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Role of Higher Education Students' Environmental Awareness and Environmental Concern in the Purchase Intention of Circular Economy Products

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Abstract: A circular economy is a concept of sustainable development that enhances a company's image and influences consumers' attitudes toward the corporation. Trust, commitment, and identification in relationship marketing are key factors for fostering long-term relationships. This study aimed to examine the relationship quality and attitudes between higher education students' personal environmental perspectives and circular economy products, further investigating their impact on the purchase intention of circular economy products. Therefore, this research proposed and tested a theoretical framework that combined variables, including environmental concern, environmental awareness, relationship quality with circular economy products, and attitudes, to determine the influencing factors on higher education students' purchase intention of circular economy products. This study adopted a survey design method and employed partial least squares structural equation modeling (PLS-SEM) to analyze data from 443 higher education students from Taiwan and Thailand. The results indicated that environmental awareness and environmental concern are critical antecedent factors for attitude and relationship quality (trust and identification) in circular economy products. In addition, trust and attitude in circular economy products have a significant impact on commitment. Furthermore, trust, commitment, and identification with circular economy products are crucial determining factors for the purchase intention of circular economy products. The findings contribute to a deeper understanding of the factors influencing higher education students' purchase intention of circular economy products, thereby achieving the goal of environmental sustainability.

Keywords: circular economy products; environmental concern; environmental awareness; purchase intention; sustainable development

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1. Introduction

In recent years, circular economy (CE) issues have attracted global attention across various industries. To establish a favorable brand image, many companies have invested in the development and sale of products related to the circular economy [1,2]. Jeong et al. [3] found that the practice of circular economy contributes to improving a company's image and consumers' attitudes toward the company, particularly among environmentally conscious consumers. Past studies have mainly focused on exploring how to construct efficient circular economy production processes, brand image, and sales procedures from a business model perspective to obtain higher profits and value [1,3,4]. However, if companies lack a thorough understanding of consumers when marketing circular economy products, it becomes challenging to design effective marketing strategies for these products [4]. In other words, when companies understand consumers' perspectives and opinions on the circular economy, they can better formulate sales strategies to meet consumers' fulfillment of environmental responsibility.

"Behavioral intention" is an outcome of trust and commitment [5]. Relationship quality is considered a marketing relationship where trust and commitment promote success in relationship marketing [5,6]. Previous research has noted a positive impact of consumers' trust on their online information searching and subsequent purchase intentions [7]. Papista and Dimitriades [8] highlighted the significant influence of relationship quality and environmental awareness on establishing customer loyalty toward green brands. Moreover, when consumers have a high level of identification with circular economy products, the interactive relationship between them and the company becomes stronger, thereby directly influencing consumer purchasing behavior [9,10].

Environmental issues are easily understandable catalysts that help consumers make sustainable consumption decisions to demonstrate their ecological awareness and commitment regarding daily consumption [11]. Consumers with environmental awareness prefer purchasing environmentally friendly products. Individuals can contribute to the sustainable development of the environment through various activities such as participating in environmental organizations, advocating environmental protection measures, and using environmentally protective products [1,12–14].

The above literature indicates that consumers' environmental awareness and concern affect their attitude and identification with circular economy products provided by businesses. Relationship quality is a critical indicator affecting consumers' purchase intentions, and it reflects the interaction between consumers and businesses. However, previous studies on circular economy products have rarely discussed the interaction between the two. Hence, this study aims to apply the concept of relationship quality to circular economy products to predict and understand the relationship quality between consumers and these products, and its impact on the purchase intention of circular economy products. By examining the crucial factors influencing the purchase intention of circular economy products, the current study aimed to identify ways to maintain a positive interactive relationship between consumers and businesses in the circular economy product market. It can also effectively benefit accurate decision making in developing effective marketing strategies related to circular economy products for businesses.

Higher education students are major stakeholders in environmental issues. The reasons for this include possessing innovative ideas, receiving higher education, having the knowledge and skills necessary to influence environmental behavior, and partaking in highly independent purchase decision making, among other factors [1,15,16]. Thus, this study focused on higher education students to investigate the factors influencing their purchase intention of circular economy products to achieve environmental sustainability. The research objectives of this study were as follows: (1) to examine the impacts of environmental awareness and concern on trust, attitude, and identification with circular economy products and (2) to investigate the influence of the circular economy product relationship quality on the purchase intention of circular economy products. The contributions of this study can be summarized as follows. First, this study aimed to contribute to the existing literature in the fields of relationship quality, environmental awareness, and circular economy product marketing. Second, this study focused on environmental concern, environmental awareness, and circular economy product relationship quality. The thorough investigation of data collected from higher education students has further expanded the scope of the application of circular economy product marketing.

To accomplish the above objectives, the second part of this study explores relevant literature on topics such as circular economy, environmental awareness, and environmental concern, as well as attitudes, trust, identification, and commitment to circular economy products. Section 3 illustrates the research methodology, data collection, and analysis. Sections 4 and 5 present the findings and discussions of the study. Sections 6 and 7 elaborate on the conclusions, limitations of the research, and future developments.

2. Literature Review and Hypothesis Deduction

2.1. Circular Economy

A circular economy is an economic system composed of social and natural ecosystems. Through the efficient utilization of the ecosystem, the cyclical material that flows in the production and consumption systems of the social framework can maximize energy usage and the production and services of goods [2]. According to the value of products, manufacturers or service providers should extend the lifespan and life cycle of final products as much as possible, as well as increase the recovery and reuse rates of all materials in the production process to reduce reliance on natural resources [17].

Kirchherr et al. [18] perused 117 articles to derive the definition of a circular economy and highlighted eight crucial aspects of the circular economy, including reduce, reuse, recycle, system perspective, economic prosperity, environmental quality, social equity, and waste hierarchy. "Reduce" refers to minimizing the use of natural resources during product manufacturing and decreasing environmental impact during the production process and product use [19]. "Reuse" expands the concept of reduction to decrease the demand for natural resources [20]. It can also be viewed as product remanufacturing, where manufacturers repair or recycle discarded components and materials and refurbish them as products with similar functionalities to those of new ones [21]. Recycling entails internal and external recycling. Internal recycling refers to returning defective products or scraps from the manufacturing process through reverse logistics to earlier production stages to form a closed-loop material system [22]. On the contrary, external recycling refers to the centralized collection process conducted by manufacturers or suppliers when products demonstrate abnormalities during the end-use phase or reach the end of their lifespan [23].

Therefore, through the waste sorting, recycling, reusing, and reducing of material usage [18,24], the circular economy aims to bring positive benefits to the economy, society, and the environment, as well as achieve sustainable development. The scope of impact spans individuals, companies, regions, industries, nations, and even the entire world [2]. The focus of this study, circular economy products, refers to products developed with materials that follow the principles of "reduce, reuse, recycle, and recirculate" in the production/sale and consumption processes.

2.2. Environmental Awareness

Environmental awareness is an individual's emotional viewpoint on environmental matters, including the interaction between self/other and the environment and the perception of the environment [25]. Rosli et al. [26] defined environmental awareness as individuals' awareness of the impact of environmental sustainability on human health, ecosystems, and socio-economic development. Environmental awareness plays a crucial role in promoting actions toward sustainable development [12], such as advocating for energy-saving activities [13]. Therefore, environmental awareness involves an individual's subjective emotional perceptions, attitudes, and behaviors toward environmental issues, and their impact on the sustainable development of the overall ecosystem and social economy.

Consumers' views on the environment directly affect their expectations for circular economy products. Chen [27] stated that consumers' green trust is related to their subjective feelings and perceptions of the environment. This trust relationship helps strengthen the resonance of value that consumers associate with providers of green products. Yeh et al. [28] noted that consumers' trust relationships with companies are mainly influenced by the environmental awareness of the stakeholders, indicating that stakeholders with environmental awareness are more likely to establish interactions with companies providing circular economy products. Moreover, consumers believe that by purchasing circular economy products, they express their personal values and identities, thus becoming part of an environmental conservation group [29]. In summary, when consumers' environmental awareness is built on circular economy products, it fosters long-term trust in, identification with, and attitudes toward each other. Therefore, this study believes that when higher education students'

environmental awareness is built on circular economy products, it establishes a long-term interactive relationship with these products and positive attitudes toward circular economy products. Thus, the following hypotheses were proposed:

Hypothesis 1. *Environmental awareness significantly influences trust in circular economy products.*

Hypothesis 2. *Environmental awareness significantly influences attitudes toward circular economy products.*

Hypothesis 3. *Environmental awareness significantly influences identification with circular economy products.*

2.3. Environmental Concern

The conceptualization of environmental concern is the extent to which consumers worry about threats to the environment [14]. In other words, it represents the degree of significance that individuals place on environmental protection issues or their willingness to actively solve environmental problems [14,30]. It reflects an individual's concern for ecological issues and environmental preservation, signifying a sense of involvement and understanding of environmental consequences [14,30]. Environmental concern is directly related to personal fundamental values, often concretely manifested in the purchasing behavior of green products or as a key factor positively influencing the purchase intention of circular economy products [7]. Trivedi et al. [31] found that environmental concerns can identify, position, and foster a group of consumers highly loyal to circular economy products. Consumers' concerns for the environment also impact their level of trust in circular economy products. Carfora et al. [32] suggested that highly environmentally concerned consumers consider purchasing circular economy products as having a positive environmental impact, so they tend to have a higher sense of identification with these products. In summary, consumers' concern for the environment relates to their efforts and practices toward the environment. The drive behind their actions might be influenced by their attitude toward, trust in, or identification with the companies or the companies' circular economy products. As a result, this study posits that the environmental concern of higher education students can effectively predict their trust in, attitude toward, and identification with circular economy products. This study proposed the following hypotheses:

Hypothesis 4. *Environmental concern has a significant impact on the trust in circular economy products.*

Hypothesis 5. *Environmental concern has a significant impact on the attitude toward circular economy products.*

Hypothesis 6. *Environmental concern has a significant impact on the identification with circular economy products.*

2.4. Attitude toward Circular Economy Products

Green attitude is the degree to which an individual perceives themselves as part of the natural environment, involving personal emotions and judgments toward environmental issues, and is beneficial to the preservation of the environment and natural resources [33,34]. Green attitude influences consumers' preferences, willingness to purchase green products, and behaviors [35,36]. Moreover, consumers' repeated purchasing attitude toward green products is related to their belief in, knowledge of, and attention to green concepts [37]. Green attitude is considered a leading factor influencing consumers' purchase intention of circular economy products; it not only determines consumers' purchasing decisions, but also affects their consumption behavior, including repeated purchases and expenditures [38]. Chen and Chai [39] suggested that when consumers demonstrate a high level of green attitude, their commitment to transforming it into green purchasing behavior

increases, and the product management end tends to adopt green operational models. Previous studies have focused on the impact of green attitudes, with relatively limited investigations of attitudes toward circular economy products. This study applied the concept of green attitude to the attitude toward circular economy products. It suggests that higher education students' attitude toward circular economy products influences their personal commitment to purchasing these products. Therefore, the following hypothesis was proposed:

Hypothesis 7. *Attitude toward circular economy products significantly influences commitment to circular economy products.*

2.5. Relationship Quality of Circular Economy Products

Previous research has shown that relationship quality can effectively predict consumer behavior [6,40,41] and plays a significant role in purchase decisions and processes [5]. As a higher-order construct, relationship quality consists of several dimensions that represent the strength of the relationship between consumers and a specific entity [5], such as a brand, organization, or people and the environment. Therefore, this study suggests that similar to relationships between people and the environment, consumers actively respond to the relationships proposed by circular economy products, which can contribute to predicting consumers' purchase intention. Smith [42] posited that relationship quality is the result of various positive buyer–seller relationships, reflecting the overall relationship condition and satisfaction of both parties' relationship in terms of needs and expectations. However, Hennig-Thurau [40] argued that satisfaction cannot be considered a dimension of relationship quality since consumers tend to add up the services received into feelings of satisfaction, which has a decisive impact on relationship quality. Su et al. [9] viewed satisfaction, identification, and commitment as crucial structures of relationship quality. Previous studies have identified trust, commitment, and satisfaction as primary measurement dimensions of relationship quality [41,42]. Therefore, this study adopted trust, identification, and commitment as dimensions of relationship quality and applied them to the relationship quality of circular economy products. The various dimensions of the relationship quality of circular economy products are discussed below.

2.5.1. Trust in Circular Economy Products

Lee et al. [43] considered consumers' trust in products a determining factor for their long-term purchase behaviors. Nuttavuthisit and Thøgersen [44] also noted that trust can regulate buyer–seller relationships and increase consumers' loyalty to the product or brand. Green trust is an individual's expectation of reliability, credibility, and honesty of the product, considering its qualities of environmental performance, energy saving, service, brand, and reputation. Green trust also helps enhance consumers' perception of the eco-friendliness of the products or services, further strengthening their overall satisfaction with the products or services [27,45]. Yang and Zhao [46] found that establishing green trust with consumers can build their loyalty toward green brands and their purchase intention of green products. Amin and Tarun [47] noted a significant positive impact of green trust on green purchase intention. The higher the level of trust in green products, the higher the green purchase intention. However, when consumers lose their confidence or trust in green qualities, their purchase intention of circular economy products decreases [48].

Green trust can also improve relationship quality, creating consumer trust in brands' commitment to environmental performance [49]. Elbeltagi and Agag [50] discovered that online consumers' trust in e-commerce providers helps maintain the commitment and long-term relationship between consumers and e-commerce providers. Li et al. [7] suggested that consumers' green trust can deepen the connection between environmental concern and green purchase intention. Previous studies have shown that green trust significantly influences consumers' commitment to products and sellers and can also influence consumers' green product purchase behaviors. Hence, this study posited that higher education students'

trust in circular economy products is a leading factor for predicting consumers' commitment to circular economy products and significantly affects their commitment. Moreover, trust in circular economy products also influences consumers' purchase intention. The following hypotheses were proposed:

Hypothesis 8. *Trust in circular economy products significantly influences commitment to circular economy products.*

Hypothesis 11. *Trust in circular economy products significantly influences the purchase intention of circular economy products.*

2.5.2. Identification with Circular Economy Products

Long and Shiffman [29] pointed out that consumers express their self-image by purchasing products that they identify with and expect to become part of the community associated with those products. Therefore, consumers' identification with a product not only shapes personal and social images and values, but also reveals their emotional and psychological attachment to the product [29,51]. This study applied the concept of identification to circular economy products, suggesting that identification with circular economy products implies that consumers consider their values related to environmental issues aligned with the environmental protection views and principles advocated by circular economy products.

Carfora et al. [32] defined consumers who associate themselves with green values as green consumers, and their research indicated that green consumers consider their purchasing behavior highly important and impactful for environmental conservation. Additionally, Kashima et al. [52] suggested that consumers' identification with green products is an effective predictor of purchasing green products. Moreover, Čater and Čater [53] pointed out that consumers' values and identification with products also influence their emotional commitment to the products. Commitment is a value relationship that sellers employ and maintain with customers, and long-term value relationships lead to brand performance and brand loyalty [54]. Sharma et al. [55] found that as individuals' concept of and self-identification with the circular economy becomes stronger, their purchase intention of circular economy products becomes more noticeable. Keh and Xie [56] noted a close relationship between consumers' identification and commitment. Therefore, consumers' identification can serve as a major factor in predicting their purchase intentions and is highly associated with their commitment to products. Therefore, this study posited that higher education students' identification with circular economy products significantly influences their commitment to these products and their intention for repeated purchases. Hence, the following hypotheses were proposed:

Hypothesis 9. *Identification with circular economy products significantly influences commitment to circular economy products.*

Hypothesis 12. *Identification with circular economy products significantly influences purchase intentions.*

2.5.3. Commitment to Circular Economy Products

Padgett et al. [57] proposed that consumer commitment to products can be divided into three types: affective commitment, calculative commitment, and normative commitment. Elbeltagi and Agag [50] found that online retailers' commitment to consumers positively influences their purchase intentions. Mishra et al. [11] stated that an increase in environmental commitment contributes to enhancing sustainable consumer behavior. Li et al. [7] indicated that consumers' intention to purchase green products is influenced by factors such as purchase tendency, product preferences, and emotional commitment. A company's green commitment to its products demonstrates its level of involvement in environmental

protection and directly impacts consumers' perceptions of and loyalty toward the company. After a company's products fulfill consumers' functional and emotional needs, consumers expect the company to make environmentally relevant moral commitments to the products. This type of commitment enhances consumers' purchase intention, product innovation, and market competitiveness [58–60]. The above studies demonstrate that commitment to circular economy products not only enhances the relationship between a company and environmental conservation, but also involves emotional and moral value interactions with green consumers. Therefore, this study proposed the following hypothesis:

Hypothesis 10. *Commitment to circular economy products significantly influences purchase intentions.*

This path analysis study aimed to establish a theoretical model to understand and predict the factors influencing higher education students' intentions to continue using circular economy products. It also assessed the effectiveness and goodness of fit of this model. Figure 1 summarizes the hypothetical relationship between research variables within the path model. The directional arrows indicate the assumed relationships between variables, reflecting the research hypotheses.

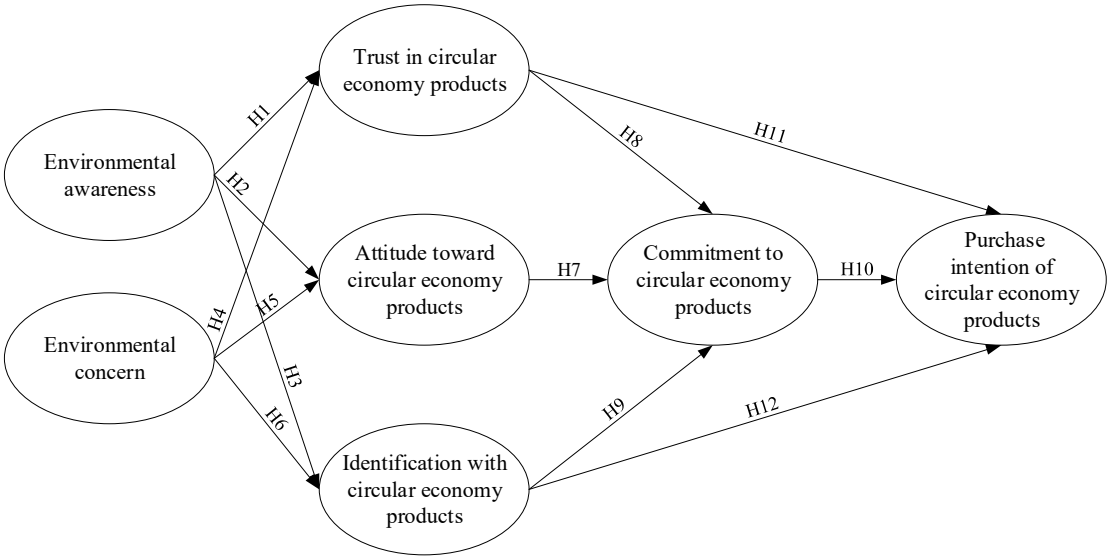

Figure 1. Research framework.

3. Research Method

3.1. Instrumentation and Data Collection Tools

To validate the research model and hypotheses proposed in this study, research data were collected through an online survey created in Google Forms. The study employed a closed-ended structured questionnaire consisting of two main sections: respondent demographics and participant characteristics (gender, year of study, age, disposable monthly income in NTD, nationality), and seven latent constructs (environmental awareness, environmental concern, attitude toward circular economy products, trust in circular economy products, identification with circular economy products, commitment to circular economy products, and purchase intention of circular economy products). After data collection, the proposed hypotheses were examined using structural equation modeling (SEM).

This study adapted measurement items from previous research. All scales were composed of multiple items. First, the study employed a 5-item measurement scale designed by previous researchers [13,26,28] to assess environmental awareness, and a 5-item measurement scale designed by previous researchers [14,30,31] to assess environmental concern. The scales developed by previous researchers [5,7,9,32,47,60] were employed to measure

trust in (3 items), identification with (4 items), and commitment (4 items) to circular economy products. In addition, scales from previous researchers [36–38] were used to measure attitudes toward circular economy products (4 items). Finally, four items from previous research [1,31,47] were employed to assess purchase intention. All latent constructs and items were measured using seven-point Likert scales.

This study utilized questionnaires to collect data and adopted the back-translation method to ensure the quality and effectiveness of the questionnaire translation [61]. The questionnaire items were translated from English to Chinese and revised based on the scale development process recommended by Churchill [62] and MacKenzie, Podsakoff, and Podsakoff [63]. Subsequently, five experienced researchers in circular economy and environmental education were invited to translate the same questionnaire items from Chinese back to English. To ensure participants understood the research background, they were informed again about the study's purpose and content before filling out the questionnaire and read a brief explanation at the top of the questionnaire. Additionally, their personal information was kept confidential and not recorded on the data collection forms. Participants had the opportunity to withdraw from the study at any time.

3.2. Sampling and Data Collection

A pilot test was conducted on 96 students from various universities of science and technology in Central Taiwan. The reliability analysis results indicated that Cronbach's α values of all variables were higher than the standard of 0.7 [64], demonstrating that all scale items in this study were of good reliability as important tools for formal questionnaire administration.

An email was sent out to invite participants, providing information about the research purpose, survey instructions, and the survey link. To mitigate the potential influence of the order of questions on participants' responses, a randomized response technique was employed to obtain their true opinions and reduce survey response bias [65]. The study adopted the convenience sampling method and invited 250 higher education students from Central Taiwan and Bangkok, Thailand, to participate. Invalid responses, such as incomplete responses, identical responses for all questions, and incomplete questionnaires were excluded. In addition, the responses of participants who have never purchased circular economy products and others who indicated their refusal to participate were also excluded. In total, 443 valid questionnaires were collected, with a response rate of 88.6%.

A total of 230 participants were from Taiwan (51.9%), and 213 were from Thailand (48.1%). The average age was 21.56 years (standard deviation = 2.46 years). Among the participants, 288 were female (65.0%), and 155 were male (35.0%). Regarding the year of study, 120 participants (27.1%) were second-year university students, and 105 (23.7%) were third-year university students. In addition, 42.4% of the participants had a disposable monthly income ranging from NT $1000 to NT $5000. Table 1 presents the demographic characteristics of the participants.

Table 1. Demographic details of respondents (N = 443).

Demographics/Level	N	Percentage	Demographics/Level	N	Percentage
Sex			Disposable amount per month (NTD)		
Male	155	35.0	<1000	124	28.0
Female	288	65.0	1000~5000	188	42.4
Year			5000~10,000	76	17.2
First-year college student	83	18.7	>10,000	55	12.4
Second-year college student	120	27.1	Nationality		
Third-year college student	105	23.7	Taiwan	230	51.9
Fourth-year college student	66	14.9	Thailand	213	48.1
First-year graduate student	30	6.8			
Second-year graduate student	39	8.8			

4. Results

To test the research model and hypotheses proposed in this study, a two-stage procedure was conducted with Smart PLS 3.0 [66]. The first stage involved examining the measurement model, and the second stage involved assessing the research model. The reliability and validity of the model were evaluated with indicators, including confirmatory factor analysis (CFA), Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), and discriminant validity (DV). The structural model involved verifying the fit of the model.

4.1. Measurement Model

Before validating the research hypotheses, CFA was performed to assess the reliability and validity of the scales, ensuring the effectiveness of the sample data for the proposed research model. Cronbach's α and CR values were used to assess the reliability of the constructs [64]. Table 2 indicates that the standardized factor loadings of all measurement variables were above 0.6 and statistically significant ($p < 0.05$) [64]. Cronbach's α and the CR values of all constructs met the recommended standard of above 0.7, as suggested by prior research [64,67]. Thus, the reliability was verified.

Table 2. Construct reliability results.

Construct	No. of Items	Item Loading	Cronbach's α	CR	AVE	DV
EA	5	0.775–0.850	0.877	0.911	0.671	1.106
EC	5	0.815–0.874	0.894	0.922	0.703	1.158
ATCEP	4	0.741–0.862	0.842	0.894	0.679	1.077
TCEP	3	0.869–0.903	0.856	0.912	0.776	1.343
ICEP	4	0.814–0.847	0.858	0.903	0.700	1.193
CCEP	4	0.820–0.849	0.860	0.905	0.705	1.118
PICEP	4	0.820–0.877	0.877	0.916	0.731	1.446

Notes: EA: Environmental awareness; EC: Environmental concern; ATCEP: Attitude toward circular economy products; TCEP: Trust in circular economy products; ICEP: Identification with circular economy products; CCEP: Commitment to circular economy products; PICEP: Purchase intention of circular economy products; AVE: Average variance extracted; CR: Composite reliability; DV: Discriminant validity.

This study employed AVE to assess convergent validity [64,67]. Table 2 shows that the AVE values of all constructs were above 0.5 [64], indicating a relatively high convergent validity. In addition, the Fornell–Larcker criterion was adopted to assess discriminant validity. A comparison between the square root of the AVE and the correlation coefficient of the pair construct was performed to ensure discriminant validity. The discriminant validity values of all the constructs exceeded 1.0, as recommended in previous research [68]. The results demonstrated good discriminant validity for the scale.

4.2. Structural Model

The SEM was employed to analyze the 443 samples using Smart PLS 3.0 statistical software to examine path coefficients and R^2 values. Moreover, this study adopted the bootstrapping method to analyze the structural model, with 5000 resamples to assess the t-values and significance of latent structures to test the research hypotheses proposed in this study.

Figure 2 and Table 3 present the test results of the structural model hypothesis. The findings demonstrated that environmental awareness ($\beta = 0.379$, $t = 5.738$, $p < 0.05$) and environmental concern ($\beta = 0.311$, $t = 4.458$, $p < 0.05$) had significant positive impacts on trust in circular economy products. These two factors explained 42.6% of the variance in the trust in circular economy products. On the contrary, environmental awareness ($\beta = 0.492$, $t = 7.230$, $p < 0.05$) and environmental concern ($\beta = 0.201$, $t = 2.682$, $p < 0.05$) had significant positive impacts on attitudes toward circular economy products. These two paths explained 43.8% of the variance in the attitude toward circular economy products. Moreover, environmental awareness ($\beta = 0.506$, $t = 7.801$, $p < 0.05$) and environmental concern ($\beta = 0.176$,

t = 2.614, $p < 0.05$) had significant positive effects on identification with circular economy products. These two paths explained 42.7% of the variance in the identification with circular economy products. The results support research hypotheses 1 to 6. Both attitude toward and trust in circular economy products directly affected students' commitment to circular economy products, with path coefficients of 0.494 (t = 7.179, $p < 0.05$) and 0.347 (t = 5.570, $p < 0.05$), respectively, supporting hypotheses 7 and 8. These two paths explained 69.4% of the variance in commitment to circular economy products. However, in the case of commitment to circular economy products, identification with circular economy products did not have a statistically significant impact (t = 1.243, $p > 0.05$). Thus, hypothesis 9 was not supported. Commitment to circular economy products (β = 0.452, t = 6.641, $p < 0.05$), trust in circular economy products (β = 0.145, t = 2.391, $p < 0.05$), and identification with circular economy products (β = 0.232, t = 4.482, $p < 0.05$) had significant positive impacts on the purchase intention of circular economy products. These three paths explained 55.7% of the variance in the purchase intention of circular economy products. Consequently, hypotheses 10–12 are supported.

