



Promoting sustainable consumption and circular economy: the intention of Vietnamese youth consumers to purchase products made from recycled plastics

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ABSTRACT

Recycling is viewed as a key component in a circular economy and serves as an ideal solution for promoting sustainability. During the global plastic crisis, plastic recycling practices have been adopted worldwide, leading to the production of various products made from recycled plastics (PRP). Nevertheless, a gap persists between consumption and demand for such products, which is primarily attributed to a lack of comprehension from the consumer perspective. Given the pivotal role consumers play in the adoption of these products, this study explores consumers' intentions to purchase PRP. This is particularly significant in Vietnam, which is an emerging economy aspiring to achieve the objectives of a circular economy and sustainable development. Utilizing an integrated cognitive-emotional framework comprising the Valence Theory and the Norm Activation Model, data from 564 Vietnamese students were gathered and analyzed using structural equation modeling. The results show that awareness of consequences is a major driver of consumer purchase intentions, followed by perceived ease of application and monetary incentives. The results also indicate that health concerns have the strongest effect on purchase intention and in the negative side, meaning that the health-related risk is the primary concern for consumers during the decision-making process. This research holds substantial value for academics and managers, as it aids in the theoretical exploration and the formulation of strategies to improve consumer acceptance of PRP.

1. Introduction

Underpinned by the shift from a traditional linear consumption model to a closed-loop production model, the circular economy (CE) has emerged as a resilient system that addresses climate change and global environmental challenges (Testa et al., 2022). Specifically, the foundation of a CE rests on three design-oriented standards: the elimination of waste and pollution, maximization of the circulation of products and materials at their optimal value, and restoration of the natural environment (Gomes et al., 2022). Therefore, to mitigate the adverse impacts stemming from excessive resource production and consumption, CE appears to be an ideal paradigm that facilitates the “sustainable consumption and production patterns” emphasized in Sustainable Development Goal 12 (Calvo-Porrall and Lévy-Mangin, 2020; Dobbstein and Lochner, 2023; Polypartis et al., 2022; UN, 2015). In the context of the increasing global plastic waste crisis, the idea of CE has been steadily gaining prominence, drawing significant interest from both academics and practitioners (Magnier et al., 2019;

Testa et al., 2022). Plastics have become a major environmental concern owing to the endless production of virgin plastic and the limited recycling capacity of billions of tons of plastic waste, which causes the rapid exhaustion of natural resources and environmental pollution (Boyd and Orellana, 2023).

For instance, Vietnam has been severely affected by plastic waste and is fighting against the issue of “white pollution” (WB, 2022). Statistical data indicate a significant increase in plastic consumption in Vietnam, from 3.8 kg per capita in 1990 (MONRE, 2020) to 81 kg per capita in 2019 (IUCN-EA-QUANTIS, 2020). Approximately 3.1 million metric tons of plastic waste are annually discharged on land in Vietnam, and 0.73 million tons are discharged into the ocean. Consequently, Vietnam ranks among the 20 largest generators of plastic waste globally and is among the top five contributors to plastic pollution in the world's oceans (Makarchev et al., 2022). Of this, only approximately 10% of plastic waste is recovered through recycling or reuse (MONRE, 2020); the remaining plastic waste in Vietnam either disposed of in landfills or poorly managed through burial in dumps,

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open burning, dumping in waterways, and so on (IUCN-EA-QUANTIS, 2020; Jambeck et al., 2015). Therefore, the Vietnamese government needs a CE structured around a tripartite system involving the “make-use-recycle” model for plastics, which facilitates waste reduction and decreases resource extraction by means of recycling, reduction, and reuse (Lai et al., 2021). For Vietnam, to meet low-carbon growth targets and promote sustainable development, a CE for plastics is recommended (WB, 2022). For example, recently, various measures have been implemented to address plastic waste pollution, including updating legal documents and environmental protection policies. Directive No. 33/CT-TTg, issued by the Prime Minister in August 2020, addresses the enhancement of the management, reuse, recycling, disposal, and reduction of plastic waste.

Within the CE framework, multiple loops are possible, including reuse, repair, refurbishment, and recycling (Dobbelstein and Lochner, 2023). Recycling appears to be an optimal solution, not only addressing the ever-worsening plastic waste crisis, but also driving sustainability achievements (Hameed et al., 2022). Therefore, amid the global challenge of increasing plastic waste, innovative researchers and organizations worldwide have devised solutions to recycle this waste and transform it into valuable resources, creating new plastic products and other items such as plastic toys, clothing, shoes, furniture, personal care items, household goods, and even building materials (Esmat, 2023). The production of recycled products involves two primary stages. The first stage involves the collection and transformation of materials into new raw materials. The second stage involves transforming recycled raw materials into final recycled products ready for sale to target consumers (Bae, 2021; Bigliardi et al., 2020; Esmat, 2023). Products from recycled plastic waste are sustainable and eco-friendly solutions for reducing waste and promoting a CE, meeting the growing demand for a brighter and more sustainable future for the planet and its inhabitants (Calvo-Porrall and Lévy-Mangin, 2020; Luu and Baker, 2021).

Consumers hold significant importance to CE because their decisions can either facilitate or impede circularity (Calvo-Porrall and Lévy-Mangin, 2020; Polypartis et al., 2022). For example, the European Commission’s recent adoption of the CE paradigm emphasizes the pivotal role that consumers play as a key source of stimuli in achieving CE targets, expanding markets for products operating within the CE model, and facilitating the shift of the European economy toward greater circularity (Testa et al., 2022). However, despite consumers’ crucial role in promoting circular products, their understanding of their willingness to use such products remains limited (Dobbelstein and Lochner, 2023; Pretner et al., 2021). Hamzaoui-Essoussi and Linton (2014) indicated that while consumers express substantial environmental concerns, these attitudes often do not translate into their consumption behavior. Moreover, despite consumers’ positive attitudes toward products made from recycled materials, they often fail to make the purchase (Dobbelstein and Lochner, 2023; Park and Lin, 2020; Polypartis et al., 2022). Therefore, over the past few decades, scholars have generated substantial evidence regarding the degree to which these factors influence consumer consumption of recycled products (Abella et al., 2022; Hamzaoui-Essoussi and Linton, 2014; Kuah and Wang, 2020).

Empirical research suggests that buying behavior is a complicated phenomenon influenced by numerous factors that may involve trade-offs among conflicting needs, including economic savings (Conke, 2018), quality and functional performance (Luchs et al., 2010; Magnier et al., 2019), and environmental attributes (Testa et al., 2020; Testa et al., 2022). Additionally, numerous studies have investigated how various individual factors, both in cognitive and affective aspects, such as the quality, image, sustainability, and safety of recycled products (Calvo-Porrall and Lévy-Mangin, 2020; Queiroz et al., 2021) or the influence of uncertainty, attitude, value, subjective norms, price, promotion, and buying effort, influence consumers’ purchase intention (Dobbelstein and Lochner, 2023). Specifically, the in-

fluences of emotional (Bulut and Nazli, 2020; Kim et al., 2021), social (Calvo-Porrall and Lévy-Mangin, 2020; Kim et al., 2021; Queiroz et al., 2021), environmental (Bulut and Nazli, 2020; Kim et al., 2021; Kumagai, 2021), and perceived safety (Calvo-Porrall and Lévy-Mangin, 2020; Luu and Baker, 2021; Queiroz et al., 2021) values were found to be significant positive predictors of buying intention. Contrastingly, risk factors such as aesthetic, sanitary, functional, and financial risks have been identified as having a negative impact on purchase intentions (Kim et al., 2021; Magnier et al., 2019; Meng and Leary, 2021).

The literature mentioned earlier reveals that diverse factors, including both positive and negative effects, have been recognized as predictors of consumer willingness and preferences for purchasing products manufactured from recycled materials in general, and specifically for products made from recycled plastics (PRP) (Gomes et al., 2022; Polypartis et al., 2022; Testa et al., 2020). However, most prior studies have concentrated solely on the effects of particular influencing factors and targeted general recycled materials, making it impossible to grasp all the aspects associated with the adoption of PRP. It leads to the fact that there is a lack of a holistic approach to the acceptance of PRP. Especially in the context of Vietnam, the country is currently undergoing a transformation toward circularity in the plastics economy, aligning with Vietnam’s goal of fostering a more CE within its borders. Hence, there is an urgent need to gain a complete understanding of the determinants of PRP consumer acceptance in Vietnam.

Hence, this study focuses on understanding consumers’ intentions to adopt PRP. Specifically, the primary objective of this study is to investigate the drivers and barriers, both cognitive and affective, influencing consumers’ purchase intention toward PRP in Vietnam by integrating the valence theory (VT) and the norm activation model (NAM). VT introduced by Peter and Tarpey (1975), which includes perceived benefits (perceived ease of application and monetary incentives) and perceived risks (health concerns), is effective in assessing the trade-offs between the benefits and drawbacks of buying such products. The NAM (Stern, 2000; Stern et al., 1999) reflected by the awareness of consequences and the ascription of responsibility, is a powerful model for forecasting consumers’ decision-making in ethical scenarios, such as pro-social and environmentally responsible behaviors. My research holds significant value for academics interested in the topic, as it provides a framework that aids in theorizing additional effects. Moreover, valuable insights into consumers’ acceptance of PRP can greatly benefit managers in developing strategies to enhance their favorability and mitigate consumers’ negative responses toward these products.

2. Theoretical framework and hypotheses development

2.1. Theoretical framework

The literature has attempted to construct a theoretical framework that provides insights into the factors that impact the intent to purchase recycled products by drawing from various theories. For example, while the theories of reasoned action (Sun et al., 2018) and planned behavior (Chaturvedi et al., 2020; Hosta and Zabkar, 2021) have been widely used to predict individual purchase intentions, a growing body of research has adopted an integrated approach that combines multiple theories. Such combinations include integrating perceived risk into the Value-Belief-Norm Theory (Hein, 2022) or incorporating the Value-Belief-Norm, Ambiguity Tolerance Theory, Norm Activation Theory, Elaboration-Likelihood Models, Theory of Planned Behavior, and Prospect Theory (Bigliardi et al., 2020). Conversely, several studies have investigated the influential factors by categorizing them into main groups, such as external factors (education, culture, social influence), internal factors (awareness, attitude, knowledge), and situational factors (monetary incentives, legislation) (Che-

ben et al., 2017). To provide an overview of the drivers of and barriers to consumer acceptance toward PRP, Polyportis et al. (2022) summarized and categorized the influential factors into two groups: cognitive and affective aspects. The former refers to consumers’ knowledge and understanding of environmental friendliness and perceived risks. The latter concerns the feelings of liking and disliking, such as positive feelings, self-expression, psychological risk, contamination, and negative feelings (Polyportis et al., 2022). From the aforementioned information, it is evident that various factors influence consumers’ purchase intentions toward products made from recycled materials. To gain a comprehensive understanding of both cognitive and affective aspects, this study integrated VT and NAM to explore the positive and negative impacts on consumers’ acceptance of PRP in Vietnam.

2.1.1. The VT

Built upon the concept of “cognitive-rational” decision-making, the VT is considered a powerful framework used to understand individuals’ determination by weighting both positive and negative valences (Peter and Tarpey, 1975). Because the valence framework operates on rational principles, it assumes that consumers aim to maximize benefits while minimizing risks, leading to decisions based on the optimal net valence derived from both negative and positive effects (Dhir et al., 2021; Verma et al., 2019). Perceived benefits are defined as consumer perceptions of the overall advantage gained from products and services, whereas perceived risks involve the subjective potential of loss. Therefore, to explore the cognitive antecedents of consumers’ intentions to purchase PRP, this study focuses on the foundation of VT, which posits that people consider both negative and positive perspectives when making purchase decisions. In this study, perceived ease of application (effort value) and monetary incentives (functional value) formed a positive valence, whereas health concerns about the products formed a negative valence.

2.1.2. The NAM

The NAM is a social-psychological model that is widely used to explain an individual’s pro-social behavior in terms of altruistic and environmentally friendly behavior. This model was developed by Schwartz (Schwartz, 1970; Schwartz, 1973; Schwartz, 1977), which assumes that the norm activation process hinges on two factors: ascription of responsibility and awareness of consequences. The former relates to a sense of responsibility for negative outcomes resulting from failing to engage in pro-social actions, and the latter involves the recognition of adverse effects on others and the natural environment arising from the specific behaviors of individuals (Park and Lin, 2020; Sun et al., 2018).

Based on these concepts, the integration of the VT and NAM was developed as a theoretical framework in this study, as shown in Figure 1.

2.2. Hypotheses development

In research related to sustainable consumption, prior investigations have revealed that accessibility considerably influences the intention to purchase green products (Connell, 2010; Nguyen et al., 2019; Walia et al., 2020). Similarly, Gleim et al. (2013) found that lack of accessibility to green products is among the primary reasons why consumers opt not to purchase eco-friendly alternatives. Drawing on the concept of recycled products, Dobbelstein and Lochner (2023) found that buying recycled products had a significant effect on German consumers’ purchase intentions. Alternatively, the perceived ease of buying recycled products is considered a key element associated with positive purchase intentions among consumers. Therefore, this study adopted perceived ease of application, which relates to the extent of an individual’s belief that PRP consumption will be effortless, as a factor in positive valence. Apart from perceived ease of buying, incentives also drive consumers’ purchase intentions for PRP. For example, consumers perceive a lower price for circular products than for those made of virgin materials that are cleaner or of higher quality (Hamzaoui Essoussi and Linton, 2010; Pretner et al., 2021). In addition, promotions such as discounts or vouchers have a positive effect on the intention to purchase recycled products (Baier et al., 2020; Barbu et al., 2018; Camacho-Otero et al., 2019; Dobbelstein and Lochner, 2023; Grewal et al., 1998; Jiménez-Parra et al., 2014; Kuah and Wang, 2020). Therefore, offering promotions or monetary incentives to consumers when purchasing PRP acts as a stimulus to encourage purchase intention. Based on these observations, the following hypotheses are formulated:

Hypothesis 1 (H1): Ease of application positively affects consumers’ purchase intention for PRP.

Hypothesis 2 (H2): Monetary incentives positively affect consumers’ purchase intentions regarding PRP.

Regarding negative valence, safety risks and health concerns have emerged as barriers that hinder the use of recycled products (Bigliardi et al., 2020; Esmat, 2023; Hamzaoui-Essoussi and Linton, 2014; Magnier et al., 2019; Polyportis et al., 2023; Queiroz et al., 2021). Research has highlighted that PRP can result in an increased perception of contamination, consequently leading to decreased purchase intention (Magnier et al., 2019; Meng and Leary, 2021). Some studies have revealed that consumers may have negative perceptions of recycled plastics used in circular production due to concerns about potential contagion and contamination (Akkucuk, 2011; Luu and Baker, 2021; Meng and Leary, 2021). From this perspective, the following hypothesis is proposed.

Hypothesis 3 (H3): Health concerns negatively affect consumers’ PRP purchase intentions.

Regarding factors extracted from the NAM, awareness of consequences, which is defined as environmental concern, also affects consumers’ purchase decisions of consumers toward recycled products. Dobbelstein and Lochner (2023) found that environmental concerns

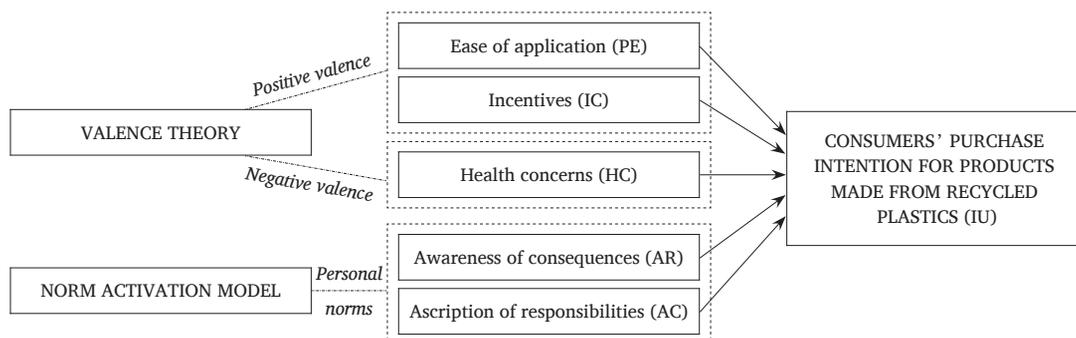


Figure 1. Theoretical framework and hypotheses development

had the strongest influence on the intention to purchase recycled products among South African consumers. Similarly, others have shown that environmental concerns may positively affect consumers' purchase intentions toward recycled fashion products (Kim et al., 2021; Magnier et al., 2019; Queiroz et al., 2021). In addition, the literature on pro-environmental behavior underscores the significance of consumer roles in mitigating environmental issues (Bamberg and Schmidt, 2003; Liu et al., 2017; van der Werff and Steg, 2015). Hence, it is assumed that the ascription of responsibility for purchasing PRP acts as a motivator of consumer intentions. Based on these references, the following hypotheses are proposed.

Hypothesis 4 (H4). Awareness of consequences positively affects consumers' PRP purchase intentions.

Hypothesis 5 (H5). Ascription to responsibility positively affects consumers' PRP purchase intentions.

3. Methods

3.1. Questionnaire development

The questionnaire consisted of three sections. First, information about recycled plastics and PRP was presented to help the respondents gain an overview of the questionnaire's content. Second, participants were asked to evaluate 18 measurement items related to purchase intention using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), as shown in Table 1. The final section pertained to demographic questions related to participant characteristics.

All measurement items were adopted from previous studies and modified to align with the specific objectives and contextual conditions of the present study. After initial preparation, a draft of the questionnaire was reviewed by three experts to ensure content validity. Subsequently, a pilot test was conducted with 30 undergraduate students to identify any potential ambiguities in wording and content. The data collected from the pilot test were analyzed to identify the Cronbach's alpha value, which was found to satisfy the recom-

mended cut-off value of 0.7 (Hair et al., 2019), implying the reliability of all measurement items used in the questionnaire.

3.2. Study area and execution

A survey was conducted in Vietnam, an emerging economy that has experienced the negative impact of increasing plastic waste (WB, 2022). The Vietnamese government has developed a growing interest in recycling solutions for plastic waste, aiming to facilitate a shift toward circularity in the plastic economy and promote sustainable development. To achieve this goal, it is necessary to highlight the decisive role of consumers in the adoption of recycled products. Nevertheless, there is limited research on consumers' purchase intentions toward PRP in this region. This underscores the necessity of conducting surveys in Vietnam. The targeted population for this study was the older Generation Z (18–26 years old), who have recently emerged as prominent consumers (Kim et al., 2021). Additionally, statistics from 2021 reported that young people will account for the largest global population (UN, 2022), which is expected to exert a substantial influence on consumption trends and drive a transformation in the concept of sustainability and the CE system (Chaturvedi et al., 2020; Kim et al., 2021). Numerous empirical surveys have confirmed that young individuals are well-educated and environmentally oriented, concerned about their public image, and represent one of the most sustainability-focused generations (Chi, 2015; Francis and Hoefel, 2018; Gaur et al., 2015; Park and Lin, 2020). Regarding green consumerism, this generation, who are currently attending college or university (Nguyen et al., 2018), might pursue green, ethical, repairable, long-lasting, and eco-friendly products (Adnan et al., 2017; Kim et al., 2021), but lack the motivation to purchase green products. (Muralidharan et al., 2016). Hence, comprehending the purchasing behavior of consumers within this age group is imperative (Chaturvedi et al., 2020).

From these points of view, the data were collected from undergraduate and graduate students who are currently enrolled in three colleges (3-year programs) and seven universities (4- to 6-year programs for bachelors or doctorate, respectively, and 2-year programs

Table 1
Measurement items adopted in the current study

Measurement items		References
Code	Statement	
PE1	I can purchase PRP easily if I want to	(Zahan et al., 2020)
PE2	It is easy for me to find PRP when I go shopping	(Zahan et al., 2020), (Dobbelstein and Lochner, 2023) (opposite)
PE3	I have plenty of opportunities to buy PRP	(Zahan et al., 2020), (Dobbelstein and Lochner, 2023) (opposite)
IC1	I hope to get vouchers when I buy PRP	(Dobbelstein and Lochner, 2023)
IC2	I hope to earn redeem points (accumulated for gift) when I buy PRP	(Dobbelstein and Lochner, 2023)
IC3	I hope to get discount on products when I buy PRP	(Dobbelstein and Lochner, 2023)
HC1	I doubt that PRP contain toxic substances	(Widayat et al., 2022)
HC2	I doubt that PRP contain contaminants	(Dobbelstein and Lochner, 2023; Widayat et al., 2022)
HC3	I doubt that using PRP is not safe for my health	(Hein, 2022)
AR1	I feel responsible to buy PRP	
AR2	I feel morally obligated buy PRP	(Chaturvedi et al., 2020)
AR3	It would be right of me to buy PRP	
AC1	Using PRP is the major way to prevent plastic waste pollution and conserve natural resources	(Kim et al., 2021)
AC2	Using PRP helps to build a better environment for future generations	(Queiroz et al., 2021)
AC3	Using PRP helps to increase the quality of ecosystem in the environment	(Hein, 2022)
IU1	I am likely to buy PRP	(Calvo-Porrall and Lévy-Mangin, 2020; Queiroz et al., 2021)
IU2	I have the intention to buy PRP	(Hein, 2022)
IU3	I definitely want to buy PRP	(Chaturvedi et al., 2020)

for masters), covering North to South Vietnam. In this study, a non-probabilistic quota sampling method was employed, and a self-administered questionnaire was created using Google Forms and shared with connectors. Subsequently, the questionnaire link was distributed to participants across different social media platforms (including Gmail, Outlook, Facebook, and Zalo) and across different social groups using connectors. Finally, 718 completed answers were collected during the two months from August to September 2023. After removing biased responses, 564 responses were useful for further analysis, resulting in an effective response rate of 78.55%.

The demographic profiles of the respondents included gender, age, and study profile (major and educational level). Of the 564 respondents, 123 were male (21.8%) and 438 were female (77.7%), while only three respondents (3) categorizes themselves as being of another gender (0.5%). The sample consisted of students aged between 18 and 25 years: 92% were 18–20 years old; 8% were aged 21–25 years. The age group of respondents in this study aligns with the primary focus of this study, which targets young consumers aged 18–26. According to statistics, this age group constitutes a substantial portion—nearly 12%—of the demographics across the nation (UN, 2022). Regarding the study profile, most respondents were pursuing a bachelor's degree (15.6% and 82.4% for college and university education, respectively). Only 2% of participants were studying for a master's degree. Most respondents were studying in the field of Social Sciences (56.2%), followed by those majoring in Natural Sciences, Engineering, and Economics (10.6%, 10.3%, and 8.0%, respectively). A minor proportion of participants focused on Healthcare Sciences (6.4%), Agriculture (3.5%), and Languages, Arts and Humanities (5.0%).

3.3. Analytical approach

Data analyses were conducted in two stages using the Statistical Package for Social Sciences (SPSS, version 22, IBM Corp., Armonk, New York) and Analysis of Moment Structures (AMOS, version 22, IBM Corp., Armonk, New York), as outlined below.

The first stage involved defining the underlying structure of a group of measurement items and analyzing the reliability of the scales. An exploratory factor analysis (EFA) was performed to check the common factors of all item variables used and to verify the valid-

ity of the variables. To measure the reliability and internal consistency of a set of survey items, Cronbach's alpha was applied to determine whether a set of items consistently assessed a shared attribute. Cronbach's alpha measures the level of agreement using a standardized scale ranging from 0 to 1. Higher values signify increased concordance among items, and it is suggested that this value should be greater than 0.7 (Hair et al., 2019).

The second stage of analysis was a two-step approach to structural equation modeling to test the hypothesized associations. First, a confirmatory factor analysis (CFA) was performed to evaluate the properties of the measurements, including reliability, convergent validity, and discriminant validity. In CFA, convergent validity refers to the coherence of a group of indicators in assessing the latent factor and discriminant validity refers to the uniqueness of the factors assessed through various sets of indicators (Kline, 2015). Finally, a structural model was used to examine the path correlations between the five independent and dependent factors.

4. Findings

4.1. Results of EFA

Table 2 presents the results of EFA using the principal axis factoring extraction model and the Oblimin rotation method with the Kaiser Normalization rotation method. To evaluate the issues of low correlations and singularity, correlation matrix, Kaiser-Meyer-Olkin (KMO), and Bartlett's Test of Sphericity are screened. The determinant of the correlation matrix was 0.000 02 that was greater than 0.000 01, suggesting that there was no potential for multicollinearity. A significant value of the Bartlett test of sphericity ($\chi^2 = 6\ 264$, $df = 105$, $sig. < 0.000\ 1$) signifies that the data do not result in an identity matrix, suggesting that there are sufficient relationships between the variables to perform factor analysis. A KMO value of 0.929, which is greater than 0.7 (Hair et al., 2019), demonstrated an adequate sample for conducting factor analysis. Communalities, which are estimates of shared or common variance among the variables after extraction has taken place, ranged from 0.563 to 0.826 (see Table 2).

Factor extraction was performed using the total variance explained and a scree plot. It is recommended that the retained factors account for at least 70% of the total variability. In the scree plot, the

Table 2
EFA

Measurement items	Communalities	Extracted factors KMO = 0.929; Bartlett's test of sphericity ($\chi^2 = 6\ 264$, $df = 105$, $sig. < 0.000\ 1$)					Factors' labels
		1	2	3	4	5	
AC3	0.790	0.875					Awareness of consequences(AC)
AC1	0.751	0.839					
AC2	0.731	0.710					
HC2	0.826		0.929				Health concerns(HC)
HC1	0.753		0.815				
HC3	0.719		0.803				
PE2	0.664			0.836			Perceived ease of application(PE)
PE1	0.563			0.683			
PE3	0.616			0.590			
IC1	0.779				0.888		Incentives(IC)
IC2	0.806				0.876		
IC3	0.777				0.809		
AR2	0.647					0.752	Ascription of responsibilities(AR)
AR1	0.721					0.704	
AR3	0.691					0.559	

Notes: Factor loadings from pattern matrix are reported; extraction method: principal axis factoring; rotation method: Oblimin with Kaiser normalization.

number of factors that can be extracted is determined by identifying the point of inflection where the curve’s slope noticeably levels off or flattens. From these criteria, as shown in Table 2 and Figure 2, five factors were extracted from the initial dataset of 15 measurement items, which explained 72.23% of the total variance. Five factors, named “Awareness of consequences”, “Health concerns”, “Perceived ease of application”, “Incentives”, and “Ascription of responsibilities”, each consist of three items, and all factor loadings exceed the suggested threshold of 0.5 (Hair et al., 2019). Follow-up reliability analysis revealed that all five factors achieved strong internal consistency, as indicated by Cronbach’s alpha values falling within the range of (0.813–0.916) (Table 3).

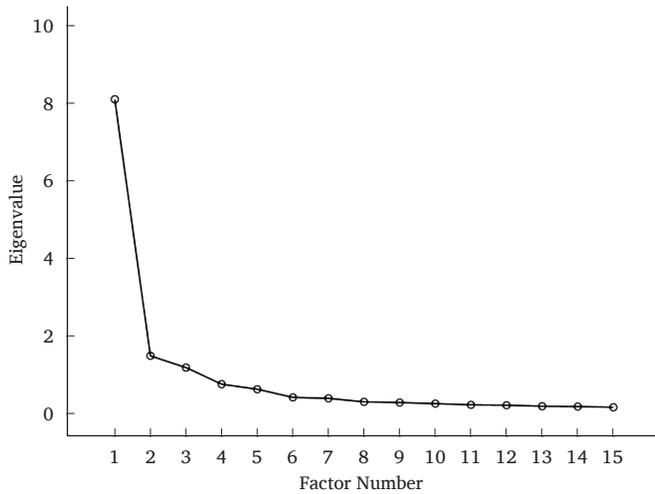


Figure 2. Scree plot

4.2. Measurement model analysis

To evaluate the model’s validity, such as reliability, convergent validity, and discriminant validity, indicators including Cronbach’s alpha, CR, AVE, and HTMT ratio were examined, and the outcomes are presented in Table 3. The Cronbach’s alpha scores for each factor exceeded 0.7, signifying that the measures demonstrated satisfactory internal reliability. Convergent validity was evaluated based on the criteria proposed by Fornell and Larcker (1981), which consists of three criteria: factor loadings (significant and > 0.5), CR (> 0.7), and AVE (> 0.5). The output obtained from the CFA showed that all factor loadings between each factor and its corresponding observed variables were significant, ranging from 0.743 to 0.893 (> 0.5), indicating that all factors adequately explained the observed variables (By-

rne, 2016; Hair et al., 2019). In addition, as can be seen in Table 3, the CR and AVE of all five factors are higher than the thresholds of 0.7 and 0.5, respectively. Therefore, all three conditions for convergent validity are satisfied. Regarding discriminant validity, the HTMT ratio was evaluated, and the findings showed that all HTMT values were below the 0.85 threshold suggested by Henseler et al. (2015), implying that the measurement model in this study demonstrated discriminant validity.

To examine the association between the observed and theoretical data that would be anticipated based on the model, a range of model fit indices were utilized to evaluate the model goodness-of-fit (Alavi et al., 2020). Two groups of model fit indices are applicable to the CFA: global (population-based) and local (sample-based). Each group includes three subcategories: absolute, incremental (relative or comparative), and parsimony fit indices (Alavi et al., 2020; Kline, 2015; Sun, 2005). Absolute fit indices evaluate the relationship of the overall theoretical model against a set of measurement items, and then evaluate how well the model fits the data compared with the baseline model, including the goodness-of-fit index (GFI), adjusted GFI (AGFI), root mean square residual (RMR), standardized RMR (SRMR), and root mean square error of approximation (RMSEA). Additionally, Chi-square (χ^2) statistic obtained using maximum likelihood method is also categorized in a group of absolute fit indices, which is for evaluating the fit between the proposed model and the observed data. A high chi-square p-value (> 0.05) suggests a more favorable model fit (the null hypothesis of a perfect fit is accepted). However, this tends to be sensitive when working with large sample sizes (Alavi et al., 2020; Byrne, 2016; Kline, 2015). The incremental fit indices indicate an enhancement in the model fit relative to the assumption of variable independence. Examples include the normed fit index (NFI), Tucker-Lewis index (TLI), comparative fit index (CFI), incremental fit index (IFI) and relative fit index (RFI). Parsimonious fit indices included the parsimonious GFI (PGFI), parsimonious NFI (PNFI), and parsimony comparative fit index (PCFI), whose values should exceed 0.5. The rule of thumb for evaluating the model fit is that values of GFI, AGFI, NFI, TLI, CFI, IFI, and RFI should be greater than 0.9 and 0.95 for an acceptable fit and a good fit, respectively. Additionally, to have an acceptable model, it is suggested that SRMR should be less than 0.05, and RMR and RMSEA less than 0.08 (Awang, 2012; Bentler and Bonett, 1980; Byrne, 2016; Hair et al., 2019). The fit indices of the measurement model in this study are presented in Table 4, which shows that all goodness-of-fit indices fulfilled the suggested criteria, indicating that the measurement model is a good fit for the data.

4.3. Structural model analysis

Following confirmation of the fit of the measurement model, the structural model was evaluated and the research hypotheses were

Table 3 Reliability, convergent and discriminant validity

Factors	Means	SD	Reliability (Cronbach’s α)	Convergent validity		Discriminant validity (HTMT analysis)					
				AVE	CR	PE	IC	HC	AC	AR	IU
PE	3.894	0.806	0.813	0.590	0.812						
IC	4.174	0.880	0.916	0.785	0.916	0.628					
HC	2.321	1.080	0.904	0.760	0.905	0.518	0.591				
AC	4.292	0.811	0.899	0.750	0.900	0.647	0.773	0.520			
AR	4.130	0.840	0.861	0.673	0.861	0.812	0.747	0.587	0.787		
IU	4.020	0.872	0.875	0.692	0.840	0.646	0.714	0.821	0.698	0.711	
Cut-off values			> 0.7	> 0.5	> 0.7	< 0.9					
Comments			Reliability, convergent, and discriminant validity are established.								

Notes: SD–standard deviation; AVE–average variance extracted; CR–composite reliability; HTMT–heterotrait-monotrait ratio.

Table 4
CFA goodness-of-fit statistics

Fit index	Abbreviation	Findings		Threshold ^Δ	Yield
		CFA model	Structural model		
Goodness-of-fit index	GFI	0.934	0.925	> 0.90	Fulfilled
Adjusted goodness-of-fit index	AGFI	0.905	0.900	> 0.90	Fulfilled
Root mean square residual	RMR	0.030	0.031	< 0.08	Fulfilled
Standardized root mean square residual	SRMR	0.032	0.032	< 0.05	Fulfilled
Mean square error of approximation	RMSEA	0.060	0.066	< 0.08	Fulfilled
Normed fit index	NFI	0.955	0.949	> 0.90	Fulfilled
Tucker-Lewis index	TLI	0.960	0.953	> 0.90	Fulfilled
Comparative fit index	CFI	0.969	0.963	> 0.90	Fulfilled
Incremental fit index	IFI	0.959	0.963	> 0.90	Fulfilled
Relative fit index	RFI	0.942	0.935	> 0.90	Fulfilled
Parsimonious goodness-of-fit index	PGFI	0.650	0.649	> 0.5	Fulfilled
Parsimonious normed fit index	PNFI	0.743	0.744	> 0.5	Fulfilled
Parsimony comparative fit index	PCFI	0.754	0.755	> 0.5	Fulfilled
Normed chi-square	CMIN/DF	3.039	3.417	[1,5]	Fulfilled

Notes: ^ΔAwang (2012); Bentler and Bonett (1980); Byrne (2016); Hair et al. (2019).

tested using AMOS 22 software. Looking back at Table 4, the goodness-of-fit of the model is assessed using a chi-square test, resulting in a ratio of chi-square to degrees of freedom of 3.417, remaining below the recommended maximum threshold of 5.0. All fit indices were within the range of the suggested values (Table 4). Thus, it was confirmed that the model had a good fit and was suitable for hypothesis testing.

The structural model was then analyzed to quantify the relationships among multiple variables. The coefficient of determination (R^2), which indicates the proportion of variance in the dependent variable predicted by the independent variables, was computed. As shown in Figure 3, 80.4% of the variance in consumers’ purchase intention for PRP was accounted for by the five independent factors ($R^2 = 0.804$), which greatly exceeds the reference value of 0.1 (Raithel et al., 2012), indicating greater explanatory power (Hair et al., 2021). The standardized path coefficients (β) between the factors are also calculated and the outcomes are presented in Figure 3 and Table 5.

