such as purchasing products that do not harm the environment, can be used to solve certain problems, such as reducing environmental pollution. These consumers strongly believe that their behavior regarding environmental issues will have a more positive influence or outcome than that of others. For example, Ellen et al. showed that PCE directly influences environmental perceptual behavior, and that PCE is related to consumers' knowledge and direct or indirect experience. Thus, because each person's knowledge and experience are completely different, PCE varies

from person to person: some people believe that their own actions will have transformative consequences, while other consumers may believe that their own behavior will not make any difference.

Furthermore, PCE is a phenomenon that changes according to situations and behaviors; consumers respond differently under different circumstances. If a consumer believes that a certain environmental problem can be solved by a specific behavior, then the belief regarding that issue may change the consumer's behavior. It is expected that consumers with higher PCE will be more likely to translate positive attitudes into actual purchasing behavior.

In summary, this study considers perceived consumer effectiveness as the degree to which consumers believe that the efforts of their own actions will bring about different changes in society and the environment.

2.5 Confidence

According to Bennett and Harell, confidence can be defined as the degree of self-assurance consumers possess when making decisions about brands or products, and its source mainly depends on consumers' familiarity with the product or brand. Bearden, Hardesty, and Rose further defined confidence as the ability individuals feel when making decisions and behaving in the marketplace, and divided it into two major dimensions, decision-making confidence and self-protection, with six key factors. Luce argued that confidence reflects an individual's perceived ability to effectively obtain product information and make optimal purchasing decisions, as well as the ability to protect oneself from unfair treatment or misleading practices in the market. This confidence helps consumers resist others' persuasion attempts, thereby demonstrating greater independence in the decision-making process.

In research on organic product purchases, Vermeir and Verbeke [15] pointed out that confidence is also reflected in consumers' trust in whether products conform to their labeled claims. Therefore, in the purchasing decision process, when consumers have higher confidence, they rely more on their own judgment and are less likely to be swayed by the opinions of others. Conversely, when consumers have lower confidence, they tend to

accept others' advice more readily and rely less on their own attitudes and judgments.

In summary, based on the definitions of Luce and Vermeir and Verbeke, this study defines confidence as consumers' degree of trust in the correctness of their sustainable consumption decisions. In the online purchasing environment, confidence not only affects the depth with which consumers process product information but also strengthens their identification with sustainable values and their agency in the formation of sustainable consumption behavior.

2.6 Relationships among Values, Perceived Consumer Effectiveness, Confidence, and Sustainable Consumption

2.6.1 Values, Perceived Consumer Effectiveness, and Sustainable Consumption

According to the Value-Attitude-Behavior theory proposed by Homer and Kahle and MaCarty and Shrum, when consumers perceive that a product or service provided by a firm has value, their personal values directly influence their attitude toward that product or service, and further influence whether consumers are willing to engage in related behaviors [8]. In the context of green consumption, values not only have direct effects on consumption behavior but also have indirect effects through attitudes, with attitudes playing an important mediating role.

Larouche and Barbaro showed that altruism and security values have significant positive effects on the intention to engage in premium green consumption. Similarly, a survey of consumers in Hong Kong, China found that consumers' egoistic and altruistic tendencies significantly influence their information search for green products and actual consumption behavior. In addition, Kim and Choi [6] used the Value-Attitude-Behavior Hierarchy to examine the relationship between values and green consumption behavior. Their results showed that egoistic consumers who recognize the impact of environmental behavior on themselves influence green consumption behavior through perceived effectiveness, whereas altruistic consumers show higher willingness to participate in environmental protection because of their sense of responsibility toward society. Kim further pointed out that altruistic values influence green behavior through

mediating factors such as self-enhancement, self-transcendence, and environmental attitudes.

In research on consumer participation intention, values are regarded as important independent variables. For example, Fritzsche and Oz divided values into five types and found that altruistic values have a significant positive effect on ethical decision-making, whereas egoistic values show different influence patterns on actual behavior because of their emphasis on personal interests. Straughan and Robert argued that perceived consumer effectiveness (PCE) is the variable that best predicts consumer green behavior, followed closely by altruistic values. Webb, Mohr, and Harris further pointed out that altruism should be regarded as an important variable for examining socially responsible consumption.

In domestic research, many studies have also examined the effects of egoistic and altruistic values on purchasing behavior. For example, Cheng [16] found that consumers with egoistic and altruistic values have significant positive effects on purchase intention for electric motorcycles. Ko [17] also showed that consumers' altruism and egoism both positively influence purchase intention for carbon-labeled products. Therefore, it is appropriate for this study to use altruistic and egoistic values as value variables.

Based on the Value-Attitude-Behavior Hierarchy, this study interprets egoism and altruism as the "value" dimension of independent variables and uses PCE as the mediating variable of "attitude" to jointly examine the influencing mechanism of consumer participation in sustainable consumption. This approach is highly appropriate.

Based on the above, this study argues that values have significant positive relationships with attitudes and sustainable consumption. That is, collectivism and altruism both have significant positive relationships with PCE and ethical consumption behavior.

H1: Consumers' egoistic values positively affect their perceived effectiveness.

H2: Consumers' altruistic values positively affect their perceived effectiveness.

H3: Consumers' egoistic values positively affect sustainable consumption.

H4: Consumers' altruistic values positively affect sustainable consumption.

H5: Consumer perceived effectiveness directly and positively affects sustainable consumption.

2.6.2 The Moderating Effect of Confidence on Sustainable Consumption

According to Vermeir and Verbeke [15], confidence can serve as an important moderating variable between attitude and green consumption behavioral intention, mainly reflecting consumers' trust in whether a product has sustainable functions. In green online consumption, the level of confidence plays a key role in consumers' purchasing decisions. When consumers have low confidence in the environmental attributes of green products or the credibility of their labeling, they often do not actively choose such products, which in turn weakens their green consumption behavioral intention [15, 18]. Conversely, if consumers have high confidence in green products and their claimed environmental benefits, they are more likely to actively participate in green online consumption.

H6: The relationship between consumer perceived effectiveness and sustainable consumption is affected by consumers' level of confidence.

III. RESEARCH METHODS

3.1 Research Framework

This study is based on the Value-Attitude-Behavior Hierarchy proposed by Homer and Kahle. In light of the characteristics of ethical consumption, it takes egoistic and altruistic values as value variables, PCE as the attitude variable, and consumer confidence as the moderating variable to jointly examine consumers' willingness to participate in sustainable consumption. The research framework of this study is shown in Fig.1.

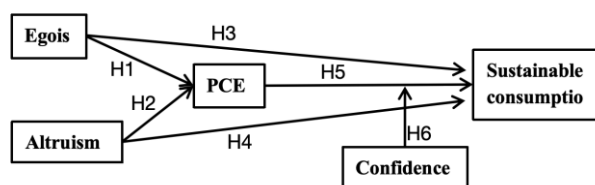


Fig.1 Research Framework of This Study

3.2 Operational Definitions and Measurement of Variables

According to the research framework, this questionnaire uses the Value-Attitude-Behavior Hierarchy as its theoretical foundation to examine whether consumers' perceptions of and attitudes toward environmentally friendly packaging and sustainable delivery mechanisms in e-commerce shopping affect their actual participation intention. The variables to be measured include five variables: egoism, altruism, perceived consumer effectiveness (PCE), confidence, and sustainable consumption intention. For most of these variables, established and reliable scales developed abroad are available. In addition, since the purpose of this study is not to develop rigorous scales, this study does not intend to develop its own scales but instead adopts existing scales with established reliability and validity to measure the variables. In the questionnaire, egoism has four items, altruism has four items, confidence has three items, PCE has two items, and the last part—sustainable consumption behavior in delivery and packaging mechanisms—has five items. The final section of the questionnaire collects respondents' basic personal information. The operational definitions of each variable and the sources of the scales are shown in Table 1. All scales are measured using a 5-point Likert scale.

3.3 Data Collection

This study will first design the questionnaire content and conduct a pretest to understand whether respondents understand the content and items of the questionnaire and whether they align with the research purposes. The pretest participants are college students who have shopped on e-commerce platforms. According to scholars, the number of pretest participants should be three to five times the number of items in the subscale with the largest number of items. Since the subscale with the most items in the initial draft of this questionnaire has 7 items, the pretest sample size will be based on 35 participants in principle, in order to determine whether the questionnaire deviates from the topic or contains ambiguous wording, and to check whether the content is clear and correct.

Young people are the mainstream consumers of future society. In line with the principles of

sustainable development, young people will be the mainstay in future economic, political, cultural, and social development. After completing their studies, most college students enter the workforce and become a major source of productivity. Moreover, it is common for college students to work part-time during their studies, which gives them a certain source of income. Therefore, this study plans to take current college students as the research subjects and will collect online questionnaire data from college students by purposive sampling. The questionnaire is

compiled using Google Forms, and the samples are obtained through online distribution. The questionnaire survey period of this study is from April to May 2025. A total of 263 questionnaires were collected. After excluding invalid questionnaires, 261 valid questionnaires remained. According to the background information of the collected samples, in terms of gender, female respondents accounted for the largest proportion, with 197 respondents, accounting for 74.9%.

Table 1 Operational Definitions and Sources of Scales

Construct	Operational Definition	Scale Source and Number of Items
Egoism	Consumers prioritize personal interests as the primary basis for decision-making.	Chang (2014), 3 items Example: I feel that my efforts make me feel at ease.
Altruism	Consumers adopt green consumption behavior out of concern for environmental or social public interests.	Kim (2006), 7 items Example: Overall, if I have the ability to help others, I will do my best to do so.
Perceived Consumer Effectiveness (PCE)	The degree to which consumers believe that the efforts of their own actions will bring about different changes in society and the environment.	Straughan & Roberts (1999); 4 items Example: I feel that I am capable of helping to solve environmental problems.
Confidence	The degree to which consumers feel that their sustainable consumption decisions are correct.	Vermeir & Verbeke (2008), 3 items Example: I am full of confidence in the way I recycle and reuse cardboard boxes.
Sustainable Consumption Behavior in Delivery and Packaging Mechanisms	Sustainable consumption behavior refers to consumers' active selection of delivery and packaging that meets environmental standards, reduces resource waste, and brings positive environmental impacts after selecting products on e-commerce platforms, based on high concern for sustainable development, resource conservation, environmental awareness, and perceived effectiveness.	Peng (2023); delivery and packaging mechanisms of five major shopping platforms Including: Are you willing to use simple packaging? Are you willing to consolidate shipments into one box? Are you willing to delay the delivery time in order to wait for consolidated shipment? Are you willing to support merchants that use environmentally friendly packaging materials? Are you willing to use recycled cardboard boxes for shipping? If possible, are you willing to place the cardboard boxes shipped by the seller at designated recycling points so that the original seller can recycle and reuse them?

IV. ANALYSIS RESULTS

4.1 Reliability and Validity Analysis

In the reliability analysis of this study, Cronbach's α coefficient was used to examine the reliability of the main constructs in the questionnaire in order to understand the degree of consistency of the scales. Bagozzi and Yi suggested that a composite reliability above 0.6 indicates that the latent variable has good

composite reliability. The results of this study show that the reliability α value for egoism is 0.804, for altruism is 0.809, for confidence is 0.847, for perceived consumer effectiveness (PCE) is 0.750, and for sustainable consumption in delivery and packaging mechanisms is 0.858. Overall, the five Cronbach's α coefficient estimates of the scale constructed in this study range from 0.750 to 0.858, all exceeding 0.6, indicating that the reliability of the

research scale is quite good and meets the requirement of internal consistency. In addition, all variables in this study were compiled through relevant theories, scholarly literature, and related research. Moreover, the selection of measurement instruments is supported by theory and related scholarly research. Therefore, the content covered meets the requirements of content validity.

4.2 Correlation Analysis

This study conducted a correlation analysis among the four variables in examining the influence of consumer perceived value on sustainable consumption in delivery and packaging mechanisms. The results show that there are significant correlations among the five variables: egoism, altruism, confidence, PCE, and sustainable consumption in delivery and packaging mechanisms. Among them, the correlations between egoism and altruism ($|r|=0.796$, $p<0.01$) and between confidence and PCE ($|r|=0.720$, $p<0.01$) show significant high correlations. The correlations between egoism and confidence ($|r|=0.439$, $p<0.01$), egoism and PCE ($|r|=0.550$, $p<0.01$), egoism and sustainable consumption in delivery and packaging mechanisms ($|r|=0.446$, $p<0.01$), altruism and confidence ($|r|=0.490$, $p<0.01$), altruism and PCE ($|r|=0.594$, $p<0.01$), altruism and sustainable consumption in delivery and packaging mechanisms ($|r|=0.594$,

$p<0.01$), confidence and sustainable consumption in delivery and packaging mechanisms ($|r|=0.528$, $p<0.01$), and PCE and sustainable consumption in delivery and packaging mechanisms ($|r|=0.603$, $p<0.01$) show significant moderate correlations.

4.3 Regression Analysis

This study used regression analysis to test H1 through H5. First, it examined whether consumers' egoistic and altruistic values directly affect perceived consumer effectiveness (PCE). According to the regression analysis results of M1 in Table 2, the independent variables egoism ($\beta=0.225$, $t=2.734$) and altruism ($\beta=0.408$, $t=4.951$) both directly and significantly affect PCE, with altruism having a stronger effect than egoism ($\beta=0.408 > \beta=0.225$). Therefore, H1 and H2 of this study are supported. Furthermore, according to M2 in Table 2, consumers' egoistic values directly and significantly affect sustainable consumption in delivery and packaging mechanisms ($\beta=0.453$, $t=5.121$), and therefore H4, which states that consumers' altruistic values positively affect sustainable consumption, is supported. In contrast, the independent variable egoism has no significant effect on sustainable consumption behavior ($\beta=0.085$, $t=0.962$), and therefore H3, which states that consumers' egoistic values positively affect sustainable consumption behavior, is not supported.

Table 2 Regression Analysis Table

	M1: Dependent variable=Perceived Consumer Effectiveness(PCE)		M2: Dependent variable=Sustainable consumption		M3 :Dependent variable=Sustainable consumption		M4=Sustainable consumption	
	Standardized coefficient β	t	Standardized coefficient β	t	Standardized coefficient β	t	Standardized coefficient β	t
Constant		6.483***		7.819***		7.839***		3.295***
Egoism	0.225	2.734**	0.085	0.962				
Altruism	0.408	4.951***	0.453	5.121***				
Perceived Consumer Effectiveness (PCE)					0.603	12.126***	0.452	3.669***
Confidence							0.189	1.383
PCE							0.015	0.071
*Confidence								
M1: $R^2=0.364$ ($F=73.232$);								

$$M2: R^2 = 0.274 (F = 47.930);$$

$$M3: R^2 = 0.363 (F = 147.044);$$

$$M4: R^2 = 0.381 (F = 52.234)$$

∗: $p < 0.05$ ∗∗: $p < 0.01$ ∗∗∗: $p < 0.001$

As for whether PCE positively affects sustainable consumption behavior in delivery and packaging mechanisms, according to M3 in the table, PCE positively and significantly affects sustainable consumption behavior in delivery and packaging mechanisms ($\beta = 0.603$, $t = 12.126$); thus H5 is supported. Finally, regarding the moderating effect of confidence, according to the M4 data in Table 2, confidence does not significantly affect sustainable consumption behavior ($\beta = 0.189$, $t = 1.383$). When confidence is treated as a moderating variable to examine the relationship between PCE and sustainable consumption behavior, the results show that the moderating effect of confidence is not significant ($\beta = 0.015$, $t = 0.071$). Therefore, H6 of this study, which states that the relationship between consumer perceived effectiveness and sustainable consumption is affected by consumers' level of confidence, is not supported.

V. RESEARCH CONCLUSIONS AND SUGGESTIONS

This study aims to examine consumers' willingness to participate in sustainable packaging mechanisms on e-commerce platforms. Starting from altruistic and egoistic values, it analyzes their effects on PCE, and further examines the effect of perceived effectiveness on sustainable consumption behavior in delivery and packaging mechanisms. At the same time, this study also examines the moderating effect of confidence on the relationship between PCE and sustainable behavior.

5.1 Research Conclusions

First, the results of this study confirm that both altruism and egoism have positive effects on PCE. When consumers realize that participating in sustainable packaging actions can bring personal benefits, such as discounts, it helps to enhance their motivation to participate, but this part is not as lasting as social issues. This indicates that although

egoistic orientation can trigger action intention, it is more difficult to form deep psychological identification and long-term participation. The findings of this study confirm that when e-commerce platforms promote sustainable packaging policies, in addition to emphasizing environmental value and social responsibility, they should also appropriately incorporate communication strategies for personal benefits. For example, in packaging design and marketing communication, presenting the substantive benefit that "choosing environmental protection means saving money for yourself" can resonate with consumers.

At the same time, when consumers have a high degree of social concern and environmental responsibility, they are more likely to believe that their own actions can have a substantive impact on society and the environment. Altruistic values reflect personal moral beliefs and also strengthen consumers' perception of the effectiveness of individual actions, enhance their psychological identification with participating in sustainable actions, and make them more inclined to think that "their own choices are meaningful." This kind of thinking makes buyers more actively practice consumption behaviors that benefit society and the environment. The results of this study also show that consumers with stronger altruistic values than egoistic values are more likely to have higher perceived consumer effectiveness. For e-commerce platforms, when promoting sustainable packaging, conveying the social responsibility values of environmental protection and carbon reduction can help arouse consumers' intrinsic altruism and strengthen their identification with the impact of individual behavior. Through resonance and positive beliefs generated by values, it is possible to enhance consumers' psychological identification and support for their willingness to implement sustainable actions.

Furthermore, the results of this study confirm that although egoism can enhance PCE, it has little effect on actual sustainable consumption behavior. This shows that even if consumers realize that their actions may bring benefits, these benefits are limited to the personal level and do not lead them to take sustainable actions, reflecting that the essence of environmental behavior is mostly built on social responsibility and public interest. Simply starting from self-interest easily leads to the thought that “if others do not do it, it is useless for me to do it.” Therefore, it is suggested that when e-commerce platforms promote sustainable packaging mechanisms, merely emphasizing personal convenience, cost savings, and other incentives may not effectively increase overall usage. Instead, more information transmission that combines group values and social justice can help strengthen participation motivation. In contrast, this study finds that consumers with a high altruistic tendency are better able to recognize the urgency of environmental protection and show higher supportive attitudes and actual participation intention. This indicates that approaching from the perspective of social responsibility and environmental sustainability helps arouse their intrinsic motivation and further promote positive responses to sustainable packaging actions. When consumers have a stronger sense of social responsibility, they are more willing to take actual actions, such as choosing environmentally friendly packaging, indicating that sustainable behavior is not based solely on personal interests but is closely related to deep value beliefs. When e-commerce platforms design packaging mechanisms and promotional strategies, they should emphasize the positive impact of sustainable packaging on the environment and future generations, and guide consumers to actively participate with the attitude of “doing the right thing for society” through storytelling marketing or public welfare connections.

Finally, although the results of this study show that consumer perceived effectiveness has a significant influence on sustainable consumption behavior in e-commerce platform delivery and packaging mechanisms, after adding confidence as a moderating variable, there is no significant moderating effect on sustainable consumption behavior. A possible reason is that when consumers

believe that their choices have a substantial impact on the environment, they are more likely to participate in green packaging actions. Although confidence has stable psychological characteristics, even if consumers have good environmental values, it does not significantly moderate the relationship between perceived effectiveness and sustainable consumption. Therefore, regardless of whether consumers rate their own ability as high or low, as long as they have a positive perception of sustainable actions, their willingness to participate will not be affected. The results of this study suggest that the design of sustainable strategies may not need to over-distinguish between high-confidence and low-confidence groups, but should focus on how to choose specific actions and positive feedback to enhance consumers’ identification with their own behavior. If consumers lack the confidence that “they can make a difference,” their behavior may be inhibited. Therefore, when enterprises or platforms implement sustainable packaging systems, they should design clear action feedback mechanisms so that consumers feel that the value of their choices is affirmed.

5.2 Managerial Implications

According to the empirical results of this study, consumers’ altruistic values directly and positively affect sustainable consumption, indicating that when consumers believe their actions can bring positive impacts to the environment or society, they are more willing to participate in related sustainable practices. In particular, in the marketing process, emphasizing messages such as “protecting the earth” and “reducing carbon to save the environment” can stimulate consumers’ sense of moral responsibility and willingness to participate. It is suggested that when e-commerce platforms promote sustainable packaging policies, they should focus on strengthening such social welfare implications, so that consumers regard green choices as meaningful actions, thereby increasing the actual usage rate of sustainable packaging. Furthermore, the results of this study show that consumer perceived effectiveness significantly and positively affects their intention to engage in sustainable consumption in delivery and packaging mechanisms. This shows that making consumers realize that “doing this is influential” may effectively enhance their actual

action intention. It is suggested that enterprises can focus on strengthening consumers' sense of self-efficacy, for example through clear feedback systems, data disclosure, environmental labels, and other methods, so that consumers understand that "my choice is valuable."

5.3 Research Limitations and Future Research

The sample of this study consists mainly of young female college students, which makes it difficult to fully reflect the overall consumer market. In addition, the questionnaire is self-administered and may be affected by social desirability, leading to an overestimation of sustainable behavior intention and an inability to accurately reflect the effects on values and perceived effectiveness. In summary, this study suggests expanding the sample to different genders, ages, and occupational groups to improve representativeness. Different cultural backgrounds may also have different values and perceptions. It is suggested that future research incorporate cultural factors into related investigations. Finally, follow-up research can use in-depth interviews to gain a deeper understanding of the motivations and thoughts behind consumer behavior, as well as how e-commerce platforms' sustainable policies affect the behaviors of consumers with different values.

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