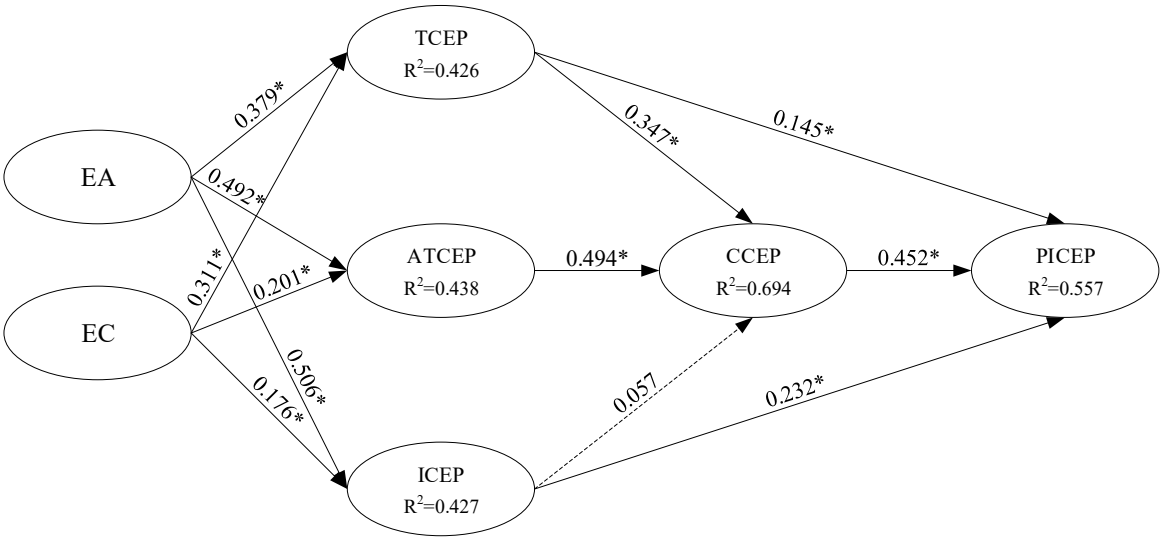

Figure 2. Empirical results of the structural path model. Value on path: standardized coefficients (β), R^2: coefficient of determination and * $p < 0.05$.

Table 3. Structural path model's hypothesis testing outcomes.

Hypothesis	Relationships between Variables	Standardized Coefficient	t-Statistic	Test Results
H 1	EA → TCEP	0.379 *	5.738	supported
H 2	EA → ATCEP	0.492 *	7.230	supported
H 3	EA → ICEP	0.506 *	7.801	supported
H 4	EC → TCEP	0.311 *	4.458	supported
H 5	EC → ATCEP	0.201 *	2.682	supported
H 6	EC → ICEP	0.176 *	2.614	supported
H 7	ATCEP → CCEP	0.494 *	7.179	supported
H 8	TCEP → CCEP	0.347 *	5.570	supported
H 9	ICEP → CCEP	0.057	1.243	rejected
H 10	CCEP → PICEP	0.452 *	6.641	supported
H 11	TCEP → PICEP	0.145 *	2.391	supported
H 12	ICEP →PICEP	0.232 *	4.482	supported

* $p < 0.05$.

5. Discussion

This study aimed to examine the relationship quality and attitudes between higher education students' personal environmental perspectives and circular economy products,

further investigating their impact on the purchase intention of circular economy products. The most significant theoretical contribution of this study is the construction of a comprehensive new theoretical framework to promote higher education students' purchase intention of circular economy products, combining factors such as environmental awareness, environmental concern, attitude toward circular economy products, trust in circular economy products, commitment to circular economy products, and identification with circular economy products. The objective of the study was to provide a more comprehensive and innovative evidence-based theory to explain higher education students' purchase intention of circular economy products.

The research results confirm that environmental awareness and concern are the most critical antecedent factors influencing higher education students' trust in, attitude toward, and identification with circular economy products, with evidence supporting this argument and aligning with previous research findings [28,29,31,32,45]. Firstly, in terms of the impact of environmental awareness, higher education provides students with more opportunities to be exposed to environmental science and sustainability-related courses and knowledge, which makes it easier for them to understand the significance of environmental issues. This awareness contributes to building trust in environmentally friendly products, making students more inclined to believe that these products can decrease environmental burdens. Regarding environmental concerns, higher education students often engage in environmental activities, support environmental organizations, or initiate environmental actions on campuses. Their participation not only reflects their environmental concerns, but also influences their attitude toward circular economy products, making them more likely to support and purchase these products. Environmental awareness and concern also shape higher education students' identification with circular economy products. They consider these products part of their values and lifestyle and tend to buy and promote them. In summary, the environmental awareness and concern of higher education students are crucial factors driving their trust in, attitude toward, and identification with circular economy products, playing significant roles in shaping sustainable consumption and lifestyles.

Regarding the factors influencing identification with circular economy products, three variables of the hypothesized path were tested, including trust in, attitude toward, and identification with circular economy products. The results indicate that when predicting the purchase intention of circular economy products, the weight of each variable's path coefficient differed from each other. This aspect is the main contribution of this study. First, trust in circular economy products and attitude toward circular economy products affected the commitment to circular economy. The results support the hypothesis proposed in this study and align with previous research findings [39,49,50]. This also impliea that when higher education students had trust in the quality and reliability of circular economy products and held a positive attitude toward them, they were more inclined to commit to continuing using these products. This is because they believe that these products can meet their needs and provide satisfaction. However, this study also found that identification with circular economy products had no impact on the commitment to these products, differing from the findings of previous research that described the influence of identification on commitment [32,52,55]. Despite the potential significance of identification in an individual's life, it had no influence on forming commitment. This finding also suggests that while higher education students may identify with circular economy products, whether they commit to using them depends on their attitude toward and trust in the products.

Finally, this study also found that commitment to circular economy products had the greatest impact on purchase intention. This finding is similar to previous research outcomes [7,50]. This implies that when higher education students commit to using circular economy products, they tend to continue using these products because they feel responsible and motivated to support sustainable consumption behavior. Therefore, commitment to circular economy products plays a crucial role in shaping consumer intentions. The factors influencing higher education students' repeated use intention of circular economy products include identification with and trust in circular economy products. These findings

align with those of previous research [7,11,50] and confirm our main proposition that identification with and trust in circular economy products contribute to the development of the repeated use intention of these products. When higher education students associate using circular economy products with environmental and sustainable values and have trust in these products, they are more likely to continue using them as they believe these products align with their values and needs without posing unnecessary risks.

6. Conclusions

In this study, cross-sectional survey data from higher education students in Taiwan and Thailand were employed to construct a theoretical model for understanding and predicting the determinants influencing the purchase intention of circular economy products. The SEM analysis results revealed that environmental awareness and concern are significant antecedent factors for trust in circular economy products, attitude toward circular economy products, and identification with circular economy products. Both trust in circular economy products and attitude toward circular economy products significantly influence commitment to circular economy products. Trust in, commitment to, and identification with circular economy products are crucial determinants of the purchase intention of circular economy products. Existing research has rarely integrated environmental concern, environmental awareness, and the relationship quality of circular economy products into a single theoretical framework to test their impact on the purchase intention of circular economy products. The current research findings aim to contribute to a deeper understanding of the factors influencing higher education students' purchase intentions of circular economy products, thereby contributing to the goal of environmental sustainability.

7. Limitations and Future Research

Although the present study reveals important findings, it has some limitations that could be further verified and addressed in the future. First, this research was based on cross-sectional data collected at one point in time. The results are limited to associations rather than established possible causal relationships. Future research could conduct longitudinal studies to understand how university students' purchase intention of circular economy products develops over time. Second, since this study employed convenience sampling, the results may be limited in terms of their generalizability and universality to other countries or different populations. In addition, they may not adequately represent Taiwan and Thailand or the population of green consumers. Future research should be conducted to provide a broader perspective by comparing sectoral, societal, and educational conditions. Third, this study proposed a comprehensive model on the antecedents of the purchase intentions of circular economy products among higher education students in Taiwan and Thailand, but it might have missed several variables. Future research should identify other key variables influencing higher education students' purchase intention of circular economy products, such as circular economy product labels, product quality, ethical norms, and altruism, among others. Despite these research limitations, this study has made theoretical and practical contributions to the investigation of higher education students' purchase intention of circular economy products. The findings can benefit educators, business decision makers, and the academic community.

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