The analysis reveals that consumers’ intention to purchase PRP is significantly influenced by four of the five initially proposed factors, with only the “ascription of responsibilities” factor failing to exhibit a statistically significant impact on purchase intention among the participants in this study. These findings support H1, H2, H3, and H4, while H5 is not supported (Table 5). Consumers’ purchase intention for PRP is significantly predicted by perceived ease of application ($\beta = 0.112, P < 0.10$), monetary incentives ($\beta = 0.127, P < 0.05$), health concerns ($\beta = -0.586, P < 0.001$), and awareness of consequences ($\beta = 0.220, P < 0.01$), among which health concerns has the strongest effect on purchase intention and in the negative side.

5. Discussion and implications

Grounded in the concept of “cognitive-rational” decision-making, a theory such as VT (Peter and Tarpey, 1975) proposes that consumers are likely to aim for a thorough assessment of value and risk when making purchasing decisions. The findings of this study confirm that its application in the case of PRP is significant. In alignment with the observations of Bigliardi et al. (2020), the current research illustrates how consumers weigh the trade-offs between perceived value and perceived risk, and how outcomes strongly contribute to their purchase

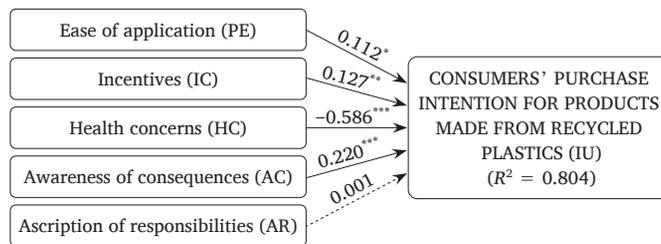


Figure 3. Path analysis
Notes: The solid lines represent significant path coefficients, while the dashed line indicate insignificance. * $P < 0.10$, ** $P < 0.05$, and *** $P < 0.01$.

Table 5
Findings from hypotheses testing

Hypotheses	Coefficients	P-value	t-stats	Remarks
H1: PE ---> IU	0.112	0.084	1.725	Pass
H2: IC ---> IU	0.127	0.019	2.345	Pass
H3: HC ---> IU	-0.586	***	-14.469	Pass
H4: AC ---> IU	0.220	***	3.747	Pass
H5: AR ---> IU	0.001	0.993	0.009	Fail

Notes: *** $P < 0.01$.

determinations. This suggests that consumers’ intentions to purchase PRP are positively influenced by perceived ease of application and monetary incentives, whereas health concerns have a negative impact.

Among the three VT factors examined, health concerns exert the most substantial influence, meaning that risks related to human health are at the forefront of consumers’ minds in the decision-making process. This outcome is supported by numerous previous studies that have emphasized how the potential for bodily harm or physical risks may hinder the adoption of recycled products (Akkucuk, 2011; Calvo-Porral and Lévy-Mangin, 2020; Hamzaoui-Essoussi and Linton, 2010; Hamzaoui Essoussi and Linton, 2014; Magnier et al., 2019; Queiroz et al., 2021). A plausible explanation for consumers’ heightened health concerns is their frequent perception of recycled products as inferior to traditional new products (Hamzaoui-Essoussi and Linton, 2014). Limited research has discovered that consumers may have negative perceptions of recycled plastics used in circular

production, primarily driven by concerns related to contagion and contamination, which could potentially harm human health (Kim et al., 2021). For example, Meng and Leary (2021) discovered that apparel made from recycled PET bottles reduced purchase intention, as consumers had safety concerns about garments. Safety-related concerns may arise from a lack of consumer knowledge about product safeguards taken by manufacturers or from their limited previous experience in using PRP (Calvo-Porrall and Lévy-Mangin, 2020; Hazen et al., 2017). Furthermore, imagined changes resulting from consumers' negative mental associations lead to a greater perception of the risks to personal health from recycled products (Pretner et al., 2021). In Vietnam, information about the PRP production process is not widespread, potentially leading consumers to have a limited understanding of the safety of PRP. Additionally, some recycling manufacturing facilities in Vietnam, primarily small-scale or home businesses, may improperly operate the recycling processes. The PRP from these manufacturers lacks quality control and supervision from the authorities. Consequently, this can lead to poor-quality PRP and potential health risks. Diagnosing the reasons for the high level of health concerns among consumers regarding PRP helps to generate recommendations to address this issue. To mitigate the perceived health-related risks, steps should be taken to enhance transparency in the production process, establish a reputable brand name, and offer warranties. These actions can help alleviate doubts about the potential harm caused by PRP, ultimately fostering greater confidence and a positive societal impact.

Conversely, the two factors linked to perceived benefits also play a crucial role in shaping consumers' purchase intentions toward PRP. Both perceived ease of application and monetary incentives exhibited considerable impacts on intention, with monetary incentives having a slightly stronger influence than perceived ease of application. The positive effect of incentives has been reported as a primary driver that encourages consumers to buy recycled products and can take various forms, including discounts, vouchers, reward points, and other promotional campaigns (Baier et al., 2020; Barbu et al., 2018; Camacho-Otero et al., 2019; Dobbstein and Lochner, 2023; Grewal et al., 1998; Jiménez-Parra et al., 2014; Kuah and Wang, 2020). Recycled products in the market face the ongoing challenge of achieving an equal perception of conventional products. Pricing is a prominent issue, often resulting in higher or comparable costs. While recycled products offer strong environmental benefits by conserving natural resources and reducing waste, their production remains expensive as they encompass all expenses associated with collection, transportation, recycling, and manufacturing (Conke, 2018). Nevertheless, consumers expect to pay less for recycled products than for new ones because they believe that the inputs for these recycled items are sourced from post-consumer waste, which is typically more cost-effective than raw materials. In addition, there is a perception that recycled products may be of lower quality because they are not made of virgin materials like new products, thus prompting the expectation of lower pricing for these recycled items (Hamzaoui Essoussi and Linton, 2010; Kuah and Wang, 2020; Magnier et al., 2019; Pretner et al., 2021; Sun et al., 2018).

Therefore, to encourage customers to purchase recycled products in general, and PRP specifically, it is essential to find a solution that aligns the price of recycled products more closely with consumer price perceptions (Esmat, 2023). In the short term, providing promotions or monetary incentives to consumers when purchasing PRP can serve as stimuli to boost their purchase intentions. In fact, Jiménez-Parra et al. (2014) revealed that promotion introduces contingencies into the consumer decision-making process, leading to personally relevant objectives, such as the desire to save money or be resourceful with available resources, consequently raising the possibility of purchasing products. In the long term, producers should find the way to lower manufacturing costs of recycled products through technological innovation and logistical optimization. However, government support

is required, which includes tax reductions on these products and the introduction of laws that promote investments in recycling businesses to foster opportunities and innovations within this industry.

This study also found that perceived ease of application significantly influenced the purchase intention of young Vietnamese consumers toward PRP. This finding is consistent with several studies suggesting the importance of the availability and accessibility of sustainable products (Connell, 2010; Nguyen et al., 2019; Walia et al., 2020; Zahan et al., 2020) or recycled products (Dobbstein and Lochner, 2023). Specifically, Nguyen et al. (2019) and Walia et al. (2020) found that the availability of green products has a notable impact on purchase intentions, which aligns with Connell (2010) and Gleim et al. (2013) observed that the unavailability of these products is a significant barrier. In a study focusing on recycled products conducted in Germany and South Africa, Dobbstein and Lochner (2023) reported that the greater the effort consumers exert when purchasing recycled products, the lower their intention to purchase. Therefore, it is advisable to provide consumers with convenient access to PRP. One feasible recommendation is to make PRP available not only in physical stores, but also through online platforms, facilitating access for consumers, particularly the younger generation, who increasingly favor online shopping.

Regarding the concept of “social and environmentally friendly” decision-making, derived from NAM, while the awareness of consequences is powerful in predicting consumers' intention to purchase PRP, the ascription of responsibility fails to demonstrate a significant predictive effect. In the current research model, the impact of AC is identified as strong, second only to health concerns regarding the weight of the standardized path coefficients. The results of this study are in line with the idea that awareness of consequences has one of the greatest effects on purchase intentions (Chaturvedi et al., 2020; Dobbstein and Lochner, 2023; Kim et al., 2021; Magnier et al., 2019; Queiroz et al., 2021). This implies that young Vietnamese consumers who exhibit a heightened awareness of the environmental consequences of plastic waste, or, more simply, a stronger consciousness of environmental protection through the adoption of recycled products, are more likely to consider purchasing PPR. It can be explained that the increase in purchase intention among consumers can be attributed to their perception of the significant environmental benefits offered by PRP, as confirmed by research conducted with Dutch consumers by Magnier et al. (2019) which focused on apparel made from ocean plastic. Kuah and Wang (2020) found that Asian consumers consider recycled products to have a minimal environmental footprint that motivates their use. Furthermore, previous research indicates that products with reduced environmental impacts or favorable environmental characteristics generally elevate consumers' perceived value, which in turn increases consumers' intention to purchase. This relationship has been confirmed across various product types including packaging (Testa et al., 2020) and recycled plastic-sourced apparel (Luu and Baker, 2021). Similarly, Sun et al. (2018) indicated that consumers decide to use products made from recycled materials because of environmental concerns and awareness of environmental issues. Michaud and Llerena (2011) and Pretner et al. (2021) reported that a greater awareness of environmental consequences results in increased consumer willingness to pay for remanufactured domestic appliances and circular products, respectively. Based on the above discussion, it is evident that disseminating information about the environmental benefits of recycled products or PRP to the community is crucial as it aids in motivating more consumers to purchase PRP. It is highly recommended that all stakeholders prioritize strengthening a propaganda scheme aimed at raising awareness about the environmental benefits of PRP adoption, which contribute to the reduction of plastic waste, mitigation of environmental pollution, and preservation of natural resources.

5. Conclusion and limitations

This study investigates the effects of drivers and barriers on consumers' purchase intentions toward PRP in Vietnam. Drawing from the concept of "cognitive-rational" decision-making extracted from VT, it is evident that among young consumers, the perceived risk associated with health concerns is the most influential barrier that hampers their intention to purchase PRP. Contrastingly, the perceived benefits arising from perceived ease of application and monetary incentives exert a significant positive influence on intention, with monetary incentives having a slightly stronger impact than perceived ease of application. It is also found that awareness of environmental consequences, a factor aligned with the altruistic aspect in NAM theory, is identified as the strongest driver of consumers' purchase intention toward PRP. Based on these findings, it is essential to conduct educational programs or propaganda campaigns that equip consumers with knowledge and information about health safety and the positive environmental attributes of PRP. Additionally, the promotion scheme and availability of PRP are equally important factors that make it more affordable and accessible, thereby incentivizing more people to engage in PRP purchases. Thus, it is expected that the perceived benefits outweigh the negative perceived risk, primarily due to health concerns, when consumers consider purchasing PRP.

Nevertheless, this study had certain limitations that open avenues for future research. First, the observed sample in this study is university students who represent a part of Generation Z. Therefore, it is recommended that future research broaden its scope to include diverse participant groups beyond students, conducted in more areas and nations as well, to explore potential differences in demographics among consumers' purchase intentions. Second, the inclusion of additional influential factors could enhance the examination of generalizability, leading to a more comprehensive understanding of consumer purchase intentions concerning PRP. Regarding the previously mentioned constraints and potential directions for future research, this study holds significant value for academics interested in the topic as it provides a framework that aids in theorizing additional effects. Furthermore, the valuable insights gained regarding consumers' acceptance of PRP can significantly assist managers in formulating strategies to improve their engagement and tackle unfavorable responses from consumers toward these products. In the long run, this will motivate more individuals to promote sustainable consumption and a CE.

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Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author used ChatGPT in order to check and correct grammar and spelling. After using this service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Ethics statement

The authors declare that their Institutional Ethics Committee confirmed that no ethical review was required for this study. Written informed consent for participation was not required because all participants' data was anonymized before the statistical analyses were done.

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