南華大學管理學院企業管理學系管理科學博士班

博士論文

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Doctoral Dissertation

建立綠色採用行為的綜合模型：以知覺社會責任與知覺心理利益為調節作用

Toward a Comprehensive Model of Green Adoption Behavior: The Moderating Roles of Perceived Social Responsibility and Perceived Psychological Benefits

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準博士推薦函

本校企業管理學系管理科學博士班研究生 武明君 君在本系修業 6 年，已經完成本系博士班規定之修業課程及論文研究之訓練。

1、在修業課程方面：武明君君已修滿 45 學分，其中必修科目： 研究方法 、 最佳化理論 、 書報討論 、 企業倫理專題研討 等科目，成績及格(請查閱博士班歷年成績)。

2、在論文研究方面：武明君君在學期間已完成下列論文：

(1)博士論文：

Toward a Comprehensive Model of Green Adoption Behavior: The Moderating Role of Perceived Social Responsibility and Perceived Psychological Benefits (中文: 建立綠色採用行為的綜合模型：以知覺社會責任與知覺心理利益為調節作用)

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本人認為武明君君已完成南華大學企業管理學系管理科學博士班之博士養成教育，符合訓練水準，並具備本校博士學位考試之申請資格，特向博士資格審查小組推薦其初稿，名稱：Toward a Comprehensive Model of Green Adoption Behavior: The Moderating Role of Perceived Social Responsibility and Perceived Psychological Benefits (中文: 建立綠色採用行為的綜合模型：以知覺社會責任與知覺心理利益為調節作用)，以參加博士論文口試。

指導教授：吳萬益 簽章

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Title of Thesis: Toward a Comprehensive Model of Green Adoption Behavior: The Moderating Roles of Perceived Social Responsibility and Perceived Psychological Benefits

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ABSTRACT

Resource depletion and environmental change have a significant negative effect on the natural ecosystem and human societies. Thus, increasing green adoption and reducing environmental deterioration have been the top priority issues not only for firms but also for individuals. However, a comprehensive framework to integrate antecedents, mediators, and moderators of green adoption behavior has yet to be developed. This study intended to fulfil these research gaps and aimed to investigate the effects of antecedents (personal traits), and mediators (environmental concern, green environmental attitude, green environmental self-identity, and green customer value) on consumers' green adoption behavior. The moderating roles of perceived social responsibility and perceived psychological benefits were also investigated. A research framework was developed based on an integration of signalling

Theory, Attitude-Behavior-Context (ABC) Theory, Value-Belief-Norm (VBN) Theory, and Social Identity Theory.

A survey approach was adopted using MTurk online data collection platform to obtain data from 352 randomized respondents. SPSS22 and SmartPLS3 were adopted in data analysis. The study results indicated that personality traits play important roles in environmental concern, green environmental attitude, and green customer value. Environmental concerns also serve as some of the most important constructs to promote mediating variables such as green environmental attitude, green environmental self-identity, and green customer value. These mediators further significantly facilitate consumers' green adoption. Perceived social responsibility and perceived psychological benefits were identified as two important moderators that can provide interactive effects with green environmental attitude, green environmental self-identity, and green customer value on consumers' green adoption behavior.

Since previous studies still rarely integrated relevant research constructs to explain the phenomenon of consumers' green adoption behavior, this study has filled the research gaps to embrace our understanding of antecedents, mediators, and moderators of green adoption behavior. The study results could be very supportive for academicians to conduct further validation on this research issue. The results could be also very helpful for executives and managers to design and implement appropriate green marketing and management strategies to pursue the sustainability development of the firm.

Keywords: personal traits, green adoption behavior, green environmental self-identity, perceived social responsibility, perceived psychological benefits

題目： 建立綠色採用行為的綜合模型：以知覺社會責任與知覺心理利益為調節作用

摘要

資源枯竭和環境變化對自然生態系統和人類社會產生了顯著的負面影響。因此，提高綠色產品採用率和減少環境惡化已成為企業和個人的首要任務。然而，尚未開發出一個綜合框架來整合採納綠色產品行為的前因、中介因子和調節因子。本研究旨在填補這些研究空缺，調查前因（個人特質）和中介（環境關注、綠色環境態度、綠色環境自我認同和綠色客戶價值）對消費者綠色採納行為的影響。並進一步探討知覺社會責任和知覺心理利益的調節作用。基於信號理論、態度-行為-情境 (ABC) 理論、價值-信念-規範 (VBN) 理論和社會認同理論的整合，提出一研究模型。

本研究採用 MTurk 線上數據蒐集平台的調查方法，共蒐集 352 筆樣本。數據分析採用 SPSS22 和 SmartPLS3。研究結果顯示，人格特質在環境關注、綠色環境態度和綠色顧客價值中扮演重要作用。環境問題也是促進綠色環境態度、綠色環境自我認同和綠色客戶價值等中介變量的一些最重要的結構。這些調解員進一步顯著促進了消費者的綠色採納。知覺社會責任和知覺心理利益被確定為兩個重要的調節因子，可以為消費者的綠色採納行為提供綠色環境態度、綠色環境自我認同和綠色顧客價值的交互效應。

由於以往的研究仍然很少整合相關研究結構來解釋消費者的綠色採納行為現象，本研究結果可供學者們對該研究問題進行進一步驗證。研究結果也可能對企業經理人設計和實施適當的綠色行銷和管理策略以追求公司的可持續發展非常有幫助。

關鍵詞：人格特質、綠色採納行為、綠色環境自我認同、知覺社會責任感、知覺心理利益

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CHAPTER ONE
INTRODUCTION

This chapter illustrated an overview of the study. Specifically, the research background and motivations, research questions and objectives, and research procedures were included in this chapter.

1.1. Research background and motivation

Growing awareness of global warming and increasing concerns about environmental degradation, both businesses and consumers have shown a greater inclination towards social responsibility through increased green investments and the adoption of eco-friendly products (Liao, Wu, and Pham, 2020). However, there is not so many research in environmental-related domains, particularly in identifying the factors that influence consumers' green adoption behavior, as well as the mediators and moderators involved. Although previous studies have explored this behavior using various theoretical frameworks such as TBP Theory of Planned Behavior (Paul, Modi & Patel, 2016), TAM Technological Acceptance Model (Davis, 1986), and VBN Value-Belief and Norm Theory, there is a need for further efforts to achieve greater understanding and progress in this area.

With increasing awareness of environmental issues, need to understand and promote sustainable behaviors. Green adoption behavior refers to the actions individuals take to adopt environmentally friendly practices, products, or technologies. By studying this behavior comprehensively, the can identify the key factors that influence individuals' decision-making processes and facilitate the adoption of green practices. Consumer behavior plays a crucial role in shaping market demand. Understanding the factors that drive or hinder consumer adoption of green practices can help businesses develop innovative and sustainable products, enhance their market competitiveness, and create strategies to target environmentally conscious consumers effectively. A

comprehensive model of green adoption behavior can provide valuable insights into consumer decision-making processes, including the influence of attitudes, beliefs, social norms, and perceived benefits and barriers. Studying green adoption behavior requires an interdisciplinary approach, combining insights from fields such as psychology, sociology, economics, marketing, and environmental science. By integrating knowledge and perspectives from multiple disciplines, the study can develop a holistic understanding of the complex factors that influence green adoption behavior. This interdisciplinary approach is crucial for addressing the multifaceted nature of sustainable behavior change and developing comprehensive models that capture the nuances and interactions between various factors. Conducting research on a comprehensive model of green adoption behavior is crucial due to the pressing need for sustainable development, the influence of consumer behavior on market dynamics, the formulation of effective policies, and the interdisciplinary nature of the topic. Such kind of studies can provide valuable insights for individuals, businesses, policymakers, and organizations to foster widespread adoption of green practices and contribute to a more sustainable future.

First of all, personality traits have emerged as significant factors influencing environmental concerns and green adoption. Mowen (2000) created Meta-theoretic Model, 3M Model was originally designed to understand the impact of different factors on general purchase intention (Kang & Johnson, 2015). However, its specific application for green products has not been extensively examined (Dennis et al., 2005). Previous research have argued that consumer characteristics alone are inadequate to shape green purchase behavior (Ton et al., 2016). In contrast, recent studies have increasingly focused on exploring the role of motivational drivers (Sharma et al., 2020). 3M Model provides a comprehensive framework to understand how personality

traits, as elemental traits, can trigger their influence on compound traits, situational traits, and surface traits related to green adoption. These different levels of traits collectively contribute to individuals' engagement in pro-environmental behavior. This study seeks to enhance our understanding of the factors driving green adoption behavior by investigating the specific role of personality traits in conjunction with motivational drivers,. While previous studies have primarily focused on demographic and psychographic factors, this study aims to uncover the underlying mechanisms through which personality traits interact with motivational drivers to influence individuals' green adoption behavior. By considering the dynamic interplay between personality traits and motivational drivers, this study contributes for the understanding of the factors that create individuals' attitudes and behaviors towards green adoption. Overall, this study try to shed light on the complex relationships between personality traits, motivational drivers, and green adoption behavior. By investigating these interconnections, the study seeks to provide valuable insights for marketers, policymakers, and practitioners interested in promoting sustainable behaviors and facilitating the adoption of green products and practices. Previous research acknowledges the importance of personality traits in shaping environmental concerns and green adoption behavior. Mowen's 3M model explains how personality traits influence compound, situational, and surface traits related to green behavior. However, the applicability of this model to green products is uncertain. This study fills the research gap by examining the interplay between personality traits, motivational drivers, and green adoption behavior.

Second, environmental concern encompasses many aspects such as perceptions, emotions, knowledge, attitudes, values, and behaviors, as acknowledged by the general public (Bamberg, 2003). Within academic research, environmental concern has often been conceptualized as a component of morally charged human concerns, linked to universal values (Hirsh, 2010).

The preservation of the natural environment is contingent upon a value system that shapes attitudes and behaviors, and it can serve the interests of stakeholders involved (Jang et al., 2017). Despite its significance, only few studies have delved into impact of environmental concern on ecologically responsible attitudes and behaviors (Dasher et al., 2015). Moreover, there has been a dearth of research examining the interplay between environmental orientation, which incorporates the interconnectedness of environmental sensitivity, values, attitudes, and behaviors, and the shift from anthropocentrism to egocentrism in individuals (Koustova, 2017). As a result, further validation is necessary. Personality traits have been found to shape individuals' attitudes and behaviors across various domains, including environmental concerns. Examining how specific personality traits interact with environmental concerns can provide insights into the motives driving green purchase behavior. Understanding the motivational aspects associated with environmental concern can assist marketers and policymakers in tailoring their strategies to effectively engage with environmentally conscious consumers. Additionally, the study will explore the influence of environmental concerns on green purchase behavior, encompassing factors such as the perceived importance of sustainability, willingness to pay a premium for environmentally friendly products, and actual purchase behavior. This comprehensive analysis will enhance our understanding of how environmental concerns translate into tangible actions in the marketplace. The study will employ a mixed-methods approach, utilizing quantitative surveys and qualitative interviews. The survey will collect data on personality traits, levels of environmental concern, consumer motivation, and green purchase behavior. The qualitative interviews will provide deeper insights into individuals' experiences, perceptions, and motivations related to environmental concerns and green consumption. Environmental concern encompasses a broad range of knowledge, perceptions, emotions, attitudes,

values, and behaviors. While the public views it as such, academic researchers often consider it a subset of morally driven human concerns rooted in universal values. Limited research has explored the impact of environmental concern on ecologically responsible attitudes and behaviors, as well as the interplay of environmental orientation with sensitivity, values, attitudes, and behaviors. This study objective is to fill in these research gaps by examining the relationships among personality traits, environmental concerns, consumer motivation, and green purchase behavior.

Thirdly, social expectations regarding social responsibility, a motivating factor to prompt individuals to act in an ecologically responsible manner (Yu, Yu, and Chao, 2017). Previous studies have categorized social responsibility into four types: environmental social responsibility, ethical/human rights social responsibility, philanthropic corporate responsibility, and economic corporate social responsibility. In this study, perceived environmental social responsibility refers to consumers' perception of firms' commitment to designing environmentally friendly operations to maintain sustainability. Perceived ethical social responsibility refers to consumers' perception of firms' commitment to running the business ethically based on the principles of human rights equality. Perceived philanthropic corporate responsibility refers to firms' commitment to operating in a manner that actively contributes to the betterment of society. Perceived social responsibility is one of the most influential factors for green adoption (Yu, Yu, & Chao, 2017). Although its direct effect on consumers' green adoption has been widely discussed, the impact of the interactions between perceived social responsibility and consumer motivations on green adoption has rarely been explored. Thus, by evaluating the moderating role of perceived social responsibility on consumers' green adoption behavior, this study aims to fill this research gap. The study proposes that perceived social responsibility will enhance the influence of consumers' attitudes, values, and

self-identity on their adoption of green products. Individuals with a strong sense of social responsibility are more likely influenced by their positive attitudes towards green products, values aligned with environmental protection, and a self-identity that includes being environmentally conscious. By investigating the moderating role of perceived social responsibility, this study aims to shed light on the complex interplay between individual motivations, social responsibility, and green adoption behavior. The findings can bring deeper understanding to embrace environmentally friendly products and practices of the factors that influence consumers' decisions. The study will employ quantitative research methods, such as surveys and statistical analyses, to gather data on consumers' perceived social responsibility, motivations, attitudes, values, self-identity, and green adoption behavior. Previous studies have categorized social responsibility into environmental, ethical, philanthropic, and economic dimensions. Perceived social responsibility extends social norms, fosters altruism, and promotes self-regulated behaviors. However, the interaction between perceived social responsibility and consumer motivations in driving green adoption has received limited attention.

Psychological benefits can be categorized as self-expressive thought benefits related to personal expression and the experience of nature. Drawing on symbolic and conspicuous consumption theories (Hartmann et al., 2012), self-expressive benefits have a significant impact on green consumer behavior. Consumers are willing to purchase eco-friendly products or services because of the self-expressive benefits associated with them. Additionally, the concept of a "warm glow," which represents a positive emotional state, motivates individuals to voluntarily help others (Allison, McKenny, and Short, 2013). Empathy-driven motivations can evoke a sense of warmth and fulfillment in individuals when they engage in prosocial behaviors. Moreover, nature experience plays a vital role in perceived psychological benefits (Hwang &

Choi, 2017; Andereck & Nyaupane, 2011). While previous literature has mainly focused on the direct influence of perceived psychological benefits on green adoption behavior, some studies have proposed the moderating effect of these benefits, suggesting that they can amplify the impact of customer values, attitudes, and norms on the intention to engage in green purchasing (Hartmann et al., 2017). It include warm glow, nature experience and self-expressive thought benefits, have garnered attention in relation to their moderating effect. These benefits influence green customer behavior by enhancing self-expression, generating positive emotions, and fostering a connection with nature. While previous studies have primarily examined the direct influence of perceived psychological benefits on green adoption behavior, some studies have suggested their moderating role in amplifying the effects of customer values, attitudes, and norms on green purchasing intentions. This study aims to address this research gap by investigating the moderating effect of perceived psychological benefits on the relationship between consumer motivations and green adoption behavior.

Finally, over the last two decades, many studies have acknowledged the importance of green adoption behavior to improve environmental deterioration (Deepak & Rishi, 2018). There were a lot of themes related to green adoption behavior, however, relatively little has been investigated using the bibliometric method. This method was first introduced by Alan Pritchard (1969) and has won a great deal of attention from marketing and management researchers (Fan et al., 2021; Pen, Zhu, & Wa, 2020). This study intends to verify the major themes and scholars through bibliometric analyses.

Based on the above discussions, the following research questions were identified:

Research question 1 - How personality traits can affect environmental concern, consumers' environmental attitudes, values and norms, consumer environmental self-identity, and green adoption Behavior?

Research question 2 - How environmental concern can promote consumers' environmental attitudes, values, and self-identity, and how these three constructs can facilitate consumers' green adoption behavior?

Research question 3 - How and what possible paths can consumers' perceived social responsibility facilitate consumers' green adoption?

Research question 4 - How And what possible paths can consumers' perceived psychological benefits facilitate consumers' green adoption?

1.2. Research objectives

The study aimed to achieve four main research objectives, which can be summarized as follows:

1. Examine the influence of positive personality traits on environmental concern, green environmental attitude, green environmental self-identity, green customer value, and green adoption behavior.

2. Verify the influence of environmental concern on three mediating constructs, including green environmental attitude, green environmental self-identity, and green customer value.

3. Investigate the influence of the about three mediating constructs on green adoption behavior.

4. Investigate the moderating effect of perceived social responsibility and perceived psychological benefits that can promote the influence of three mediating constructs on consumers' green adoption behavior.

1.3. Research contribution

First, the study aims to identify multiple predictors of green adoption behavior. Second, this research added to the existing body of literature about the impact of personality traits and environmental concerns on individuals'

attitudes, values, and self-identity. Third, the study investigates the simultaneous effect of antecedents and mediators on consumers' green adoption behavior. Last, but not least, this study sheds light on two moderating variables: perceived social responsibility and perceived psychological benefits both of them can accelerate the influence of mediators on consumers' green adoption behavior.

1.4. Research project and scope of the study

Based on the aforementioned research objectives, the author designed and outlined the scope and framework of the current study, as depicted in Table 1-1.

Table 1 - 1 The scope of this study

Items	Scope of the Study
Types of the study	1. The literature reviews that were used to develop the research hypotheses and framework. 2. To collect empirical data, questionnaires and construct measures were utilized. 3. Bibliometric co-citation analysis and empirical survey were implemented.
Key issue	The current study focuses on identifying the antecedents, mediators, and moderators of consumers' green adoption behavior. Inter-relationships among antecedents, mediators, and moderators were also investigated.
Dependent variables	Green adoption behavior.
Independent variables	Positive personality traits, environmental concern, green environmental attitudes, green environmental self-identity, and green customer value.
Moderating variables	Perceived social responsibility and perceived psychological benefits.
Underlying theory	Attitude-Behavior-Context (ABC Theory), Value-Belief-Norm (VBN Theory), Signaling theory

Items	Scope of the Study
Testing location and sample	Using MTurk survey platform to collect data from the United States, Asia and Europe.
Analyzed unit	Individual level.
Time frame	Cross-sectional study.
Research instruments	1. Bibliometric-analysis: Theory inference and co-citation using VOSviewer software. 2. Survey: SPSS 22.0 and PLS-SEM 3.0 were used for theory inference, primary data, and analytical approaches.

1.5. Research procedures

The study contains six chapters, and the summary for each chapter is as follows:

Chapter one was the introduction of the study, providing an overview of the research. It included the background and motivation behind the study, the research objectives and scope, the research procedure, and an outline of the study's structure.

Chapter two focused on conducting a comprehensive review of the existing literature, including the bibliometric analysis, the co-citation analysis, the assessment of the theoretical formation, and providing clear definitions for the variables that will be examined in the study.

Chapter three focused on the development of the research hypothesis. For each research hypothesis, relevant literature was integrated to reach a consensus. Eventually, 14 hypotheses were developed in the study.

Chapter four focused on the research design and methodology of this study. Specifically, the research model has developed. The measurement of the research constructs was identified and the design of the questionnaire was finalized to ensure the collection of relevant data. , the results of the qualitative study conducted using meta-analysis were presented, which contributed to the

development of a comprehensive research model and the formulation of survey questionnaire items.

Chapter five presented the empirical results of the empirical survey. The hypothesis was tested using statistical software. This chapter also included descriptive analysis, measurement scale, reliability, validity, and hypothesis testing.

Chapter six providing a summary and offering conclusions based on the research outcomes. A summary and conclusion of the research outcome were offered. The research conclusions, academic practical implications of the research findings, limitations, and future research directions were also presented in this chapter.

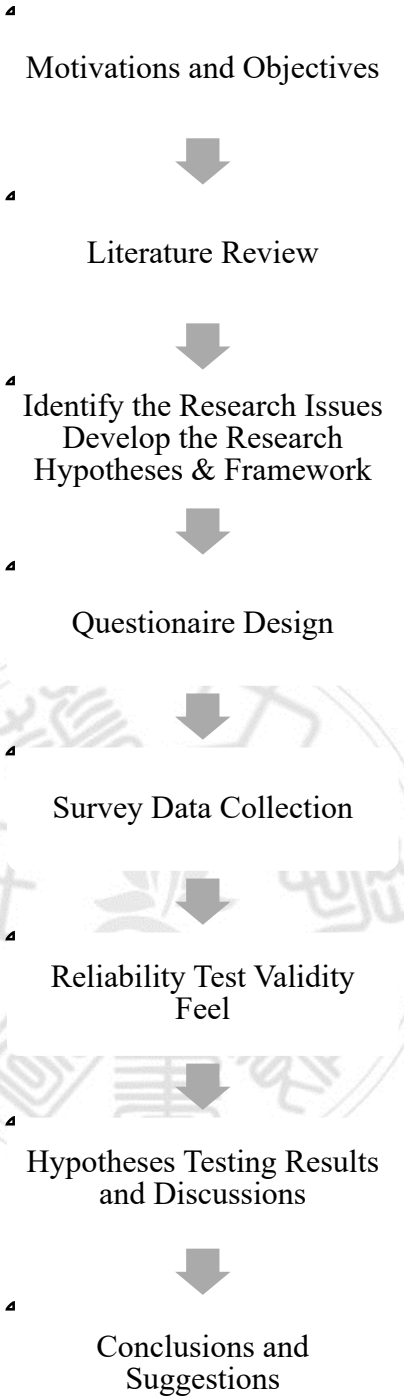

Figure 1 - 1 The flow chart

CHAPTER TWO
LITERATURE REVIEW

This chapter reviewed relevant literature through (i) bibliometric analysis, (ii) theoretical background review, and (iii) definition of research constructs. Specifically, bibliometric analysis was conducted to review the main themes of previous studies regarding the environmental concern, green adoption behavior and other research constructs. Relevant theories and models were then reviewed to identify the relationship among constructs from different perspectives. The definition of each research construct was then presented to identify the contexts of this study.

2.1. Bibliometric analysis

2.1.1. An overview of bibliometric analysis

The most commonly used software was VOSviewer and the sources of scientific databases such as SCOPUS and Web of Science were commonly adopted to illustrate the important themes for relevant research topics. Bibliometric studies can support researchers to get a "one-step overview" of the literature review to figure out research gaps and identify dominant themes for further studies (Douthe et al., 2021).

Using VOSviewer, 1.6.8 software, both co-citation and co-occurrence analysis were applied in this study. The co-occurrence analysis demonstrated the information of another study using the same keywords (green adoption) with any words that appeared in "article titles", "keywords", and "abstracts" for further analysis, which provided the domain knowledge of areas from the past to present, and to future research direction. The co-citation analysis could discover who are the most influential authors in the field of green adoption. Three steps of the procedures were required to conduct bibliometric analysis.

Step 1: Data collection: Collect the data for bibliometric analysis. Since previous literature regarding green adoption was enormous. This study focused

on papers written in English with peer-reviewed in the areas of marketing, management, business, applied psychology and interdisciplinary social science, and economics. Books and monographs were excluded due to the limited capacity to identify their uniqueness and contribution.

Step 2: Data Screening: The title, keywords, and abstracts of the reviewed papers were checked carefully by the author to avoid any duplicated/erroneous/irrelevant papers related to green adoption. Eventually, 1513 papers were included in this bibliometric analysis.

Step 3: Data analyzing: The selected 1280 data were analyzed using VOSviewer software to illustrate the structure and themes relevant to green adoption. The descriptive analysis of 1280 selected papers were presented (including the common trend, number of publications, geographical distribution by areas, and main themes), co-citation networks with visualized outcomes were presented, and co-occurrence analysis of keywords of the selected studies was also presented.

In this study, the data were extracted from the SCOPUS database which includes most of SCI, SCI-Expanded, SSCI, A&HCI, and ESCI. This collection included more than highly regarded periodicals from 2010 to 2024 throughout the world, which is possibly one of the most popularly used bibliometric analysis databases. The advanced search strategy for retrieving the topic of green adoption was as follows.

Scholarly Works (1,280) = Title: (Positive AND Personality) OR (Title: (Environmental AND Concern) OR (Title: (Green AND (Customer AND Attitude)) OR (Title: (Green AND (Customer AND Value)) OR (Title: (Green AND (Environmental AND Self-Identity)) OR (Title: (Perceived AND (Social AND Responsibility)) OR (Title: (Perceived AND (Psychological AND Benefits)) OR Title: (Green AND (Adoption AND Behavior)).

Bibliometrics was a fundamental area of information science using mathematical/statistical techniques to identify the conceptual structures, features, and patterns of previous literature (Merigo & Yang, 2017). This method was very helpful to show a conceptual map and to present clusters of the relevant research constructs (Kataria et. al., 2019). The VOSviewer software was used in this study to create a graphical representation of the bibliometric data. Before clustering, the author tried to eliminate the data without authors, or the wrong spelling of keywords to increase the accuracy of the presentation.

Eventually, a total of 1280 academic articles retrieved from the journal of SCOPUS database at the time of collection in February 2023. These publications have been published from 2010 to February, 2023.

2.1.2. Descriptive analysis

Figure 2-1 showed the number of annual publications on green adoption from 2010 to 2023. This figure showed a tendency for a significant publication increase during the last five years. Thus, researchers have paid much more attention to environmental and green issues.

Table 2-1 demonstrated the location where these green adoption studies were conducted. The UK, the US, Netherlands, and Switzerland accounted for most of the number of publications, with 407, 390, 210, and 148, respectively. These high-intensity publication countries might have higher concerns about environmental concerns and green adoption issues.

Figure 2 - 1 Number of publications on green adoption from 2010-Feb2023

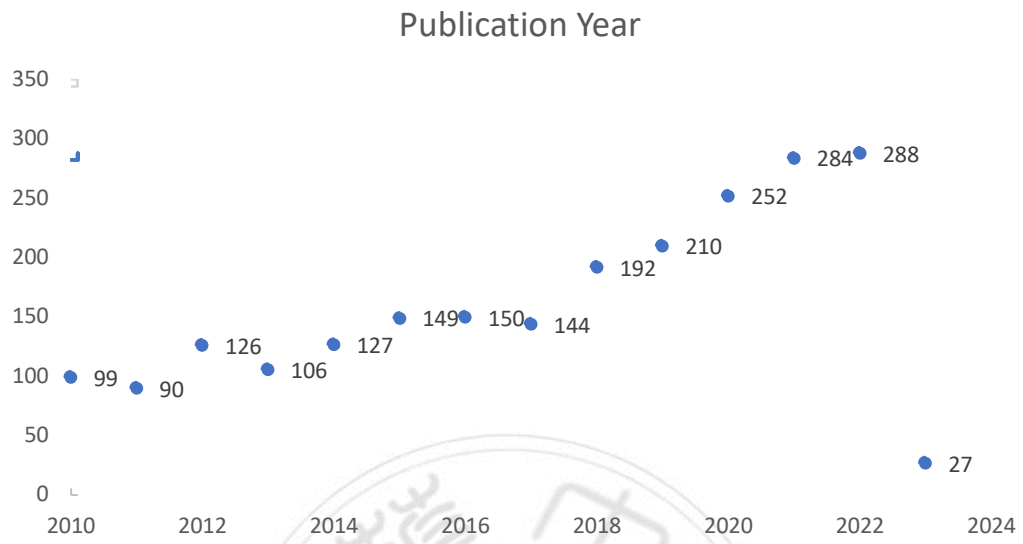

Table 2 - 1 Country where green adoption studies research was conducted

Ranking	Name of Country	Number of Publications
1	United Kingdom	407
2	United States	390
3	Netherlands	210
4	Switzerland	148
5	Germany	82
6	India	12
7	Romania	10
8	Turkey	8
9	New Zealand	8
10	Sweden	5
	Total	**1280**

2.1.3. Co-citation analysis

The structure of the subjects (themes) in the area of green adoption was identified and demonstrated by co-citation analysis of titles and keywords in published papers between 2010 and 2023. The detailed structure and its connected metrics were shown in Figure 2-2.

The structure of the subject is in the area of consumers' green adoption behavior was demonstrated by co-occurrence analysis of keywords, and published papers between 2010 and 2023. The detailed structure as shown in Figure 2-2 seemed to illustrate some prominent topics overshadowing the field such as humans, personality, male, and female, environmental concern, social responsibilities, attitude, etc. These are all the important constructs to be used in the study.

Table 2-2, illustrated the formation of clusters and their publication areas. Based on the co-citation network, there were four clusters categorized by VOSviewer software. The first cluster included 591 occurrences focusing on personality traits, especially on the research issues of personality, gender, adolescent, adult/middle-aged/young adult, personality disorders, etc. The second cluster included 335 occurrences, focusing on environmental issues, especially on the research topics of environmental concern. The third cluster included 599 occurrences of focusing on human motivation, especially focusing on the research issues of attitude, cultural influences, public health, and behavior intention. The fourth cluster included 88 occurrences focused on the psychological benefit, environmental adoption, risk factors, sustainability, and practices.

Table 2 - 2 The keyword by clusters

Cluster	Keyword
Cluster 1 **(Personality trait)** (n=591)	adaptation, psychological (8); adolescent (32); adult (72); affect (8); borderline personality disorder (11); borderline personality disorder/diagnosis (6);borderline personality disorder/physiopathology (6); borderline personality disorder/psychology (9); emotions (20); extraversion, psychological (6); female (103); interpersonal relations (10); male (80); middle aged (40); multivariate analysis (5); neuroticism (5); personality (46); personality disorders (6); personality disorders/diagnosis (5);personality inventory (5); pesticides (5); positive affect (5); prospective studies (5); psychiatric status rating scales (6); quality of life (6); regression analysis (5); reproducibility of results (6); self-concept (14); severity of illness index (5); social perception (7); time factors (7); young adult (37)
Cluster 2 **(Environment Issues)** (n=335)	adsorption (5); Australia (5); bioaccumulation (6); biodegradation, environmental (8); cities (5); decision making (6); ecosystem (12); emerging contaminants (5); environment (35); environmental exposure (9); environmental health (18); environmental justice (5); environmental monitoring (30); environmental monitoring/methods (13); environmental pollutants/analysis (11); environmental pollutants/toxicity (5); environmental pollution (10); Europe (5); environmental concern (19); fluorocarbons/analysis (5); lakes (5); pandemics (5); pharmaceutical preparations (9); pharmaceuticals (10); risk

Cluster	Keyword
	assessment (20); toxicity (9); united states (18); wastewater (12); wastewater/chemistry (5); water (9); water pollutants, chemical/analysis (28); water pollutants, chemical/toxicity (7)
Cluster 3 **(Human Motivation)** (n=599)	affect/physiology (5); altruism (5); animals (40); attitude (14); child (16); China (19); climate change (16); conservation of natural resources (15); corporate social responsibility (5); covid-19 (16); cross-sectional studies (17); economic development (5); emotions/physiology (5); environmental exposure/adverse effects (6); environmental exposure/prevention & control (5); humans (217); intention (10); models, theoretical (5); motivation (5); parents/psychology (6); perception (8); Pollution (5); pro-environmental behavior (5); psychometrics (7); public health (13); public opinion (7); recycling (7); risk factors (10); risk perception (5); sars-cov-2 (10); social responsibility (13); socioeconomic factors (5); students (5); surveys and questionnaires (43); United Kingdom (5)
Cluster 4 **(Psychological benefit)** (n=88)	adaptation, psychological (8); child (16); environmental exposure/adverse effects (6); parents/psychology (6); risk factors (10); aged (19); aged 80 and over (6); environmental concerns (7); health knowledge, attitudes, practice (5); sustainability (5)

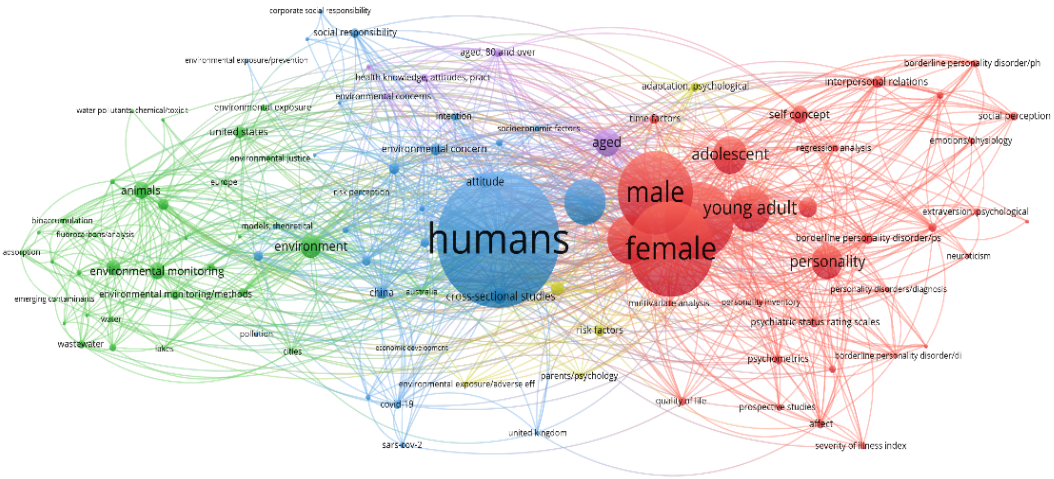

Figure 2 - 2 The network visualization of keywords in the green adoption research between 2010 and 2023.

2.1.4. Assessment of clusters

Cluster 1: Personality traits.

The enlarged perceptual map of cluster 1 was shown in Figure 2-3. This research cluster primarily concentrated on investigating how personality traits impact individuals' adoption of green behaviors. The keywords of male/female accounted for the highest impact (183 occurrences), followed by an adult (72 occurrences), personality (46 occurrences), middle-aged (40 occurrences), and young adult (37 occurrences). Other research issues such as personality disorder, borderline personality disorder, etc. were also included. These results suggested that scholars tended to pay the highest attention to the influences of personality-related constructs on consumers' environmental concerns, attitudes, values, norms self-identity, and green adoption behavior.

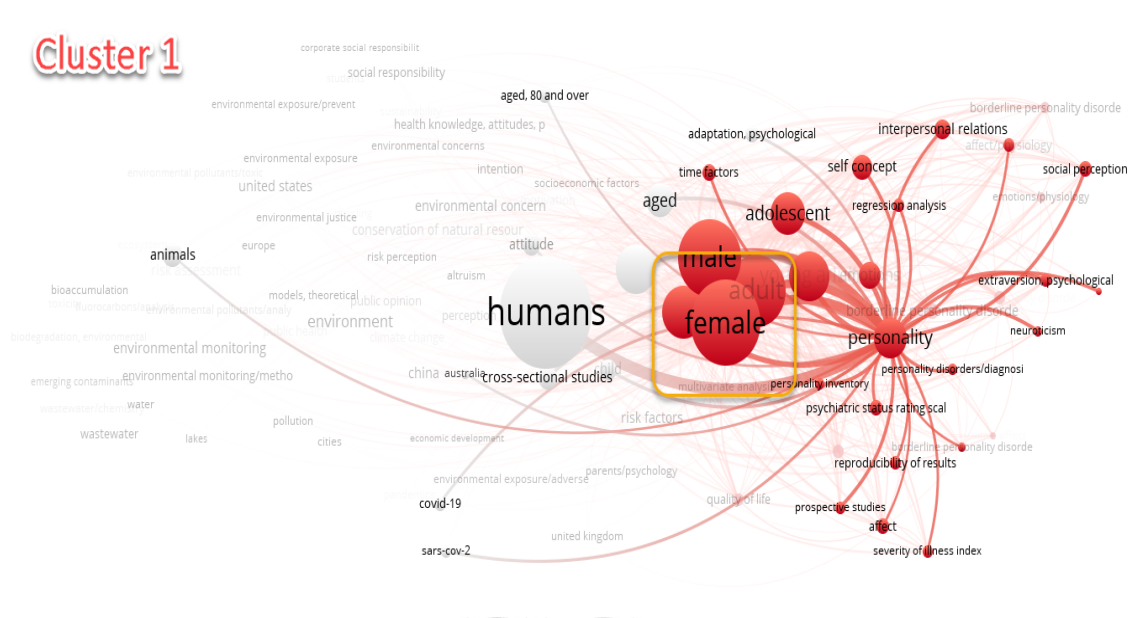

Figure 2 - 3 The perceptual map of cluster 1

Cluster 2: Environmental issues

The enlarged perceptual map of Cluster 2 was shown in Figure 2-4. This cluster mainly focused on its research area on consumers' concerns about climate change and environmental deterioration. In this cluster, the keywords of the environment accounted for the highest occurrences (35 occurrences), followed by environmental monitoring (30 occurrences), chemical or analysis (28th occurrences), risk assessment (20 occurrences), environmental health (18 occurrences) environmental monitoring methods (13 occurrences), ecosystem (12 occurrences) environmental pollutants/analysis (11 occurrences), environmental pollution (10 occurrences). This result indicated that environmental issues have also created the highest concern for the scholars.

Following Mowen, (2000), environmental concerns might be served as a compound trait or a mediating variable which can mediate the influence of personality traits on consumers, attitudes, values norms, and self-identity.

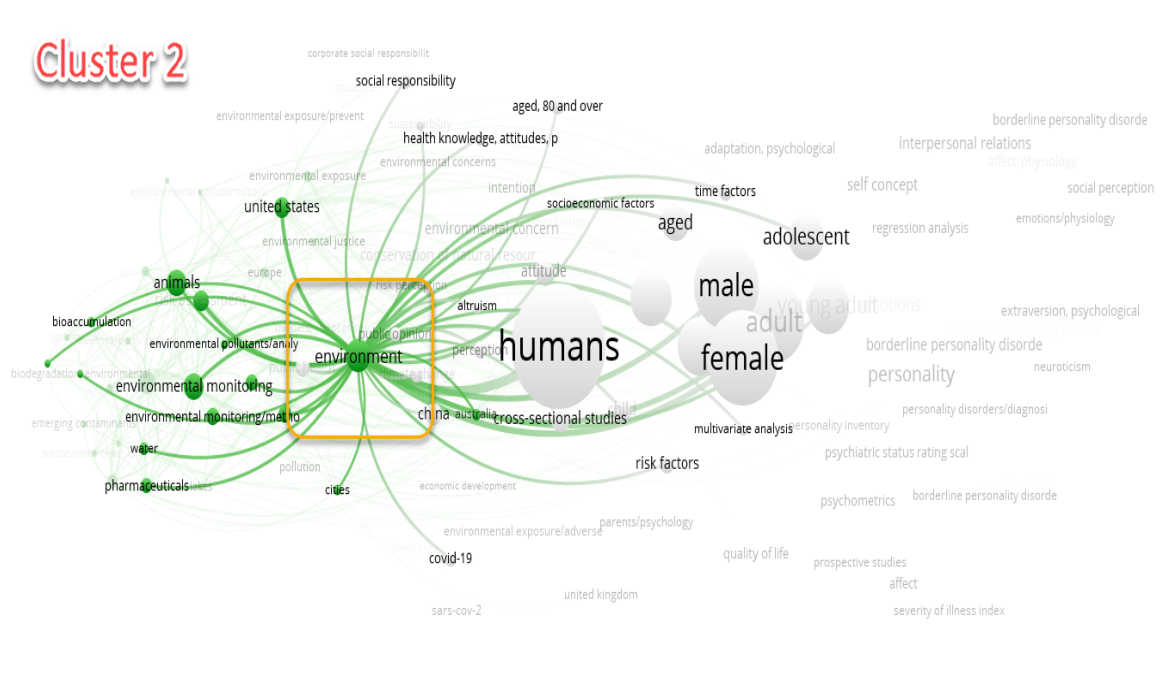

Figure 2 - 4 The perceptual map of cluster 2

Cluster 3: Human motivation.

The enlarged perceptual map of cluster 3 was shown in Figure 2-5. This cluster mainly focused its research area on consumers' motivation toward green adoption behavior. In this cluster, the keywords of human accounted for the highest number of occurrences (217 occurrences) followed by animals (40 occurrences), cross-sectional studies (17 occurrences) Climate change (16 occurrences), child (16 occurrences) conservation of natural Resources (15 occurrences), attitude (14 occurrences), Public Health (13 occurrences). These results showed that human motivation could serve as a very important factor for green adoption behaviors. Consumer motivations including human need perceptions, beliefs, attitudes, intentions, pro-environmental behaviors, and perceived social responsibility are all critical factors to enhance consumers' green adoption behaviors.

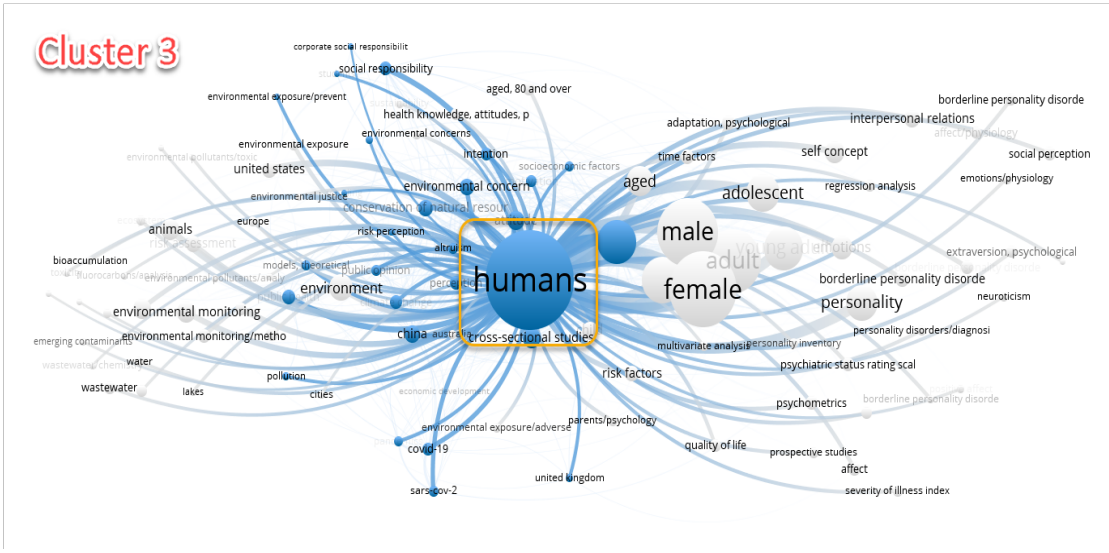

Figure 2 - 5 The perceptual map of cluster 3

Cluster 4: Psychological issues

The enlarged perceptual map of cluster 4 was shown in Figure 2-6. This cluster mainly focused its research areas on psychological consideration of the consequences of environmental deterioration. In this cluster, the keywords of age accounted for the highest occurrence (19 occurrences), followed by child (16 occurrences), risk factors (10 occurrences) adaptation and psychological (8 occurrences). This result seemed to suggest that psychological feelings and benefits should become the key issues of consumers' green adoption behavior.

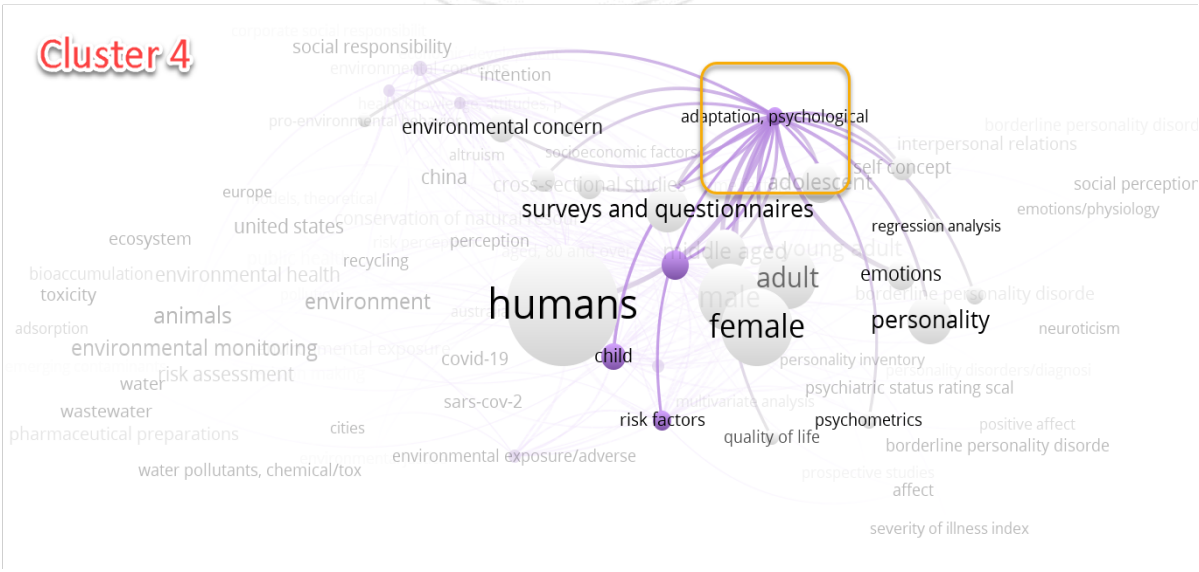

Figure 2 - 6 The perceptual map of cluster 4

To integrate the results of previous research into the trends of current research, this study adopted the bibliometric analysis to demonstrate different aspects of research related to environmental concerns and green adoption behavior. Based on the results of the bibliometric analysis, the study claimed that environmental issues and green adoption issues could continue to be the major focus areas of study. Based on these results, the study intended to integrate the antecedence (personality traits), mediators (environmental concerns, green attitudes, green values, and environmental self-identity), and moderators (perceived social responsibility, and perceived psychological benefits) to identify their roles in green adoption behavior.

Bibliometric analysis has provided valuable insights that can be connected to the research model of this study in several ways: by conducting a bibliometric analysis, researchers can identify the most cited and influential articles, books, or authors within a specific field of study. These influential works can serve as foundational knowledge for developing the research model. Researchers can examine the key concepts, theories, and frameworks presented in these influential publications and use them as a basis for constructing their research model. Bibliometric analysis can help researchers identify emerging research trends and topics within a particular field. By analyzing publication patterns, citation networks, and co-citation clusters, researchers can gain insights into the most active research areas and the interconnections between various concepts and theories. These trends can inform the development of the research model by highlighting relevant variables, relationships, or gaps in the existing literature. Bibliometric analysis can reveal areas where research is relatively scarce or underdeveloped. By examining the distribution of publications across different sub-topics or research dimensions, researchers can identify research gaps that have not been adequately addressed. These gaps can be incorporated into the research model as areas of focus, allowing researchers

to contribute new insights and fill the knowledge voids in the field. Bibliometric analysis can help researchers identify the most frequently cited theories or frameworks within a specific research domain. These established theories can serve as the theoretical foundation for constructing the research model. Researchers can leverage these theories to define the constructs, relationships, and mechanisms within the model and ensure that their work is grounded in existing theoretical perspectives. In summary, bibliometric analysis can inform and enhance the development of a research model by identifying influential literature, mapping research trends, identifying research gaps, informing theoretical foundations, and validating or refining the model based on existing literature and evidence. It serves as a valuable tool for researchers to connect their work to the broader knowledge base and shape their research model within the context of existing scholarship.

2.2. Theoretical background

2.2.1. 3M model in green adoption

Mowen (2000) developed the 3M model suggests that consumers' personality traits, such as the big five traits, interact with compound traits (e.g., environmental concern) and situational traits (e.g., beliefs, attitudes, values, and self-identity) during the decision-making process, ultimately influencing surface traits, such as behavioral intentions and behaviors. Personality traits occupy the highest level of abstraction in this model and can have an impact on lower-level traits, including compound traits and situational traits, which are considered immediate determinants of surface traits like behavior intentions or actual behaviors. Originally, Mowen's 3M model aimed to explain how the interaction between personality traits and specific situations affects consumer behaviors (Mowen and Sujan, 2005). This study extends the application of the 3M model to the context of consumers' environmental concerns, attitudes, values, and self-identity in relation to their green adoption behaviors.

2.2.2. Social identity theory and the self-perception theory

According to Stets & Burke, (2000), individuals tended to act based on their own expectations or others' expectations. Once self-identity was developed, individuals would be fulfilled and persuaded for the endorsement of this identity, which could further facilitate specific behavior. Kashima, Paladino, and Morgetts (2014) argued that higher level of environmental self-identity's individuals have a strong belief in environmental striving. Thus, environmental self-identity referred to an individual who perceived themselves acts in an environmentally concerned way. Self-perception Theory suggested that individuals tended to become aware of certain attitudes by observing their own behavior (Bein, 1967), which implied that individuals tended to analyze their own behavior in the same criteria as they would analyze someone else's behavior. Individuals' self-perception or self-concept could influence their judgment, mood, and behaviors. Based on Self-perception Theory (Bem, 1972), we could have concluded that an individual's beliefs attitudes, and values could influence pro-environmental behaviors.

2.2.3. Attitude - behavior - context (ABC) theory

ABC Theory is developed by Stern and Oskamp, (1987) to explain environmentally significant behaviors. Behavior (B) was an interactive product of consumers' attitudes (A) and contextual factors (C). This theory assumed that consumers tended to be consistent with the expectation from specific actions. Contextual variables might include personal capability, resources, situational, and environmental conditions. This study intended to integrate ABC Theory to explain our research framework from the perspectives of green environmental attitude, green environmental self-identity, and green customer values.

2.2.4. Value, belief, and norm (VBN) theory

The VBN Theory of Environmentalism (Stern et al., 1999), provides an explanation of how normative factors influence sustainable attitudes and behaviors. This theory establishes a causal chain connecting values, beliefs, norms, and behaviors (Rivas et al., 2022). Consumer values, including altruistic values, sphere values, egoistic values, and green customer values, play a significant role in shaping beliefs related to environmental concerns, environmental awareness, and perceived social responsibility. These beliefs, in turn, impact the development of norms and pro-environmental behaviors (Ghazali, Soon, Mutum, and Gail, 2017). By understanding the interplay between values, beliefs, norms, and behaviors, this theory provides a comprehensive framework for comprehending the factors that motivate individuals to engage in environmentally friendly actions (Yu, Yu, & Chao, 2017). It highlights the importance of values as a foundational element that shapes environmental beliefs, which then guide the adoption of pro-environmental norms and behaviors. Overall, the VBN Theory of Environmentalism provides a comprehensive understanding of the relationship between personal values, beliefs, norms, and behaviors in the context of sustainability. It offers valuable insights for researchers and practitioners seeking to promote and encourage pro-environmental attitudes and actions among individuals and society as a whole.

2.2.5. The symbolic and conspicuous consumption theories

The Symbolic Consumption Theory as proposed by Hirschman (1981) argued that consumers tended to view products not only from physical meanings (attributes) but also from symbolic meanings. These symbolic meanings might have important influences on their product adoption. The Conspicuous Consumption Theory, as proposed by Veblen, (1899) contended that people consume conspicuously for two reasons (i) to be recognized by their

peers and; (ii) to achieve a higher social status in society. Based on the above discussions, consumers perceived psychological benefits could be originated from self-expressive benefits (Choi & Kandampully, 2019). People might be willing to purchase a green product to look for symbolic meaning, to achieve self-expressive benefits, to get higher recognition, or to win higher social status. This study would like to apply these two theories to explain our research model.

2.3. Definition of research constructs

2.3.1. Positive personality traits

According to Hills & Roberts, (2011), positive personality traits were associated with greater well-being, better physical health, and more positive social relationships. While these traits could be innate, they can also be developed through intentional efforts, such as by practicing gratitude, seeking help when needed, or engaging in acts of service. By cultivating positive personality traits, individuals can improve their mental and physical health, enhance their resilience, and lead more fulfilling life. According to Barbara Fredrickson (2001), positive personality traits are those that promote positive emotions, thoughts, and behaviors. These traits allow individuals to cope with challenges, build meaningful connections with others, and find joy and satisfaction in their lives.

There were various definitions and conceptualizations for positive personality traits. In relevance to this study, it were individual differences in the tendency to think, feel, and behave in ways that were generally considered desirable by society, including such traits as honesty, kindness, wisdom, courage, and justice (Peterson, Christopher, and Seligman, 2004). The current research study includes the following personality traits: introversion, conscientiousness, emotional stability, openness to experience, and agreeableness. This study aimed to investigate the influence of these positive personality traits on other constructs. In general, this construct could depend on

the research question, the theoretical framework, and the available tools and resources that were reliable, valid, and aligned with the research goals.

2.3.2. Environmental concern

Environmental concern pertains to an individual's comprehension and consciousness regarding the influence of human activities on the environment, as well as the potential consequences of these actions on natural resources, ecosystems, and human well-being. Since it involved recognizing the interdependence between humans and the natural world, its multifaceted nature posed a challenge for researchers, but also offers a rich opportunity to explore its different dimensions and how they many impacts. Environmental concern could be expressed through conservation behaviors, political activism, and consumer choices. In general, according to Wright et. al., (2017) environmental concern was "a recognition of the interdependence of human and natural systems, and a willingness to take responsible action to maintain the health and integrity of those systems for current and future generations". In recent times, the significance of environmental concern has grown due to the heightened awareness surrounding climate change, habitat destruction, and other environmental challenges. This has prompted individuals to actively engage in efforts aimed at reducing their carbon footprint, conserving resources, and supporting sustainability initiatives. In the context of this study, "environmental concern" encompasses a broad spectrum of perceptions, emotions, knowledge, attitudes, values, and behaviors related to the environment, as described by Bamberg (2003). The inclusion of five items focusing on the concern for natural resources was derived from Dunlap et al. (2000).

2.3.3. Green environmental attitude

Environmental attitude referred to a person's mindset or viewpoint that affects their level of concern for the environment when making decisions about purchasing green products to minimize harm to the environment. There was a

trend of increasing consumer interest in engaging in ecological practices to reduce environmental damage, which affected their purchasing behavior. Environmental attitude was acknowledged as a major influence on consumers' preference for eco-friendly products. A green environmental attitude could be conceptualized as an individual's general orientation towards the environment, characterized by beliefs, values, and emotions that prioritize environmental protection and sustainability (Gatersleben, 2002). According to Dunlap & Van Liere, (1978), an environmental attitude referred to an individual's beliefs and feelings about the natural environment, including the degree of concern for its preservation and enhancement. Individuals with a green environmental attitude tended to place a high value on environmental protection and were more likely to engage in behaviors that promote sustainability. Previous research has shown that environmental attitudes were influenced by a range of factors, including personal experiences, education, and social norms (Stern et al., 1999, Schultz, 2000). Based on the studies, Environmental attitudes referred to the psychological constructs that underlie an individual's pro-environmental behaviors and actions.

2.3.4. Green environmental self-identity

Green environmental self-identity could be defined as an individual's self-concept about environmentalism and environmentally responsible behaviors. It referred to the extent to individuals saw themselves as environmentalists and identify with pro-environmental values and behaviors. Previous studies have demonstrated that when individuals reflect on themselves, they perceive and describe themselves as individuals who engage in environmentally friendly behaviors. There are commonly used labels that people adopt to identify themselves as pro-environmental. Based on the concepts of self-congruity consideration (Confente et al., 2020) and self-perception theories (Bem, 1972), individuals tend to act in line with their own

expectations and the expectations of others. As the significance of a green environment is increasingly acknowledged, researchers have been exploring novel approaches to measure and assess the influence of green environmental self-identity. In this study, green environmental self-identity refers to an individual's specific self-concept related to engaging in environmentally responsible behaviors and actions.

2.3.5. Green customer value

Consumers' perceptions of green customer value were influenced by a range of factors, including environmental impact, cost, and functional benefits. According to Hartmann and Apaolaza-Ibáñez (2012), green customer value referred to the overall perceived value of eco-friendly products or services, taking into account both environmental and functional benefits. A strong perceived green customer value can lead to greater adoption of environmentally sustainable products and services. Previous research has shown that perceived green customer value is influenced by a range of factors, including personal values, environmental education, and marketing messages Liao, Wu and Pham, (2020). Numerous studies examining human values indicate that values serve as the guiding force behind individuals' decision-making and behavior. Within these decision-making processes, conflicting motivations often arise, pitting personal interests against the welfare and well-being of others. In the context of this study, green customer value could be conceptualized as the perceived worth or importance that consumers place on environmentally sustainable products and services, based on their environmental impact and benefits.

2.3.6. Perceived social responsibility

Perceived social responsibility could be defined as an individual's perception of their obligations and responsibilities towards society and the environment, shaped by social norms, values, and beliefs (Luchs, 2010). Consumers' intentions to engage in green behaviors are characterized by self-

control, self-regulation, and self-discipline, driven by a sense of perceived social responsibility. Maignan & Ferrell (2001) and Carrington et al. (2010) defined perceived social responsibility refers to an individual's feeling towards society and the environment, grounded in moral and ethical considerations. In this study, perceived social responsibility is regarded as a fundamental factor influencing individuals' ethical behavior, guiding them to act in accordance with what is considered right, thus impacting their propensity for green adoption.

2.3.7. Perceived psychological benefits

Perceived psychological benefits could be referred to, in general, as the positive mental and emotional outcomes that individuals associate with environmentally responsible behaviors and actions, such as reduced stress, improved well-being, and a sense of purpose. According to Wells & Rollins (2012), perceived psychological benefits referred to the subjective experiences and outcomes that individuals attribute to environmental behaviors, such as emotional well-being, increased self-esteem, and a greater sense of control. Individuals demonstrate a willingness to acquire eco-products or utilize eco-services due to the self-expressive benefits and/or personal satisfaction they derive from them. This can be attributed to the warm glow effect, which refers to a positive emotional state triggered by the voluntary pursuit of helping others. Within this study, we have identified three factors within the perceived psychological benefits construct: warm glow, self-expressive benefits, and nature experience. These factors are associated with individuals' perception of the psychological benefits they receive from engaging in environmentally responsible behaviors and actions. This multifaceted nature of this study posed a scope for further rich research opportunities to explore different dimensions of the perceived psychological benefits and how they might impact environmentally responsible behaviors.

2.3.8. Green adoption behavior.

Green adoption behavior could be defined as an individual's willingness and intention to adopt environmentally sustainable behaviors and actions, such as recycling, using public transportation, or reducing energy consumption. According to Stern (2000), adoption behavior referred to the process of adopting new behaviors, including the stages of awareness, interest, trial, and adoption. This study defined the term “green adoption behavior” as the process of specifically adopting environmentally sustainable behaviors and actions.

In green adoption behavior, innovative green product purchase intention was considered as the sub-construct. This could reflect on the willingness of consumers to support and adopt eco-friendly products. When future generations were involved, consumers tend to focus more on innovative green products, to promote sustainability.

When the goal was to understand and embrace sustainable actions, psychological and social factors played a role in influencing individuals toward a green and healthier planet.

CHAPTER THREE
HYPOTHESES DEVELOPMENT

This chapter developed the research hypotheses based on a synthesis of literature review, co-citation and meta-analysis. Eventually 14 hypotheses regarding environmental concern and green adoption were developed in this chapter.

3.1. The influence of personality traits

The issues of environmental deterioration have garnered significant attention. Consumers have become increasingly conscious of the impact their purchasing behavior has, both directly and indirectly, on the environment (Sharma et al., 2020). Previous research highlighted the influential role of personality traits on consumers' adoption of environmentally friendly practices (Kong & Johnson, 2015). More specifically, Mower (2000) proposed that personality traits act as foundational traits, rooted in an individual's early learning experiences, representing the most abstract form of traits. These have the potential to influence situational traits, compound traits and surface traits, which ultimately shape individuals' behaviors and actions.

Table 3-1 showed the relevant empirical studies for the relationship between positive personality and environmental concern. Chen et al., (2020) argued that consumer, with higher level of positive personality traits could result in higher level of environmental concern. Abdollahi et al., (2017) stated that individual's conscientiousness, agreeableness, and openness to experience all have significant influence on environmental concerns. Wuertz (2015) stated that, the Big five personality traits have significant impact on environmental concern and pro- environmental behavior, except extroversion. Terrier et al., (2013) showed that personality traits have a significant impact on organizational citizenship behavior. Verplanken & Roy, (2013) further contented that personality traits (including agreeableness, openness to

experience, and emotional stability) positively influenced on environmental concern.

Table 3 - 1 A summary of literature review for the impact of positive personality traits on environmental concern

Author(s) name	n	r	Country
Chen et al., (2020)	398	0.75	Taiwan
Abdollahi et al., (2017)	1160	0.132	Malaysia
Abdollahi et al., (2017)	1160	0.051	Malaysia
Abdollahi et al., (2017)	1160	0.081	Malaysia
Wuertz (2015)	93	0.03	USA
Wuertz (2015)	93	0.17	USA
Wuertz (2015)	93	0.36	USA
Terrier et al., (2016)	178	0.13	Switzerland
Terrier et al., (2016)	178	0.31	Switzerland
Terrier et al., (2016)	178	0.07	Switzerland
Verplanken, & Roy (2013)	132	0.15	US and Europe
Verplanken, & Roy (2013)	132	-0.20	US and Europe
Verplanken, & Roy (2013)	132	0.16	US and Europe
Verplanken, & Roy (2013)	132	0.22	US and Europe

Note: n= sample size, r= correlation coefficient

Based on the 3M Model, Mowen (2000) used environmental concern as a compound trait that could be triggered down from positive personality traits as the highest abstract traits. Emekei (2019) argued that personality traits could predict ecologically concerned consumers better than social economic variables. Fraj and Matinez, (2006) contended that consumers with personality traits of higher tolerance, more comprehensiveness, and seeking higher security should perform higher ecological concerns.

Feelings away from society, community, and local culture tended to result in ignoring ecological concerns (Hindmarsh & Alidoust, 2019). Those

who have a higher standard of social responsibility tended to involve in green adoption activities. Hirsh and Dolderman, (2007) suggested that individuals with a higher level of agreeableness and empathy tended to display a higher level of environmental concern. Chen et. al., (2019) argued that consumers with a higher level of openness to experience should encourage to engage in more experiences of nature. The previous literature reviewed in the statement makes a unique contribution to the hypothesis by highlighting the significant impact of positive personality traits on environmental concerns. The studies examined the relationship between various personality traits, such as conscientiousness, agreeableness, openness to experience, and environmental concern. They found consistent evidence that individuals with higher levels of positive personality traits tend to exhibit greater environmental concern. This suggests that personality traits play a crucial role in shaping individuals' attitudes and behaviors towards the environment. The studies also provide cross-cultural insights, with research conducted in different countries, demonstrating the universal nature of the relationship. By emphasizing the influence of positive personality traits on environmental concerns, the literature contributes to our understanding of the psychological factors that drive individuals' engagement in environmentally friendly behaviors. Based on the discussion above, this study proposes the following hypothesis:

H_1: Positive Personality traits have a significant impact on environmental concerns.

Table 3-2 illustrated a summary of previous empirical studies on the influence of positive personality traits on consumers' green environmental attitudes. According to Mowen (2000), consumers' green environment was categorized as one of the situational variables that could be influenced by the 3M hierarchy of abstract traits and compound traits. Thus, individuals with a higher level of introversion, conscientiousness, agreeableness, emotional

stability, and openness to experience tended to perform a higher level of environmental concern and to formulate displeasures with environmentally harmful activities. (Zaremohzzabieh et. al., 2021). Sim et. al., (2018) also confirmed the influence of agreeableness, introversion, conscientiousness, and openness on green environmental attitude. Piroth et. al., (2020) argued that conscientiousness, agreeableness, and openness to experience did not show a significant influence on green environmental attitude. Verplanken and Roy, (2013) stated that compared to conscientiousness and agreeableness, emotional stability and openness to experience tend to have a significantly higher impact on green environmental attitude. Chen confirmed that personality traits tended to have a significant influence on consumers' green environmental attitudes. Rothermich, (2021) argued that individuals' personality traits can help define their attitudes toward people, situations, or specific things. Most people preferred to work with people who have positive personality traits. Individuals' environmental attitudes might be more easily formed when they have more personal experience regarding environmental issues. Because personality traits were distinctive characteristics, these characteristics might serve as a guiding standpoint for them to form attitudes (or opinions) toward something or someone. Rivas et. al., (2022) argued that consumers' personality traits may encourage them to become more interested in participating in more ecological practices, which further facilitates them to promote environmental attitudes. The reviewed literature contributes by providing evidence of the significant impact of positive personality traits, such as introversion, conscientiousness, agreeableness, emotional stability, and openness to experience, on green environmental attitudes. Despite some variability in findings, a consensus emerges that positive personality traits influence individuals' attitudes towards the environment. The studies encompass diverse cultural contexts, including Malaysia, China, Germany, the United States, and Europe, demonstrating the

generalizability of the relationship. By highlighting the role of positive personality traits in shaping green environmental attitudes, this literature enhances our understanding of the psychological factors driving individuals' pro-environmental preferences. Based on the above discussions, this study proposed the following hypothesis:

H_2: Positive personality traits have a significant impact on green environmental attitudes.

Table 3 - 2 A summary of literature review for the effect of positive personality traits on green environmental attitude

Author(s) name	n	r	Country
Zaremohzzabieh et al., (2021)	38622	0.308	Malaysia
Sun et al., (2018)	360	0.78	China
Sun et al., (2018)	360	0.77	China
Sun et al., (2018)	360	0.73	China
Sun et al., (2018)	360	0.75	China
Piroth et al., (2020)	678	0.001	Germany
Piroth et al., (2020)	678	-0.022	Germany
Piroth et al., (2020)	678	0.118	Germany
Chen et al., (2020)	398	0.68	Taiwan
Verplanken, & Roy (2013)	132	0.05	US and Europe
Verplanken, & Roy (2013)	132	-0.13	US and Europe
Verplanken, & Roy (2013)	132	0.26	US and Europe
Verplanken, & Roy (2013)	132	0.17	US and Europe

Note: n= sample size, r= correlation coefficient

Table 3-3 showed a summary of previous empirical studies on the impact of positive personality traits on consumers' green customer value. Kim et. al., (2021) and Wu & Mursid, (2019) stated that positive personality traits can result in higher green customer value. Givili et. al., (2020) also illustrated that the Big-five personality traits have a significant impact on economic value and

social value. Marbach et. al., (2019) presented similar results in their questionnaire survey. Mowen and Sujan, (2005) treated personality traits as antecedent factors which could become internal drivers to promote consumers' green environmental self-identity.

Table 3 - 3 A summary of literature review for the impact of positive personality on green customer value

Author(s) name	n	r	Country
Kim et al., (2021)	16762	0.410	Korea
Wu & Mursid (2019)	496	0.217	Taiwan
Gvili et al., (2020)	311	0.15	Israel
Carlo et al., (2005)	796	0.312	USA
Marbach et al., (2019)	559	0.41	UK

Note: n= sample size, r= correlation coefficient

Previous studies have shown that personality traits could influence green customer value through the following mechanisms:

1. Cognitive processes: Higher level of environmental concern's consumer may be more likely to value information about the environmental impact of products and services, which may lead them to perceive higher values on green options.

2. Emotional responses: Higher level of empathy's consumer may be more likely to experience higher positive emotions when using green products and services, which may lead them to perceive higher values in green options.

3. Values and beliefs: Personality traits can reflect underlying values and beliefs, which should be relevant to their green customer values.

4. Social influence: Higher level of social consciousness's consumer should be more likely to be influenced by the options of others, which may lead them to perceive high values on green options.

Specifically, Chen (2010) suggested that consumers with a higher positive personality trait may result in higher environmental concerns, which might lead to perceiving a higher level of green customer values with higher quality and reliability. Leong et al., (2015) stated that consumers' personality traits such as neuroticism have a negative effect on green customer value. Thus, higher level's consumer of neuroticism might be less likely to value green customer value. Shaw et. al., (2013) suggested that higher level's consumer of moral identity tended to be more likely to value ethical and sustainable products, while those with a higher level of self-monitoring tended to concerned with social norms and conformity. The reviewed literature contributes uniquely to the hypothesis by demonstrating the significant impact of positive personality traits on consumers' green customer value. These studies explore the relationship between traits like empathy, environmental concern, social consciousness, and moral identity, and their influence on green customer value through cognitive processes, emotional responses, values and beliefs, and social influence. With insights from various countries, including Korea, Taiwan, Israel, the USA, and the UK, the findings suggest the generalizability of this relationship across diverse cultural contexts. Overall, this literature enhances understanding of the psychological factors that drive consumers to value environmentally friendly products and services. Based on the discussions above, this study proposed the following research hypothesis

H_3: Personality traits have a significant impact on green customer value.

3.2. The influence of environmental concern

Table 3-4 presented a summary of previous empirical studies on the influence of environmental concern on green environmental attitudes. Tang et. al., (2014) and Chaudhary and Bisai, (2018) concluded that environmental concern has a significance on green environmental attitude . Barbarossa et. al., (2015) reached similar results, though their level of significance was lower.

Mowen's 3M Model, (2000) viewed environmental concern as one of the compound traits while environmental self-identity is one of the situational traits. Mowen (2000) suggested that by using the hierarchical trigger-down concept, environmental concern should result in a higher environmental attitude. Stern et. al., (1999) developed the VBN theory and explained that environmental concern might serve as one of the factors of personal beliefs, which can promote the formation of consumers' environmental attitudes. Koustova, (2017) proposed that environmental concern might lead to individuals' environmental orientation, which further promotes their environmental attitude.

Table 3 - 4 A summary of literature review for the impact of environmental concern on green environmental attitude

Author(s) name	n	r	Country
Tang et al., (2014)	638	0.145	China
Chaudhary & Bisai (2018)	202	0.649	India
Chen et al., (2020)	398	0.54	Taiwan
Barbarossa et al., (2015)	611	0.26	Denmark
Barbarossa et al., (2015)	600	0.47	Belgium
Barbarossa et al., (2015)	794	0.16	Italy
Li et al., (2021)	365	0.715	Bangladesh
Liao et al., (2021)	314	0.835	Cambodia
Chen et al., (2022)	428	0.491	China

Note: n= sample size, r= correlation coefficient

According to Kim et al. (2016), environmental concerns have a significant impact on consumers' environmental attitudes and their motivation to engage in green purchases as a means of addressing environmental issues. Sundt and Rehdanz (2015) suggested that individuals with a heightened level of environmental concern are more likely to exhibit a positive attitude towards environmental protection and display a willingness to pay a premium for

renewable energy. Similarly, Wei et al., (2018) argued that individuals who possess a greater concern for environmental issues tend to be more motivated in terms of their attitudes, values, and norms, making them more inclined to purchase green products.

According to the ABC Theory, consumers' environmental concerns play a crucial role in shaping their perceived green environmental attitudes (Das & Dash, 2012). Several studies have emphasized the significance of environmental attitudes as a key driver of consumer preference for green products (Lin & Huang, 2012). Moreover, Choi and Johnson (2019) argued that individuals with higher levels of environmental concerns are more likely to develop positive environmental attitudes, which in turn, enhance their intention to engage in green purchasing. These findings highlight the strong association between environmental concern and favorable attitudes towards the environment, as well as the willingness to adopt eco-friendly behaviors. Importantly, this relationship holds true across different cultural contexts, indicating the universal relevance of environmental concern in shaping pro-environmental attitudes. In conclusion, the literature underscores the influential role of environmental concern in influencing individuals' attitudes towards the environment, contributing to a deeper understanding of the factors driving pro-environmental behaviors. Based on the above discussion, the following research hypothesis was developed.

H_4: Environmental concern has a significant impact on green environmental attitude.

Table 3-5 illustrated a summary of an empirical study on the influence of environmental concern on green environmental self-identity. Barbarossa et. al., (2015,2017) stated that environmental concern might serve as a very significant and influential variable for consumers' green environmental self-identity. It was argued that, when individuals were concerned about the

environment, they tended to regard environmental issues as the priority, which could lead to a formation of a green environmental self-identity, which was an individual's sense of self as environmental consciousness and responsibility (Li et. al., 2021 and Chuah et. al., 2020) Previous studies have also argued that individuals who has higher level of environmental concern were positively related to the formation of a green environmental self-identity (Gifford & Nelson, 2014; Karp & Karp, 2018; Vander Werff, Steg, & Keizer, 2013).

Table 3 - 5 A summary of literature review for the effect of environmental concern on green environmental self-identity

Author(s) name	n	r	Country
Barbarossa et al., (2015)	2005	0.67	Belgium
Barbarossa et al., (2015)	611	0.78	Denmark
Barbarossa et al., (2015)	600	0.40	Belgium
Barbarossa et al., (2015)	794	0.43	Italy
Li et al., (2021)	365	0.720	Bangladesh
Chuah et al., (2020)	582	0.31	International

Note: n= sample size, r= correlation coefficient

According to Social Identity Theory, consumers tended to develop a sense of self-identity, which become part of their self-concept. In the application of environmental issues, consumers using environmental concern as the priority might directly lead to the development of a green environmental self-identity. Consumers exposed to environmental concerns might seek out information and engage in behavior that aligns with their new found environmental values, and they might become more involved in environmental activities, which leads to a more entrenched green environmental self-identity. Based on Signalling Theory, consumers who perceived a high level of environmental concern might be more active to acquire knowledge about environmental deterioration and the ways to protect the environment, which further promotes their green environmental self-identity (Mishra & Sharma,

2014). The reviewed literature contributes by showing that environmental concern significantly influences individuals' green environmental self-identity, forming a stronger sense of environmental consciousness and responsibility. These findings from multiple countries emphasize the universality of this relationship, enhancing our understanding of how environmental concern shapes individuals' identification with environmental values and behaviors. Based on VBN Theory (Ghazali, Soon & Mutum, 2017), the environmental concern might serve as consumers' belief system to create personal norms and self-identity to protect the environment. Based on the above discussions, the following hypothesis developed.

H5: Environmental concern has a significant impact on green environmental self-identity.

Table 3-6 showed a summary of previous studies on the influence of environmental concern on green customer value. These results suggested that environmental concern has served as a crucial factor for green customer value. Such a link could be explained from the following aspects.

1. Perceived environmental quality: Consumers who preferred to adopt green products and services tended to believe that the adoption of green products and services can result in lower environmental impact.

2. Social responsibility: Consumers who were highly environmentally concerned might perceive that the adoption of green products and services might contribute to fulfilling social responsibility and promoting sustainability.

3. Personal values: Consumers' environmental concerns may reflect underlying personal values, such as nature experiences, social justice, sustainability, etc., These values might be recognized that perceived green products and services as having higher values.

4. Emotional attachment: Consumers with higher environmental concerns might experience higher emotional attachment, which leads them to perceive higher green customer value.

Table 3 - 6 A summary of literature review for the effect of environmental concern on green customer value

Author(s) name	n	r	Country
Mohd Suki et al., (2015)	200	0.489	Malaysia
Liao et al., (2021)	314	0.747	Cambodia
Chen et al., (2022)	428	0.496	China
Policarpo & Aguiar (2020)	871	0.037	Brazil

Note: n= sample size, r= correlation coefficient

Cho, Park, and Lee (2015) conducted a study revealing that environmental concern has the potential to influence green customer value by shaping individuals' attitudes toward green products. This finding was supported by Mohd Suki et al., (2015) and Liao et al., (2021), who also confirmed the impact of environmental concern on green customer value. Dhurup and Parumasur (2017) argued that environmental concern positively influences green customer values, and this relationship is moderated by green brand identity. Chen et al., (2022) and Policarpo and Aguiar (2020) further corroborated the direct influence of environmental concern on green customer value. Although Lwin, Writz, and William (2007) did not specifically study the influence of environmental concern on green customer value, their research shed light on the ethical considerations underlying green customer value. They provided insights into the interconnectedness between environmental sensitivity and respect, values, attitudes, and behaviors. The model suggested that self-perceived value could arise from individuals' environmental concerns. The reviewed studies collectively demonstrate the significance of environmental concern in shaping green customer value. The finding

emphasizing the need for businesses and marketers to understand and address environmental concerns to enhance green customer value. The reviewed literature contributes by showing that environmental concern significantly influences green customer value. It highlights how environmental concern shapes consumers' perception of value in relation to green products and services. Factors such as perceived environmental quality, social responsibility, personal values, and emotional attachment contribute to this relationship. The findings from diverse countries (e.g., Malaysia, Cambodia, China, Brazil) enhance our understanding of how environmental concern affects consumers' evaluation of green options. Based on the discussions above, this study proposed the following research hypothesis.

H_6: Environmental concern has a significant impact on green customer value.

3.3. Interrelationship among green environmental attitude, green environmental self-identity, and green customer value

Table 3-7 provides a summary of previous studies investigating the influence of green environmental attitudes on green customer value. Several studies have supported the hypothetical link between these two constructs. For instance, do Paco et al. (2019) and Yadav and Pathak (2017) have found empirical evidence supporting the positive influence of green environmental attitudes on green customer value. Lin and Huang (2012) proposed that environmental attitude reflects individuals' psychological inclination to influence their perception of trust in the environment, ultimately impacting their consumption values related to green purchasing. Milfont (2012) further emphasized that individuals with higher levels of environmental attitude tend to exhibit greater awareness of consumption value in relation to green adoption. These findings highlight the significance of individuals' environmental attitudes in shaping their perceptions of and values associated with green

consumption. Consumers who hold positive environmental attitudes are more likely to value environmentally friendly products and services. The research suggests that fostering and promoting positive environmental attitudes can contribute to enhancing consumers' perceived value and preference for green alternatives. The reviewed studies provide support for the relationship between green environmental attitudes and green customer value. The findings underscore the importance of considering individuals' attitudes toward the environment in understanding their consumption values and preferences in the context of sustainable and eco-friendly choices. Hessami and Yousefi, (2013) argued that a green environmental attitude could promote customers' green customer value. Adhithya and Astuti, (2019) have also reached similar conclusions. Liao et. al., (2021) stated that green environmental attitudes referred to consumers' beliefs and concerns regarding environmental protection and sustainability.

There are several theoretical reasons to explain the influence of green environmental attitudes on green customer value:

Table 3 - 7 A summary of literature review for the effect of green environmental attitude on green customer value

Author(s) name	n	r	Country
Paço et al., (2019)	471	0.324	Portugal and UK
Yadav & Pathak (2017)	620	0.47	India
Lioa et al., (2020)	319	0.540	Cambodia
Liao et al., (2021)	314	0.759	Cambodia
Caniëls et al., (2021)	339	0.370	Poland
Chen et al., (2022)	428	0.438	China
Zand Hessami & Yousefi (2013)	35	0.069	Iran
Adhitiya &Astuti (2019)	200	0.383	Indonesia
do Paço et al., (2019)	471	0.324	Portugal and UK

Note: n= sample size, r= correlation coefficient

1. Cognitive Dissonance Theory: Consumers tended to strive for consistency in their beliefs and behaviors. Once they have higher green environmental attitudes, it was very unlikely that they would engage in environmentally harmful behaviors. To reduce this dissonance, consumers tended to adopt green purchase behavior if they have higher environmental attitudes.

2. Social Identity Theory: Consumers tended to act aligned with the identity of their belonging social groups. Thus, consumers tended to perceive higher customer value toward green purchasing.

3. Norm-Activation Theory: When consumers perceived that green adoption was the normative consensus of the social groups, then they might perceive higher value toward green adoption.

4. Value-Belief-Norm Theory: Consumers with certain green-related beliefs should be transferred to their value system and act accordingly.

Consumers, driven by their environmental attitudes, demonstrate a strong inclination towards environmental protection and a willingness to engage in green purchasing in order to mitigate the environmental impact of their consumption choices. The previous literature reviewed in the statement makes a unique contribution to the hypothesis. The studies demonstrate that consumers' positive attitudes towards the environment influence their perception of value associated with green purchasing. They highlight the role of cognitive dissonance, social identity, norm activation, and value-belief-norm theories in explaining this relationship. The findings from multiple countries, including Portugal, UK, India, Cambodia, Poland, China, Iran, and Indonesia, contribute to our understanding of how green environmental attitudes shape consumers' valuation of green options. Based on the above discussions, this study developed the following research hypothesis:

H_7: Green environmental attitude has a significant impact on green customer value.

Table 3-8 summarizes previous empirical studies suggest that environmental attitude plays a crucial role in shaping individuals' sense of environmental self-identity, as it is influenced by their concerns and awareness of the environmental consequences. Studies have shown that individuals' attitudes towards the environment can trigger personal norms and contribute to the formation of their environmental self-identity. For instance, research by Shi, Fan, and Zhao (2017) indicates that individuals' attitudes towards the environment significantly influence their environmental self-identity. Similarly, studies conducted by Nevers and Oliveira (2021), Han et al. (2022), and Zaremohzzabieh (2021) also support the link between environmental attitude and environmental self-identity. As discussed earlier, individuals often derive their identity from the social groups they belong to. To maintain consistency and avoid cognitive dissonance, individuals strive to align their attitudes and self-identity with their environmental behavior. Drawing from Self-determination Theory, individuals have psychological needs for autonomy, competence, and relatedness. By fulfilling these needs, individuals with a stronger green environmental attitude are more likely to develop a robust green environmental self-identity. The research suggests that individuals who hold positive environmental attitudes are more inclined to identify themselves as environmentally conscious individuals. This identification with environmental values and behaviors becomes an integral part of their self-identity. Consequently, they are more motivated to engage in pro-environmental actions and adopt sustainable practices. Overall, the reviewed studies highlight the important role of environmental attitude in shaping individuals' environmental self-identity. Understanding this relationship can provide valuable insights for promoting sustainable behaviors and fostering a sense of environmental

responsibility among individuals. In a summary, a green environmental attitude referred to a consumer's positive beliefs and values towards the environment, which may include concerns for environmental issues and a willingness to engage in environmentally friendly behaviors. As they engaged in these behaviors, they might begin to see their green environmental self-identity. Furthermore, when consumers identify themselves as caring about the environment, they could be more willing to engage in environmentally friendly behaviors to maintain their self-identity. This creates a positive feedback loop where a green environmental self-identity may lead to a green environmental concern, which, in turn, reinforces the green environmental attitude (Barbarossa et. al., 2015; Li et. al., 2021; Patel et. al., 2020).

Table 3 - 8 A summary of literature review for the effect of green environmental attitude on green environmental self-identity

Author(s) name	n	r	Country
Neves & Oliveira (2021)	1136	0.272	Spain
Han et al., (2022)	309	0.334	United State
Zaremohzzabieh et al., (2021)	38622	0.409	Malaysia
Barbarossa et al., (2015)	611	0.41	Denmark
Barbarossa et al., (2015)	600	0.12	Belgium
Barbarossa et al., (2015)	794	0.35	Italy
Li et al., (2021)	365	0.752	Bangladesh
Patel et al., (2020)	365	0.52	USA
Patel et al., (2020)	308	0.47	India

Note: n= sample size, r= correlation coefficient

The previous literature reviewed in the statement makes a unique contribution to the hypothesis by providing evidence of the significant impact of green environmental attitude on individuals' green environmental self-identity. The studies demonstrate that consumers' positive beliefs and values towards the environment are associated with the formation of a stronger sense

of self as environmentally conscious. They highlight the role of environmental concerns, self-determination theory, and the feedback loop between attitude and self-identity in shaping individuals' green environmental self-identity. The findings from Spain, the United States, Malaysia, Denmark, Belgium, Italy, Bangladesh, and India contribute to our understanding of how green environmental attitudes influence individuals' identification with environmental values and behaviors. Based on the above discussions, the following research hypothesis was developed. Table 3-9 showed a summary of empirical studies on the influence of green customer value on green environmental self-identity.

H_8: Green environmental attitude has a significant impact on green environmental self-identity.

Table 3 - 9 A summary of literature review for the effect of green customer value on green environmental self-identity

Author(s) name	n	r	Country
Confente et al., (2020)	292	0.330	USA
Bhutto et al., (2022)	319	0.249	Pakistan
Grębosz-Krawczyk et al., (2021)	250	0.721	Poland

Note: n= sample size, r= correlation coefficient

Green customer value referred to the value that customers engaged in environmentally friendly green products or services, which were normally produced in an environmentally responsible manner.

Thus, when customers are satisfied with their green environmental purchases, they may develop a sense of pride in their decision, and want to continue making similar decisions. Such continuous activities may reinforce the development of a green environmental self-identity. When consumers place value on adopting green behaviors, they are more likely to make environmentally friendly purchase decisions, which, in turn, contributes to the

development of a green environmental self-identity (Confente et al., 2020; Bhutto et al., 2022). According to Self-perception Theory, consumers who consistently make environmentally conscious purchasing may begin to see themselves as someone who values the environment and takes action to protect the environment. This can lead to the development of a green environmental self-identity.

According to the Value-Identity-Praxis Model, consumers tended to develop a sense of environmental self-identity based on their values. These values further reinforce the development of environmental self-identity. The reviewed literature provides unique evidence of the significant impact of green customer value on individuals' green environmental self-identity. It shows that valuing environmentally friendly products and engaging in green behaviors enhances a stronger sense of environmental consciousness. Self-perception theory and the Value-Identity-Praxis Model explain how green customer value influences the formation of green self-identity. The findings from multiple countries contribute to understanding the relationship between green customer value and environmental values and behaviors. Based on the above discussions, this study developed the following hypothesis.

H_9: Green customer value has a significant impact on green environmental self-identity

3.4. Influential factors on green adoption behavior

Table 3-10 provides a summary of prior empirical research exploring the impact of green environmental attitudes on green adoption behavior. This theoretical connection can be explained from various perspectives. Firstly, drawing from the theory of planned behavior, consumers' attitudes, subjective norms, and perceived behavioral control influence their intention to engage in specific actions. Specifically, when consumers hold positive attitudes towards green adoption behaviors, they are more likely to engage in such behaviors.

Secondly, in line with the Self-determination Theory, consumers' intrinsic motivation and external motivation can both drive their participation in environmentally friendly actions. Third, based on Social Cognitive Theory, consumers' environmental attitudes can influence personal beliefs about the environment, and these beliefs can further promote consumers to engage in green adoption behavior.

Table 3 - 10 A summary of literature review for the effect of green environmental attitude on green adoption behavior

Author(s) name	n	r	Country
Zaremohzzabieh et al., (2021)	38622	0.250	Malaysia
Tang et al., (2014)	638	0.856	China
Wei et al., (2017)	373	0.29	Taiwan
Chaudhary & Bisai (2018)	202	0.388	India
Yadav & Pathak (2017)	620	0.42	India
Neves & Oliveira (2021)	1136	0.740	Spain
Han et al., (2022)	309	0.677	United State
Li et al., (2021)	365	0.743	Bangladesh
Patel et al., (2020)	365	0.10	USA
Patel et al., (2020)	308	0.38	India
Liao et al., (2021)	314	0.531	Cambodia
Mark & Law (2015)	457	0.429	China

Note: n= sample size, r= correlation coefficient

Fourth, based on Protection Motivation Theory, consumers tended to adopt protective behavior when they perceived a threat to their health or the well-being of society. Fifth, based on Cognitive Dissonance Theory, consumers could experience discomfort when their attitudes and behaviors were inconsistent. Sixth, based on the Diffusion of Innovation Theory, consumers with positive environmental attitudes may be the early adopters of green adoption, while consumers with negative environmental attitudes may be the laggards of green adoption. Seventh, based on the Theory of Reasoned Action,

consumers with positive environmental attitudes may hold positive beliefs about green adoption, which may further facilitate the likelihood of green adoption.

Previous studies have demonstrated high support for the influence of green environmental attitudes on green adoption behavior (Zaremohzzabieh et. al., 2021; Tang et. al., 2014; Wei et. al., 2017). As shown in Table 3-10 relatively, the study results from Never & Oliveira, (2021) for this relational link were significantly higher than those from Patel et. al., (2020), Liao et. al., (2021), and Mark and Law, (2015). The reviewed literature uniquely contributes by providing evidence of green environmental attitudes' significant impact on green adoption behavior. Multiple theoretical perspectives, such as the theory of planned behavior, self-determination theory, and social cognitive theory, explain this relationship. The findings from various countries enhance our understanding of how green environmental attitudes influence individuals' likelihood of adopting green behaviors. Based on the above discussions, this study developed the following hypothesis.

H_{10}: Green environmental attitude has a significant impact on green adoption behavior.

Table 3-11 provides a summary of previous empirical studies investigating the influence of green environmental self-identity on green adoption behavior. This theoretical link can be explained from several perspectives. Firstly, consumers are motivated to align their behavior with their self-identity and self-concept. When consumers have a strong concern for environmental deterioration, they are more likely to adopt green products and services. Secondly, when social norms emphasizing environmental protection are prominent, consumers tend to engage in eco-friendly activities. Consumers with a higher level of green environmental self-identity are inclined to express their identity to others. For instance, studies have shown that green

environmental self-identity directly affects consumer intentions to adopt electric cars, as well as indirectly through ethical motives such as ecological care and moral obligation. Additionally, green self-identity has been found to influence consumers' choices in purchasing energy-efficient heating appliances, mediated by factors such as social and emotional values. The findings suggest that green environmental self-identity has a positive impact on consumers' green adoption behaviors. Several studies have concluded that individuals who strongly identify with environmentalism are more likely to engage in green adoption behavior and make green purchases. In summary, environmental self-identity represents how consumers perceive themselves as individuals who engage in environmentally friendly behavior, and it can serve as a driving force for adopting eco-friendly practices.

Table 3 - 11 A summary of literature review for the effect of green environmental self-identity on green adoption behavior

Author(s) name	n	r	Country
Barbarossa et al., (2017)	2005	0.38	Belgium
Zaremohzzabieh et al., (2021)	38622	0.23	Malaysia
Bhutto et al., (2022)	319	0.510	Pakistan
Neves & Oliveira (2021)	1136	0.320	Spain
Han et al., (2022)	309	0.344	United State
Bhutto et al., (2021)	319	0.510	Pakistan
Grębosz-Krawczyk et al., (2021)	250	0.408	Poland
Li et al., (2021)	365	0.797	Bangladesh

Note: n= sample size, r= correlation coefficient

The existing literature reviewed provides valuable insights into the hypothesis by presenting compelling evidence of the substantial influence of green environmental self-identity on green adoption behavior. These studies emphasize the significance of self-identity and self-concept in motivating individuals to participate in environmentally friendly actions. Additionally,

they explore how social norms and values impact the association between self-identity and green adoption behavior. The findings, derived from diverse countries, consistently support the notion that consumers' environmental self-identity plays a pivotal role in influencing their decision to adopt green products and services. Based on the above discussions, this study proposed the following hypothesis.

H_{11}: Green environmental self-identity has a significant impact on green adoption behavior.

Table 3-12 illustrated a summary of previous empirical studies on the influence of green customer value on green adoption behavior. According to Yadav & Pathak, (2017), based on the Theory of Planned Behavior, customers' value system toward green products tended to enhance their intentions to acquire eco-friendly goods, which in turn affected their green purchasing behavior. do Paco et. al., (2019) showed how green customer values impacted green consumer behavior in a beneficial way. Adhitiya and Astuti, (2019) used organic food to test Indonesian consumer behavior. The findings showed only social value has a beneficial influence on green consumer behavior. Hessami and Yousefi, (2013) argued that consumer values were the key factors that have been found as affecting consumers' green purchasing behavior. Research has shown that green customer value could be a significant driver of green adoption behavior. Consumers who perceived higher levels of green customer value are more likely to engage in green adoption behavior. This is because they may view green adoption behavior as providing personal and societal benefits (Chen & Chang, 2012). The VBN Theory can fully explain this phenomenon consumers green value can facilitate their norms and subsequent behavior. Consumers with a higher level of green value can perceive a higher level of personal and societal benefits from engaging in green adoption behavior (Biswas & Roy, 2015).

Table 3 - 12 A summary of literature review for the effect of green customer value on green adoption behavior

Author(s) name	n	r	Country
Yadav & Pathak (2017)	620	0.43	India
do Paço et al., (2019)	471	0.739	Portugal and UK
Liao et al., (2020)	319	0.242	Cambodia
Liao et al., (2021)	314	0.697	Cambodia
Chen et al., (2022)	428	0.625	China
Zand Hessami & Yousefi (2013)	35	0.286	Iran
Adhitiya & Astuti (2019)	200	0.211	Indonesia

Note: n= sample size, r= correlation coefficient

The Environmental Paradigm can also be used to explain the influence of green customer value on green adoption behavior. In this paradigm, green customer value could be viewed as a component of environmental quality, where consumers may view green adoption behavior as contributing to a higher-quality environment. This perception can motivate consumers to engage in green adoption behavior to contribute to a better environment. The previous literature reviewed makes a unique contribution to the hypothesis by providing evidence of the significant impact of green customer value on green adoption behavior. The studies highlight the role of consumer values, including their value system towards green products and their perceptions of personal and societal benefits, in influencing their intentions and behavior towards eco-friendly goods. They also emphasize the explanatory power of theories such as the Theory of Planned Behavior and the Environmental Paradigm in understanding the relationship between green customer value and green adoption behavior. The findings from various countries contribute to our understanding of how consumer values shape their adoption of green practices. Based on the above discussions, the following research hypothesis is developed:

H_{12}: Green customer value has a significant impact on green adoption behavior.

3.5 The moderating roles of perceived social responsibility and perceived psychological benefits

Table 3-13 presents a summary of empirical studies that investigate the influence of perceived social responsibility on green adoption behavior. Perceived social responsibility expands upon social norms and moral obligations related to environmental altruism. Researchers such as Eckhardt, Belk, and Devinney (2010) argue that individuals who perceive social responsibility are more likely to engage in self-controlled, self-regulated, and self-disciplined behavior for the purpose of environmental improvement. Consequently, consumers with a higher level of perceived social responsibility tend to display stronger intentions to adopt green behaviors (Mark & Law, 2015; Yue et al., 2020; Chen et al., 2022). When consumers feel a sense of social responsibility towards engaging in green adoption behavior, they are more inclined to adopt green products and services (Steenis et al., 2018; Chuah et al., 2020; Vander Werff et al., 2021). This inclination may arise from consumers perceiving their green purchases, even if they are more expensive, as a means of contributing to environmental improvement. While the direct effects of perceived social responsibility have been extensively studied, its potential moderating effect on accelerating green adoption behavior remains an area of further exploration. Previous research has indicated that higher levels of perceived social responsibility can amplify the influence of consumption values and personal norms on innovative green adoption (Rivas et al., 2002). Individuals who possess greater environmental concern tend to experience a stronger sense of social responsibility and are more inclined to engage in green adoption behavior (Thogersen & Crompton, 2009). Moreover, consumers who have a heightened level of social responsibility and a deeper understanding of

environmental issues are more likely to participate in green adoption behavior. Perceived social responsibility can also moderate the relationship between green customer value and green adoption behavior, indicating that consumers who place a higher value on green environmental protection and perceive a greater social responsibility are more likely to engage in extensive green adoption behavior (Tam & Chan, 2017).

Table 3 - 13 A summary of literature review for the effect of perceived social responsibility on green adoption behavior

Author(s) name	n	r	Country
Mark & Law (2015)	457	0.185	China
Yue et al., (2020)	680	0.471	China
Chen et al., (2022)	428	0.462	China
Steenis et al., (2018)	643	0.380	Netherlands
Chuah et al., (2020)	582	0.37	International
Van der Werff et al., (2021)	2479	0.39	Belgium

Note: n= sample size, r= correlation coefficient

Lastly, perceived social responsibility can also moderate the relationship between green environmental self-identity and green adoption behavior (Eckhardt, Belk & Devinney, 2010). These findings can be supported by various theoretical perspectives. Social Identity Theory can help explain the interaction effects between green environmental self-identity and perceived social responsibility on consumers' green adoption behavior. The Theory of Planned Behavior can shed light on the interaction effect between green environmental attitude and perceived social responsibility on consumers' green adoption behavior. Additionally, the Value-Belief-Norm Theory can be utilized to understand the interaction effect between green customer value and perceived social responsibility on green adoption behavior. The literature reviewed highlights that perceived social responsibility significantly influences

green adoption behavior. Consumers who feel a strong sense of responsibility toward the environment are more likely to adopt green practices. The theories of Social Identity, Planned Behavior, and VBN provide frameworks for understanding these interactions. These findings enhance our understanding of how social responsibility shapes individuals' adoption of environmentally friendly behaviors. Based on the above discussions, the following hypotheses were developed.

H13a: Perceived social responsibility moderates the influence of green environmental attitude on green adoption behavior.

H13b: Perceived social responsibility moderates the influence of green environmental self-identity on green adoption behavior.

H13c: Perceived social responsibility moderates the influence of green customer value on green adoption behavior.

Table 3-14 presented a summary of previous empirical studies on the influence of perceived psychological benefits. Perceived psychological benefits referred to the positive emotional and cognitive experiences that individuals associate with engaging in environmentally friendly behavior or using green products. These benefits could include feelings of personal satisfaction, pride, social approval, a sense of moral obligation, and a connection to nature (Peattie & Peattie, 2003; Ryan & Deci, 2000). Sweeney and Webb, (2007) argued that psychological benefits originated from self-expressive benefits, which could be significant drivers of green adoption behavior (Jia & Linden, 2020).

According to Symbolic Consumption Theory (Veblen, 1899), consumers tended to use green purchasing to communicate their symbolic meanings such as social position, personal values, social norms, and others. According to Conspicuous Consumption Theory (Veblen, 1899), consumption was not only

for practical value but also to signal social status and wealth to others. Thus, psychological benefits should be reviewed from a wider spectrum.

Table 3 - 14 A summary of literature review for the effect of perceived phycological benefits on green adoption behavior

Author(s) name	n	r	Country
Boobalan et al., (2021)	911	0.60	USA & India
Jia & Linden et al., (2020)	341	0.35	UK
Ho et al., (2023)	673	0.561	Pakistan
Hartmann et al., (2012)	726	0.27	Spain
Policarpo & Aguiar (2020)	871	0.176	Brazil
Afshar Jahanshahi & Jia (2018)	247	0.181	Bangladesh
Afshar Jahanshahi & Jia (2018)	732	0.251	Peru
Lioa et al., (2020)	319	0.867	Cambodia
Hartmann et al., (2012)	726	0.59	Spain

Note: n= sample size, r= correlation coefficient

Perceived psychological benefits might play a significant role in green adoption. Engaging in environmental activities like green adoption behaviors can lead to a sense of well-being, a sense of social identity, a sense of guilt alleviation, a sense of self-esteem, and a sense of self-controlled could be very helpful to enhance green adoption. Given that perceived psychological benefits have been regarded as the influential variables for consumers' green adoption, the moderating role of perceived psychological benefits has been largely neglected. This study proposed that considering the interactive effect, perceived psychological benefits should be regarded as a moderator that can accelerate the influence of consumer attitudes, self-identity, and green customer values on green adoption behavior.

1. Interaction effect between perceived psychological benefits and green environmental attitude: A positive attitude toward green behavior may serve as a key driver to facilitate green adoption. However, under a higher level of

perceived psychological benefits, this influential route would become significantly stronger.

2. Interaction effect between perceived psychological benefits and green customer value: Values were important factors to influence green adoption. Consumers who placed a high value on the environment were more likely to adopt green behavior.

3. Interaction effect between perceived psychological benefits and green environmental self-identity. Consumers who identified strongly as environmentally conscious were more likely to adopt green behavior. When consumers perceived higher psychological benefits, the influence of self-identity and green adoption may be significantly stronger.

The previous literature reviewed provides a unique contribution to the hypothesis by emphasizing the significant role of perceived psychological benefits in influencing green adoption behavior. Furthermore, the literature suggests that perceived psychological benefits can act as a moderator, amplifying the effects of green environmental attitude, green environmental self-identity, and green customer value on green adoption behavior. This research expands our understanding of the interactive effects between psychological benefits and other factors in driving individuals' adoption of green practices. Based on the above discussions, the following hypotheses were proposed.

H_{14a}: Perceived green psychological benefits moderate the influence of green environmental attitude on green adoption behavior.

H_{14b}: Perceived green psychological benefits moderate the influence of green environmental self-identity on green adoption behavior.

H_{14c}: Perceived green psychological benefits moderate the influence of green customer value on green adoption behavior.

CHAPER FOUR

RESEARCH DESIGN AND METHODOLOGY

The research design and methodology of this study were presented in this chapter. Specifically, the research framework, research hypotheses, construct measurement, data collection procedure and data analysis techniques were illustrated in detail.

4.1. Research framework

A comprehensive research framework was constructed and depicted in Figure 4-1. The objective of this study was to identify the crucial factors that influence customers' green adoption behavior, including antecedents, mediators, and moderators. The study proposed that positive personality traits could significantly influence three key mediators: customer's environmental concern, green environmental attitude, and green customer value. These mediators, in turn, could impact the customer's green environmental self-identity and their subsequent green adoption behavior. Additionally, the study explored the moderating role of perceived social responsibility and psychological benefits in the relationship between customer environmental attitude, green customer value, green environmental self-identity, and green adoption behavior.

As shown in chapter three, a total of 14 research hypotheses were developed:

Hypothesis H_1: Positive personality traits have a significant impact on environmental concern.

Hypothesis H_2: Positive personality traits have a significant impact on his/her green environmental attitude

Hypothesis H_3: Positive personality traits have a significant impact on his/her green customer value.

Hypothesis H_4: environment concern has a significant impact on green environmental attitude.

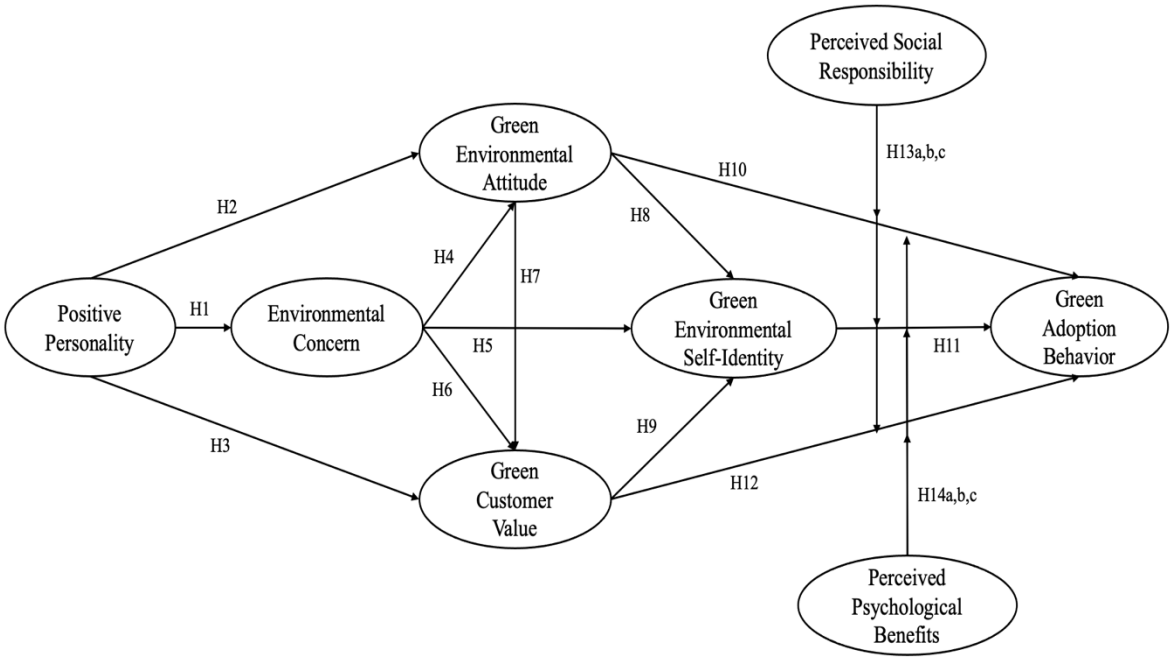

Figure 4 - 1 The comprehensive research framework of this study

Hypothesis H_5: Environment concern has a significant impact on green environment self-identity.

Hypothesis H_6: Environment concern has a significant impact on green customer value.

Hypothesis H_7: green environmental attitude has a significant impact on green customer value.

Hypothesis H_8: green environment attitude has a significant impact on green environmental self-identity.

Hypothesis H_9: green customer value has a significant impact on green environmental self-identity.

Hypothesis H_{10}: green environmental attitude has a significant impact on green adoption behavior.

Hypothesis H_{11}: Green environmental self-identity has a significant impact on green adoption behavior.

Hypothesis H_{12}: Green customer value has a significant impact on green adoption behavior.

Hypothesis H_{13a}: Perceived social responsibility moderates the influence of green environmental attitude on green adoption behavior.

Hypothesis H_{13b}: Perceived social responsibility moderates the influence of green environmental self-identity on green adoption behavior.

Hypothesis H_{13c} :Perceived social responsibility moderates the influence of green customer value on green adoption behavior.

Hypothesis H_{14a}: Perceived green psychological benefits moderate the influence of green environmental attitude on green adoption behavior.

Hypothesis H_{14b}: Perceived green psychological benefits moderate the influence of green environmental self-identity on green adoption behavior.

Hypothesis H_{14c}: Perceived green psychological benefits moderate the influence of green customer value on green adoption behavior.

4.2 Research instrument

This study identified positive personality, environmental concern, green environmental attitude , green customer value, green environmental self-identify, and green adoption behavior. Furthermore, perceived social responsibility and perceived psychological benefits were served as two moderating variables that moderate green environmental attitude to green adoption behavior, green environmental self-identity to green adoption behavior, and green customer value to green adoption behavior. Based on a literature review and the objective of this study, survey 67uestionnaire items were created. The following sections shared the research items for each research constructs:

4.2.1. Positive personality

Personality traits are indicative of individuals' consistent patterns of thoughts, emotions, and behaviors. These traits demonstrate stability, suggesting that individuals who score high on a particular trait, such as extraversion, are expected to exhibit sociability consistently across different

situations and over time. In line with the research of Saucier (1994), Mowen (2000), and McCrae and Costa (1987), this study incorporated positive personality traits comprising five factors: (1) introversion, (2) conscientiousness, (3) emotional stability, (4) openness to experience, and (5) agreeableness.

Table 4 – 1 The questionnaire items of positive personality

Introversion (INTR)	
INTR1	Quite when with people
INTR2	Preferred to be alone rather than in a large group
INTR3	Introverted
Conscientiousness (CONS)	
CONS1	Orderly
CONS2	Precise and efficient
CONS3	Organized
Emotional Stability (EMO)	
EMO1	Remain calm and composed
EMO2	A stable and consistent mood
EMO3	Good control of my anger and frustration
EMO4	Easy to adapt to change
Openness to Experience (OPEN)	
OPEN1	Frequently feel high creative
OPEN2	Imaginative
OPEN3	More original than others
Agreeableness (AGRE)	
AGRE1	Kind to others
AGRE2	Tender-hearted with others
AGRE3	Sympathetic

4.2.2. Environmental concern

Table 4 - 2 The questionnaire items of environmental concern (ENVI)

ENVI1	Environment is severely abused by humans
ENVI2	Uncontrolled expansion of the industrialized society must be checked
ENVI3	We must maintain the balance of nature for our survival
ENVI4	The balance of nature is very delicate and easily upset
ENVI5	If things continue on their present course, we will soon experience a major ecological catastrophe

In this study, environmental concern, defined by Dunlap et al., (2002) as "the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or willingness to contribute personally to their solution", was adopted. The measure of environmental concern used in this study comprised five items specifically focused on the concern of nature resource limitation. The questionnaire items of environmental concern were shown in Table 4-2.

4.2.3. Green environmental attitude

Table 4 - 3 The questionnaire items of green environmental attitude (GEA)

GEA1	I consider the potential environmental impact of my actions when making many of my consumption decisions.
GEA2	I am concerned about wasting the resources of our planet.
GEA3	I would describe myself as environmentally responsible.
GEA4	It has become inevitable to protect the environment for future generations

In accordance with Heyl et al. (2013), this study conceptualized green attitudes as an individual's inclination to consistently exhibit favorable or unfavorable responses towards environmental matters. To measure the

construct of green environmental attitude, a four-item scale developed by Steg et al. (2014) was adopted in this study. The questionnaire items of green environmental attitude were shown in Table 4-3.

4.2.4. Green customer value

Green customer value means the attitude of customers towards green products has effects on their green purchase intention. These conflicting motivations involve making choices between personal interests and the well-being of others, as highlighted in previous studies (Liao et al., 2020). Previous research has indicated that customer satisfaction can be influenced by the perceived value of a product or service (Dodds et al., 1991). In this study, the construct of green customer value was measured using a five-item scale developed by Dodds et al. (2014). The questionnaire items of green customer value were shown in Table 4-4.

Table 4 - 4 The questionnaire items of green customer value (GCV)

GCV1	I value products/services that are environmentally friendly
GCV2	I am willing to pay a premium for products/services that are environmentally sustainable
GCV3	I consider the environmental impact of a products/services when making purchase decision
GCV4	I believe that adopting environmentally friendly products/services contribute to a better future
GCV5	Environmental benefits are very important factors in my overall satisfaction with a products/service

4.2.5. Green environmental self-identity

In this study, green environmental self-identity was defined following the conceptualization of Van der Werff, Steg, and Keizer (2013) as "an individual's perception of themselves as a kind of person who acted in an environmentally friendly manner." It is important to note that the

conceptualization of environmental self-identity differs from environmental identity, which pertains to the extent to which an individual perceives environmentalism as a fundamental part of their identity.

Table 4 - 5 The questionnaire items of green environmental self-identity (GES)

GES1	I think of myself as someone who is concerned about environmental issues.
GES2	I see myself as begin an environmentally friendly consumer
GES3	I would want my family and friend s to think of me as someone who is concerned about the environment
GES4	I would be embarrassed not to be seen as having an environmentally friendly lifestyle

A higher level of environmental self-identity indicates a stronger belief in being a pro-environmental individual, leading to a greater likelihood of engaging in environmentally friendly behaviors. To measure consumers' green environmental self-identity, this study utilized a four-item scale developed by Van der Werff, Steg, and Keizer (2013). This scale aimed to capture individuals' perceptions of themselves as environmentally conscious individuals and their identification with environmentally friendly behaviors. Table 4-5 showed the questionnaire items of green environment self-identity.

4.2.6. Green adoption behavior

Green adoption behavior encompasses any behavior that is beneficial to the environment or minimizes harm to the environment, as defined by Steg and Vlek (2009). Several influential factors contribute to individuals' engagement in green adoption behavior, including their environmental beliefs, attitudes, values, and self-identity (Rivas et al., 2022). To measure the main construct of innovative green product adoption, this research suggests two sub-constructs:

innovative green product purchase and innovative green product investment. Innovative green product purchase intention captures individuals' current or future intentions to purchase new green products (Halkier et al., 2011; Pitaloka & Gumnati, 2019). On the other hand, innovative green product investment intention reflects the extent to which consumers intend to contribute to green product consumption by investing in green products. This intention is driven by concerns for the stability of the environment for future generations (Inderst et al., 2012). The questionnaire items for measuring green adoption behavior are presented in Table 4-6. These items are designed to assess individuals' behaviors and intentions related to the adoption of innovative green products. By examining consumers' attitudes, intentions, and actual behaviors towards green adoption, this study aims to gain insights into the factors that influence the adoption of environmentally friendly products and the underlying motivations behind consumers' engagement in such behaviors.

Table 4 - 6 The questionnaire items of green adoption behavior (GAB)

GAB1	In the near future, I am willing to purchase products made from recyclable materials.
GAB2	I will make an effort to purchase this product because of its environmental concerns
GAB3	I have changed my principal products for ecological reasons
GAB4	I intend to invest in eco-friendly products in the future because of its environmental concern.
GAB5	I expect to invest in eco-friendly products in the future because of its environmental performance.
GAB6	I am glad to invest in green products in the future because it is environmentally friendly.

4.2.7. Perceived social responsibility

Perceived social responsibility is the belief that every individual has a moral obligation to act responsibly and ethically. It involves voluntary actions

based on personal integrity, commitment, and ownership. Perceived social responsibility extends social norms by promoting environmental altruism. It is considered a crucial factor in determining consumers' willingness to adopt green products (Yu et al., 2017). Table 4-7 provides the questionnaire items related to perceived social responsibility, capturing the various aspects and dimensions of this concept.

Table 4 - 7 The questionnaire items of perceived social responsibility (PSR)

PSR1	I would recommend eco-friendly products to my friends and family.
PSR2	I feel morally obliged to purchase green products.
PSR3	I participate in activities that aim to protect and improve the quality of the environment.
PSR4	I support nongovernmental organizations working to minimize the negative impacts

4.2.8. Perceived psychological benefits

In this study, psychological benefits were defined in line with Sweeney and Web (2007) as the feelings of trust or confidence in the other party that result in greater peace of mind. The construct of green psychological benefits encompassed three factors: warm glow, self-expression, and nature experience. The warm glow factor refers to the positive emotions and satisfaction derived from engaging in environmentally friendly behaviors. Self-expression captures the sense of identity and personal values associated with environmentally conscious actions. Nature experience encompasses the enjoyment and connection individuals feel when experiencing the natural environment. Liao et al. (2020) argued that consumers' perception of green psychological benefits can act as a moderator, accelerating the influence of their attitudes and green

customer values on their intentions to make green purchases. In other words, when consumers perceive psychological benefits associated with environmentally friendly choices, it strengthens the link between their positive attitudes and values towards green products and their intention to purchase them. By examining the role of psychological benefits in influencing consumers' green purchase intentions, this study aims to shed light on the underlying motivations and psychological mechanisms that drive individuals to choose environmentally friendly options.

Table 4 - 8 The questionnaire items of perceived psychology benefit (PPB)

Nature experience (NAE)	
NAE1	In the near future, I am willing to purchase products made from recyclable materials.
NAE2	I will make an effort to purchase this product because of its environmental concerns
NAE3	Nature experience always inspires me towards the buying of organic products and services
NAE4	Nature provides me with a sense of peace and tranquility
Self-expressive (SEB)	
SEB1	I always self-expressive to buy eco-friendly products and services
SEB2	My personality does not accept the product or service that is hazardous for the environment
SEB3	My purchase intention always triggers by the inner conscious that support the eco-friendly product or service
SEB4	Through self-expression, I feel a sense of liberation and freedom
SEB5	Engaging in self-expression activities boots my self-confidence and self-esteem

SEB6	Self-expression empowers me to challenge environmental issues and express my authentic self
Warm glow (WAG)	
WAG1	Warm glow always could be achieved through buying eco-friendly products and services
WAG2	The pro-environmental strategies of any product or organization provide a significant sense of warm glow
WAG3	Warm glow always be a significant psychological benefit of eco-friendly services and products' buying
WAG4	Doing something good for others bring me joy
WAG5	I feel a sense of fulfillment when I make a positive impact on the lives of others
WAG6	Warm glow always brings me a sense of satisfaction

4.2.9. Respondents demographic questions

In order to understand the characteristics of the respondents, this study selected seven questionnaire items, including (1) Gender, (2) Age, (3) Education, (4) Working experience, (5) Industry, (6) Current position, and (7) Current working country

4.3. Questionnaire design

To ensure the reliability and validity of the questionnaire items the following steps were adopted:

1. Following Hardesty and Bearden, (2004), the research questionnaire items were further consulted with six specialists (including one professor, two associate professors, one business manager and two Ph.D. students) from on University in Taiwan and one University in Vietnam. These specialists were asked to review the questionnaire item by item, and make recommendation to adjust the questionnaire items. Therefore, certain wordings for questionnaire

items were changed.

Table 4 - 9 Pilot test reliability

Construct	Cronbach's alpha
Positive personality	
Introversion (INTR)	0.826
Conscientiousness (CONS)	0.840
Emotional stability (EMO)	0.825
Openness to experience (OPEN)	0.822
Agreeableness (AGRE)	0.890
Environmental concern (ENVI)	0.894
Green environmental attitude (GEA)	0.903
Green customer value (GCV)	0.912
Green environmental self-identity (GES)	0.828
Green adoption behavior (GAB)	0.873
Perceived social responsibility (PSR)	0.826
Perceived psychology benefit (PPB)	
Nature experience (NAE)	0.832
Self-expressive (SEB)	0.806
Warm glow (WAG)	0.839

2. A pilot test was conducted in December, 2022 using 72 Vietnamese's students from the International college of Vietnam National University, Hanoi. The purpose of this pilot test was to see whether the questionnaire items and terminologies are clearly understood from the respondents. The questionnaire items has been modified based on the comments and suggestion from the specialists and from the respondents. In the pilot test, this study originally design 78 items to measure relevant research constructs. Eleven items had been deleted due to their low factor loadings in the pilot test. Eventually, 67

questionnaire items were developed, which consisted of 60 measurement items for the research constructs and 7 items for the demographic information. The Cronbach's alpha for each research construct are shown in table 4-9.

4.4. Sampling plan

In the official study, the survey was conducted with data collection from randomized respondents through MTurk. MTurk is a crowdsourcing platform that makes the author easier to collect data from the respondents. The author was to pay for collecting data from MTurk platform, one USD per valid response. At the end of the questionnaire, the demographic information was collected.

Kyle & Scott., (2017) mentioned that a number of papers have been rapidly adopted the Amazon's Mechanical Turk (MTurk) as a common research platform in the social sciences, and many papers regarding the validity of Mturk research have been addressed (such as, Lu et al., 2022; Mellis, and Bickel, 2020; Casler, Bickel, & Hackett, 2013).

Based on Bowerman, O'Connell, and Orris, (2004), where the population size is unknow, the formula to calculate the sample size is as followed:

$$N = z^2 \frac{p*(1-p)}{e^2} \qquad (1)$$

Where

N= Required sample size

Z= 1.96 at p= 0.05

p= The estimated percentage of population size (with the characteristics of interest in this study)

e= tolerance of error (5%)

This study used a seven-point Likert scale ranging from 1=totally disagree to 7=totally agree. So, the answer for the proportion (%) of respondents who

answered 5=somewhat agree, 6=agree, 7=totally agree were collected as the proportion for p, because these three answers are the characteristic of interest in this study. From the descriptive analysis of the questionnaire items, most of the proportion for answering 5,6,7 was approximately 70%. Therefore, this study used p=0.7, and (1-p) = 0.3 to calculate the sample size.

The required sampling size is

$$N= (1.96)^2 \frac{0.7*0.3}{0.05^2}=352$$

Furthermore, Hair et al., (2010) stated that the valid respondents should be more than 250 or more than 10 times of the biggest number of construct-measuring formation indicators. Van Voorhis and Morgan, (2007) suggested that the good sample size for multivariate data analysis is approximate 300. To meet these criteria, this study collected a valid sample size of 352 from the survey. The official period of collecting data is about 10 days from late January to early February, 2023. The respondents were mainly from United States, Taiwan, European Union etc.

A sample size of 352 is commonly used in a cross-sectional survey (Hair et al., 2016). However, the required sample size may vary depending upon the desired precision and specific characteristics of the study population. Since this study focused on empirical theory validation rather than theory development, a sample size of 352 could be adequate, because several studies (Cohen, 1992; Hulley, Cummings, Browner, Grady and Newman, 2013) argued that for a statistical power of 80% with the significant level at 0.05, a sample size of 100 to 200 is often considered adequate.

4.5 Data analysis techniques

SPSS statistics Version 22 and the Smart Partial Least Square (PLS) 3.0 were employed to test the research hypotheses as shown in the research framework. The following data analysis approaches were adopted:

4.5.1. Descriptive statistical analysis

Descriptive statistics analysis, including means, standard deviations, frequencies, etc. were conducted to verify the characteristic of the respondents, and the descriptive value of the research questionnaire items.

4.5.2. Factor analysis and reliability test

Confirmatory factor analysis (CFA) had been applied to identify the dimensionality of the research constructs. In addition, item-to-total correlation among questionnaire items to verify the correlation between item scores and summated scores of a factor. Cronbach's alpha had been used to confirm the internal consistency of the research items with the same factor. The number of dimensions retrieved from the main component factor analysis was decided using the talent root (eigenvalues), and the score test. Following Hair et al., (2010), the criteria for factor analysis and reliability test were as follows:

(1) Factor loading > 0.7

(2) KMO (Kasier-Meyer-Olkin) > 0.5

(3) Item-to-total correlation > 0.5

(4) Cronbach's alpha (α) > 0.7

(5) CR > 0.6

(6) AVE > 0.5

(7) VIF < 5

This study used SPSS 22 to perform confirmatory factor analysis and reliability.

4.5.3. Reliability and convergent validity

Hair et al. (2016) suggested to measure reliability using the following measures

(1) Composite reliability (CR)

$$CR = (\sum \lambda)^2 / ((\sum \lambda)^2 + \sum \delta) > 0.6 \qquad (2)$$

where λ = Factor loading (standardized)

δ = error term (standardized)

(2) Cronbach's alpha (α)

$$\text{Alpha } (\alpha) = \frac{k}{k-1}\left[\frac{\sum S_i^2}{\sum S_i^2 + 2\sum\sum S_i}\right] > 0.7 \qquad (3)$$

Where k = Number of research items

S_i = Variance among research items

S_{ij} = Co-variance among research items

(3) Convergent Validity = AVE (average variance extracted)

$$\text{AVE} = (\sum \lambda^2)/n > 0.5$$

Where λ = factor loading

n = Number of research items

If the CR values do the research constructs are higher than 0.6, and the AVE is higher than 0.5, then we may conclude that the criteria for reliability and convergent validity are fulfilled (Hair et al., 2016).

4.5.4. Discriminate validity and common method variance issue

The following criteria were used in this study to verity the discriminant and common method variance issues:

(1) Fornell and Larcker, (1981) suggested that the share root of AVE of all research construct should be greater than its highest correlation with other research constructs.

(2) Henseler et al., (2015) suggested that the HTMT (Heterotrait-Monotrait) ratio should be less than 0.85 for conceptually similar constructs and 0.90 for conceptually different construct. The formula of HTMT is shown below:

$$HTMT_{ij} = \frac{1}{K_i K_j}\sum_{g=1}^{K_i}\sum_{h=1}^{K_j}\gamma_{ig,jh} \qquad (4)$$

Where $\gamma_{ig,jh}$ is the correlation between different items.

4.5.5. Hypotheses testing techniques

Hair et al., (2016) suggested using the following four criteria evaluate the goodness of the structural model: (1) multicollinearity, (2) coefficient of determination (R^2), (3) the impact size (f^2), and (4) Goodness of fit (GoF).

1. Multicollinearity (VIF)

$$VIF = \frac{1}{tolerance} < 5. \qquad (5)$$

Where VIF = Variance of inflation factor

Tolerance= 1- R_i^2

R_i^2 = coefficient of determination for the regression of independent variables

2. Coefficient of determination

$R^2 = 1 - (SSR / SST)$ (6)

Where:

SSR (Sum of Squares Residual) measures the sum of the squared differences between the actual values of the dependent variable and the predicted values obtained from a regression model.

On the other hand, SST (Sum of Squares Total) represents the sum of the squared differences between the actual values of the dependent variable and the mean value of the dependent variable.

Following Chin, (1998) and Hair et al., (2013) $R^2 > 0.672$ were clarified as strong substantial, $R^2 \cong 0.33$- 0.672 were classified as moderate, $R^2 < 0.19$ were classified as weak

3. Effect size (f^2)

Effect size evaluate the amount of influence of extraogenous constructs on endogenous constructs.

$$f^2 = \frac{{R_{xy}}^2 - {R_x}^2}{1 - {R_{xy}}^2} \qquad (7)$$

Where ${R_{xy}}^2$= variance accounted for extrogenous constucts and endogenious constructs

${R_x}^2$ = variance accounted for extrogenous constructs

Following Hair et al, (2016) effect sizes (f^2) of 0.02, 0.15, and 0.35 were classified as small medium, and large, respectively.

4. Goodness of fit (GoF)

$$\text{GoF} = \sum \frac{(O_i - E_i)^2}{E_i} = \sqrt{(R\ square) \times (AVE)} \qquad (8)$$

Where O_i = The frequency of observation

E_i = The frequency of determination

R^2 = coefficient of determination

AVE = Average variance extracted

Latan and Ghozali, (2015) suggested that GoF > 0.36 are strong, GoF= 0.25-0.36 are medium, GoF<0.1 are weak.

CHAPTER FIVE

EMPIRICAL RESULTS AND DISCUSSIONS

This chapter showed the empirical results of the questionnaire survey. Demographic information of respondents, descriptive analysis of the measurement items was demonstrated. Reliability tests including confirmatory factor analysis, item-to-total correlation, and Cronbach's alpha were presented. Evaluation of the structural model for hypotheses testing was also included.

5.1 Characteristics of respondents

The questionnaire items were finalized through the process of literature review and pre-test. Questionnaire items were adjusted based on the feedbacks from the literature review and the comments of the specialists and the respondents. The official survey was conducted in late January, 2023, using MTurk as the platform for data collection. Eventually, 352 valid data were obtained. Table 5-1 illustrated the characteristics of respondents in terms of gender, age, education, working experience, industry, current position, and country of origin.

Table 5 - 1 The demographic data of the respondents

Variable		Frequency (n = 352)	Percentage (%)
Gender			
	1: Male	208	59.1
	2: Female	144	40.9
Age			
	1: Less than 26	96	27.3
	2: 26-35	122	34.7
	3: 36-45	66	18.8
	4: 46-55	42	11.9
	5. 56-65	18	5.1

Variable		Frequency (n = 352)	Percentage (%)
	6. Above 65	8	2.3
Education			
	1: Bachelor degree	187	53.1
	2: Master degree	151	42.9
	3: Doctoral degree	14	4
Working experience			
	1: Less than 5 years	207	58.8
	2: 5-10 years	139	39.5
	3: More than 10 years	6	1.7
Industry			
	Service Industry	136	38.6
	Electronic and Information	100	28.4
	Manufacturing	55	15.6
	Retailing/Wholesale	15	4.3
	Financial service	14	4
	Logistics	11	3.1
	Education	8	2.3
	Tourism	5	1.4
	Advertising	2	0.6
	Agricultural	2	0.6
	Others	4	1.1
Current position			
	Working staff	69	19.6
	Supervisor	249	70.7
	Manager	20	5.7

Variable		Frequency (n = 352)	Percentage (%)
	Senior manager	14	4
Current working country			
	United States	175	49.7
	Taiwan	93	26.4
	European union	56	15.9
	Others	28	8

5.2. Descriptive analysis for research variables

Table 5-2 showed the means, standard deviations, lower bound and upper bound of research variables. For the research construct of positive personality, five major factors were identified to operationalize this construct; Introversion, conscientiousness, emotional stability, openness to experience and agreeableness. For the factor of introversion, the mean values of its 3 measurement items were ranged from 5.63 to 5.77 with standard deviations from 1.071 to 1.198. For the factor of conscientiousness, the mean values of its 3 measurement items were ranged from 5.85 to 5.86 with standard deviations from 0.875 to 0.972. For the factor of emotional stability, the mean values of its 4 measurement items were ranged from 5.74 to 5.82 with standard deviations from 0.888 to 0.968. For the factor of openness to experience, the mean values of its 3 measurement items were ranged from 5.70 to 5.76 with standard deviations from 0.936 to 0.955. For the factor of agreeableness, the mean values of its 3 measurement items were ranged from 5.80 to 6.01 with standard deviations from 0.882 to 0.933. For the construct of environmental concern, the mean values of its 5 measurement items were ranged from 5.68 to 5.85 with standard deviations from 0.849 to 0.904. For the construct of green environmental attitude, the mean values of its 4 measurement items were ranged from 5.82 to 5.91 with standard deviations from 0.95 to 1.031. For the

construct of green customer value, the mean values of its 5 measurement items were ranged from 5.76 to 5.95 with standard deviations from 0.933 to 1.04. For the construct of green environmental self-identity, the mean values of its 4 measurement items were ranged from 5.83 to 6 with standard deviations from 0.973 to 1.013. For the construct of green adoption behavior, the mean values of its 7 measurement items were ranged from 5.47 to 5.55 with standard deviations from 1.146 to 1.320. The mean values for perceived social responsibility of its 4 measurement items were ranged from 5.51 to 5.9 with standard deviations from 1.137 to 1.206.

Table 5 - 2 Results of means and standard deviations of research variables

Research Items	Mean	Std. Dev.	Lower Bound	Upper Bound
Research Construct: Positive Personality			Min.	Max.
Introversion (INTR)				
[INTR1]	5.63	1.198	2	7
[INTR2]	5.68	1.071	2	7
[INTR3]	5.77	1.143	2	7
Conscientiousness (CONS)				
[CONS1]	5.86	0.972	3	7
[CONS2]	5.85	0.903	4	7
[CONS3]	5.85	0.875	3	7
Emotional stability (EMO)				
[EMO1]	5.82	0.888	3	7
[EMO2]	5.74	0.968	3	7
[EMO3]	5.80	0.900	3	7
[EMO4]	5.82	0.914	3	7
Openness to experience (OPEN)				
[OPEN1]	5.73	0.936	3	7
[OPEN2]	5.70	0.955	3	7

Research Items	Mean	Std. Dev.	Lower Bound	Upper Bound
[OPEN3]	5.76	0.941	3	7
Agreeableness (AGRE)				
[AGRE1]	6.01	0.912	3	7
[AGRE2]	5.82	0.882	3	7
[AGRE3]	5.80	0.933	3	7
Research Construct: Environmental Concern				
[ENVI1]	5.79	0.869	3	7
[ENVI2]	5.85	0.849	3	7
[ENVI3]	5.84	0.871	3	7
[ENVI4]	5.84	0.904	3	7
[ENVI5]	5.68	0.896	3	7
Research Construct: Green Environmental attitude				
[GEA1]	5.82	0.95	3	7
[GEA2]	5.91	0.987	2	7
[GEA3]	5.91	1.023	2	7
[GEA4]	5.88	1.031	1	7
Research Construct: Green Customer Value				
[GCV1]	5.76	0.963	3	7
[GCV2]	5.91	0.962	3	7
[GCV3]	5.88	1.04	3	7
[GCV4]	5.84	0.933	3	7
[GCV5]	5.95	0.968	3	7
Research Construct: Green Environmental Self-Identity				
[GES1]	5.89	1.013	3	7
[GES2]	5.95	0.974	3	7
[GES3]	6	0.973	3	7
[GES4]	5.83	0.979	3	7
Research Construct: Green Adoption Behavior				
[GAB1]	5.5	1.186	1	7
[GAB2]	5.47	1.251	2	7

Research Items	Mean	Std. Dev.	Lower Bound	Upper Bound
[GAB3]	5.55	1.146	2	7
[GAB4]	5.48	1.236	2	7
[GAB5]	5.51	1.32	1	7
[GAB6]	5.53	1.265	1	7
Research Construct: Perceived Social responsibility				
[PSR1]	5.9	1.206	2	7
[PSR 2]	5.84	1.14	2	7
[PSR 3]	5.51	1.162	2	7
[PSR 4]	5.66	1.137	1	7
Research Construct: Perceived Psychological benefit				
Warm Glow				
[WAG1]	5.58	1.132	1	7
[WAG2]	5.74	1.221	1	7
[WAG 3]	5.61	1.217	1	7
[WAG 4]	5.74	1.102	2	7
[WAG 5]	5.79	1.034	2	7
[WAG 6]	5.8	1.108	2	7
Self-expressive benefits				
[SEB1]	5.87	0.878	2	7
[SEB 2]	6.04	0.985	3	7
[SEB 3]	5.99	0.986	3	7
[SEB 4]	5.82	0.994	3	7
[SEB 5]	5.88	0.958	3	7
[SEB 6]	5.89	0.912	4	7
Nature experience				
[NAE1]	5.66	1.001	3	7
[NAE 2]	5.72	0.969	3	7
[NAE 3]	5.85	0.89	3	7
[NAE 4]	5.68	0.956	2	7

For the research construct of perceived psychological benefits, three major factors were identified to operationalize this construct. For the factor of warm glow, the mean values of its 6 measurement items were ranged from 5.58 to 5.80 with standard deviations from 1.034 to 1.221. For the construct of self-expressive benefits, the mean values of its 6 measurement items were ranged from 5.82 to 6.04 with standard deviations from 0.878 to 0.994. For the construct of nature experience, the mean values of its 4 measurement items were ranged from 5.66 to 5.85 with standard deviations from 0.89 to 1.001. Based on these results, it could be concluded that respondents seem to express their opinions in a very high score in a consistent way. The standard deviations are all reasonable.

5.3. Factor analysis and reliability test

This study adopted three purification methods to verify the dimensionality and reliability of the research constructs: Factor analysis, item-to-total correlation analysis, and Cronbach's alpha (α) coefficients.

1. Principal component factor analysis: Principal component factor analysis with varimax rotated methods was adopted to identify the dimensionality of the research construct. SPSS22 software package was used in this study. Confirmatory factor analysis was used in this study to verify the pre-specified factor structure based on the theoretical and empirical evidence. According to Hair et al. (2010), in the factor analysis, the following criteria should be fulfilled.

a. Eigenvalue (accumulated explained variance) > 1

b. Accumulative explained variance > 0.6

c. Factor loading > 0.7

2. Item-to-total correlation: Item-to-total correlation was used to measure the correlation between the score of an individual item and the summated score (the average score of all variables in the same factor or construct). Hair et al.

(2010) argued that each item-to-total correlation should exceed 0.5 to confirm the meaningful existence of an individual item as one of the members of all measurement items.

3. Cronbach's alpha: Cronbach's alpha is the reliability coefficient to measure the internal consistency of a set of measurement items. Hair et al. (2017) stated that Cronbach's alpha should be greater than 0.7

This study adopted CFA and showed that for the model fit CFI=0.918, RMSEA=0.072. Thus the research model seems acceptable.

5.3.1. Positive personality traits

Table 5-3 presents results of the CFA and reliability assessment for positive personality traits construct, consisting of five factors. The factor of Introversion demonstrated strong psychometric properties. All factor loadings exceeded 0.7, indicating a substantial association between the observed items and the latent factor (0.867-0.896). Additionally, all item-to-total correlation coefficients surpassed the desired threshold of 0.5, indicating a satisfactory level of item consistency within the factor (0.705-0.754). The cumulative explained variance, a measure of the proportion of total variance accounted for by the factor, exceeded 60% (77.337%), signifying a substantial representation of the construct. Furthermore, Cronbach's alpha coefficient, which assesses internal consistency, exceeded the acceptable threshold of 0.7 (0.854), indicating a high level of reliability for the Introversion factor. These results provide confidence in the measurement reliability and construct validity of the Introversion factor within the positive personality traits construct. For the outcomes of the confirmatory factor analysis and reliability assessment of conscientiousness factor within the positive personality traits construct. The results indicate strong psychometric properties which factor loading all above 0.7 (0.860-0.871). Moreover, all item-to-total correlation coefficients surpassed the desired threshold of 0.5, suggesting satisfactory item consistency

within the conscientiousness factor (0.684-0.702). The cumulative explained variance, exceeded 60% (74.939%), demonstrating a substantial representation of the construct. Additionally, Cronbach's alpha exceeded the acceptable threshold of 0.7 (0.833), signifying a high level of reliability for the Conscientiousness factor. These findings provide evidence of the measurement reliability and construct validity of the Conscientiousness factor within the positive personality traits construct.

For the confirmatory factor analysis and reliability assessment of emotional stability factor within the positive personality traits construct. All factor loadings above 0.7 (0.786-0.861). Additionally, all item-to-total correlation coefficients exceeded the desired threshold of 0.5, demonstrating satisfactory item consistency within the Emotional stability factor (0.626-0.730). The cumulative explained variance exceeded 60% (67.934%), indicating a substantial representation of the construct. Moreover, Cronbach's alpha coefficient exceeded of 0.7 (0.842). For the openness to experience factor within the positive personality traits construct. The findings demonstrate strong psychometric properties for this factor. All factor loadings above 0.7 (0.865-0.889). Moreover, all item-to-total correlation coefficients surpassed the desired threshold of 0.5, indicating satisfactory item consistency within the Openness to experience factor (0.698-0.739). The cumulative explained variance exceeded 60% (76.631%), indicating a substantial representation of the construct. Additionally, Cronbach's alpha coefficient exceeded 0.7 (0.848). These results confirm the measurement reliability and construct validity of the Openness to experience factor within the positive personality traits construct.

For the outcomes of the confirmatory factor analysis and reliability assessment for the Agreeableness factor within the positive personality traits construct. The results indicate a strong level of measurement reliability and internal consistency for this factor. All factor loadings exceeded 0.7 (0.824-

0.863). Additionally, all item-to-total correlation coefficients exceeded the desired threshold of 0.5, signifying satisfactory item consistency within the Agreeableness factor (0.615-0.675). The cumulative explained variance exceeded 60% (76.774%), indicating a substantial representation of the construct. Cronbach's alpha coefficient exceeded 0.7 (0.805).

Table 5 - 3 Confirmatory factor analysis for positive personality

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item- to-Total	Cronbach's α
			2.320	77.337		.854
Introversion	[INTR1]	0.896			0.754	
	[INTR2]	0.875			0.718	
	[INTR3]	0.867			0.705	
			2.248	74.939		.833
Conscientiousness	[CONS1]	0.871			0.702	
	[CONS3]	0.866			0.694	
	[CONS2]	0.860			0.684	
			2.717	67.934		.842
Emotional stability	[EMO3]	0.861			0.730	
	[EMO2]	0.836			0.694	
	[EMO4]	0.812			0.658	
	[EMO1]	0.786			0.626	
			2.299	76.631		.848
Openness to experience	[OPEN3]	0.889			0.739	
	[OPEN2]	0.872			0.709	
	[OPEN1]	0.865			0.698	
			2.303	76.774		.805
Agreeableness	[AGRE3]	0.863			0.675	
	[AGRE2]	0.857			0.666	
	[AGRE1]	0.824			0.615	

5.3.2. Environmental concern

Table 5-4 presents the findings of the confirmatory factor analysis and reliability assessment for the construct of environmental concern. The results indicate a strong level of measurement reliability and internal consistency for this construct. All measurement items demonstrated factor loadings exceeding the recommended threshold of 0.7, suggesting a robust relationship between the observed items and the latent construct (0.794-0.846). Furthermore, all item-to-total correlation coefficients exceeded the desired threshold of 0.5, indicating satisfactory item consistency within the environmental concern construct (0.678-0.747). The cumulative explained variance surpassed 60% (68.325%), demonstrating that the construct captures a substantial portion of the underlying variance. Additionally, Cronbach's alpha coefficient exceeded 0.7 (0.884). These results provide strong evidence for the reliability and validity of the measurement model, supporting the use of the construct to assess individuals' levels of environmental concern.

Table 5 - 4 Confirmatory factor analysis for environmental concern

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item-to-Total	Cronbach's α
			3.416	68.325		.884
	[ENVI 2]	0.846			0.747	
Environmental Concern	[ENVI 4]	0.836			0.732	
	[ENVI 3]	0.831			0.726	
	[ENVI 5]	0.825			0.719	
	[ENVI 1]	0.794			0.678	

5.3.3. Green environmental attitude

Table 5-5 present the results of the confirmatory factor analysis and reliability test conducted for the construct of green environmental attitude. The construct was assessed using four measurement items. The analysis revealed

that all factor loadings exceeded the recommended threshold of 0.7 (ranging from 0.820 to 0.874), indicating a strong association between the observed items and the underlying latent construct. Furthermore, the item-to-total correlation coefficients, which assess the consistency between each item and the overall construct, were all above 0.5 (ranging from 0.683 to 0.760), indicating satisfactory item consistency within the construct. The accumulative explained variance, which measures the proportion of variance accounted for by the measurement items, exceeded the desired level of 60% (71.483%). Additionally, the Cronbach's alpha higher than 0.7 (0.867).

Table 5 - 5 Confirmatory factor analysis for green environmental attitude

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item-to-Total	Cronbach's α
			2.859	71.483		.867
Green Environmental attitude	[GEA3]	0.874			0.760	
	[GEA2]	0.852			0.726	
	[GEA1]	0.835			0.701	
	[GEA4]	0.820			0.683	

5.3.4. Green customer value

Table 5-6 presents the findings of the confirmatory factor analysis and reliability test conducted for the construct of green customer value. The construct was measured using five items. The analysis revealed that all measurement items exhibited factor loadings above 0.7 (ranging from 0.794 to 0.849), indicating a strong association between the observed items and the latent construct. Additionally, all item-to-total correlation exceeded 0.5 (0.622 - 0.748), indicating satisfactory item consistency within the construct. The accumulative explained variance, which measures the proportion of variance

accounted for by the measurement items, exceeded the desired threshold of 60% (66.707%). Furthermore, the Cronbach's alpha above 0.7 (0.879).

Table 5 - 6 Confirmatory factor analysis for green customer value

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item-to-Total	Cronbach's α
			2.335	66.707		.879
Green Customer Value	[GCV4]	0.849			0.748	
	[GCV2]	0.842			0.739	
	[GCV3]	0.835			0.727	
	[GCV1]	0.827			0.718	
	[GCV5]	0.749			0.622	

5.3.5. Green environmental self-identity

Table 5-7 presents the results of the confirmatory factor analysis and reliability test conducted for four measurement items of green environmental self-identity construct.

Table 5 - 7 Confirmatory factor analysis for green environmental self-identity

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item- to-Total	Cronbach's α
			2.757	68.934		0.891
Green Environmental self-identity	[GES3]	0.858			0.739	
	[GES1]	0.839			0.765	
	[GES2]	0.822			0.690	
	[GES4]	0.801			0.757	

The analysis revealed that all measurement items exhibited factor loadings higher than 0.7 (0.801-0.858). Additionally, all item-to-total

correlation exceeded 0.5 (0.690-0.765). The accumulative explained variance exceeded the desired threshold of 60%, specifically at 68.934%. Furthermore, Cronbach's alpha surpassed the recommended value of 0.7, with a value of 0.891.

5.3.6. Green adoption behavior

Table 5-8 presents the results of the confirmatory factor analysis and reliability test conducted for the construct of green adoption behavior. This construct was measured using six items. The analysis revealed that all measurement items demonstrated factor loadings higher than 0.7 (0.763-0.859). This indicates a strong association between the observed items and the latent construct of green adoption behavior. Moreover, all item-to-total exceeded 0.5, (0.669-0.786). The accumulative explained variance surpassed the desired threshold of 60%, specifically at 69%. Additionally, the Cronbach's alpha exceeded 0.7 (0.910).

Table 5 - 8 Confirmatory factor analysis for green adoption behavior

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item-to-Total	Cronbach's α
			4.14	69.00		0.910
Green Adoption Behavior	[GAB5]	0.859			0.785	
	[GAB4]	0.858			0.786	
	[GAB1]	0.841			0.760	
	[GAB3]	0.833			0.750	
	[GAB2]	0.826			0.785	
	[GAB6]	0.763			0.669	

5.3.7. Perceived social responsibility

Table 5-9 show the results of the confirmatory factor analysis and reliability test conducted for the construct of perceived social responsibility. This construct was assessed using four measurement items. The analysis

revealed that all measurement items exhibited factor loadings above 0.7 (0.753-0.803). This indicates a strong association between the observed items and the latent construct of perceived social responsibility. Furthermore, all item-to-total correlation exceeded 0.5 (0.561-0.625). The accumulative explained variance exceeded 60%, specifically at 61.546%. Additionally, the Cronbach's alpha surpassed value of 0.7 (0.791).

Table 5 - 9 Confirmatory factor analysis for perceived social responsibility

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item-to-Total	Cronbach's α
			2.462	61.546		.791
Perceived Social responsibility	[PSR 2]	0.803			0.625	
	[PSR 1]	0.801			0.618	
	[PSR 4]	0.781			0.598	
	[PSR 3]	0.753			0.561	

5.3.8. Perceived psychological benefit

Table 5-10 presents the results of the confirmatory factor analysis and reliability test for the construct of perceived psychological benefit, specifically focusing on the factor of warm glow. The analysis revealed that all factor loadings for the warm glow factor were above the recommended threshold of 0.7 (0.733-0.822). Similarly, all item-to-total exceeded 0.5 (0.614-0.719). The accumulative explained variance for the warm glow factor surpassed the desired threshold of 60%, specifically at 60.039%. Additionally, the Cronbach's alpha higher than 0.7 (0.866). For perceived psychological benefit, focusing on the factor of self-expressive benefits. The analysis revealed that all factor loadings for the self-expressive benefits factor exceeded 0.7 (0.740-0.824). Additionally, all item-to-total were above 0.5 (0.629-0.730). The accumulative

explained variance for the self-expressive benefits factor surpassed 60%, specifically at 62.778%. Furthermore, Cronbach's alpha coefficient higher than 0.7 (0.881). These results provide strong evidence for the high degree of internal consistency within the self-expressive benefits factor of the perceived psychological benefit construct.

Table 5 - 10 Confirmatory factor analysis for perceived psychological benefit

Construct	Items	Factor Loading	Eigenvalue	Accumulative Explanation %	Item-to-Total	Cronbach's α
			3.602	60.039		.866
Warm Glow	[WAG 6]	0.822			0.719	
	[WAG 2]	0.801			0.693	
	[WAG 4]	0.782			0.670	
	[WAG 5]	0.763			0.647	
	[WAG 3]	0.743			0.629	
	[WAG 1]	0.733			0.614	
			3.767	62.778		.881
Self-expressive benefits	[SEB 4]	0.824			0.730	
	[SEB 5]	0.814			0.717	
	[SEB 2]	0.810			0.712	
	[SEB 3]	0.808			0.709	
	[SEB 6]	0.754			0.644	
	[SEB 1]	0.740			0.629	
			2.426	60.644		.784
Nature experience	[NAE 3]	0.802			0.619	
	[NAE 2]	0.792			0.608	
	[NAE 1]	0.767			0.573	
	[NAE 4]	0.753			0.558	

For the factor of nature experience within the construct of perceived psychological benefit exhibited strong internal consistency, all factor loadings for the nature experience factor exceeded 0.7, ranging from 0.753 to 0.802, indicating a robust association between the observed items and the latent construct. Similarly, all item-to-total higher than 0.5 (0.558-0.619). The accumulative explained variance for the nature experience factor surpassed 60%, specifically at 60.644%. Furthermore, the Cronbach's alpha coefficient, measuring internal consistency, exceeded 0.7, with a value of 0.784.

5.4. Evaluation of the measurement model

As shown previously, this study adopted the following criteria to evaluate the goodness of the measurement model:

1. Reliability (Hair et al., 2017)

a. Composite Reliability (CR)>0.6

b. Cronbach's alpha >0.7

c. Indicator reliability (rho-A)>0.7

2. Convergent validity (Henseler et al., 2009)

a. The Average variance extracted (AVE)>0.5

3. Discriminant validity

a. √AVE of a construct > its highest correlation with other constructs

b. Hetrotrait – monotrait (HTMT) ratio

< 0.85 for conceptually similar construct

< 0.90 for conceptually different construct (Henseler et al., 2015)

Table 5-11 presents the results of the construct reliability and convergent validity analysis. The composite reliability (CR) values, Cronbach's alpha coefficients (α), and indicator reliability (rho-A) values were examined to assess the reliability of each latent research construct in the measurement model. The CR values for all latent constructs exceeded the recommended threshold of 0.7, ranging from 0.909 to 0.954. This indicates that the

measurement items within each construct have a high level of internal consistency and contribute strongly to measuring the respective constructs. Similarly, the Cronbach's alpha coefficients for all constructs were higher than 0.7, ranging from 0.837 to 0.910, further confirming the reliability of the measurement model.

Table 5 - 11 Reliability and construct validity research constructs

	Average Variance Extracted (AVE)	Composite Reliability (CR)	Cronbach's alpha	Composite Reliability (rho-A)
Environmental Concern	0.683	0.915	0.884	0.886
Green Adoption Behavior	0.625	0.920	0.910	0.912
Green Environmental Self-Identity	0.696	0.920	0.891	0.892
Green environmental attitude	0.715	0.909	0.867	0.869
Green Customer Value	0.674	0.912	0.879	0.878
Positive Personality	0.568	0.954	0.837	0.840

Indicator reliability (rho-A) values were also assessed, and all constructs exhibited values higher than 0.7, ranging from 0.840 to 0.912. These values indicate that the measurement items within each construct are reliable and provide consistent measurements of the latent variables. Regarding convergent validity, the average variance extracted (AVE) values were examined. The AVE values for all constructs exceeded the recommended threshold of 0.5, ranging from 0.568 to 0.715. This indicates that more than 50% of the variance in the measurement items is explained by their corresponding constructs. Therefore, the measurement model demonstrates acceptable convergent validity,

suggesting that the latent constructs are adequately measured by their respective indicators. Based on the results presented in Table 5-11, it can be concluded that the reliability of each latent research construct in the measurement model is acceptable, as evidenced by high CR, Cronbach's alpha, and rho-A values. Additionally, the measurement model demonstrates acceptable convergent validity, as indicated by the AVE values exceeding the threshold. These findings provide confidence in the reliability and validity of the measurement model used in this study.

Table 5-12 presents the results of the discriminant validity analysis for the research constructs. Two criteria, namely the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) criterion, were employed to assess the discriminant validity of the constructs.

According to the Fornell-Larcker criterion, the square root of the Average Variance Extracted (AVE) of each construct should be greater than its highest correlation with other constructs in order to establish discriminant validity. Upon reviewing the results in Table 5-12, it can be observed that the criterion has been met for all constructs. The square root of the AVE for each construct is higher than its highest correlation with other constructs, indicating that each construct is distinct and has discriminant validity. In addition to the Fornell-Larcker criterion, the study also employed the HTMT criterion proposed by Henseler et al. (2015) to assess the similarity between constructs. The HTMT values were compared against the threshold values of 0.85 for conceptually similar constructs and 0.9 for conceptually different constructs. If the HTMT value is below the threshold, it indicates that the constructs have discriminant validity.

The results obtained in this study satisfy the HTMT criterion, with all HTMT values below the respective thresholds. Therefore, it can be concluded that the discriminant validity of the research constructs is established. By

meeting both the Fornell-Larcker and HTMT criteria, this study provides robust evidence of the discriminant validity of the research constructs. These findings confirm that each construct measures a unique aspect of the underlying construct and is distinct from other constructs in the measurement model. The discriminant validity analysis enhances the credibility and robustness of the study's measurement model, ensuring that the constructs are adequately differentiated from one another.

Table 5 - 12 Discriminant validity of the research constructs based on Fornell-Larcker criterion

	Environmental Concern	Green Adoption Behavior	Green Environmental Self-Identity	Green environmental attitude	Green Customer Value	Positive Personality
Environmental Concern	**0.826**					
Green Adoption Behavior	0.640	**0.790**				
Green Environmental Self-Identity	0.657	0.667	**0.835**			
Green environmental attitude	0.626	0.642	0.789	**0.845**		
Green Customer Value	0.669	0.686	0.799	0.808	**0.821**	
Positive Personality	0.678	0.666	0.707	0.677	0.728	**0.753**

Notes: Square-root of AVEs is bold the numbers in the diagonals. Below the diagonal elements are the correlations coefficient between the research constructs.

Table 5-13 presents the HTMT values, it is noted that, except for one case with a value of 0.956, all other HTMT values were below 0.9 (ranging from 0.709 to 0.896). These findings further support the establishment of discriminant validity among the latent constructs.

Table 5 - 13 HTMT Discriminant validity of the research constructs

	Environmental Concern	Green Adoption Behavior	Green Environmental Self-Identity	Green environmental attitude	Green Customer Value
Environmental Concern					
Green Adoption Behavior	**0.714**				
Green Environmental Self-Identity	0.738	**0.742**			
Green environmental attitude	0.709	0.722	**0.896**		
Green Customer Value	0.756	0.770	0.801	**0.823**	
Positive Personality	0.956	0.719	0.768	0.743	**0.796**

Notes: The value of HTMT calculated based on Hensler (2015)

According to the guidelines provided by Henseler et al., (2015, 2021) and Hair et al., (2017), an HTMT value below 0.9 is considered acceptable for demonstrating discriminant validity. It is acknowledged that having one or two HTMT values slightly higher than 0.9 is generally acceptable in the assessment of discriminant validity. The results obtained in this study indicate a satisfactory level of discriminant validity. While one HTMT value exceeded the threshold of 0.9, it is within the acceptable range as suggested by the aforementioned

guidelines. The remaining HTMT values, which were below 0.9, further support the distinctiveness and discriminant validity of the latent constructs. Therefore, based on the HTMT analysis and the established guidelines, it can be concluded that the latent constructs in this study possess acceptable levels of discriminant validity. The findings reinforce the credibility of the measurement model and confirm that the constructs represent distinct and independent dimensions of the underlying theoretical constructs.

5.5. Evaluation of the structural model

The structural model is evaluated through empirical data. The 352-survey data were obtained from a survey using the Mturk platform. The path coefficients were used to test the research hypotheses, by adopting SmartPLS 4 using a non-parametric bootstrapping procedure (Chin, 2010) with 5000 sub-sample.

Before testing the hypotheses, Hair et al., (2016) suggested that, besides path coefficients, four criteria should also be evaluated; (1) VIF-Variance of inflation factor; (2) R^2 - Coefficient of determination; (3) f^2 - effect size; and (4) GoF - Goodness of fit. VIF is the inverse of the tolerance coefficient. If the tolerance coefficient is higher than 0.2 then VIF should be smaller than 5 (Hair et al., 2016). Hair et al., (2013) argued that R^2 values higher than 0.65, are classified as vital, 0.33 as moderate, while 0.19 as weak, and f^2 is used to measure the impact size of the influence of latent exogenous constructs on latent endogenous constructs. Cohen (1988) and Hair et al., (2016) argued that f^2 of 0.02, 0.15, and 0.35 are regarded as small, medium, and large, respectively. GoF is used to assess the overall fitness of the data on the research model. Vinzi et al., (2010) argued that a GoF of more than 0.36 is regarded as big, 0.25 is considered medium and 0.10 is considered small.

In Table 5-14, VIFs (Variance Inflation Factors) were used to assess multicollinearity among the research constructs. The results revealed that all

VIF values were below the threshold of 5 (ranging from 1.000 to 4.939). These findings indicate that there is no significant correlation or multicollinearity issue among the exogenous constructs. When VIF values are below 5, it suggests that the independent variables in the model are not highly correlated with each other, indicating the absence of multicollinearity. In this study, the VIF values falling below the specified threshold confirm the absence of multicollinearity among the research constructs. Therefore, based on the VIF analysis, it can be concluded that there is no significant multicollinearity issue among the exogenous constructs. This strengthens the reliability of the regression analysis and ensures that the effects of the individual predictors can be accurately assessed in the model.

Table 5 - 14 Collinearity statistics: Variance of inflation factor (VIF)

	Environmental Concern	Green Adoption Behavior	Green Environmental Self-Identity	Green Environmental Attitude	Green Customer Value
Environmental Concern			1.882	4.362	4.398
Green Environmental Self-Identity		3.302			
Green Environmental Attitude		3.446	2.999		1.863
Green Customer Value		3.599	3.298		
Positive Personality	1.000			4.362	4.939

Table 5-15 presents the R^2 and adjusted R^2 values for the five endogenous latent constructs: environmental concern, green environmental

attitude, green customer value, green environmental self-identity, and green adoption behavior. These measures of goodness-of-fit assess the amount of variance explained by the exogenous constructs in the model. R^2represents the proportion of variance in the dependent variable accounted for by the independent variables, while adjusted R^2 adjusts for the number of predictors in the model. The reported R^2 and adjusted R^2 values provide insights into the overall predictive power of the model for each endogenous construct.

Table 5 - 15 The Assessment of R^2

	R Square	R-Square Adjusted
Environmental Concern	0.771	0.770
Green Adoption Behavior	0.516	0.512
Green Environmental Self-Identity	0.712	0.709
Green Environmental Attitude	0.463	0.460
Green Customer Value	0.714	0.712

The results reveal that the endogenous construct of environmental concern accounted for the highest proportion of variance among the latent exogenous constructs with an R^2 value of 77.1%. This indicates that environmental concern is strongly influenced by the exogenous variables in the model. Following this, green customer value explained 71.4% of the variance, while green environmental self-identity accounted for 71.2%. Green adoption behavior had an R^2 value of 51.6%, and green environmental attitude explained 46.3% of the variance. Based on the criteria suggested by Hair et al. (2013), all R^2 values for the endogenous constructs can be classified as significant or moderate, indicating a substantial level of explanation by the exogenous constructs.

Table 5-16 presents the effect sizes of the research hypotheses, assessed using Cohen's (1988) criteria. According to these criteria, an effect size greater

than 0.02 indicates a meaningful effect on the hypothetical link. The results indicate that most of the hypothetical links in the study have effect sizes greater than 0.02, supporting their significance. Specifically, the links with effect sizes higher than 0.02 include environmental concern -> green environmental self-identity (f^2=0.05), green environmental self-identity -> green adoption behavior (f^2=0.047), green environmental attitude -> green customer value (f^2=0.629), green environmental attitude -> green environmental self-identity (f^2=0.160), green customer value -> green adoption behavior (f^2=0.072), green customer value -> green environmental self-identity (f^2=0.158), positive personality -> environmental concern (f^2=3.362), positive personality -> green environmental attitude (f^2=0.132), environmental concern -> green environmental attitude (f^2=0.008), green environmental attitude -> green adoption behavior (f^2=0.012), and positive personality -> green customer value (f^2=0.061). These links have met the suggested criteria for meaningful effect sizes. However, the hypothetical links for environmental concern -> green customer value (f2=0.002) and green environmental attitude -> green adoption behavior (f2=0.012) have effect sizes below the threshold of 0.02, indicating that the effect sizes of these hypotheses were not significant. Overall, the effect sizes of the majority of the research hypotheses align with the suggested criteria, providing evidence for the significance of the relationships among the constructs. The effect sizes highlight the strength and importance of the relationships, indicating substantial effects in the theoretical model.

The author decided to keep some f-square effect sizes lower than 0.02 in this study, although they did not reach statistical significance. This decision is driven by its theoretical relevance and its importance in previous research. Although the size of the effects may seem small, these structures are the foundation of many previous theories and are conceptually crucial for understanding the complex dynamics of the studied phenomenon. For the link

of environmental concern → green environmental attitude f^2= 0.008, however, the mean value of correlation coefficient for this link as shown in table 3-4 is 0.474. For the link of environmental concern → green customer value f^2= 0.002, however, the mean value of correlation coefficient for this link as shown in table 3-6 is 0.442. For the link of green environmental attitude → green adoption behavior f^2 = 0.012, however, the mean value of correlation coefficient for this link as shown in table 3-10 is 0.484. This situation may suggest that the effect size of this link in this study may be due to the multicollinearity among predictors. Thus further validations may be required.

Table 5 - 16 The assessment of effect size f^2

	Environmental Concern	Green Adoption Behavior	Green Environmental Self-Identity	Green Environmental Attitude	Green Customer Value
Environmental Concern			0.050	0.008	0.002
Green Adoption Behavior					
Green Environmental Self-Identity		0.047			
Green Environmental Attitude		0.012	0.160		0.629
Green Customer Value		0.072	0.158		
Positive Personality	3.362			0.132	0.061

Structural equation models were tested using Smart PLS 3.0 with a sample of 352 respondents, with a non-parametric initialization process using 5000 subsamples, the research hypotheses can be verified. Fit (GoF) refers to the degree to which the structural model fits the observed data.

GoF= $\sqrt{avarage(R\ square) \times average(AVE)}$

Where R^2 = coefficient of determination

AVE = Average variance extracted

Vinzi et al., (2010) suggested that GoF > 0.36 as big, GoF= 0.25 as medium, and 0.1 as small.

GoF= $\sqrt{0.635 \times 0.660}$ = 0.647

The GoF of this research model is 0.647; it is considered as big. The result suggest that the model provided a good representation of the underlying relationship, research model structure is consistent with high predictive power.

5.5.1. Direct effect

Regarding the relationship between positive personality traits and environmental concerns, the influential path coefficient (β=0.878, t=67.358, p<0.001) demonstrates a significant and positive association. This finding supports H1, indicating that positive personality traits play a crucial role in influencing individuals' environmental concerns. The high path coefficient suggests that individuals with more positive personality traits are likely to exhibit greater environmental concerns. This result aligns with previous studies, which have consistently found a positive association between personality traits and environmental concerns. Similarly, for the relationship between positive personality traits and green environmental attitude, the influential path coefficient (β=0.556, t=6.872, p<0.001) is significant. Therefore, H2 is supported. This result suggests that positive personality traits significantly influence individuals' green environmental attitudes. Individuals with more positive personality traits are more likely to exhibit favorable attitudes towards green environmental practices. This finding is consisted with previous research for the role of personality traits in shaping individuals'

environmental attitudes. These findings suggest that positive personality traits have a notable impact on both environmental concerns and green environmental attitudes. By confirming these relationships, this study contributes to existing literature and reinforces importance of considering personality traits in understanding individuals' environmental concerns and attitudes. The results support the notion that individuals with more positive personality traits are more likely to exhibit higher levels of environmental concerns and more favorable attitudes towards green environmental practices.

In Table 5-17, the path coefficients, statistics, and p-values are provided for several research hypotheses, allowing us to assess the significance of the relationships between positive personality traits, environmental concerns, green customer value, green environmental attitude, and green environmental self-identity. Regarding the relationship between positive personality traits and green customer value, the influential path coefficient (β=0.293, t=4.237, $p<0.001$) is significant, supporting H3. This finding suggests that positive personality traits play a significant role in influencing individuals' perceptions of green customer value. Individuals with more positive personality traits are more likely to place greater value on environmentally friendly products or services. This result aligns with previous research highlighting the influence of personality traits on consumer behavior, including green customer value. However, the relationship between environmental concern and green environmental attitude, as indicated by the path coefficient (β=0.138, t=1.661, p=0.098), was not statistically significant. Although not meeting the conventional threshold for significance ($p<0.05$), it is noted that the p-value was marginally significant. This suggests that there may be a weak or limited association between environmental concern and green environmental attitudes in the context of this study. The findings imply that environmental concern may not be a strong predictor of individuals' attitudes towards green environmental

practices in this particular sample. On the other hand, for the relationship between environmental concern and green environmental self-identity, the influential path coefficient (β=0.165, t=3.959, p<0.001) is significant, supporting H5. This result suggests that environmental concern plays a substantial role in shaping individuals' identification with a green environmental self-identity. Individuals with higher levels of environmental concern are more likely to perceive themselves as environmentally conscious and align their self-identity with green values and behaviors. This finding is consistent with previous research highlighting the influence of environmental concern on self-identity related to environmental issues. In summary, the results indicate that positive personality traits significantly influence green customer value, supporting H3. However, the relationship between environmental concern and green environmental attitude (H4) was marginally significant, suggesting a weaker association. On the other hand, the relationship between environmental concern and green environmental self-identity (H5) was significant, indicating a meaningful influence. These findings provide insights into the interplay between personality traits, environmental concerns, and individuals' attitudes and self-identities related to green environmental practices.

The relationship between environmental concern and green customer value, indicated by the path coefficient (β=0.049, t=0.837, p=0.403), was not found to be statistically significant. Consequently, H6, which posits that environmental concern has a direct effect on green customer value, was not supported. This suggests that environmental concern may not have a significant direct impact on individuals' perceptions of green customer value in this study. On the other hand, the relationship between green environmental attitude and green customer value, as evidenced by the path coefficient (β=0.579, t=11.015, p<0.001), was found to be significant, supporting H7. This finding suggests

that individuals' positive attitudes towards green environmental practices play an important role in influencing their perceptions of green customer value. Individuals with a more favorable attitude towards environmental issues are more likely to place higher value on environmentally friendly products or services. Furthermore, the relationship between green environmental attitude and green environmental self-identity, as indicated by the path coefficient (β=0.372, t=6.788, p<0.001), was also found to be significant, supporting H8. This result suggests that individuals' green environmental attitudes contribute to the development of their green environmental self-identity. Individuals with a more positive attitude towards green practices are more likely to identify themselves as environmentally conscious and engage in environmentally friendly behaviors. These findings highlight the importance of green environmental attitudes in shaping individuals' perceptions of green customer value and their identification with a green environmental self-identity. However, it suggests that environmental concern does not directly influence green customer value in this study. Understanding these relationships contributes to the broader understanding of consumers' attitudes, values, and behaviors towards environmental issues and sustainable practices.

The relationship between green customer value and green environmental self-identity was also examined. The path coefficient (β=0.388, t=6.827, p<0.001) between these constructs was found to be significant, supporting H9. This result suggests that individuals' perception of green customer value influences their development of green environmental self-identity. When individuals perceive value in environmentally friendly products or services, they are more likely to identify themselves as environmentally conscious and engage in environmentally friendly behaviors.

Table 5 - 17 Direct effect (hypothesis testing)

H	Path	Path Coefficient (β)	t values	p values
H1	Positive Personality -> Environmental Concern	0.878	67.358	0.000***
H2	Positive Personality -> Green environmental attitude	0.556	6.872	0.000***
H3	Positive Personality -> Green Customer Value	0.293	4.237	0.000***
H4	Environmental Concern -> Green environmental attitude	0.138	1.661	0.098
H5	Environmental Concern -> Green Environmental Self-Identity	0.165	3.959	0.000***
H6	Environmental Concern -> Green Customer Value	0.049	0.837	0.403
H7	Green environmental attitude -> Green Customer Value	0.579	11.015	0.000***
H8	Green environmental attitude -> Green Environmental Self-Identity	0.372	6.788	0.000***
H9	Green Customer Value -> Green Environmental Self-Identity	0.388	6.827	0.000***
H10	Green environmental attitude -> Green Adoption Behavior	0.139	1.958	0.050
H11	Green Environmental Self-Identity -> Green Adoption Behavior	0.274	3.419	0.001**
H12	Green Customer Value -> Green Adoption Behavior	0.355	3.571	0.000***
H_{13a}	(Green environmental attitude x Perceived social responsibility) -> Green adoption behavior	0.142	2.704	0.010**
H_{13b}	(Green environmental self-identity x Perceived social responsibility) -> Green adoption behavior	0.133	2.541	0.012*
H_{13c}	(Green customer value x Perceived social responsibility) -> Green adoption behavior	0.074	1.174	0.319
H_{14a}	(Green environmental attitude x Perceived psychological benefits) -> Green adoption behavior	0.091	1.181	0.317

H_{14b}	(Green environmental self-identity x Perceived psychological benefits) -> Green adoption behavior	0.149	3.054	0.000***
H_{14c}	(Green customer value x Perceived psychological benefits) -> Green adoption behavior	0.015	1.978	0.048*

On the other hand, the relationship between green environmental attitude and green adoption behavior, indicated by the path coefficient (β=0.139, t=1.958, p=0.050), was not found to be statistically significant. Thus, H10, which proposes a direct effect of green environmental attitude on green adoption behavior, was not supported. This suggests that green environmental attitude may not play a significant role in directly influencing individuals' actual adoption of green behaviors in this study. These findings highlight the importance of green customer value in shaping individuals' green environmental self-identity. However, they suggest that green environmental attitude may not have a direct impact on individuals' green adoption behavior. It is possible that other factors, such as personal values, social norms, or external constraints, may mediate the relationship between green environmental attitude and actual behavior adoption. Understanding these relationships provides insights into the complex dynamics between individuals' perceptions, attitudes, and behaviors related to environmental issues. It emphasizes the role of perceived customer value in fostering a sense of green environmental self-identity and highlights the need for further investigation into the factors influencing actual adoption of green behaviors.

The path coefficient (β=0.274, t=3.419, p<0.001) between these constructs was found to be significant, supporting H11. This result suggests that individuals' identification with a green environmental self-identity positively influences their engagement in green adoption behavior. When individuals strongly identify themselves as environmentally conscious, they are more likely to adopt and engage in green behaviors. Similarly, the relationship between

green customer value and green adoption behavior was examined, and the path coefficient (β=0.355, t=3.571, p<0.001) was found to be significant, supporting H12. This result indicates that individuals' perception of green customer value positively influences their actual adoption of green behaviors. When individuals perceive value in environmentally friendly products or services, they are more motivated to engage in green adoption behavior. These findings highlight the importance of both green environmental self-identity and green customer value in influencing individuals' actual adoption of green behaviors. It suggests that individuals who strongly identify with being environmentally conscious and perceive value in eco-friendly products are more likely to adopt sustainable behaviors. These results are consistent with previous research emphasizing the role of self-identity and perceived customer value in driving pro-environmental behavior. Understanding these relationships provides valuable insights for promoting and encouraging green adoption behavior. By focusing on enhancing individuals' green environmental self-identity and promoting the perceived customer value of sustainable products, organizations and policymakers can effectively encourage the adoption of green behaviors and contribute to sustainability goals.

For the moderating roles of perceived social responsibility, Table 5-17 showed that the influence of the interaction term between green environmental attitude and perceived social responsibility on green adoption was significant (β=0.142, t=2.704, p=0.01). These results suggested that perceived social responsibility could accelerate the magnitude of the influence of green environmental attitude on green adoption behavior. The moderating effect of perceived social responsibility can play a significant role in influencing the relationship between environmental attitude and green adoption behavior. Perceived social responsibility refers to an individual's belief about the ethical obligations and responsibilities towards society and the environment. When

examining the influence of environmental attitude on green adoption behavior, the presence of perceived social responsibility as a moderator can amplify or diminish the strength of this relationship. Individuals with high levels of perceived social responsibility are more likely to internalize environmental attitudes and transform them into pro-environmental behaviors. Their strong sense of social responsibility may enhance the impact of positive environmental attitudes on green adoption behavior, leading to a higher propensity to adopt environmentally friendly practices, products, or technologies. Perceived social responsibility may not be significantly influenced by their environmental attitudes when it comes to actual behavioral change. Their perceived lack of responsibility towards society and the environment may weaken the link between environmental attitudes and green adoption behavior. Acknowledging this moderating effect is crucial for understanding the complex dynamics involved in promoting sustainable behavior change and designing targeted interventions that consider individuals' varying levels of perceived social responsibility. In addition, the influence of the interaction term between green environmental self-identity and perceived social responsibility on green adoption is also significant (β=0.133, t=2.541, p=0.012). These results suggested that perceived social responsibility could accelerate the magnitude of the influence of green environmental self-identity on green adoption behavior. The moderating effect of perceived social responsibility plays a significant role in shaping the influence of green environmental self-identity on green adoption behavior. Green adoption behavior, on the other hand, encompasses actions taken by individuals to adopt environmentally friendly practices or products. Perceived social responsibility refers to the perception that individuals have about the social expectations and obligations associated with environmental issues. The moderating effect occurs because perceived social responsibility acts as a catalyst that strengthens the relationship between

green environmental self-identity and green adoption behavior. Individuals who believe that society expects them to be environmentally responsible are more likely to translate their self-identity into concrete actions. This could include behaviors such as purchasing eco-friendly products, conserving energy and water, recycling, or supporting environmental causes. The moderating effect of perceived social responsibility highlights the crucial role of social factors in driving the influence of green environmental self-identity on green adoption behavior. Understanding this interaction can help policymakers, marketers, and environmental advocates develop effective strategies to promote sustainable behaviors by emphasizing societal expectations and cultivating a sense of responsibility towards the environment. However, the influence of the interaction term between green customer value and perceived social responsibility on green adoption is not significant (β=0.074, t=1.174, p=0.319). These results suggested that perceived social responsibility could not accelerate the magnitude of the influence of green environmental attitude on green adoption behavior. The moderating effect of perceived social responsibility has significant implications for the influence of green customer value on green adoption behavior. Green customer value refers to the perceived benefits and advantages that individuals associate with environmentally friendly products or services. Green adoption behavior involves the adoption and usage of these environmentally friendly offerings. Perceived social responsibility acts as a moderator, shaping the relationship between green customer value and green adoption behavior. When individuals perceive a strong social responsibility towards the environment, the influence of green customer value on green adoption behavior is amplified. The moderating effect occurs because perceived social responsibility serves as a motivator that strengthens the connection between green customer value and green adoption behavior. Individuals who believe that society expects them to be

environmentally responsible are more inclined to translate their appreciation for the benefits of eco-friendly offerings into actual adoption and usage. This can include behaviors such as purchasing environmentally friendly products, using public transportation, or supporting sustainable brands. Conversely, when individuals perceive a weak social responsibility towards the environment, the impact of green customer value on green adoption behavior diminishes. They may be less motivated to adopt environmentally friendly options, as they perceive fewer societal expectations or obligations to do so. The moderating effect of perceived social responsibility underscores the role of social factors in shaping the influence of green customer value on green adoption behavior. Understanding this interaction can assist marketers, policymakers, and environmental advocates in developing strategies that emphasize societal responsibility and highlight the environmental benefits of products or services, thus encouraging individuals to adopt more sustainable behaviors.

For the moderating roles of perceived psychological benefits, Table 5-17 showed that the influence of the interaction term between green environmental attitude and perceived psychological benefits on green adoption is not significant (β=0.091, t=1.181, p=0.317). These results suggested that perceived social responsibility could not accelerate the magnitude of the influence of green environmental attitude on green adoption behavior. The moderating effect of perceived psychological benefits has important implications for the influence of green environmental attitude on green adoption behavior. Green environmental attitude refers to an individual's beliefs, values, and concerns regarding the environment and sustainability. Green adoption behavior entails the adoption and engagement in environmentally friendly practices or behaviors. Perceived psychological benefits act as a moderator in the relationship between green environmental attitude and green adoption behavior. When individuals perceive significant psychological benefits associated with

engaging in green behaviors, the influence of their environmental attitude on their adoption behavior is strengthened. In other words, individuals who have a positive attitude towards the environment are more likely to engage in green adoption behaviors when they perceive personal benefits, such as enhanced well-being, self-esteem, or a sense of fulfilment. The moderating effect occurs because perceived psychological benefits serve as motivational factors that amplify the link between green environmental attitude and green adoption behavior. When individuals perceive that going green can positively impact their psychological well-being, they are more inclined to align their behaviors with their environmental values. This may include behaviors such as recycling, reducing energy consumption, or using sustainable transportation options. Conversely, when individuals perceive limited psychological benefits associated with green adoption behavior, the influence of their environmental attitude on their adoption behavior is weakened. They may be less motivated to engage in green behaviors if they do not perceive significant personal benefits from doing so. The moderating effect of perceived psychological benefits highlights the importance of understanding the personal advantages and motivations individuals associate with green adoption behavior. By emphasizing the psychological benefits of going green, policymakers, marketers, and environmental advocates can encourage individuals with positive environmental attitudes to translate their beliefs into concrete actions, fostering a greater adoption of environmentally friendly practices and behaviors. On the other hand, table 5-17 showed that the influence of the interaction term between green environmental self-identity and perceived psychological benefits on green adoption is significant (β=0.149, t=3.054, $p<0.001$). These results suggested that perceived psychological benefits could accelerate the magnitude of the influence of green environmental self-identity on green adoption behavior. The moderating effect of perceived psychological

benefits has implications for the influence of green environmental self-identity on green adoption behavior. Green environmental self-identity refers to individuals' perception of themselves as environmentally conscious and their identification with pro-environmental values. Green adoption behavior involves engaging in environmentally friendly practices or adopting eco-friendly products. Perceived psychological benefits act as a moderator, shaping the relationship between green environmental self-identity and green adoption behavior. When individuals perceive significant psychological benefits associated with green adoption behavior, the influence of their self-identity on their adoption behavior is strengthened. In other words, individuals who strongly identify as environmentally friendly are more likely to engage in green adoption behaviors when they perceive personal benefits, such as improved well-being, self-satisfaction, or a sense of purpose. The moderating effect occurs because perceived psychological benefits serve as motivational factors that amplify the connection between green environmental self-identity and green adoption behavior. When individuals perceive that their green actions lead to positive psychological outcomes, they are more inclined to align their behaviors with their self-identity. This may include behaviors like buying sustainable products, practicing waste reduction, or supporting environmental initiatives. Conversely, when individuals perceive limited psychological benefits associated with green adoption behavior, the influence of their self-identity on their adoption behavior is weakened. They may be less motivated to engage in green behaviors if they do not perceive substantial personal benefits. The moderating effect of perceived psychological benefits underscores the role of personal motivations in driving the relationship between green environmental self-identity and green adoption behavior. By emphasizing the psychological benefits of engaging in environmentally friendly actions, policymakers and marketers can encourage individuals with a

strong self-identity as environmentally conscious to translate their identity into tangible behaviors, promoting a wider adoption of sustainable practices and products. Furthermore, the influence of the interaction term between green customer value and perceived psychological benefits on green adoption is also significant (β=0.015, t=1.978, p=0.048). These results suggested that perceived psychological benefits could accelerate the magnitude of the influence of green customer value on green adoption behavior. The moderating effect of perceived psychological benefits has significant implications for the influence of green customer value on green adoption behavior. Green customer value refers to the perceived benefits and advantages individuals associate with environmentally friendly products or services. Green adoption behavior involves the adoption and usage of these eco-friendly offerings. Perceived psychological benefits act as a moderator, shaping the relationship between green customer value and green adoption behavior. When individuals perceive substantial psychological benefits associated with engaging in green behaviors, the influence of green customer value on green adoption behavior is amplified. In other words, individuals who perceive greater value in environmentally friendly products or services are more likely to engage in green adoption behaviors when they anticipate or experience positive psychological outcomes. The moderating effect occurs because perceived psychological benefits serve as motivators that strengthen the connection between green customer value and green adoption behavior. When individuals believe that adopting eco-friendly options will lead to personal benefits such as improved well-being, self-satisfaction, or a sense of purpose, they are more inclined to align their behaviors with their perceived value of these offerings. Conversely, when individuals perceive limited psychological benefits associated with green adoption behavior, the influence of green customer value on green adoption behavior diminishes. They may be less motivated to engage in green behaviors if they do not anticipate significant

personal benefits. The moderating effect of perceived psychological benefits emphasizes the importance of understanding the personal advantages and motivations individuals associate with green adoption behavior. By emphasizing and promoting the psychological benefits of going green, policymakers, marketers, and environmental advocates can enhance the perceived value of environmentally friendly products or services, thus encouraging individuals to adopt and use them more readily in their daily lives. A summary of study result for each hypothesis is shown in figure 5.1.

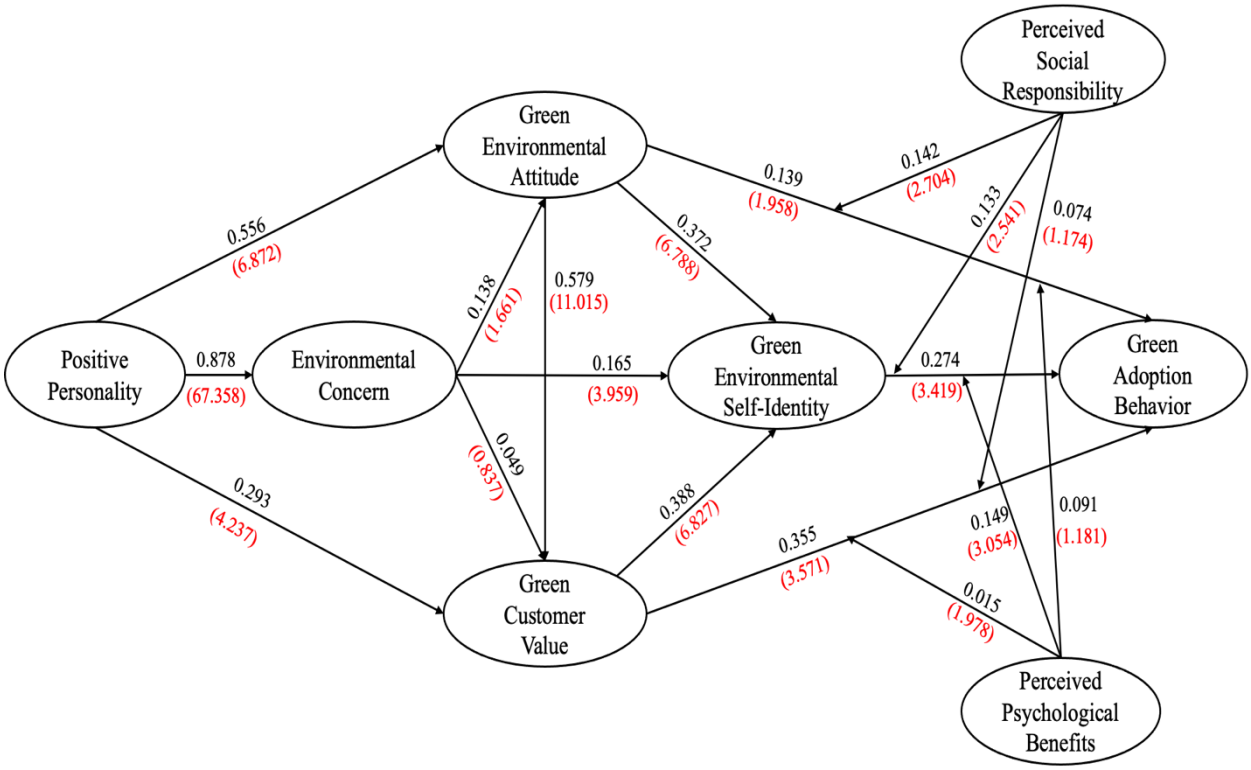

Figure 5 - 1 The results of hypotheses testing

CHAPTER SIX
CONCLUSIONS AND SUGGESTIONS

This chapter provide the results of the study, academic and managerial implications, limitations, and recommendations for future research directions.

6.1 Research conclusions

This study was developed based on the Big Five traits theory, Mowen's 3M Model (Meta-theoretic Model of Motivation), Theory of Planned Behaviors, ABC theory, VBN Theory, Self-identity Theory, Signaling Theory, etc. The objectives were to evaluate the impact of personality traits on environmental concerns, and the impact of these two constructs on three mediating constructs, including customers' green environmental attitude, green environmental self-identity, and green customer values. Secondarily, the influence of these three mediating constructs on customers' green adoption behaviors was investigated. Thirdly, the moderating roles of perceived social responsibility and perceived psychological benefits on the influence of the above three mediators on green adoption behaviors were also investigated.

In addition to the traditional literature review, this study employed co-citation and co-occurance analysis to identify the main themes related to the topic of this study. This study further employed meta-analysis to integrate and develop 14 research hypotheses. This study also collected 352 data through a survey using the MTurk platform of Amazon. The survey data was analyzed using SPSS22 and SmartPLS 3. The study results were presented in Table 6-1.

Several conclusions could be drawn from the results of this study. First, personality traits have a significant influence on green environmental concern, green environmental attitude, green customer value, and green environmental concern have further effects on green environmental attitude, green environmental self-identity, and green customer value. In particular, as consumers have become more and more aware of the direct and indirect impact

of global weather change and global environmental deterioration, Mowen's 3M hierarchical model can explain the general influence of personality traits on antecedents, mediators and green adoption behavior (Mowen & Sujan, 2005).

Table 6 - 1 A summary results of research hypotheses

H	Relationship	Assessment
H_1	Positive personality -> Environmental concern	Supported β=0.878, t=67.358, p<0.001***
H_2	Positive personality -> Green Environmental attitude	Supported β=0.556, t=6.872, p<0.0001***
H_3	Positive personality -> Green customer value	Supported β=0.293, t=4.237, p<0.001***
H_4	Environmental concern -> Green Environmental attitude	Not Supported β=0.138, t=1.661, p=0.098
H_5	Environmental concern -> Green Environmental Self-Identity	Supported β=0.165, t=3.959, p<0.001***
H_6	Environmental concern -> Green customer value	Not Supported β=0.049, t=0.837, p=0.403
H_7	Green Environmental attitude -> Green customer value	Supported β=0.579, t=11.015, p<0.001***
H_8	Green Environmental attitude -> Green Environmental Self-Identity	Supported β=0.372, t=6.788,p<0.001***
H_9	Green customer value -> Green Environmental Self-Identity	Supported β=0.388, t=6.827, p<0.001***
H_{10}	Green Environmental attitude -> Green Adoption Behavior	Not Supported β=0.139, t=1.958, p=0.050
H_{11}	Green Environmental Self-Identity -> Green Adoption Behavior	Supported β=0.274, t=3.419, p=0.001**
H_{12}	Green customer value -> Green Adoption Behavior	Supported β=0.355, t=3.571, p<0.001***

H	Relationship	Assessment
H_{13a}	(Green environmental attitude x Perceived social responsibility) -> Green adoption behavior	Supported β=0.142, t=2.704, p=0.010**
H_{13b}	(Green environmental self-identity x Perceived social responsibility) -> Green adoption behavior	Supported β=0.133, t=2.541, p=0.012**
H_{13c}	(Green customer value x Perceived social responsibility) -> Green adoption behavior	Not Supported β=0.074, t=1.174, p=0.319
H_{14a}	(Green environmental attitude x Perceived psychological benefits) -> Green adoption behavior	Not Supported β=0.091, t=1.181, p=0.317
H_{14b}	(Green environmental self-identity x Perceived psychological benefits) -> Green adoption behavior	Supported β=0.149, t=3.054, p<0.001***
H_{14c}	(Green customer value x Perceived psychological benefits) -> Green adoption behavior	Supported β=0.015, t=1.978, p=0.048*

This study co-aligns with Mowen's 3M Model and confirmed that personality traits (Big five factors) should interact with situations (environmental concern) to influence feeling (green environmental attitude), thoughts (green environmental self-identity and green customer value), and behavior (green adoption behavior). Thus, it was suggested that personality traits (including introversion, conscientiousness, emotional stability, openness to experience, and agreeableness) have a significant influence on environmental concern and may serve as a significant motivational driver to promote attitude, self-identity, and values.

Second, the study findings revealed that environmental concern played a crucial mediating role in facilitating the influence of personality traits on

green environmental attitude, perceived environmental self-identity, and green customer value. According to signaling theory, when consumers receive signals or information about environmental concerns, it can significantly impact their perceived attitudes, values, and behavioral intentions towards green purchasing (Chan, He & Wang, 2012; Davari & Strutton, 2014; Liao, Wu & Pham, 2020). The information serves as a signal that raises consumers' awareness of environmental issues and prompts them to align their attitudes and behaviors with green ideals. Similarly, based on the ABC Theory, consumers' environmental concerns act as an independent construct that facilitates their perceived green environmental attitude, green environmental self-identity, and green customer value (Das & Dash, 2012; Mishra & Sharma, 2014). The more individuals are concerned about environmental changes, the greater their inclination to seek knowledge about green products and develop positive attitudes and values towards them. These factors, when integrated, strengthen consumers' intention to purchase green products (Nguyen et al., 2017). In line with Arli et al. (2018), individuals who exhibit a higher level of environmental concern are more likely to engage in proactive behaviors, such as acquiring knowledge about green products and developing positive attitudes and values towards them. These factors collectively contribute to a reinforced intention to purchase green products. By highlighting the mediating role of environmental concern, the study emphasizes the importance of addressing and promoting environmental awareness among consumers. Fostering environmental concern can enhance consumers' green environmental attitude, perceived environmental self-identity, and green customer value, consequently influencing their intention to purchase and support green products. Overall, the findings underscore the significance of environmental concern as a mediator in the relationship between personality traits and consumers' attitudes, values, and intentions towards green products. This understanding has implications for

marketers and policymakers who seek to promote sustainable consumption and encourage the adoption of environmentally friendly practices.

Third, the study findings provided confirmation that consumers' green environmental self-identity plays a crucial role in their green purchasing behavior. The empirical results demonstrated that the environmental attitudes and green customer values of green consumers significantly influenced their level of environmental norms and self-identity. The VBN Theory suggests that consumers' values, beliefs, norms, and behaviors form a causal chain (Ghazali et al., 2017). In this context, environmental concern serves as consumers' belief system for social responsibility, which in turn promotes personal norms and environmentally friendly behavior, including green purchasing (Yu, Yu, & Chao, 2017). Therefore, individuals who possess a strong environmental concern are more likely to develop positive environmental attitudes, which, in turn, heighten their awareness of the value associated with using green products (Malhotra & Maheshwari, 2017) and foster their environmental self-identity (Whitmarsh & O'Neill, 2010; Dean, Raats, & Shepherd, 2011; Rise, Sheeran, & Hakkelberg, 2010). The VBN Theory suggests that individuals' beliefs about the importance of the environment and their corresponding environmental attitudes shape their norms and values, ultimately influencing their behavior. In the context of green purchasing, this implies that consumers who have a strong sense of environmental concern, positive environmental attitudes, and a deep-rooted belief in the importance of environmental protection are more likely to align their purchasing decisions with green products. These findings highlight the significance of fostering consumers' environmental concern and promoting positive environmental attitudes and values. Marketers and policymakers can leverage these insights to develop strategies that emphasize the environmental benefits and values associated with green products, thereby encouraging consumers to adopt green purchasing behaviors.

Furthermore, two moderators, namely perceived social responsibility and perceived green psychological benefits, were examined to explore their enhancing effects on the impact of green environmental attitude, green environmental self-identity, and green customer value on consumers' green adoption behavior. The results revealed that a higher level of perceived social responsibility significantly amplified the influences of green environmental attitude and green environmental self-identity on green adoption behavior. These findings align with the arguments made by Yu, Yu, and Chao (2017) and Milfont and Duckitt (2010), suggesting that consumers' perception of social responsibility arises from their concerns regarding global environmental changes when evaluating green purchases. Thus, individuals with a strong sense of social responsibility are more likely to strengthen their green environmental attitude and green environmental self-identity, ultimately leading to increased engagement in green adoption behavior. However, the enhancing effect of perceived social responsibility on the influence of green customer values on green adoption was not supported and requires further validation.

Finally, the study results revealed that consumers' perception of green psychological benefits had a significant moderating effect on the influence of green environmental self-identity and green customer value on green adoption behavior. These findings were consistent with previous studies conducted by Hartmann and Apaolaza-Ibanez (2012), Vlachos et al. (2019), and others. These studies emphasized the importance of psychological benefits such as self-expression, positive emotional states (warm glow), and a connection with nature in driving customers' green adoption behavior, pro-environmental actions, nature conservation behaviors, and altruistic tendencies. Therefore, it can be concluded that consumers' perception of psychological benefits plays a role in promoting their green environmental self-identity and green customer

value, ultimately strengthening their engagement in green adoption behavior. However, the accelerating effect of perceived psychological benefits on the influence of green environmental attitude on green adoption behavior was not supported in this study, suggesting the need for further investigation in this area.

6.2. Academic implications

There are several academic implications if this study. Firstly, the results highlight the shift in societal environmental concerns and green adoption towards a hierarchical model, driven by resource depletion and environmental degradation. This phenomenon can be understood through the application of Mowen's 3M Model. This framework provides valuable insights into the motivations and personality traits that underlie individuals' environmental concerns. By employing this model, the study contributes to the understanding of how environmental concerns evolve within society and the factors that shape individuals' green adoption behaviors. Mowen (2000) and Mowen and Sujan (2005) proposed this 3M Model through the hierarchy of (i) elemental traits (such as Big-Five traits) (ii) compound traits (such as environmental concerns) (iii) situational traits (such as attitude, value, self-identity, ethic, etc.,), and (iv) surface traits (such as disposition or green behavior intention). This study has successfully used the concept of the 3M Model and empirically confirmed the viability of the 3M Model. