



# **An exploration into gender differences in Chinese consumers' green purchase intention**

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This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

## **Abstract**

With the expansion of green consumption across the whole world, this research seeks to explore the crucial determinants influencing individuals' green purchase intentions and the gender differences in the antecedents of consumers' green purchase intention. An extended version of the Theory of Planned Behavior (TPB) serves as the theoretical framework for this study. The extension was implemented by introducing three new variables: environmental concern (EC), environmental knowledge (EK), and perceived consumer effectiveness (PCE). Data of the study was gathered through a questionnaire survey method and analyzed using structural equation modeling (SEM). The findings suggest that consumers' environmental attitudes, environmental concern, subjective norm, and perceived consumer effectiveness all positively influence their intention to purchase eco-friendly products and services. However, the impact of environmental knowledge on individuals' green purchase intention was surprisingly found to be negative. In terms of the gender differences in the determinants of green purchase intention, women usually show more positive environmental attitude than man while man tend to possess more environmental knowledge compared to women. No apparent gender differences were found in environmental concern, subjective norm and perceived consumer effectiveness. Based on the results, this paper suggests that companies must redouble their efforts in developing their sustainable marketing strategy to meet the needs of customers who increasingly prioritize sustainability today.

**Key words:** *Green consumption, Purchase intention, Gender, Environmental Attitudes, Environmental Concern, Environmental knowledge, Theory of Planned Behavior*

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# 1. Introduction

## 1.1 Backgrounds

Global warming, air pollution, water scarcity, soil erosion, plastic pollution, ocean acidification, depletion of natural resources, deforestation and loss of biodiversity are some of the current environmental problems that greatly threaten the sustainability of economic and society development and make human vulnerable to disasters and tragedies (Lange & Dewitte, 2019; Maleksaeidi & Keshavarz, 2019; Raeisi et al., 2018). “ Environmental quality strongly depends on the human behavior patterns ”, as Azadi et al. (2019) said. Similarly, Fahlquist (2009) claimed that the actions performed by individuals, as consumers and citizens, have aggregate negative consequences for the environment. With the ever-expanding globalization and the rapid spread of consumerism, enormous increase in the consumption of goods and services by consumers worldwide, leading to the depletion of natural resources and serious damage to the environment (Chen & Chai, 2010). Consumers in a capitalist society enjoy unprecedented individual comfort, convenience and choice (Lim, 2017), whilst our earth is suffering in all sorts of ways.

The continuous deterioration of the natural environment has placed extraordinary pressure on society and the well being of human and it has raised the issue of preserving the ecosystem and natural resources which in turn resulted in ethical consumption known as green consumerism (Moisander, 2007). In recent years, green, sustainable, and ethical consumption has gained considerable attention across the world (Jan et al., 2019). Green consumerism has grown rapidly in developed countries, and over time the concept has also gained a foothold in some developing countries (Raghavan & Vahanti, 2009).

China, being one of the largest developing countries, has undergone rapid changes since adoption of the reform and the opening policy in late 1978. As the economy has speedily grown, though, so have the environmental challenges, causing enormous

socioeconomic impact for China and the rest of the world (Liu & Raven,2010). “Facing the dual background of international and domestic environment change, developing green economy has become the necessary choice of the Chinese government ”, Lin and Zhou (2022) claimed.

Nowadays, China is still in the early stages of sustainable development and green management. But With China's economy attaching more importance to sustainable development, Government, organizations and enterprises have put integration of efforts to keep promoting green consumption development. Government have implemented green procurement policies to take advantage of its public leadership to advance green procurement in the private sector and guide public green consumption (Liu et al., 2019). Businesses positively change their production and package mode to responded to environmental problems and the relevant changes in consumers' environmental attitudes. Some of the firms have applied green marketing strategies to boost consumers' purchase of environmental-friendly products (Zhang & Dong, 2020).

However, ultimately, environmental degradation needs to be alleviated by changing individual consumption patterns. As the terminal of green consumption, consumers are the key stakeholders. Their consumption mode are the top priority in promoting green purchase development, since 30%–40% of ecological environmental deterioration is caused by personal and household consumption (Grinstein & Nisan, 2009). Therefore, a shift toward more clean, sustainable individual consumption patterns is imperative for realizing the harmonious coexistence of humans and nature.

Green consumption is typically associated with environmentally responsible consumption, where consumers consider the environmental impact of purchasing, using, and disposing of various products (Moisander, 2007). Notably, there are perpetuating differences in pro-environmental purchase behavior from a gender perspective (Vicente-Molina et al., 2018). Past research since the 1990s has concluded



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that women generally possess a higher level of concern for the environment than men (e.g., Greenbaum, 1995; Blocker & Eckberg, 1997; Tindall et al., 2003). Compared to men, women buy more green products particularly green cosmetics and hygiene products and organically farmed food (Sousa et al., 2022). Vicente-Molina et al. (2018) maintained that, compared to males, females show a greater emphasis on environmentally friendly behavior, and pro-environmental behavior is influenced by factors of various types, which appear to be moderated by gender. Nonetheless, Scott and Willits (1994) maintained men are more inclined to purchase environmentally friendly products. Regarding public pro-environmental behaviors, Johnson et al. (2004) found significantly greater participation among men compared to women. Overall, previous research findings appear to be conflicting, and there is no consensus yet on whether men or women generally exhibit higher level of pro-environmental behaviors (Lee et al., 2013). However, regardless of this, researchers (Gilg et al., 2005; Xiao & McCright, 2015) emphasized that gender can account for biases and inconsistencies observed in prior studies on pro-environmental behavior and gender do play an important role in environmental friendly practices.

In order to elucidate the gender differences present in green consumption and explain its impact on green behaviors, it is imperative to first clarify the key antecedents influencing green purchasing behavior. It has been widely discussed that green purchase behavior is affected by a variety of factors that can be categorized into groups, including personal psychological factors (e.g., attitudes, beliefs, perceived consumer effectiveness, values and personal norms, trust, and knowledge) and external environmental factors (e.g., price, product availability, product attributes and quality, brand image, eco-labeling, and consumption context) (Peattie, 2010; Joshi & Rahman, 2015).

Different models and theories have been introduced and utilized to support the empirical exploration of factors influencing green purchase intention or behaviour, such as the Theory of Planned Behavior by Ajzen (1991), the Value-Belief-Norm

theory by Stern et al.(1999), Attitude-Behavior-Context theory by Stern and Oskamp (1987), the Norm Activation Model by Schwartz and Howard (1981) (Chaudhary & Bisai, 2018; Goh & Balaji, 2016; Jaini et al., 2020; Yadav & Pathak, 2017). Among these theories, the most popular of which in environmental psychology are the Theory of Planned Behavior. TPB is widely applied for explaining human behavior in a broad range of fields and more specifically it has great applicability in the field of environmental behavior (Stern, 2005). This study applies the Theory of Planned Behavior (TPB) framework to understand consumers' intention and behavior toward purchasing green products. In this regard, the impact of variables of environmental attitudes, environmental concern, environmental knowledge, subjective norm, perceived consumer effectiveness, and the effect of gender on consumers' green purchase intention will be assessed.

## 1.2 Research questions

The motives for green purchases are diverse, complex, and context-dependent (Abrar et al., 2021). Several researchers claimed that green purchase intention are generally driven by attitude toward the green products, social norms and perceived behaviour control or self-efficacy regarding the purchase of green products ( Nguyen Thi Tuyet et al., 2017; Taufique & Vaithianathan, 2018; Dilotsolthe, 2021; Vu et al., 2022). Diamantopoulos et al.(2003) found behavioral effects of a consumer's personality characteristics and general environmental attitudes suggest that values and environmental concern are principal determinants of green consumption. Then they added that other reasons may also explain the increase of green consumption, such as the attributes of green products (e.g., recyclability, durability, biodegradability).

Elham and Nabsiah (2011) reported that attitude and demand for environmental sound products may be uneven across different market segments and cultures. Given the complexity of consumers' green purchasing behavior, generalization is not meaningful under various cultural, social and demo-graphical contexts (Ali & Ahmad,

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2016). Wang et al.(2019) concluded that most of the previous research on green purchasing behavior were conducted in individualistic developed markets while understanding green consumption requires diverse focus in developing and developed markets due to diverse socio-cultural factors. Consequently, research on identifying the crucial determinants of consumers' green purchase intentions in emerging Asian markets is considered to be opportune (Wang et al., 2019). Based on arguments above, the following research questions are posed:

*RQ1:What are the antecedents for green purchase behavior intention?*

As we mentioned above, multiple previous research have indicated that there are significant gender differences in green purchase behavior. Several researchers found women have higher pro-environmental attitudes than men (Heinzle et al., 2010; Vinz, 2009; Xiao & Hong, 2010; Zelenzny et al., 2000). According to other researchers, women show relatively stronger environmental concern and behavior than men (Dietz et al., 2002; Mc Cright, 2010; Xiao & Mc Cright, 2015). Likewsie, Vicente-Molina et al.(2018) reported that women tend to show higher levels of pro-environmental behavior than men, since women tend to have more altruistic motivation and have more perceived consumer effectiveness. As per Kollmuss and Agyeman (2002), women exhibit a higher engagement in pro-environmental behavior, primarily driven by their emotional considerations and general openness to embrace change. Some studies have shown that women's greater involvement in environmental behaviors is related to behavior patterns that typically can be carried out in regular daily routines, since women typically assume more family obligations compared to men (Hunter et al., 2004; Xiao & Hong, 2010; Tindall et al., 2003). Researchers (Blocker & Eckberg, 1997; Davidson & Freudenburg, 1996) maintained that the gender difference can be explained because of the different socialization process that men and women undergo and therefore develop different social expectations and values (Chodorow, 1978; Gilligan, 1982).

However, previous research on gender and pro-environmental behavior has not conclusively determined whether men or women are more likely to participate in such behavior (Lee et al., 2013). Some researchers uncovered no significant gender differences in environmentally friendly behaviors (Berenguer et al., 2005), while several empirical studies examining the relationship between gender and environmental behaviors have yielded mixed results. For instance, Scott and Willits (1994) found men are more likely to purchase green products, but men and women have similar levels of environmental concern. Eisler et al. (2003) concluded that men tend to engage in environmental related behaviors more strongly than women. Furthermore, Hunter et al. (2004) discovered that in the majority of countries included in the 1993 International Social Survey, women showed higher involvement in household-oriented private environmental actions, whereas there were no apparent and consistent gender differences in environmentally activities carried out in public society-oriented settings. Given these conflicting findings, there is a clear need for further investigation into the role of gender in green behavior.

According to Agarwal (2000), previous studies in Western cultures have found gender differences in environmental perceptions, values and behaviors. However, this issue has not often been examined in the context of Asian developing countries. This study seeks to fill this gap by examining gender differences in Chinese urban consumers': environmental attitude, environmental concern, environmental knowledge, perceived consumer effectiveness, subjective norms and green purchasing behaviors. This leads to the proposed research question for our thesis:

*RQ2: Are there significant gender differences in green consumption? How gender differences affect the antecedents of consumers' green purchase intention?*

## 2.Literature Review and Hypothesis Development

### 2.1 Theoretical basis

#### 2.1.1 Theory of Planned Behavior (TPB)

The theory of planned behavior (TPB) (Ajzen,1991) was developed from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen 1975; Ajzen & Fishbein 1980). TPB is a psychological theory used to predict deliberate human behavior (Ajzen,1991), which explains the influence of personal determinants, social environment and non-volitional determinants on behavioral intentions (Han & Kim, 2010). The TPB has now become a prominent framework for predicting and explaining behavior in various fields (Steinmetz et al., 2016). The theory posited that human conduct is voluntary and addresses the importance of individuals' inherent personality in decision-making (Kamalanon et al., 2022).

TPB considers behavioral intentions are the most proximal determinants of human behavior (Ajzen, 1991; Orbell, 2004). Accordingly, we take green purchase intention as a predictor of actual green purchase behavior. Besides, behavioral intentions to perform different behaviors can be predicted with high accuracy from three core elements, namely, attitudes toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 1991). Figure 1 illustrates the model of TPB.

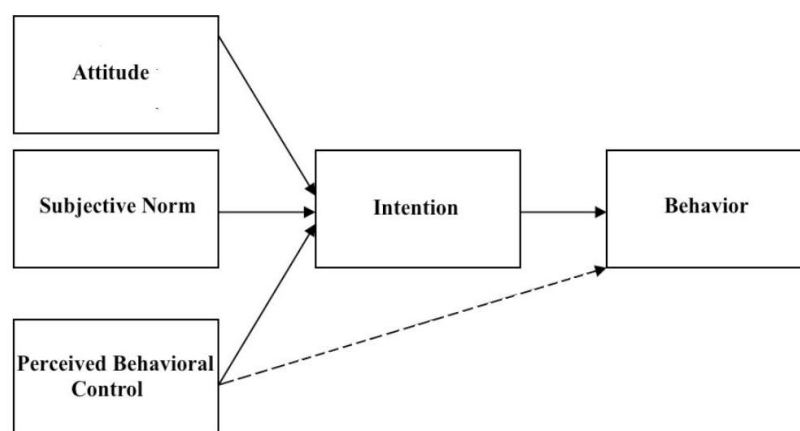


Figure 1. Model depicting the theory of planned behavior (Ajzen, 1991)

The TPB has been used in a broad range of human behaviors, including predicting academic achievement (Ajzen & Madden, 1986), predicting exercising intentions (Godin, Valois & Lepage, 1993), predicting weight loss (Shifter & Ajzen, 1985), predicting and explaining use and misuse of alcohol (Marcoux & Shope, 1997). Meanwhile, TPB has been successfully applied in substantial research on environmental choices and behaviors (Nigbur et al., 2010; Oreg & Katz-Gerro, 2006; Morren & Grinstein, 2016) and the theory of planned behavior is validated in the context of pro-environmental behavior (Arvola et al., 2008). Moreover, Kalafatis et al. (1999) concluded that the TPB is a reliable and foundational model of intention to purchase green products and TPB constructs can be used to detect the relevant antecedents of green purchase behavior.

In this paper, we propose an extended model based on the original TPB model. Apart from attitude toward environment and subjective norm, other three main antecedents of green purchase intention were added to the Ajzen's Theory of Planned Behavior (TPB) for a more comprehensive model, namely, environmental concern (EC), environmental knowledge (EK), and Perceived Consumer Effectiveness (PCE). We suppose that these factors could help understanding the green purchase intention and behaviour (Emekci, 2019). Furthermore, this study highlights the role of gender as a crucial predictors of the antecedents of green purchase intention.

## 2.2 Research hypothesis

### 2.2.1 Environmental attitudes (EA)

Ajzen and Driver (1991) posited that attitudes were shaped by one's beliefs regarding the consequences of engaging in a particular behavior and the perceived significance of those consequences for the individual. In other words, attitudes are influenced by how people think a behavior might affect them and how important they feel those

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effects are. Attitude captures an individual's overall evaluation (a favorable or unfavorable) of a target behavior (Steinmetz et al., 2016). Some researchers (Jung et al., 2014; Lee, 2009) defined environmental attitudes (EA) as individuals' affection for and judgement towards environmental protection. Milfont and Duckitt (2010) described environmental attitude as a psychological inclination to view the environment positively or negatively. While green purchase intention and behaviors are driven by three main factors, green attitudes is the one which demonstrate the most predominant influence on the individual's intention to buy green products (Biswas & Roy, 2015; Paul et al., 2016; Verma & Chandra, 2018; Taufique & Vaithianathan, 2018; Nguyen & Nguyen, 2020). According to TPB, the more positive the attitude is towards a specific behavior, the stronger the intention of an individual to complete that behavior (Ajzen, 1991). Gifford and Sussman (2012) also testified that environmental attitude often determine behaviors that either increases or decreases environmental quality.

Some studies considered that people's environmental attitude doesn't effectively promote sustainable behaviors (Hobson, 2002; D'Souza et al., 2006) and researchers (Davis et al., 2009) stated that the correlation between environmental attitude and environmental behaviour is either moderate or tenuous. However, most relevant studies have so far validated that environmental attitude and green purchase intention both positively related with each other (Schlegelmilch et al., 1996; Flamm, 2009; do Paço and Raposo, 2009; Aman et al., 2012; Aksoy et al., 2013; Yadav & Pathak, 2016). Also, a favorable and statistically significant influence of environmental attitude has been reported for the purchases of green products (Kalafatis et al., 1999; Kim & Choi, 2005).

According to Scott and Willits (1994), there is no significant relationship occurred between gender and environmental attitude. However, numerous studies across countries have validated that among adults, environmental attitudes differ significantly by gender, consistently demonstrating that women have higher

pro-environmental attitudes than men (Heinzle, et al., 2010; Vinz, 2009; Xiao & Hong, 2010; Zelenzny et al., 2000). For instance, an empirical study of Paço and Lavrador (2017) concluded that when it comes to environmental attitudes and behaviors, females usually seem to display more awareness around the ecological issues than man. Gender socialization and gender role theories are frequently employed to elucidate the observed gender variations in environmental attitudes and behaviors (Dietz et al., 2002; Zelezny et al., 2000; Xiao & McCright, 2015).

Several researchers contended that, traditional gender socialization encourages women's pro-environmental attitudes. For biological and reproductive reasons, women exhibit greater identification with natural ecological processes and adhere more strongly to pro-environmental attitudes than men, indicating the presence of distinct values in women as compared to men. And they stated that "women specifically values that emphasize caring and nurturing over resource exploitation and domination and women are, ipso facto, environmentally more benign" (Eisler, 1990; Strapko et al., 2016). Therefore, based on the discussion above, the following hypothesis is derived:

*H1a: Women are more likely to have a more positive EA compare to man*

*H1b: Environmental attitude positively influences green purchase intention*

### 2.2.2 Environmental concern (EC)

Environmental concern refers to an individual's awareness of environmental consequences of one's own behavior (Lim, 2020) and his/her willingness to tackle the environmental problem (Akehurst et al., 2012). It also reflects the importance that individuals place on ecological issues and environmental protection (Park & Lin, 2020). Moreover, Schultz (2001) stated that "the concerns for the consequences of environmental damage would from three correlated factors organized around self, other people and biosphere", that is three value orientations, egoistic, altruistic and



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biospheric. People with strong altruistic and biospheric values are more likely to accept the beliefs of ecological worldview (Phipps et al., 2003).

Despite some study considered the environmental concern as the antecedent of environmental attitude (Chwialkowska et al., 2020 ; Chen et al., 2021), a plenty of evidence has shown that environmental concern has a direct impact on green purchasing intention and behavior (Goh & Balaji, 2016; Arisal & Atalar, 2016; Prakash & Pathak, 2017; Park & Lin, 2020; Kamalanon et al., 2022). Besides, researchers (Chan, 1996; Donaton & Fitzgerald, 1992; Kerr, 1990; Ottman, 1993; Schlossberg, 1992) validated that the environmental concern of consumer is a useful predictor of green buying behavior, and it can positively influence purchase behavior of environmental-friendly products (Balderjahn, 1988; Roberts & Bacon, 1997).

One widely employed theoretic perspective pertaining to the correlation between gender and environmental concern involves the processes of socialization and resultant social gender roles (Davidson & Freudenburg, 1996). This perspective posited that during early childhood socialization, women tend to develop heightened sensitivity to the emotions and needs of others, thereby fostering a greater inclination toward caregiving for both individuals and the environment. In contrast, the socialization of men during early childhood encourages emotional regulation and places greater emphasis on values such as independence and achievement (Gilligan, 1982; Zelezny et al., 2000).

Strapko et al. (2016) highlighted the fact that the social gender roles do impact the environmental concern. Particularly, women have stronger beliefs than men about consequences for self, others, and the biosphere (Stern et al., 1993). As such, women tend to concern more about the environmental issue than man. Fukukawa et al. (2007) stated that women, as the “caregiver” role, are more concerned with social justice, harmony with nature, and environmental protection, while men, who tend to identify with the role of the primary family “breadwinner”, would pay more attention to personal success, capability development, ambitions and economic issues

(Wehrmeyer & Mc Neil 2000; Lan et al., 2009). Echavarren (2017) also noted that “Being woman, being older and being more educated increase the probability of EC.” Nevertheless, Blocker and Eckberg (1997) argued that while women do tend to show more concern about the environment, there is no clear evidence to suggest that women are more likely to engage in environmentally responsible behaviors than men. Based on these findings, we construct the third hypothesis:

*H2a: Women are more likely to have a more positive EC compare to man*

*H2b: Environmental concern positively influences green purchase intention*

### 2.2.3 Environmental knowledge (EK)

Environmental knowledge can be defined as one's ability to identify a series of facts, concepts and behaviour patterns associated with environmental protection (Laroche et al., 2001). Subsequently, researchers (Kaiser & Frick, 2002; Kaiser & Fuhrer, 2003; Frick et al., 2004) concluded that EK is the individual's general knowledge that incorporates know-how connected with the functioning and problems of ecosystems, the civic behavior alternatives and the obtainment of a greater environmental benefits.

Some studies (Maloney & Ward, 1973; Bartiaux, 2008; Laroche et al., 2001; Yin et al., 2010) showed that there is no significant relation between environmental knowledge and pro-environmental behavior. Fietkau and Kessel (1981) stated that EK may act as a modifier of attitudes and values but may not directly influence behavior. However, Ajzen (2001) argues that knowledge about environment can be predictive of environmental intention and behavior. Paço and Lavrador (2017) also pointed out that environmental knowledge shapes more responsible behaviors in relation to the surrounding environment. Insufficient knowledge or the possession of conflicting information can impede engagement in pro-environmental behaviors (Vicente-Molina et al., 2013). In a Canadian study conducted by Kennedy et al. (2009), over 60% of participants expressed that their pro-environmental actions were frequently

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constrained by a perceived deficiency in knowledge. Individuals who have deeper knowledge of environmental issues are more prone to behave a pro-environmental way, *ceteris paribus* (Oguz et al., 2010). Besides, some studies confirmed that the ecological knowledge of consumer was a key determining factor of environmentally friendly behavior, for instance, green product purchase (Biswas & Roy, 2015; Rokicka, 2002). And the analysis of Lavuri et al. (2021) has detected that consumers' environmental knowledge has a positive and statistically significant influence on their green purchasing intention and behavior.

According to Paço and Lavrador (2017), males, older students and those studying Engineering and the Social Sciences are those reporting higher levels of environmental knowledge. Tikka et al.(2000) concluded that environmental knowledge seemed to be dependent on gender since males get higher average Environment Knowledge (EK) scores than females. Vicente-Molina et al.(2018) strengthened this argument and claimed that environmental knowledge appears to be affected by gender. Furthermore, Diamantopoulos et al.(2003) confirmed in their study that men generally own more knowledge related to environmental issues than women. A recent investigation in China demonstrated that men tend to possess significantly more environmental knowledge compared to women, and that this higher level of environmental knowledge is evidently linked to a higher level of green behaviors (Xiao & Hong, 2010).

Xiao and McCright (2014) also found that men are more knowledgeable about nature and ecological issues compared to women. These differences may be due to the different socialization patterns of boys and girls, argued by Schahn and Holzer (1990). And they stated that “ women were more environmentally concerned in those topical areas that refer to household behavior, whereas men knew more about environmental problems.” Besides, Zsóka et al. (2013) investigated the nexus between environmental education and environmental knowledge and their study result showed a robust correlation between the intensity of environmental education and the environmental

knowledge among students. Therefore, it is plausible to infer that the greater access of men to education may underlie these findings (Vicente-Molina et al., 2018). Based on the arguments above, it is possible to build a hypothesis:

*H3a: Men are more likely to have a more environmental knowledge than women*

*H3b: Environmental knowledge positively influences green purchase intention*

#### 2.2.4 Subjective norm (SN)

Subjective norms depict the way in which the subjects receive and interpret what people and groups say about what they are supposed to do in relation to the behavior, and the motivation to adapt to these views (Ajzen, 1991). The “people and groups” means the relatives, family members, friends, peer groups, and other reference groups (Bhutto et al., 2019). Ajzen and Driver (1991) concluded that subjective norms depend on views important others in people’s lives have, and their motivation to comply with them. According to O’Neal (2007), Subjective norms are “perceived social influences / pressures because of which an individual might indulge himself / herself in a particular behavior. ” Also, subjective norm is an individual view and significantly affects a person’s choice and action (Park, 2000; Lavuri et al., 2021). Consumers, when are unsure about the outcomes of a specific behavior, they may seek guidance or support from others (Bratt, 1999).

Past studies have analyzed the impacts of subjective norms on purchase intention and behavior. Researchers (Biswas & Roy, 2015; Yadav & Pathak, 2016) found that subjective norms are really useful for eco-friendly consumer behavior. Liobikienė et al. (2016) demonstrated the significance of subjective norms in influencing environmentally sustainable consumption within European Union countries. Additionally, Some studies have proven that a direct positive relationship exists between subjective norms and green purchase intention in the context of developing

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countries (Saricam & Okur, 2019 ; Bamberg, 2003; Jaiswal & Kant, 2018; Yadav & Pathak, 2016). For instance, Jung et al. (2021) affirmed that subjective norms favorably impact on Chinese consumers' intention to purchase sustainable apparel products.

Empirical studies have showed the subjective norm (SN) as an crucial background variable in which gender plays a role (Lee, 2013). Lee (2009) substantiated in his study that women scored significantly higher than men in peer influence in behavioral choice. Venkatesh and Morris (2000) investigated the relationship between gender and subjective norms in the context of technology adoption in the workplace and found a noteworthy gender difference. While subjective norms had no impact on men's decision-making at any juncture, they significantly influenced the decision-making process for women. Researchers (Croson & Gneezy, 2009; Tikka et al., 2000) found that females are perceived to be more environmentally conscious than males and exhibit greater responsiveness to social and communal cues. Previous research has indicated that women are influenced and motivated by social interactions, which in turn plays a role in shaping their purchasing decisions (Lee, 2009; Noble et al., 2006). Moreover, Sousa et al.(2022) also proved that females are more influenced by subjective norms compared to males. This is particularly evident in collectivist Chinese culture, where individuals are expected to conform to larger social norms (Hofstede, 1980). Therefore, the following hypothesis has been formulated:

*H4a: Women are more likely to be influenced by SN compared to man*

*H4b: Subjective norms positively influences green purchase intention*

### 2.2.5 Perceived consumer effectiveness (PCE)

Joshi and Rahman (2015) claimed that Perceived consumer effectiveness is one of the most studied variables. PCE is widely utilized to assess the environmental behavioral control and to predict environmentally conscious behavior (Berger & Corbin,1992).

Several researchers (Kinneer et al.,1974; Roberts, 1996; Straughan & Roberts, 1999; Raudsepp, 2001) demonstrated that in numerous studies, PCE has the highest explanatory power among the psychological factors examined as an antecedent to green behavior. Webster (1975) described PCE as consumers' evaluation of the extent to which their purchases can contribute to solve the overall problem and it also associated with the consumer's willingness to lead by specific activities to specific sustainability benefits (Roberts,1996). Moreover, Akehurst et al. (2012) sustained that PCE is a belief that every individual action plays an important role in environmental protection.

Ellen,et al. (1991) stated that “PCE for environmental issues is distinct from environmental concern or attitudes and make a unique contribution to the prediction of environmentally conscious behaviors such as green purchase.” In the examination of PCE and green purchasing behavior, Zhao et al. (2014) and Wesley et al.(2012) identified a noteworthy correlation between PCE and engagement in eco-friendly purchasing. Besides, PCE has been proved to have a direct and positive influence on people's ecologically use (Kang et al., 2016) and consumers' purchase intention for green consumption (Ellen et al., 1991).

Some very recent empirical evidence have shown that women seems to have higher perceived effectiveness of green behavior than man. Liang et al. (2020) did an empirical inquiry of Carbon-Labeled packaged tea products and the study result shows that PCE positively correlates with purchase intention on carbon-labeled packaged tea products. And the female respondents have a significant higher perceived consumer effectiveness (PCE) and purchase intention on carbon labels of packaged tea products than male respondents. Then they concluded that women are more inclined to sustainable low-carbon consumption. Vicente-Molina et al.(2018) pointed out in their study that “ the perceived effectiveness of pro-environmental behavior is greater for women than men and the difference is significant,” and thus women engage more in green behavior and and behave more responsibly towards the

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environment. Taking insights from the literature, we posit that:

*H5a: Women show a higher level of PCE than man*

*H5b: Perceived consumer effectiveness positively influences green purchase intention*

## 2.2.6 Green purchase intention and behavior

Green purchasing is most commonly measured as green purchasing intentions and behaviors (Joshi & Rahman, 2015). Green purchase intention refers to an individual's willingness to implement green purchase behavior, mainly in terms of considerations for reducing pollution (Chen & Deng, 2016). Paul et al.(2016) defined that Green purchase intention is an indicator for measuring to what extent consumers are ready to adopt green alternatives, in other words, buy green products.

According to TPB, an individual examines three categories of beliefs when making behavioral decisions: behavioral beliefs, normative beliefs, control beliefs (Arafat & Ibrahim, 2018; Kamalanon et al., 2022). Glanz et al. (2015) defined behavioral beliefs as an individual's belief regarding the probable results of a specific behavior. Normative beliefs are characterized as an individual's view of a certain behavior, which is impacted by the opinions of influential individuals in their life, including parents, partners, friends, or educators. Control beliefs are beliefs about the presence of factors that may enable or hinder the performance of the behavior (Arafat & Ibrahim, 2018). Attitude is determined by behavioral beliefs and evaluations whereas subjective norms are determined by normative beliefs and motivations to comply (Trafimow, 2000). And control beliefs trigger one's perceived behavioral control. The Behavioral intention is shaped by these beliefs of the behavior's consequence, which lead to favorable or unfavorable evaluation. The distinct evaluations then drive varied behavioral decisions and actions. Behavioral intention is thus seen as a direct predictor and the best approximation of real actions (Rausch & Kopplin, 2021; Park & Lin, 2020).

Mostafa (2007) proposed that Green purchase behavior represents the consumption of a product that is environmentally friendly, conservable and recyclable, safe for the society, or sensitive to environmental issues. Lee (2008) argued in his study that Green purchase behavior refers to purchasing products that bring substantial benefits to the environment and demonstrate positive attitudes toward the environment. Additionally, Moisander (2007) defined Green purchase behaviour as a complex form of ethical decision-making behaviour and a type of socially responsible behaviour. He said socially responsible consumer “takes into account the public consequences of his or her private consumption and attempts to use his or her purchasing power to bring about social change”.

Intention are a central factor capturing the motivational factors that influence consumers’ green purchasing behavior (Ajzen, 1991; Ramayah et al., 2010). Behavioral intention is also perceived as the direct antecedent and best proxy for actual human behavior (Rausch & Kopplin, 2021; Park & Lin, 2020). Similarly, Chen and Deng (2016) stated that green purchase intention is assumed to be an immediate antecedent of green purchase behavior.

Multiple study have proven that the intention to purchase green products is a significant predictor of green purchase behavior (Al Mamun et al., 2018 ; Lai & Cheng, 2016; Yadav & Pathak, 2016). For instance, Fontes et al.(2021) examined crucial antecedents of green purchase behavior of Portugal samples, and confirmed that purchase intention positively influences green purchase behavior. In addition, Ali and Ahmad (2016) concluded that purchase intention positively influences the probability of customers' decision to buy green products. Therefore, we try to use the hypothesis H6 to reiterate the prior role of green purchase intention on green purchase behavior.

*H6: Green purchase intention positively influences green purchase behavior*



### 3. Proposed Research Model

On the basis of discussed hypotheses, we propose the following conceptual model, seeking to assess and explain the relationship between gender and the antecedents of green purchase intention, as well as the relationship between the antecedents of green purchase intention and green purchase intention. Since we predict that there are obvious gender differences present in the antecedents of green purchase intention and this gender difference would affect the green purchase intention differently across male and female respondents, we therefore propose the role of gender (Botetzagias et al., 2015) as a prerequisites in the relationship among the five predictors and green purchase intention. Last but not least, the relationship between green purchase intention and green purchase behavior is also examined. The proposed research model is illustrated in Figure 2.

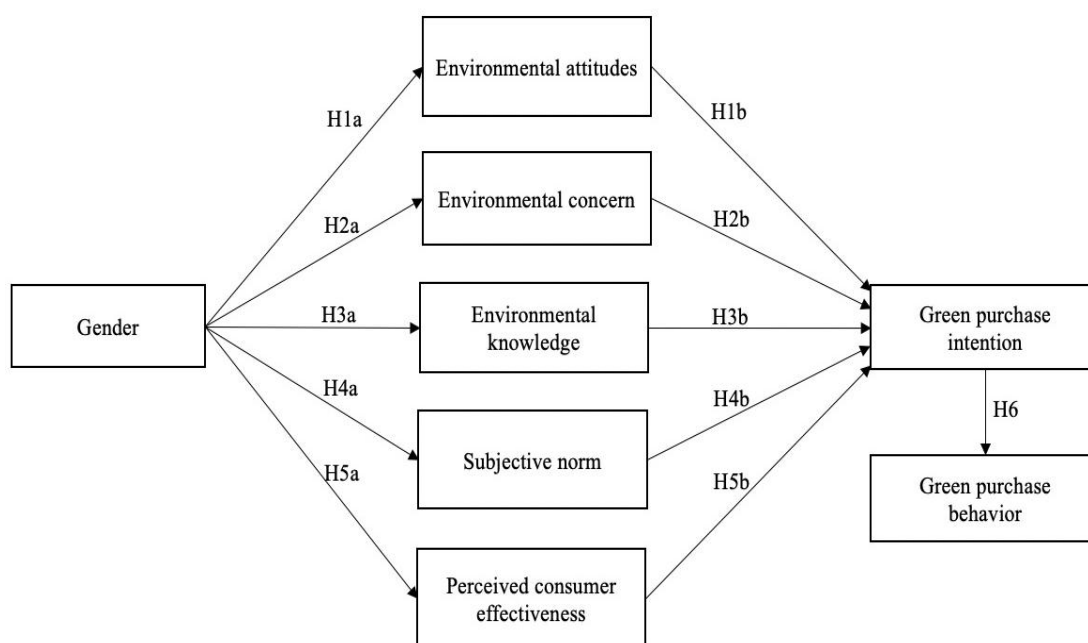


Figure 2. Proposed Conceptual model

## **4. Research methodology**

### **4.1 Research design**

Research design serves as a framework for research planning and to address the research questions. Research design is about organizing research activities, including the data collection, in ways that are most likely to achieve the research objectives (Easterby-Smith, Thorpe, & Jackson, 2015). This study will adopt a deductive approach aimed at empirically testing the hypothesised relationships described in the proposed conceptual model. Lewis, Saunders and Thornhill (2016) prove that quantitative data is often associated with a deductive approach, testing theories using data. Hence, we applied a survey during our research process to access first-hand data and analyze them to answer the research questions, making it a quantitative design. Besides, Saunders et al. (2012) argued that the survey can aid in investigating the connections among various variables and conceptualizing a model to illustrate these relationships.

However, survey has limitation that the cross-sectional data generated by the questionnaire were restricted in identifying causal relationships. For example, it can identify a positive correlation between green purchase intention and green purchase behavior, but can not establish causality. Since the data were collected at the same point in time, it was not possible to reveal dynamic relationships between variables over time. Therefore, although correlations between variables can be observed, future studies may need to employ longitudinal designs or experimental approaches to explore these relationships in greater depth and validate our findings.

#### **4.1.1 Population and sample**

This study was conducted on a specific population: educated urban Chinese consumers, both male and female, over the age of 18. Since multiple past studies have suggested that individuals with higher levels of education tend to possess greater

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knowledge about environmentally-friendly products, enabling them to better grasp the ecological context (Hedlund, 2011; Han et al., 2010; Han & Kim, 2010). As a consequence, the minimum education qualification of the target population for this study is set as graduates from both 4-year bachelor program and 3-year training college program. Although education is not one of the main independent variables in this study, it may take a potential moderating role. Differences in educational background can affect an individual's knowledge, skills and attitudes, which can indirectly influence the outcomes. Therefore, while the level of education was controlled for in the selection of the sample, the possible impact of educational level on the findings should be considered in the broader analysis.

Our conceptual model contains one independent variable (gender), five mediating variables (environmental attitudes, environmental concern, environmental knowledge, subjective norm, and perceived consumer effectiveness), and two dependent variables (green purchase intentions and green purchase behaviour). The number of these factors and paths indicates that our conceptual model is of medium complexity. In this study, the choice of sample size was based on ensuring the statistical efficacy of the structural equation modelling (SEM) analysis.

In order to ensure the reliability and validity of the findings, the sample size needs to be large enough to detect the path relationships assumed in the conceptual model. (Loehlin, 2004) surveyed 72 papers on SEM and found that the median sample size was 198, so he recommended a sample size of at least 100, and 200 would be more preferable. (Ding, Velicer, & Harlow, 1995) combined previous scholars' studies and concluded that a sample size of 100 to 150 is the minimum standard for SEM analysis. Besides, considering the incomplete questionnaires and low response rates that may exist in actual surveys, we need to increase the sample size to compensate. Based on conventional response rates in related topics and our survey methodology, we estimate a response rate of about 60% to 70%. As a result, we need to increase the sample size to ensure a sufficient number of valid samples. Therefore, 400-500

questionnaires were set as a target response to collect.

#### 4.1.2 Pre-test

The pre-test of the questionnaire is carried out before the formal questionnaire is distributed, conducted with a small and varied sample from the target population, targeting around 10 participants. Such a sample size was sufficient to identify potential problems with the wording, order, and response format of the questions. Pre-test participants were recruited to represent a cross-section of the target population, which means the selected pre-test participants were similar to the target population in a number of important characteristics, such as gender, age and educational background, ensuring that the results of the pre-test are more representative and generalized. According to the results of pre-test, we modified some measurement's translation to ensure the validity and reliability of the questionnaire. The measurements were originally developed in English to maintain consistency with the sources. The entire questionnaire (including the demographic section and the scale measuring the variables) was then translated into Mandarin. To get the consumer responses with precision and accuracy, this translation process was not only linguistic, but also included cultural adjustments to ensure that the questions were relevant and understandable to the Chinese participants' backgrounds.

After completing the pre-test, participants will be invited to provide feedback on various aspects of the questionnaire, including the relevance and comprehensibility of the questions, as well as the overall level of difficulty completing the questionnaire. Open-ended questions were included at the end of the pre-test questionnaire to solicit any additional comments or suggestions for improvement. The data and feedback collected during the pre-testing phase were then meticulously analyzed to identify patterns of misunderstandings, ambiguities or any culture-specific nuances that may have been overlooked during the translation process.

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### 4.1.3 Data collection and screening

In the period between 24 March and 7 April 2024, an online survey (see Appendix) was conducted among educated urban Chinese consumers in different cities. We used well-structured questionnaire to conduct an online survey and develop this as a tool to collect data. We published the formal questionnaire on “www.wenjuan.com”, one of the largest professional online survey platforms in China. The questionnaire was distributed to the respondents through WeChat, Weibo, QQ and other large social platforms in China to get the responses from people from different cities randomly. After collecting the survey data, the results were translated back into English. To ensure the conceptual equivalence, translation and back-translation techniques were used to develop a Chinese version of the formal questionnaire. The questionnaire was distributed using convenience sampling and then the data collected was used to determine whether need for further stratified random sampling. This choice is informed by the platforms' widespread adoption and their proven effectiveness in reaching diverse demographic segments, as indicated in studies exploring digital communication channels in China (Xu, et al., 2012; Zhou, et al., 2013).

Notably, in order to ensure the privacy and information security of survey participants, as well as to increase their participation and honesty, the survey responses was completely anonymized through the use of the standard settings of the questionnaire platform. To reduce the risk of bias, no monetary compensation or incentives was offered to participants to ensure that the data collected reflected the true views of consumers. This decision is supported by relevant literature that incentivizing participation can lead to distortions in data integrity (Krosnick, 1999; Singer & Ye, 2013). The research time was from March 10, 2024 to April 10, 2024, and the research period was one month. A total of 500 questionnaires were distributed online and 457 questionnaires were valid, with a respond rate of 91.40%. This research meets the requirement that the ratio of the number of items to the number of questionnaires in the reliability analysis should not be less than 1:5, and therefore

meets the requirements in terms of sample size.

*Table 1. Sample demographics*

		Frequency	Percentage (%)	Cumulative percentage (%)
Gender	Male	224	49.02	49.02
	Female	233	50.98	100.00
Age	18-24	24	5.25	5.25
	25-29	131	28.67	33.92
	30-39	112	24.51	58.42
	40 and above	190	41.58	100.00
Education	High school and below	32	7.00	7.00
	3-year training college	77	16.85	23.85
	4-year bachelor's degree	214	46.83	70.68
	Master and above	134	29.32	100.00
City	Tier 1	54	11.82	11.82
	Tier 2	283	61.93	73.74
	Tier 3	73	15.97	89.72
	Other	47	10.28	100.00
	Summary	457	100.0	100.0

In analyzing the demographic frequencies of the measured variables, it can be seen in table 1 that the number of males is 224 with a percentage of 49.02% and the number of females is 233 with a percentage of 50.98%. In terms of age distribution, the smallest proportion of the population is 18-24 years old, which is only 5.25%, while the largest proportion of the population is 40 years old and above, which is 41.58%. The proportion of the population in the age group of 25-29 years old and 30-39 years old is 28.67% and 24.51% respectively, which are also relatively large in these two age groups.

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In terms of education level, those with bachelor's degree accounted for the highest proportion of 46.83%, followed by those with postgraduate education and above, with a proportion of 29.32%. The proportion of people with high school education or below is the smallest, only 7.00%. In terms of the category of cities, the proportion of people in second-tier cities - capital city of a province and directly governed city, such as Tianjin, Chongqing, and Wuhan - is the highest, reaching 61.93%, followed by third-tier cities – not the capital city of a province - and other cities, with a proportion of 15.97% and 10.28% respectively. The proportion of people in first-tier cities, including Beijing, Shanghai, Guangzhou, and Shenzhen was the smallest, only 11.82%.

## 4.2 Measures

The questionnaire consists of two sections as shown in Appendix A. The first section comprises socio-demographic variables of the respondents, including age, gender, city, and education qualification. The second section is the measurement scales for each variable. The measurement scales we use in this study were derived from relevant past literature and have been previously validated. Each latent constructs were measured using multiple items, and all the items were slightly adjusted in accordance with the research context of this study to meet the criteria of reliability and validity. As we mentioned above, the items of each construct are measured using five-point Likert Scale. Given the variety of questions, the wording we use within the five-point scale may be adjusted.

Firstly, we use 4 items to measure environmental attitude. Respondents will be requested to express their sentiments about environment protection and green consumption. The 4-item scales of environmental attitude will be adapted from Shafiei and Maleksaeidi (2020) and Taylor and Todd (1995). We assess them utilizing a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A

four items scale for environmental concern drawn from several literature. Two measurements adopts from Kilbourne and Pickett (2008) and Paul et al. (2016), the other two items adopts from Lee (2008) and Nekmahmud and Fekete (2020). Environmental concern is evaluated based on individuals' worries regarding natural environments. The environmental knowledge construct with four items taken from Mostafa (2006). Participants will be asked about their knowledge of environmental issues and products. For subjective norm, the measurements are based on three relevant study, respectively, Chan and Lau (2002), Ajzen(2005) and Armitage (1999). Besides, we measure perceived consumer effectiveness using three items derived from Kim and Choi (2005). Green purchase intention is gauged by participants' readiness to opt for environmentally friendly alternatives. Meanwhile, Green purchasing behavior is assessed based on the inclination and frequency of actions taken. The five items for this construct are implemented using a 5-point scale, with statements ranging from never (1) to always (5). The complete overview of the measurements is shown in the table below.

*Table 2. Measurement of variables*

<i>Constructs</i>	<i>Measurements (items)</i>	<i>References</i>
<i>Environmental attitude</i>	Protecting the environment is important to me	Shafiei & Maleksaeidi (2020)
	Plants and animals have the right to live as much as humans	
	Green consumption is a good idea to protect the environment	Taylor & Todd (1995)
	I have a positive attitude towards green consumption	
<i>Environment concern</i>	I am deeply concerned about the environment	Kilbourne & Pickett (2008) ; Paul et al. (2016)
	I am willing to decrease my consumption to contribute to environmental protection	
	I am concerned about the deteriorating environmental quality in my country	Lee (2008); Nekmahmud & Fekete (2020)
	I am emotionally engaged in environmental protection matters in my country	



<i>Constructs</i>	<i>Measurements (items)</i>	<i>References</i>
<i>Environment knowledge</i>	I am knowledgeable about environmental issues	Mostafa (2006)
	I have a better understanding of recycling compared to the average person	
	I understand environmental terms and symbols on product packaging	
	I am knowledgeable about selecting products and packaging that minimize the amount of waste disposed of in landfills	
<i>Subjective norm</i>	Most people who are important to me would expect me to purchase green products	Chan & Lau (2002)
	Most people who matter to me would agree that I should buy green products	
	People will view me positively if I buy green products	Ajzen(2005); Armitage (1999)
	People around me can have an impact on my decision to purchase green products	
<i>Perceived consumer effectiveness</i>	I can help solve natural resource problem by purchasing green products	Kim & Choi (2005)
	I can contribute to environmental protection by purchasing green products	
	I feel empowered to contribute to solving environmental problems	
<i>Green purchase intention</i>	I am willing to buy green products for my own use	Kim et al.(2013)
	I will try to buy as many green products as possible	
	I might choose to buy an eco-friendly product if the price is comparable to other products	Chan & Lau (2000); Mostafa (2006)
	I might choose to buy an eco-friendly product if the qualities are comparable to other products.	
<i>Green purchase behavior</i>	I make efforts to buy green products	Kim & Choi (2005); Kamalanon et al. (2022)
	I have switched to buy green products due to their environmental benefits	
	When faced with options between two same products, I opt for the one that are less harmful to the environment	
	I have been purchasing green products at regular basis	Wan et al (2012)
	I have engaged in green purchasing behavior over the last six months	

## 5. Data analysis

We examine the result of the Confirmatory Factor Analysis (CFA) to check for the construct validity. CFA is a widely accepted method of testing how well the measurement items are measuring their respective constructs. CFA frequently serves to confirm how the variables, utilized for measurement, are logically and systematically defined within a theoretical model (Hair et al., 2014).

This study uses t-test to analyze the effect of gender on the mediating variables of environmental attitudes, environmental concern, environmental knowledge, subjective norms, and perceived consumer effectiveness, which are commonly used to simply compare the means of two sets of data to see if there is a significant difference, such as hypothesis testing for gender differences. Structural Equation Modelling (SEM) of SPSS AMOS statistical analysis is also used to assess the effect of how these 5 mediating variables may further influence green purchase intentions and green purchasing behaviors, testing the hypothesis.

SEM, which represents hypothetical relationships between variables through multiple linear equations, is widely used in data analysis. Compared with traditional regression models, structural equation modeling has many advantages, such as: SEM allows for the incorporation of measurement error into the model, providing more accurate estimates of relationships between variables. Besides, it can process multiple dependent variables in the model at the same time. The relationship between potential variables & measured question terms and the relationship between potential variables & potential variables in structural equation modeling can also be estimated simultaneously (Q Chen, 2004). This combination of methodologies leverages SEM's ability to deal with relatively complex models while t-tests can explore specific research questions.

## 5.1 Descriptive

*Table 3. Descriptive statistics*

<b>Variable</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Kurtosis</b>	<b>Skewness</b>
EA	1.000	5.000	4.431	0.915	1.688	-1.385
EC	1.000	5.000	4.177	0.857	1.688	-1.552
EK	1.000	5.000	3.697	0.921	-0.405	-0.377
SN	1.000	5.000	3.931	0.950	0.185	-0.737
PCE	1.000	5.000	4.189	0.859	1.959	-1.317
PI	1.000	5.000	4.342	0.843	1.579	-1.781
PB	1.000	5.000	3.714	0.936	-0.495	-0.442

The descriptive analysis of the measured indicators shows that environmental attitude has the highest mean score of 4.431 with a standard deviation of 0.915; followed by green purchase intention with a mean score of 4.342 and a standard deviation of 0.843; perceived consumer effectiveness with a mean score of 4.189 and a standard deviation of 0.859; and environmental concern with a mean score of 4.177 and a standard deviation of 0.857. All four dimensions scored relatively high. Environmental knowledge had the lowest mean score of 3.697 with a standard deviation of 0.921. The absolute values of skewness and kurtosis of the measured variables were below 2, indicating a good aggregation effect.

## 5.2 Reliability analysis

Reliability pertains to the extent of consistency within the data collection and analysis procedures (Saunders et al, 2016). Reliability analysis is often used to measure whether the items set under a variable in a questionnaire measure the same issue, i.e., to measure the stability and consistency among the items. In this paper, we use Cronbach's alpha coefficient, which is generally accepted by scholars to test the reliability. Cronbach coefficients (internal consistency coefficients) are generally used to analyze the reliability of a variable in a questionnaire scale by examining whether

the reliability coefficient of a subscale increases or decreases after the deletion of a specific measure of the variable. If the scale contains more items, the higher the internal consistency alpha coefficient will be in general. Cronbach's alpha coefficient takes a value between 0-1, the higher the value, the more reliable it is, it is usually regarded that the coefficient reaches 0.7, then it has good reliability, and greater than 0.8, then it has a more desirable reliability. The reliability value of this measure is 0.938 for environmental attitudes, 0.869 for environmental concern, 0.902 for environmental knowledge, 0.902 for subjective norms, 0.886 for consumer perceived validity, 0.939 for green purchasing intentions, and 0.924 for green purchasing behaviors, indicating satisfying construct reliability of scales.

*Table 4. Reliability analysis*

<b>Dimension</b>	<b>Measure item</b>	<b>Item correlation</b>	<b>Reliability coefficient after item deletion</b>	<b>Cronbach's alpha coefficient</b>
Environmental Attitudes	EA1	0.867	0.914	0.938
	EA2	0.809	0.934	
	EA3	0.893	0.906	
	EA4	0.844	0.922	
Environmental Concern	EC1	0.793	0.805	0.869
	EC2	0.753	0.819	
	EC3	0.696	0.842	
	EC4	0.652	0.862	
Environmental Knowledge	EK1	0.734	0.890	0.902
	EK2	0.803	0.866	
	EK3	0.783	0.873	
	EK4	0.805	0.864	

<b>Dimension</b>	<b>Measure item</b>	<b>Item correlation</b>	<b>Reliability coefficient after item deletion</b>	<b>Cronbach's alpha coefficient</b>
Environmental Attitudes	EA1	0.867	0.914	0.938
	EA2	0.809	0.934	
	EA3	0.893	0.906	
	EA4	0.844	0.922	
Environmental Concern	EC1	0.793	0.805	0.869
	EC2	0.753	0.819	
	EC3	0.696	0.842	
	EC4	0.652	0.862	
Environmental Knowledge	EK1	0.734	0.890	0.902
	EK2	0.803	0.866	
	EK3	0.783	0.873	
	EK4	0.805	0.864	
Subjective norm	SN1	0.817	0.849	0.902
	SN2	0.843	0.828	
	SN3	0.757	0.899	
Perceived consumer effectiveness	PCE1	0.761	0.852	0.886
	PCE2	0.817	0.802	
	PCE3	0.755	0.858	
Green purchase	PI1	0.871	0.917	0.939

<b>Dimension</b>	<b>Measure item</b>	<b>Item correlation</b>	<b>Reliability coefficient after item deletion</b>	<b>Cronbach's alpha coefficient</b>
Environmental Attitudes	EA1	0.867	0.914	0.938
	EA2	0.809	0.934	
	EA3	0.893	0.906	
	EA4	0.844	0.922	
Environmental Concern	EC1	0.793	0.805	0.869
	EC2	0.753	0.819	
	EC3	0.696	0.842	
	EC4	0.652	0.862	
Environmental Knowledge	EK1	0.734	0.890	0.902
	EK2	0.803	0.866	
	EK3	0.783	0.873	
	EK4	0.805	0.864	
intention	PI2	0.849	0.924	
	PI3	0.849	0.923	
	PI4	0.861	0.919	
Green purchase behavior	PB1	0.803	0.906	0.924
	PB2	0.860	0.895	
	PB3	0.716	0.922	
	PB4	0.834	0.900	
	PB5	0.803	0.906	

### 5.3 Validity analysis

Validity refers to the accuracy of a measure. Validity analysis represents the degree of match between the measurement results and the content that is intended to be examined (Saunders et al., 2016). The validity check of the assessment scale is usually conducted using content validity and construct validity. Content validity refers to the extent to which the question items of a measurement instrument match the objectives and requirements of the measurement - the extent to which the content of the questionnaire design adequately reflects the concept that is intended to be measured (Sireci, 1998). Our hypothetical relationships between variables are proposed after drawing on other literature and considering the specific situational of our study, and the questionnaire is modified and improved to ensure the content validity of the questionnaire to a certain extent.

Construct validity refers to the degree to which the test or measurement questions accurately gauge the existence of the constructs you aimed to measure (Saunders et al., 2016). According to Hair et al. (2014), construct validity should ensure that the constructs have both convergent validity and discriminant validity, which are mostly judged by the Construct Reliability (CR) and Average Variance Extracted (AVE).

In Confirmatory Factor Analysis (CFA), AVE can be described as “the mean variance extracted for the items loading on a construct and is a summary indicator of convergence” (Hair et al., 2014, p. 619). A score of AVE exceeding 0.5 indicates adequate convergence among the items, signifying that the latent factor explains more variance than error in the model. Conversely, an AVE score below 0.5 suggests that the latent factor contributes more to error than to the variance explained in the model. (Hair et al., 2014).

*Table 5. Confirmatory Factor Analysis*

DIMENSION	ITEM	LOADINGS	AVE	CR
Environmental Attitudes	EA1	0.900	0.795	0.939
	EA2	0.843		
	EA3	0.934		
	EA4	0.889		
Environmental Concern	EC1	0.857	0.638	0.875
	EC2	0.838		
	EC3	0.763		
	EC4	0.729		
Environmental Knowledge	EK1	0.799	0.700	0.903
	EK2	0.860		
	EK3	0.824		
	EK4	0.862		
Subjective Norm	SN1	0.881	0.761	0.905
	SN2	0.903		
	SN3	0.830		
Perceived consumer effectiveness	CPE1	0.821	0.724	0.887
	CPE2	0.898		
	CPE3	0.833		
Green purchase intention	PI1	0.917	0.797	0.940
	PI2	0.891		
	PI3	0.878		
	PI4	0.883		
Green purchase behavior	PB1	0.846	0.714	0.925
	PB2	0.903		
	PB3	0.749		
	PB4	0.875		
	PB5	0.843		

Table 5 contains AVE of all the latent constructs and all dimensions are above 0.5. There exists a debate on which method of measuring reliability is the appropriate one. Construct Reliability (CR) is commonly employed in the Structural Equation



Modelling (SEM) model, as high CR values indicates strong internal consistency and show that all measures consistently assess the same construct. Hair et al. (2014) suggest that a CR value exceeding 0.7 generally indicates good reliability, while CR values falling between 0.6 and 0.7 are considered acceptable. According to Table 5 above, all the constructs have a desirable score above 0.7 of CR. The synthesis can show that all dimensions have acceptable construct validity.

## 5.4 Analysis of t-tests for different genders

In this study, independent samples t-test was used to investigate the variable relationships in testing the hypotheses of gender differences in environmental attitudes, environmental concern, environmental knowledge, subjective norms, and perceived consumer effectiveness. The independent samples t-test determines whether the means of two samples are significantly different by calculating the t-statistic and finding the corresponding p-value.

*Table 6. T-tests for different genders*

	Gender	Number of Cases	Mean	Standard Deviation	t	df	p
Environmental Attitudes	Male	224	4.28	0.96	-3.606	455.000	0.000**
	Female	233	4.58	0.84			
Environmental concern	Male	224	4.11	0.89	-1.745	455.000	0.082
	Female	233	4.25	0.82			
Environmental Knowledge	Male	224	3.83	0.90	3.130	455.000	0.002**
	Female	233	3.57	0.92			
Subjective Norm	Male	224	3.91	0.96	-0.375	455.000	0.708
	Female	233	3.95	0.94			
Perceived Consumer Effectiveness	Male	224	4.12	0.91	-1.635	455.000	0.103
	Female	233	4.25	0.80			

\* p<0.05 \*\* p<0.01

As shown in table 6, there are significant differences between genders in terms of environmental attitude and environmental knowledge (p<0.05), as determined by comparing mean scores. Specifically, women scored higher in environmental attitude

( $M=4.58$ ) compared to men ( $M=4.28$ ). Therefore, hypothesis H1a: *Women are more likely to have a more positive environmental attitude (EA) compared to men*, is supported. Men scored higher in environmental knowledge ( $M=3.83$ ) compared to women ( $M=3.57$ ). Thus, hypothesis H3a: *Men are more likely to have more environmental knowledge compared to women*, is also supported by the data. There are no significant differences between genders in environmental concern, subjective norm, and consumer perceived effectiveness ( $p>0.05$ ). Therefore, hypothesis H2a: *Women are more likely to have a more positive environmental concern (EC) compared to men*, H4a: *Women are more likely to be influenced by subjective norms (SN) compared to men*, and H5a: *Women show a higher level of perceived consumer effectiveness (PCE) compared to men*, are not supported.

## 5.5 Confirmatory factor analysis (CFA)

The structural equation model was first completed based on the proposed conceptual model, as shown in the following figure 3:

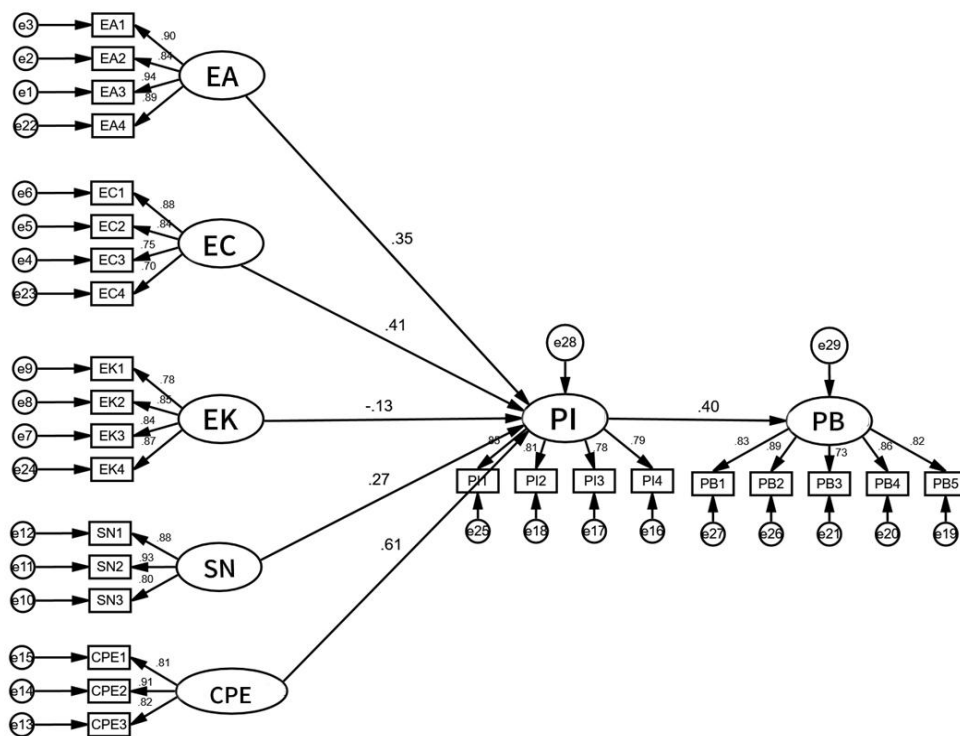


Figure 3. CFA model construction before modification

The boxes represent the observed indicators in the theoretical model, and the ellipses represent the seven variables. The two variables linked by a single arrow indicate that the two variables are causally related, which means they correspond to each of the 11 hypotheses formulated.

A good model fit means that the parameters set by the model are able to produce a pattern of data that is very close to the actual pattern of data collected. A poor fit means that the model does not adequately capture the key structures in the data and the model may need to be reconsidered or modified. According to (Balundė, A., Perlaviciute, G., & Truskauskaitė-Kunevičienė, 2020)'s similar data analysis methodology in related field, we evaluate the fitness of structural equation model by several indicators, including Normed chi-square ( $\chi^2/df$ ), Goodness-of-fit index (GFI), Comparative Fit Index (CFI), Root mean square error of approximation (RMSEA), Normed Fit Index (NFI), Relative fit index (RFI), Comparative fit index (CFI), Parsimonious normed fit index (PNFI), and parsimonious goodness-fit-index (PGFI). Table 7 shows the evaluation criteria for the different fit metrics and the results.

*Table 7. Goodness-of-fit results of CFA before modification*

<b>Goodness-of-fit Test</b>	<b>Evaluation criteria</b>	<b>Test result</b>	<b>Level of model fit</b>
Absolute fitness			
$\chi^2/df$	1-3 preferred, <5 acceptable	8.243	unacceptable
GFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.676	unacceptable
AGFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.615	unacceptable
RMSEA	$\leq 0.05$ preferred, $\leq 0.08$ acceptable	0.126	unacceptable
Value-added fitness			
NFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.785	unacceptable
RFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.763	unacceptable
CFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.805	acceptable

<b>Goodness-of-fit Test</b>	<b>Evaluation criteria</b>	<b>Test result</b>	<b>Level of model fit</b>
Parsimonious fitness			
PNFI	> 0.5 preferred	0.711	preferred
PGFI	> 0.5 preferred	0.569	preferred

As shown in Table 7, the evaluation criteria for different fit metrics and their results indicate that the initial model exhibited poor fit. The CMIN/DF (chi-square to degrees of freedom ratio) value was 8.243, which is above the acceptable range ( $<5$ ) and far exceeds the preferred range of 1-3, indicating an unacceptable fit. The Goodness of Fit Index (GFI) was 0.676, below the acceptable range of  $\geq 0.8$ . Similarly, the Adjusted Goodness of Fit Index (AGFI) was 0.615, also below the acceptable threshold of  $\geq 0.8$ . The Root Mean Square Error of Approximation (RMSEA) was 0.126, exceeding the acceptable range of  $\leq 0.08$  (with  $\leq 0.05$  being the preferred standard). The Normed Fit Index (NFI) was 0.785, falling short of the acceptable standard of  $\geq 0.8$ . The Relative Fit Index (RFI) was 0.763, also below the acceptable threshold of  $\geq 0.8$ . The Comparative Fit Index (CFI) was 0.805, which meets the minimum acceptable standard but does not reach the preferred standard of  $\geq 0.9$ . In terms of parsimonious fitness, the Parsimonious Normed Fit Index (PNFI) was 0.711 and the Parsimonious Goodness of Fit Index (PGFI) was 0.569, both of which are above the preferred threshold of  $>0.5$ .

In the analysis of the fit indicators of the variables, 6 of 9 indicators are unacceptable. The level of fit of the measurement model is relatively low, so it is necessary to modify the model and test the model relationship again. The Modification Index (MI) is a metric in the AMOS software that can be used to assess the fit of a model for structural equation modeling. When the model fit is unsatisfactory, the MI value can provide clues about how to correct the model and help the researcher optimize the model to improve the fit. If a model does not fit well, the Modification Index (MI) can be used to improve the model. Modification indices suggest adjustments such as

correlating the error terms of certain variables or adding new relationships. The output of the AMOS software contains these indices, which indicate how much the fit of the model would improve if a fixed parameter was changed to one that could be estimated. This means that adding a new free parameter may significantly improve the performance of the model. Higher values of MI indicate that the introduction of a particular free parameter may substantially improve the model. Typically, adjustments are considered for paths with MI values above 10. As shown in appendix B of the MI values, we adjusted the model by connecting the following variables with relatively high MI values more than 10 using "<-->": subjective norms <--> perceived consumer effectiveness, environmental knowledge <--> perceived consumer effectiveness, environmental knowledge <--> subjective norms, environmental concern <--> perceived consumer effectiveness, environmental concern <--> subjective norms, environmental concern <--> environmental knowledge, environmental attitude <--> perceived consumer effectiveness, environmental attitude <--> subjective norms, environmental attitude <--> environmental knowledge, and environmental attitude <--> environmental concern. The model after modification is showed in figure 4:

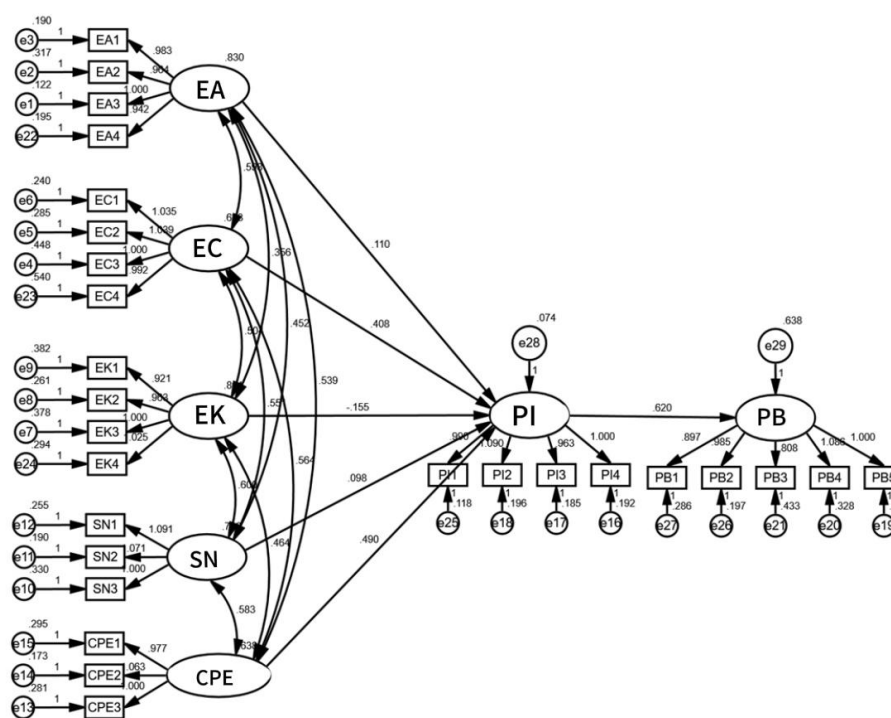


Figure 4. CFA model construction after modification

These adjustments further validated the correlations between the independent variables. Despite these moderate changes, we adhered to the principle of model modification and avoided excessive modifications to prevent over-fitting. This approach improves the model's fit while retaining its theoretical foundation and overall logical consistency. After making these modifications, rerun the revised path model to evaluate the improvements in model fit and confirm the effectiveness of these changes.

*Table 8. Goodness-of-fit results of CFA after modification*

<b>Goodness-of-fit Test</b>	<b>Evaluation criteria</b>	<b>Test result</b>	<b>Level of model fit</b>
Absolute fitness			
$\chi^2/df$	1-3 preferred, <5 acceptable	3.076	acceptable
GFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.858	acceptable
AGFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.826	acceptable
RMSEA	$\leq 0.05$ preferred, $\leq 0.08$ acceptable	0.067	acceptable
Value-added fitness			
NFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.922	preferred
RFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.911	preferred
CFI	$\geq 0.9$ preferred, $\geq 0.8$ acceptable	0.946	preferred
Parsimonious fitness			
PNFI	> 0.5 preferred	0.809	preferred
PGFI	> 0.5 preferred	0.699	preferred

As shown in Table 8, the analysis of fit indices for the variables indicates that the revised model in this study has a CMIN/DF (chi-square to degrees of freedom ratio) value of 3.076, which falls within the acceptable range (<5) though it slightly exceeds the preferred range of 1-3. The other fit indices are as follows: the Goodness of Fit Index (GFI) is 0.858, which, while slightly below the preferred standard of 0.9, is within the acceptable range of  $\geq 0.8$ ; the Adjusted Goodness of Fit Index (AGFI) is 0.826, also within the acceptable range of  $\geq 0.8$ ; the Root Mean Square Error of

Approximation (RMSEA) is 0.067, within the acceptable range of  $\leq 0.08$  (with  $\leq 0.05$  being the preferred standard); the Normed Fit Index (NFI) is 0.922, exceeding the preferred standard of  $\geq 0.9$ ; the Relative Fit Index (RFI) is 0.911, also above the preferred standard of  $\geq 0.9$ ; the Comparative Fit Index (CFI) is 0.946, meeting the preferred standard of  $\geq 0.9$ ; the Parsimonious Normed Fit Index (PNFI) is 0.809, surpassing the preferred standard of  $> 0.5$ ; and the Parsimonious Goodness of Fit Index (PGFI) is 0.699, also above the preferred standard of  $> 0.5$ .

*Table 9. Testing the significance of model regression coefficients and path relationship*

			<b>Unstand -ardized Estimate</b>	<b>C.R.</b>	<b>P</b>	<b>Standardized Estimate</b>
Green purchase intention	<---	Environmental Attitudes	.110	2.07	< 0.05	.124
Green purchase intention	<---	Environmental Concern	.408	3.21	< 0.01	.399
Green purchase intention	<---	Environmental knowledge	-.155	-3.20	< 0.01	-.172
Green purchase intention	<---	Subjective Norm	.098	1.99	< 0.05	.104
Green purchase intention	<---	Perceived Consumer Effectiveness	.490	5.13	< 0.01	.486
Green purchase behavior	<---	Green purchase intention	.620	11.19	< 0.01	.530
EA3	<---	Environmental Attitudes	1.000			.934
EA2	<---	Environmental Attitudes	.964	27.39	< 0.01	.842

			<b>Unstand- ardized Estimate</b>	<b>C.R.</b>	<b>P</b>	<b>Standardized Estimate</b>
EA1	<---	Environmental Attitudes	.983	32.63	< 0.01	.899
EC3	<---	Environmental Concern	1.000			.763
EC2	<---	Environmental Concern	1.039	19.23	< 0.01	.838
EC1	<---	Environmental Concern	1.035	19.78	< 0.01	.858
EK3	<---	Environmental knowledge	1.000			.824
EK2	<---	Environmental knowledge	.963	21.85	< 0.01	.860
EK1	<---	Environmental knowledge	.921	19.69	< 0.01	.800
SN3	<---	Subjective norm	1.000			.831
SN2	<---	Subjective norm	1.071	24.43	< 0.01	.904
SN1	<---	Subjective norm	1.091	23.45	< 0.01	.880
CPE3	<---	Perceived consumer effectiveness	1.000			.833
CPE2	<---	Perceived consumer effectiveness	1.063	24.47	< 0.01	.898
CPE1	<---	Perceived consumer effectiveness	.977	21.20	< 0.01	.821
PI4	<---	Green purchase intention	1.000			.879
PI3	<---	Green purchase intention	.963	26.64	< 0.01	.874
PI2	<---	Green purchase intention	1.090	27.85	< 0.01	.893
PB5	<---	Green purchase behavior	1.000			.842



			<b>Unstand -ardized Estimate</b>	<b>C.R.</b>	<b>P</b>	<b>Standardized Estimate</b>
PB4	<---	Green purchase behavior	1.086	23.75	< 0.01	.873
PB3	<---	Green purchase behavior	.808	18.98	< 0.01	.757
EA4	<---	Environmental Attitudes	.942	31.62	< 0.01	.889
EC4	<---	Environmental Concern	.992	16.30	< 0.01	.729
EK4	<---	Environmental knowledge	1.025	21.88	< 0.01	.861
PI1	<---	Green purchase intention	.990	29.73	< 0.01	.919
PB2	<---	Green purchase behavior	.985	25.09	< 0.01	.902
PB1	<---	Green purchase behavior	.897	22.51	< 0.01	.845

Table 9 shows the test result of the significance of modified model regression coefficients and path relationships. The first column presents the parameter estimates as unstandardized regression coefficients. The second column, labeled C.R. (Critical Ratio), shows the t-values from the t-test, which indicate the significance of the path relationships. If the absolute value of the C.R. statistic is greater than 1.96, we suggest that the path relationship is significant at the 0.05 level. The third column in the table displays the p-values, which are used to denote the significance of the path coefficients in the model. If the p-value is less than the set significance level of 0.05, the path coefficient is considered significant, which means the causal relationship between the variables is significantly present. By determining whether the path coefficient is statistically significant or not, we can assess whether the relationship in the model has some stability and consistency.

We can see from table 9 that the absolute values of the Critical Ratios (C.R.) for all six paths are greater than 1.96, and the p-values are all less than 0.05, indicating that

all six paths are statistically significant. However, only one path of Environmental knowledge → Green purchase intention has a negative standardized effect coefficient of -0.172, indicating a negative correlation between the two variables. The remaining five paths all have positive correlations. The testing results are listed as below:

The standardized path coefficient for the influence of environmental attitude on green purchase intention is 0.124 ( $Z=1.979$ ,  $p<0.05$ ). This result shows that environmental attitude significantly and positively affects green purchase intention, thus confirming hypothesis H1b: *Environmental attitude positively influences green purchase intention.*

For environmental concern, the standardized path coefficient impacting green purchase intention is 0.399 ( $Z=3.218$ ,  $p<0.01$ ). This finding indicates that environmental concern has a significant and positive effect on green purchase intention, thereby supporting hypothesis H2b: *Environmental concern positively influences green purchase intention.*

We noticed that the standardized path coefficient for the influence of environmental knowledge on green purchase intention is -0.172 ( $Z=-3.202$ ,  $p<0.01$ ). This outcome reveals that environmental knowledge significantly and negatively affects green purchase intention, contrary to hypothesis H3b: *Environmental knowledge positively influences green purchase intention.*

In the case of subjective norms, the standardized path coefficient impacting green purchase intention is 0.104 ( $Z=1.991$ ,  $p<0.05$ ), which indicates that subjective norms have a significant and positive effect on green purchase intention, thereby supporting hypothesis H4b: *Subjective norms positively influence green purchase intention.*

Besides, the standardized path coefficient for the impact of perceived consumer effectiveness on green purchase intention is 0.486 ( $Z=5.134$ ,  $p<0.01$ ). This

demonstrates that perceived consumer effectiveness has a significant positive effect on green purchase intention, supporting hypothesis H5b: *Perceived consumer effectiveness positively influences green purchase intention.*

Lastly, the standardized path coefficient for the impact of green purchase intention on green purchase behavior is 0.530 ( $Z=11.198$ ,  $p<0.01$ ). This demonstrates that green purchase intention has a significant positive effect on green purchase behavior, supporting hypothesis H6: *Green purchase intention positively influences green purchase behavior.*

## 5.6 Regression analysis

Confirmatory Factor Analysis (CFA) primarily focuses on the relationships between observed variables and latent factors. It examines whether a set of observed variables is related to the latent factors as specified by a theoretical model. CFA evaluates the validity of the measurement model, determining whether the observed variables effectively reflect the structure of the latent factors. In contrast, regression analysis focuses on the relationship between the dependent variable (target) and independent variables (predictors). It establishes a mathematical model to describe the influence of the independent variables on the dependent variable and to predict the values of the dependent variable. Regression analysis not only reveals causal relationships between variables but also provides a quantitative description of these relationships.

*Table 10. Linear Regression Analysis Results for Different Factors Affecting Green Purchase Intentions (n=457)*

	Unstandardized Coefficients		Standardized Coefficients	t	p	Collinearity Diagnostics	
	B	Standard Error	Beta			VIF	Tolerance
Constant	0.446	0.103	-	4.327	0.000**	-	-

Table 10. Linear Regression Analysis Results for Different Factors Affecting Green Purchase Intentions (n=457)

	Unstandardized Coefficients		Standardized Coefficients	t	p	Collinearity Diagnostics	
	B	Standard Error	Beta			VIF	Tolerance
Environmental attitudes	0.236	0.032	0.256	7.376	0.000**	2.490	0.402
Environmental concern	0.287	0.046	0.292	6.295	0.000**	4.465	0.224
Environmental knowledge	-0.106	0.031	-0.115	-3.446	0.001**	2.322	0.431
Subjective norms	0.123	0.036	0.139	3.401	0.001**	3.464	0.289
Perceived consumer effectiveness	0.372	0.042	0.379	8.951	0.000**	3.709	0.270
R <sup>2</sup>	0.782						
R <sup>2</sup> Adj.	0.780						
F	F (5,451) =324.163,p=0.000						
D-W	1.926						

Dependent Variable: Green Purchase Intentions

\* p<0.05 \*\* p<0.01

Environmental attitudes, environmental concern, environmental knowledge, subjective norms, and perceived consumer effectiveness were used as independent variables, and green purchase intention as the dependent variable in a linear regression analysis. As can be seen from table 10, the model equation is: Green Purchase Intention = 0.446 + 0.236 *Environmental Attitude* + 0.287 *Environmental Concern* - 0.106 *Environmental Knowledge* + 0.123 *Subjective Norm* + 0.372\* *Consumer Perceived Effectiveness*. The model's R<sup>2</sup> value is 0.782, indicating that environmental attitudes, environmental concern, environmental knowledge, subjective norms, and perceived consumer effectiveness explain 78.2% of the variation in green

purchase intentions. The model was subjected to an F-test and passed ( $F = 324.163$ ,  $p = 0.000 < 0.05$ ), suggesting that at least one of the independent variables significantly influences green purchase intentions. Furthermore, tests for multicollinearity showed that all VIF values are below 5, indicating no collinearity issues; and the D-W value is around 2, suggesting no autocorrelation in the model, and that there are no relational dependencies between the sample data, making the model robust.

*Table 11. Linear Regression Analysis Results for the Influence of Green Purchase Intentions on Green Purchasing Behavior (n=457)*

	Unstandardized Coefficients		Standardized Coefficients	t	p	Collinearity Diagnostics	
	B	Standard Error	Beta			VIF	Tolerance
Constant	1.386	0.201	-	6.881	0.000**	-	-
Green purchase intention	0.536	0.046	0.483	11.770	0.000**	1.000	1.000
R <sup>2</sup>	0.233						
F	F (1,455) =138.536,p=0.000						
D-W	1.962						

Dependent Variable: Green Purchasing Behavior

\*  $p < 0.05$  \*\*  $p < 0.01$

Green purchase intention is used as an independent variable, and green purchasing behavior as the dependent variable in a linear regression analysis. The model formula is derived as follows: Green Purchase Behavior =  $1.386 + 0.536 \times \text{Green Purchase Intention}$ . As shown in table 11, the model's R<sup>2</sup> value is 0.233, indicating that green purchase intention explains 23.3% of the variance in green purchasing behavior. The model underwent an F-test and passed ( $F = 138.536$ ,  $p = 0.000 < 0.05$ ), which confirms that green purchase intention significantly influences green purchasing behavior.

## 6. Discussion and conclusions

### 6.1 General discussion

Our individual consumer behaviors are exerting unprecedented impacts on our natural environment (Stern, 2000). Scholars warned that environmental degradation could intensify if the trend towards non-green consumption persists (Gao et al., 2017; Sun et al., 2017). Fortunately, consumers today are increasingly aware of the severity of environmental degradation, leading to greater ecological consciousness and desire to purchase green products and services. As a result, environmentalism has become a critical subject in the marketplace (Chelliah et al., 2017; Herman et al., 2023).

#### 6.1.1 Antecedents for green purchase intention

The first main objective of this thesis was to identify the crucial determinants of consumers' green purchase behavior intention. Hence, the first research question formulated was:

RQ1: *What are the antecedents for green purchase behavior intention?*

Table 11, which illustrates the findings of the study, indicates that environmental attitudes, environmental concern, subjective norms and perceived consumer effectiveness have a significant positive influence on consumers' intention to purchase green products, while environmental knowledge turned out as a strong negative factor for the green purchase intention.

First, in the effect of environmental attitudes on green purchase intention, the standardized impact coefficient of the path is 0.124 (C.R. = 2.079,  $p < 0.05$ ), this clearly shows that environmental attitudes have a significant positive effect on green purchase intention. Hence, the hypothesis H1b: *Environmental attitude positively influences green purchase intention* is supported. Besides, the value of regression coefficient of environmental attitude is 0.236 ( $t=7.376$ ,  $p=0.000<0.01$ ), which also indicating environmental attitude has a strong positive relationship with green

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purchase intention. These findings validate the importance of environmental attitude towards green products, as discussed by Aman et al.(2012), Aksoy et al.(2013), Yadav & Pathak (2016), etc.

Second, in assessing the impact of environmental concern on green purchase intention, the standardized impact coefficient is 0.399 (C.R. = 3.218,  $p < 0.05$ ), we can say environmental concern has thus a significant positive effect on green purchase intention. Therefore, H2b: *Environmental concern positively influences green purchase intention* is supported. And the value of regression coefficient of environmental concern is 0.287 ( $t=6.295$ ,  $p=0.000<0.01$ ), also shows that environmental concern has a significant positive influence relationship on green purchase intention. This finding have similar results with the study of Balderjahn, (1988), Roberts & Bacon (1997), etc. And the results reinforced the perspective put forth by those authors that environmental concern is a useful predictor of green purchase intention and it can positively influence purchase intention of eco-friendly products.

As our literature review and model proposed, environmental knowledge was argued to have a positive connection to individual consumers' green purchase intention. However, in the research we surprisingly found out that environmental knowledge has a significant negative impact on consumers' green purchase intention instead of positively influencing the green purchase intention, which points to the fact that the results of the research contradicts the corresponding outcome that Lavuri et al. (2021) have found out in their study. Similarly, this finding contradicts the results discovered by Xiao and Hong (2010). They pointed out that individuals, typically men, with higher education and greater environmental knowledge tend to participate more in all the analyzed environmental behavior patterns.

When we evaluate the effect of environmental knowledge on green purchase intention, we get the coefficient outcome of influence of the variable is -0.172 (C.R. =-3.202,

$p < 0.05$ ), the hypothesis H3b: *Environmental knowledge positively influences green purchase intention* is therefore rejected. Moreover, the value of the regression coefficient of environmental knowledge is  $-0.106$  ( $t = -3.446$ ,  $p = 0.001 < 0.01$ ), which also implies that our hypothesis of the positive relationship between environmental knowledge and green purchase intention is not supported by the data. Although researchers (Mei et al., 2012) found that environmental knowledge positively affects the intention to buy eco-friendly products to consumers, Henning and Karlsson (2011) rejected this hypothesis and stated that the factor environmental knowledge did not have any significant positive correlation with the purchase intention variable. Our findings corroborated the perspective proposed by Henning and Karlsson (2011).

The discovery that environmental knowledge negatively impacts green purchase intentions might appear counter-intuitive. However, this could be explained by the discerning perspective of consumers who possess greater environmental knowledge. Environmental knowledge encompasses not only awareness of environmental issues and their consequences but also understanding of how to take effective action (Hines et al., 1987). When individuals possess higher levels of environmental knowledge, they may become more aware of the complexities and challenges associated with environmental issues. This heightened awareness can lead to increased skepticism or doubts about the effectiveness or impact of purchasing eco-friendly products and other individual green actions.

As consumer interest in eco-friendly products surges, green advertising claims have emerged as an important element in marketing a broad array of products (Segev et al., 2016). Often, these environmental claims are applied to products that are not inherently green, such as airline flights, plastic containers, and (non-hybrid) cars. Concurrently, many green marketing advertisements communicate confusing messages that fail to provide clear, substantial information about the true environmental attributes of the products (Baum, 2012). This practice, known as greenwashing, involves misleading consumers about a company's environmental



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actions or the ecological advantages of its products or services (Carlson et al.,1993; Kangun et al., 1991; Parguel et al., 2015).

Due to rapid technological development consumers have amplified knowledge and sensitivity about green products (Bibi, 2019). Consumers are regularly confronted with environmental assertions and often question their authenticity in terms of genuine environmental improvements (Yoon & Chen, 2017). Individuals with high environmental knowledge may be more critical of "greenwashing" or misleading eco-friendly claims made by businesses. In other words, they have are more inclined to doubt whether a product that claims to be eco-friendly truly is, and this skepticism can significantly impact their purchasing decisions. Compared to consumer with limited perceptions of green products, high-knowledge consumers are able to differentiate between genuinely green products and conventional ones, as well as between authentic green products and greenwashed ones. Therefore, when they detect greenwashing tactics, they may even stop purchasing green products altogether (Nguyen,2019).

In terms of the subjective norms, the standardized impact coefficient of the variable is 0.104 (C.R. =1.991,  $p < 0.05$ ). Consistent with previous studies (Saricam & Okur, 2019 ; Bamberg, 2003; Jaiswal & Kant, 2018), the study found out that subjective norms have a significant positive impact on green purchase intention and the hypothesis H4b: *Subjective norms positively influences green purchase intention* is supported by the data. In addition, the value of regression coefficient of subjective norms is 0.123 ( $t=3.401$ ,  $p=0.001 < 0.01$ ), which strengthens the conclusion we made.

Furthermore, when we examine the influence of perceived consumer effectiveness on green purchase intention, we get the influence coefficient is 0.486 (C.R. =5.134,  $p < 0.05$ ) and the value of regression coefficient of perceived consumer effectiveness is 0.372 ( $t=8.951$ ,  $p=0.000 < 0.01$ ), which implies that perceived consumer effectiveness has a statistically significant positive influence on green purchase intention. The hypothesis H5b: *Perceived consumer effectiveness positively influences green*

*purchase intention* is supported. The results are also in accordance with Zhao et al. (2014), Wesley et al. (2012), etc.

Lastly, the influence coefficient of green purchase intention on green purchase behavior is 0.530 (C.R. =11.198,  $p < 0.05$ ) and the value of the regression coefficient of green purchase intention is 0.536 ( $t=11.770$ ,  $p=0.000 < 0.01$ ), based on the findings, we are able to conclude that green purchase intention can significantly positively promote green purchase behavior, and hence hypothesis H6: *Green purchase intention positively influences green purchase behavior* is supported. These findings, together with those from similar studies (Al Mamun et al., 2018; Lai & Cheng, 2016; Yadav & Pathak, 2016), have supported the position that the intention to purchase green products is a strong predictor of green purchase behavior.

### 6.1.2 Gender differences in green consumption

The second research question of our study aimed to find the gender differences in green consumption and its effect on the relationship between green purchase intention and five antecedents: environmental attitude, environmental concern, environmental knowledge, subjective norms, perceived consumer effectiveness. The research question composed was:

*RQ2: Are there significant gender differences in green consumption? How gender differences affect the antecedents of consumers' green purchase intention?*

As we discussed in previous chapter, there is a significant difference between genders in environmental attitudes and environmental knowledge ( $p < 0.05$ ), whereas there is no significant difference between genders in environmental concern, subjective norms, and perceived consumer effectiveness ( $p > 0.05$ ). Therefore, H2a: *Women are more likely to have a more positive EC compared to man*; H4a: *Women are more likely to be influenced by SN compared to man*; H5a: *Women show a higher level of PCE than man*, are all rejected.

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Despite these findings contradicting many of the well-established studies we reviewed earlier (Fukukawa et al., 2007; Echavarren 2017; Lee, 2009; Sousa et al., 2022; Vicente-Molina et al., 2018; etc), there are multiple studies that have arrived at similar conclusions to ours. Chan et al. (2019) asserted that while the belief that women are more pro-environmental than men is widely accepted, the research findings on gender differences in environmental concern have actually been mixed. Hungary for instance, no apparent gender differences of environmental concern were found (Kovács et al., 2014). Similarly, Vikan et al. (2007) reported no gender differences in the New Ecological Paradigm (NEP) in two Brazilian samples. Eisler et al. (2003) found that women expressed more concern toward the environment than men in Sweden and Japan, but not in Germany.

Chan et al. (2009) discovered that gender differences in environmental concern were less pronounced in societies characterized by higher levels of collectivism. When individuals prioritize compliance with social norms, they are less likely to uphold social attitudes that align with their personal values (Lönnqvist et al. 2006). Accordingly, in a more limiting sociocultural contexts, women, despite potentially stronger altruistic orientations (Eisler, 1990; Stern et al., 1993; Taylor & Kapalka, 2004), may be less likely to develop environmental concern due to limitations on self-expression, which can lead to smaller gender differences in environmental concern. And this could be a potential explanation for why we found no significant gender differences in environmental concern within the context of China's collectivist society which emphasizes restraint (Chen, 2000). In addition, a survey conducted in Turkey suggested that there was no significant difference between sex groups in terms of perceived consumer effectiveness (Tanrikulu, 2014). The extent (and even the direction) of gender differences seems to vary across different societies (Chan et al., 2019). And the inconsistent findings across different cultures and societies highlight the necessity for a more comprehensive understanding and further research into the role of gender.

In environmental attitudes, women scored higher ( $M=4.5805$ ) compared to men ( $M=4.2757$ ). Therefore, the hypothesis H1a: *Women are more likely to have a more positive EA compared to man*, is supported. This finding aligns with multiple studies conducted across countries, which have consistently shown that environmental attitudes vary significantly by gender, with women generally exhibiting higher pro-environmental attitudes than men (Heinzle et al., 2010; Vinz, 2009; Xiao & Hong, 2010). In terms of environmental knowledge, men scored higher in environmental knowledge ( $M=3.8337$ ) compared to women ( $M=3.5665$ ). Thus, the hypothesis H3a: *Man are more likely to have a more environmental knowledge than women*, is also supported. And this result also confirms the conclusion drawn by numerous scholars (Xiao & Hong, 2010; Tikka et al., 2000; Diamantopoulos et al., 2003) that men generally have more environmental knowledge compared to women.

Notably, the finding that men tend to have higher environmental knowledge than women, along with the observation that environmental knowledge negatively affects green purchase intention, presents an intriguing “paradox”. As we discussed above, one possible interpretation of this phenomenon is that individuals with higher environmental knowledge may approach green products with a more critical mindset. They might be more discerning when evaluating environmental claims made by companies, leading them to identify instances of greenwashing or misleading marketing advertising. As a result, their confidence in the authenticity of green products could diminish, affecting their intention to purchase such items (Nguyen, 2019).

Regarding the gender disparity in environmental knowledge, it's crucial to account for differential socialization patterns for boys and girls. Men tend to have greater access to education (due to socialization roles), resulting in increased exposure to environmental topics and acquisition of knowledge in this field (Vicente-Molina, 2018). In the context of gender differences, despite men tend to have higher environmental knowledge on average, both men and women with this heightened

environmental knowledge may exhibit similar behaviors due to their shared tendency towards critical evaluation of green claims and misleading green marketing advertisements. Consequently, it could translate into reduced purchase intentions for green products (Bibi, 2019; Nguyen, 2019).

### 6.1.3 Summarized results

Table 12 presents the summarized results of hypothesis testing, with a significance level (p-value) of 0.05 or lower used as the threshold.

*Table 12. Summarized results*

<b>Hypotheses</b>	<b>Result</b>
<b>H1a:</b> Women are more likely to have a more positive EA compare to man	supported
<b>H1b:</b> Environmental attitude positively influences green purchase intention	supported
<b>H2a:</b> Women are more likely to have a more positive EC compare to man	not supported
<b>H2b:</b> Environmental concern positively influences green purchase intention	supported
<b>H3a:</b> Man are more likely to have a more environmental knowledge than women	supported
<b>H3b:</b> Environmental knowledge positively influences green purchase intention	not supported
<b>H4a:</b> Women are more likely to be influenced by SN compared to man	not supported
<b>H4b:</b> Subjective norms positively influences green purchase intention	supported
<b>H5a:</b> Women show a higher level of PCE than man	not supported
<b>H5b:</b> Perceived consumer effectiveness positively influences green purchase intention	supported
<b>H6:</b> Green purchase intention positively influences green purchase behavior	supported

## 6.2 Limitation

Addressing potential limitations related to both internal and external validity of the study is important to minimize the risk that the results and conclusions drawn are incorrect (Saunders et al., 2016). In terms of internal validity, we applied well-established theoretical frameworks for explaining behavior, which is the Theory of Planned Behavior (TPB) to ensure internal validity in the study. Besides, in order to ensure content validity and internal validity of the questionnaire, a comprehensive

literature review of the measures was conducted. All of the measurement scales and constructs were derived or adapted from prior research and have been previously validated. Confirmatory factor analysis (CFA) was conducted as well, strengthening the construct validity of this study (Saunders et al., 2016). It is worth noting that Saunders et al. (2016) suggested past or recent events could decrease the internal reliability. However, our study didn't account for the impact of past or recent events on green purchase intention, the findings may thus lack robustness and generalizability to some extent.

In the study, we utilized a self-administered online questionnaire to collect data. While self-reported behaviors are commonly used as a proxy for actual behaviors, this method may be vulnerable to social desirability bias. Researchers (Gosling et al., 1998) have noted that in many situations, people tend to over-report socially desirable behaviors and under-report undesirable ones. Given that environmentally friendly behaviors are increasingly viewed as a social norm, participants in our online survey might have portrayed their green purchase intentions and behaviors more favorably (Kuokkanen & Sun, 2020). This tendency could significantly increase the risk of social desirability bias in respondents' answers (Newhouse, 1990; Vesely & Klöckner, 2020). In the study, complete anonymity was assured and promised to all respondents in the introductory message on the landing page, aiming to diminish the influence of social desirability bias. However, scholars claimed that although anonymity can alleviate interviewees' apprehension about potential social judgement and social sanctioning, the risk of social desirability bias remains a concern in survey research (Joinson, 1999; Vesely & Klöckner, 2020). To minimize socially desired responses, future research could benefit from incorporating data such as observations of actual purchases of green products to more accurately capture consumers' real behaviors (Felix & Braunsberger, 2016).

External validity pertains to the extent to which research findings can be generalized beyond the specific sample studied, indicating whether the sample accurately

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represents the broader population (Saunders et al., 2016). In order to apply the findings of the study to different settings or groups, it is essential to establish external validity. The sample of our study consisted of 49% males ( $n = 224$ ) and 51% females ( $n = 233$ ). It can be argued that an almost equal gender distribution in the sample should reflect the gender distribution among the population of China.

Nevertheless, the age distribution of the sample needs improvement. The age of the respondents was not evenly distributed in the survey result. A high percentage of respondents are over 40 years old (42%) whereas only 5% fall into the age range of 18-24, conclusions of the study were thus more applicable to middle-aged consumers compare to younger consumers, which posing a potential threat to external validity of our study. Besides, the participants in the study are predominantly from second-tier cities (62%). Although the population of second-tier cities in China do account for the majority of the entire population, the distribution of participants across various city categories in the study seems not optimal and could potentially raises some concern about the generalizability of the study findings to the broader population. It may due to the limitations in the sampling approach, and some appropriate adjustments may be needed in future research to ensure more balanced representation across age groups and city categories. Moreover, a larger sample size would help to address these threats. As McDermott (2011) state, it is never true that generalizability can be contained within a single study, but obviously more replication and a larger sample size would help to generalize the study results with more confidence.

### 6.3 Implications

Past studies conducted in Western cultures have extensively explored gender differences in environmental perceptions, values, and behaviors. However, this issue has been less frequently investigated within the context of developing Asian countries (Agarwal, 2000). The major contribution of this study for the existing body of green consumer behaviour research is to fill the gap in determining the gender differences in

the antecedents of consumers' green purchase intention in the context of China.

In contrast to numerous prior research that employed gender as a moderating factor (Sreen et al.,2018; Lasuin & Ng, 2014; Pinem, 2019; Channa et al,2022), this study treats gender as a primary predictor of the antecedents of green purchase intention. By positioning gender as a predictor, this approach allows researchers to directly assess how gender influences the antecedents of consumers' green purchase intentions, such as environmental attitudes, environmental concern and so on. This can lead to a more nuanced understanding of the causal relationships between gender and the crucial determinants of green purchase intention and a clearer apprehension of how deeply intertwined demographic factors are with sustainable consumption, rather than merely observing how gender differences might affect the strength or direction of relationships already established by other variables.

The findings of the present study reveals that gender plays a role in green consumption and contribute with some insights into green consumerism from a gender perspective. In terms of environmental attitudes, we found that women generally expressing more positive environmental attitudes than men. At present, consumers are growing more conscious of how their behavior and resource usage impact the environment, resulting more desire to purchase eco-friendly products and services (Laroche et al., 2001). Consequently, it is becoming increasingly crucial for companies to comprehend consumers' attitudes to predict their behavior accurately and adapt their marketing strategies accordingly. Lee (2009) suggested gender-based market segmentation, acknowledging the need for different strategies for male and female consumers. He claimed that marketers are advised to prioritize specifically targeting female consumers due to their more positive environmental orientation. And the influence of female consumers may contribute to the development of a stronger pro-environment culture, potentially increasing the overall effectiveness of environmental campaigns.



In addition, our study has revealed a result that differs from multiple previous research ( Mei et al., 2012; Paço and Lavrador , 2017; Kennedy et al., 2009; Lavuri et al.,2021), which is environmental knowledge negatively affects the consumers' intention to buy eco-friendly products. This finding underscores the complexity of consumer decision-making in the green context and suggests a potential information-action gap where possessing more knowledge about environmental issues may not necessarily translate into pro-environmental actions like green purchasing. The intriguing result of the study reshape our understanding of how consumers' environmental knowledge interacts with green purchase intention and provide some implications that can inform managerial strategies in green consumer behavior.

People well-versed in environmental issues are adept at identifying deceptive eco-friendly claims in advertising (Newell et al.,1998). It has been noted that consumers with more environmental knowledge are particularly capable of spotting greenwashing in advertisements, which adversely influences their intention to purchase green products. The rise in environmental awareness is a response to global environmental challenges (Zsóka et al., 2013). Nowadays, consumers are increasingly environmentally aware and well-informed. They actively access diverse sources of information to seek updated information about the environmental practices and policies of eco-conscious companies (Akehurst et al.,2012). Consequently, this environmental knowledge plays a critical role in shaping consumer behavior towards the adoption and preference of green products and services.

To effectively respond to this situation, is is essential for companies to consider educated consumer with higher level of environmental knowledge and exercise caution when making green claims. In order to establish consumer trust and foster positive purchase intentions among knowledgeable consumers, companies need to go an extra mile to ensure the transparency, authenticity and reliability of the green claims they made. Also, aligning promotional messages with actual environmental behaviors is crucial to prevent negative outcomes such as consumer dissatisfaction

(Bibi, 2019). By demonstrating a genuine commitment to sustainability, companies can have the opportunities to build trust and earn the loyalty of environmentally conscious consumers, fostering positive purchase intentions across diverse demographics, including gender.

## 6.4 Further research

### 6.4.1 Theoretical perspective

It could be meaningful to expand the scope of this research by considering other important factors that can strongly affect green purchase intention. For instance, future research could take insight into the effect of self-identity on consumers' green purchase intention.

Self-identity is commonly defined as the label individuals use to describe themselves (Cook et al., 2002), encompassing the traits and goals that are not made through connections of social group memberships (Oyserman et al., 2009). Environmental behavior serves as a unique form of altruism, carrying symbolic functions that aid in self-identity formation and allow individuals to present themselves to others (Hopper & Nielsen, 1991). Scholars (Mannetti et al., 2004; Stets & Biga, 2003) have indicated that the self-identity dimension significantly contributes to explaining intentions related to environmental behavior, such as recycling and green purchasing. In the environmental behavior literature, self-identity has been found to be strongly associated with the intention to purchase environmentally friendly (EF) products (Van der Werff et al., 2014). And Costa Pinto et al. (2014) suggested that when self-identity is prominent, female consumers are more likely to participate in green consumption as a means of aligning with their feminine personal values, such as caring for society and maintaining harmony in the environment and society.

While in more restrictive sociocultural settings, women might exhibit lower levels of environmental concern because of constraints on self-identity, resulting in narrower

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gender disparities in environmental awareness (Chan, 2019). This suggests a promising avenue for future research to incorporate self-identity as a crucial factor in exploring the relationship between gender and the green purchase intention.

#### 6.4.2 Methodological perspective

Future research could delve deeper into the exploration of the consumer skepticism, particularly examining its relationship with environmental knowledge. As we discussed earlier, consumers possessing greater environmental knowledge might approach green consumption with a more critical and skeptical perspective. Research could examine the psychological mechanism that lead knowledgeable consumers to doubt greenwashing and green claims in marketing. This could involve qualitative methods like interviews or focus groups to investigate how the utilization of Greenwashing impacts consumers' emotional responses towards advertisements incorporating these elements and gain richer insights into consumer thought processes (Panboon & Wahlgren, 2021).

Furthermore, given the potential influence of cultural contexts on the impact of environmental knowledge on green purchasing intentions, comparative studies across diverse cultural settings present an avenue for investigation. Such comparative analyses could shed light on whether the observed phenomenon holds universally or varies depending on cultural norms and values. This could help in understanding how cultural factors interact with environmental awareness and purchasing intention (Nekmahmud et al.,2022).

Last but not least, based on the limitations we discussed earlier, future studies should incorporate measures to control for the impact of past or recent events on green purchase intention. This could entail conducting longitudinal studies to track changes in consumer behavior over time (Mostafa, 2007). Researchers could also adopt qualitative research along quantitative methods, to delve into participants' perceptions

and responses to relevant events. Additionally, to address social desirability bias, future studies could assess green consumption based on actual behavior such as observed green purchase behavior, as consumers' behavioral intentions often exceed their actual actions (Costa et al., 2016). Also, incorporating social desirability measures in surveys can help uncover individuals' inclination to respond in a socially favorable manner. By incorporating this as a control variable, researchers can better address individual biases and adjust the findings accordingly (Vesely & Klöckner, 2020). Lastly, another future research direction could focus on enhancing the generalizability of our study results. Our research primarily included data from middle-aged consumers rather than younger consumers, and predominantly comprises data from consumers in second-tier cities rather than those in other cities. Future research could employ a more representative sample of the population to enhance the generalizability of the findings. This would enable a broader understanding of green consumer behavior across different demographic groups and urban settings.

## 6.5 Conclusion

As environmental issues become more prominent worldwide, consumer behavior has significantly changed and adapted to be more sustainable. Due to the growing population of green consumers, marketers are increasingly focusing on targeting the green segment of the population. D'Souza (2004) asserts that the green vision is now a reality and emphasizes the necessity for marketers to gain a deeper understanding of this demographic to develop strategies tailored to meet the specific needs of green consumers effectively.

The current study highlights four crucial factors that contribute to positively affect green purchasing behavior among Chinese urban consumers: environmental attitudes, environmental concern, subjective norm, and perceived consumer effectiveness. In terms of gender differences, the study findings show that male and female consumers show significant differences in environmental attitudes and environmental knowledge.

Women exhibit a more positive attitudes towards green purchase intentions and man possess more knowledge about environmental issues, consistent with findings from past relevant studies ( e.g., Heinzle, et al., 2010; Vinz, 2009; Xiao & Hong, 2010; Tikka et al.,2000; Diamantopoulos et al., 2003). However, distinct from other settings (e.g., Paço and Lavrador, 2017; Kennedy et al., 2009; Lavuri et al.,2021), higher levels of environmental knowledge in China do not necessarily lead to pro-environmental behaviors, thus highlighting a notable knowledge-behavior gap. This unique observation contributes to our understanding of cross-cultural differences in environmental perceptions and behaviors, particularly with its focus on Chinese urban consumers.

This study underscores the need for continued analysis into the antecedents of consumers' green purchase intentions, as well as the importance of analyzing gender differences in green consumption. As awareness and sensitivity towards the environment continue to rise, the market for green products has been experiencing steady expansion (Nekmahmud et al., 2022). By identifying the crucial determinants of green purchase intentions and the gender differences within them, marketers can make more accurate business decisions and develop more targeted and effective strategies to cater to customers who attach more importance to sustainability today.

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## Appendices

### Appendix A: Questionnaire Design in Wenjuan

#### Appendix A1: Pretest Questionnaire (Chinese Version)



#### 绿色购买行为影响因素[复制]

##### 一、基本信息

\*1. 您的性别

男

女

\*2. 您的年龄是

18-24

25-29

30-39

40及以上

\*3. 您的学历水平

高中及以下

大专/专科

本科

研究生及以上

\*4. 您所在城市类别

一线

二线

三线

其他

## 二、正式问卷

\* 5.


	非常不同意	比较不同意	一般	比较同意	非常同意
保护环境对我来说很重要。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
植物和动物与人类有同样的生存的权利。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
绿色消费是一个保护环境的好方法。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我对绿色消费保持积极态度。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我非常关心环境。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我愿意减少个人消费，为环保做出一份贡献。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我对我国环境质量不断恶化而感到担忧。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我正在投入地参与我国的环保事业中。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我充分了解当下的环境问题。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
与一般人相比，我对回收方面的知识有更好的了解。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	非常不同意	比较不同意	一般	比较同意	非常同意
我了解产品包装上的环境术语和符号。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我了解如何选择可最大限度减少垃圾填埋场废物量的产品和包装。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
对我来说重要的人他们大多数都希望我会购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
对我来说重要的人他们大多数都会认同我应该去购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
如果我购买了绿色产品，人们会对我产生积极的看法。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我认为购买绿色产品可以帮助解决自然资源问题。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
通过购买绿色产品我可以为环境保护做出一份贡献。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我觉得自己有能力为解决环境问题做出一份贡献。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我愿意购买绿色产品自用。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我会尽可能多地购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
如果环保产品的价格与同类其他产品的价格相当，我可能会倾向于购买环保产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
如果环保产品的质量与同类其他产品的质量相当，我可能会倾向于购买环保产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## \* 6. 标题

	从不	偶尔	有时	经常	一直
我在努力购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
因为绿色产品具有环保效益，我已开始从购买普通产品转而购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
当面临两种相同产品之间的选择时，我会选择对环境危害较小的一种。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我会定期购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我在过去六个月内进行了绿色产品的采购。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

您对这个问卷还有其他建议吗？

## Appendix A2: Pretest Questionnaire (English Translation Version)



### Green Purchase Behavior - Survey

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#### 1. Basic Information

\* 1. Your gender

Male

Female

\* 2. Your age group

18-24

25-29

30-39

Over 40

\* 3. Your highest education level

High school or below

Three-year college or training school

Bachelor's degree

Master's degree or above

\* 4. Your living city category

Tier 1 (Beijing, Shanghai, Guangzhou, Shenzhen)

Tier 2 (Provincial capitals and municipalities)

Tier 3 Nonprovincial capital cities)

Other

\* 5.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Protecting the environment is important to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plants and animals have the right to live as much as humans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Green consumption is a good idea to protect the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a positive attitude towards green consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am deeply concerned about the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to decrease my consumption to contribute to environmental protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am concerned about the deteriorating environmental quality in my country	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am emotionally engaged in environmental protection matters in my country	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am knowledgeable about environmental issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a better understanding of recycling compared to the average person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I understand environmental terms and symbols on product packaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am knowledgeable about selecting products and packaging that minimize the amount of waste disposed of in landfills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most people who are important to me would expect me to purchase green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most people who matter to me would agree that I should buy green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People will view me positively if I buy green product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People around me can have an impact on my decision to purchase green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can help solve natural resource problem by purchasing green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can contribute to environmental protection by purchasing green product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel empowered to contribute to solving environmental problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to buy green products for my own use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I will try to buy as many green products as possible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I might choose to buy an eco-friendly product if the price is comparable to other products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I might choose to buy an eco-friendly product if the qualities are comparable to other products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>


\* 6. Title

	Never	Seldom	Sometimes	Usually	Always
I make efforts to buy green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have switched to buy green products due to their environmental benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When faced with options between two same products, I opt for the one that are less harmful to the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have been purchasing green products at regular basis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have engaged in green purchasing behavior over the last six months	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have other suggestions on this questionnaire?

## Appendix A3: Questionnaire (Chinese Version)

This is the formal questionnaire distributed to respondents through various social media platforms.



### 绿色购买行为影响因素[复制]

尊敬的受访者：  
您好！这是一份关于绿色购买行为的调查问卷，大概将花费您3-5分钟的时间填写。您的支持和客观的反馈对于我们非常重要。我们将恪守学术研究的道德规范，所有数据结果仅用于学术目的并予以保密。请您仔细阅读并根据实际情况作答，所有回答均匿名处理。感谢您的宝贵时间！

---

一、基本信息

\* 1. 您的性别

男

女

\* 2. 您的年龄是

18-24

25-29

30-39

40及以上

\* 3. 您的学历水平

高中及以下

大专/专科

本科

研究生及以上

\* 4. 您所在城市类别

一线（北京、上海、广州、深圳）

二线（省会城市及直辖市）

三线（非省会城市）

其他



## 二、正式问卷

(绿色消费是指对环境友好、可节约、可回收、对社会安全或对环境问题敏感的产品的消费。绿色产品主要包括但不限于：节能家电、太阳能产品、餐饮或购物时使用的纸制吸管和袋子、电动汽车、使用天然成分而不是有害化学物质的洗涤剂)

\* 5.

	非常不同意	比较不同意	一般	比较同意	非常同意
保护环境对我来说很重要。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
植物和动物与人类有同样的生存的权利。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
绿色消费是一个保护环境的好方法。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我对绿色消费保持积极态度。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我非常关心环境。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我愿意减少个人消费，为环保做出一份贡献。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我对我国环境质量不断恶化而感到担忧。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我正在投入地参与我国的环保事业中。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我充分了解当下的环境问题。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
与一般人相比，我对回收方面的知识有更好的了解。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	非常不同意	比较不同意	一般	比较同意	非常同意
我了解产品包装上的环境术语和符号。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我了解如何选择可最大限度减少垃圾填埋场废物量的产品和包装。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
对我来说重要的人他们大多数都希望我会购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
对我来说重要的人他们大多数都会认同我应该去购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
如果我购买了绿色产品，人们会对我产生积极的看法。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我认为购买绿色产品可以帮助解决自然资源问题。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
通过购买绿色产品我可以为环境保护做出一份贡献。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我觉得自己有能力为解决环境问题做出一份贡献。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我愿意购买绿色产品自用。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我会尽可能多地购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
如果环保产品的价格与同类其他产品的价格相当，我可能会倾向于购买环保产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
如果环保产品的质量与同类其他产品的质量相当，我可能会倾向于购买环保产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## \* 6. 标题

	从不	偶尔	有时	经常	一直
我在努力购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
因为绿色产品具有环保效益，我已开始从购买普通产品转而购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
当面临两种相同产品之间的选择时，我会选择对环境危害较小的一种。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我会定期购买绿色产品。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
我在过去六个月内进行了绿色产品的采购。	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

提交

## Appendix A4: Questionnaire ( English Translation Version)



### Green Purchase Behavior - Survey

Dear Respondents,

Hello! This is a questionnaire regarding green purchase behavior that will take you about 3-5 minutes to fill out. Your support and objective feedback are very important to us. We will adhere to the ethical principles of academic research, and all data results will be used for academic purposes only and will be kept confidential. Please read carefully and answer according to the actual situation, all answers will be processed anonymously. Thank you for your time!

#### 1. Basic Information

\* 1. Your gender

- Male
- Female

\* 2. Your age group

- 18-24
- 25-29
- 30-39
- Over 40

\* 3. Your highest education level

- High school or below
- Three-year college or training school
- Bachelor's degree
- Master's degree or above

\* 4. Your living city category

- Tier 1 (Beijing, Shanghai, Guangzhou, Shenzhen)
- Tier 2 (Provincial capitals and municipalities)
- Tier 3 Nonprovincial capital cities)
- Other

Green consumption refers to the use of products that are environmentally friendly, conserving, recyclable, safe for society, or sensitive to environmental issues. Green products primarily include but are not limited to, energy-saving appliances, solar energy products, paper straws and bags used in dining or shopping! electric vehicles, and detergents made from natural ingredients instead of harmful chemicals.

\* 5.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Protecting the environment is important to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plants and animals have the right to live as much as humans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Green consumption is a good idea to protect the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a positive attitude towards green consumption	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am deeply concerned about the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to decrease my consumption to contribute to environmental protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am concerned about the deteriorating environmental quality in my country	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am emotionally engaged in environmental protection matters in my country	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am knowledgeable about environmental issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a better understanding of recycling compared to the average person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I understand environmental terms and symbols on product packaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am knowledgeable about selecting products and packaging that minimize the amount of waste disposed of in landfills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most people who are important to me would expect me to purchase green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most people who matter to me would agree that I should buy green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People will view me positively if I buy green product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People around me can have an impact on my decision to purchase green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can help solve natural resource problem by purchasing green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can contribute to environmental protection by purchasing green product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel empowered to contribute to solving environmental problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am willing to buy green products for my own use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I will try to buy as many green products as possible	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I might choose to buy an eco-friendly product if the price is comparable to other products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I might choose to buy an eco-friendly product if the qualities are comparable to other products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

\* 6. Title

	Never	Seldom	Sometimes	Usually	Always
I make efforts to buy green products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have switched to buy green products due to their environmental benefits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When faced with options between two same products, I opt for the one that are less harmful to the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have been purchasing green products at regular basis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have engaged in green purchasing behavior over the last six months	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

submit

## Appendix B: MI Values

*Table B. Covariance: (Group number 1 - Default model)*

			M.I.	Par Change
Subjective Norms	<-->	Perceived consumer effectiveness	259.135	.533
Environmental Knowledge	<-->	Perceived consumer effectiveness	149.301	.453
Environmental Knowledge	<-->	Subjective Norms	222.339	.571
Environmental Concerns	<-->	Perceived consumer effectiveness	281.630	.533
Environmental Concerns	<-->	Subjective Norms	235.635	.504
Environmental Concerns	<-->	Environmental Knowledge	175.758	.487
Environmental Attitudes	<-->	Perceived consumer effectiveness	208.744	.527
Environmental Attitudes	<-->	Subjective Norms	130.548	.431
Environmental Attitudes	<-->	Environmental Knowledge	71.223	.357
Environmental Attitudes	<-->	Environmental Concerns	262.658	.587
e29	<-->	Subjective Norms	25.479	.171
e29	<-->	Environmental Knowledge	37.119	.231
e29	<-->	e28	10.781	-.048
e24	<-->	Perceived consumer effectiveness	4.248	.050
e24	<-->	Subjective Norms	12.593	.089
e24	<-->	e29	8.162	.070
e24	<-->	e27	7.986	.048
e23	<-->	Perceived consumer effectiveness	7.884	.088
e23	<-->	Subjective Norms	29.693	.177
e23	<-->	Environmental Knowledge	86.381	.337
e23	<-->	e29	18.648	.138
e23	<-->	e24	8.416	.069
e22	<-->	Perceived consumer effectiveness	4.630	.041
e22	<-->	Environmental Concerns	5.113	.043

			M.I.	Par Change
e22	<-->	e29	4.540	.042
e21	<-->	Perceived consumer effectiveness	7.643	.074
e21	<-->	Environmental Concerns	6.328	.067
e21	<-->	Environmental Attitudes	12.612	.108
e21	<-->	e28	10.459	.039
e21	<-->	e29	5.811	-.065
e21	<-->	e23	7.020	-.069
e20	<-->	Environmental Knowledge	4.434	.061
e19	<-->	e20	16.981	.080
e18	<-->	e25	19.178	.038
e18	<-->	e24	5.915	.035
e18	<-->	e23	4.232	.038
e17	<-->	e29	6.922	-.048
e17	<-->	e25	10.352	-.027
e17	<-->	e23	6.318	-.044
e17	<-->	e21	5.529	.035
e17	<-->	e18	9.623	-.032
e16	<-->	Subjective Norms	5.135	-.043
e16	<-->	e29	20.565	-.085
e16	<-->	e27	7.653	-.036
e16	<-->	e25	8.225	-.024
e16	<-->	e24	9.904	-.044
e16	<-->	e21	9.786	.048
e16	<-->	e19	8.305	-.042
e16	<-->	e17	61.806	.080
e15	<-->	Subjective Norms	23.934	.119
e15	<-->	Environmental Knowledge	20.409	.123
e15	<-->	Environmental Concerns	6.493	.060
e15	<-->	e27	6.116	.041
e15	<-->	e24	8.588	.052
e15	<-->	e23	7.551	.063
e15	<-->	e21	11.650	-.067
e15	<-->	e17	5.581	-.031
e14	<-->	Subjective Norms	12.386	.074
e14	<-->	Environmental Concerns	18.520	.087
e14	<-->	Environmental Attitudes	24.655	.115
e14	<-->	e21	4.726	.037

			M.I.	Par Change
e13	<-->	Subjective Norms	6.597	.062
e13	<-->	Environmental Knowledge	11.538	.092
e13	<-->	Environmental Concerns	19.076	.102
e13	<-->	Environmental Attitudes	12.913	.096
e12	<-->	Perceived consumer effectiveness	4.210	.047
e12	<-->	Environmental Knowledge	15.564	.105
e12	<-->	Environmental Concerns	10.883	.075
e12	<-->	e28	6.517	-.026
e12	<-->	e29	8.262	.068
e12	<-->	e27	4.342	.034
e12	<-->	e23	9.530	.070
e12	<-->	e21	10.606	-.062
e12	<-->	e19	13.272	.067
e12	<-->	e16	8.159	-.038
e11	<-->	Perceived consumer effectiveness	9.341	.062
e11	<-->	Environmental Concerns	10.926	.067
e11	<-->	Environmental Attitudes	13.836	.087
e11	<-->	e28	5.821	.022
e11	<-->	e25	4.321	.020
e11	<-->	e21	4.532	.036
e10	<-->	Perceived consumer effectiveness	30.452	.144
e10	<-->	Environmental Knowledge	18.152	.128
e10	<-->	Environmental Concerns	8.775	.076
e10	<-->	Environmental Attitudes	5.842	.072
e10	<-->	e26	8.324	.048
e10	<-->	e25	7.079	-.033
e10	<-->	e23	5.619	.060
e10	<-->	e19	4.721	-.045
e10	<-->	e18	8.830	.046
e9	<-->	Perceived consumer effectiveness	35.139	.160
e9	<-->	Subjective Norms	12.922	.100
e9	<-->	Environmental Concerns	49.008	.188
e9	<-->	Environmental Attitudes	38.787	.192
e9	<-->	e24	5.293	-.045
e9	<-->	e22	7.803	.045
e9	<-->	e21	5.053	.051
e9	<-->	e18	7.256	-.043



			M.I.	Par Change
e9	<-->	e14	14.168	.064
e8	<-->	Perceived consumer effectiveness	4.508	.049
e8	<-->	Subjective Norms	4.866	.053
e8	<-->	Environmental Concerns	20.656	.105
e8	<-->	Environmental Attitudes	8.089	.075
e8	<-->	e9	9.099	.058
e7	<-->	e27	4.560	-.039
e7	<-->	e24	5.822	.045
e7	<-->	e21	10.115	-.069
e7	<-->	e14	7.033	-.043
e7	<-->	e13	6.485	.048
e6	<-->	Perceived consumer effectiveness	7.158	.058
e6	<-->	Subjective Norms	6.180	.056
e6	<-->	Environmental Attitudes	17.315	.103
e6	<-->	e9	5.899	.045
e5	<-->	Perceived consumer effectiveness	15.206	.092
e5	<-->	Subjective Norms	5.643	.058
e5	<-->	Environmental Attitudes	17.747	.113
e5	<-->	e23	4.353	-.047
e5	<-->	e22	4.101	.029
e5	<-->	e18	5.683	-.033
e5	<-->	e17	9.225	.040
e5	<-->	e14	4.139	.030
e4	<-->	Perceived consumer effectiveness	14.390	.108
e4	<-->	Subjective Norms	5.834	.071
e4	<-->	Environmental Attitudes	11.592	.111
e4	<-->	e15	4.878	.046
e4	<-->	e9	4.021	.048
e3	<-->	Perceived consumer effectiveness	5.574	.046
e3	<-->	Environmental Knowledge	5.800	.054
e3	<-->	Environmental Concerns	7.206	.051
e3	<-->	e23	5.845	.046
e2	<-->	Perceived consumer effectiveness	9.281	.072
e2	<-->	Subjective Norms	9.239	.074
e2	<-->	Environmental Concerns	5.121	.053
e2	<-->	e22	5.872	-.034
e2	<-->	e3	6.960	.037

## Appendix C: Descriptive Statistics

*Table C. Basic Descriptive Statistics of Variables*

Variables	Num.	Min.	Max.	Mean	Std.Dev.
EA1	457	1.000	5.000	4.420	0.997
EA2	457	1.000	5.000	4.379	1.045
EA3	457	1.000	5.000	4.453	0.977
EA4	457	1.000	5.000	4.473	0.966
EC1	457	1.000	5.000	4.306	0.954
EC2	457	1.000	5.000	4.249	0.980
EC3	457	1.000	5.000	4.258	1.036
EC4	457	1.000	5.000	3.895	1.075
EK1	457	1.000	5.000	3.821	1.032
EK2	457	1.000	5.000	3.755	1.003
EK3	457	1.000	5.000	3.589	1.087
EK4	457	1.000	5.000	3.626	1.067
SN1	457	1.000	5.000	3.888	1.065
SN2	457	1.000	5.000	3.967	1.018
SN3	457	1.000	5.000	3.937	1.034
CPE1	457	1.000	5.000	4.171	0.951
CPE2	457	1.000	5.000	4.254	0.947
CPE3	457	1.000	5.000	4.142	0.959
PI1	457	1.000	5.000	4.317	0.870
PI2	457	1.000	5.000	4.254	0.985
PI3	457	1.000	5.000	4.407	0.889
PI4	457	1.000	5.000	4.389	0.918
PB1	457	1.000	5.000	3.678	1.002
PB2	457	1.000	5.000	3.702	1.030
PB3	457	1.000	5.000	4.002	1.008
PB4	457	1.000	5.000	3.490	1.174
PB5	457	1.000	5.000	3.696	1.121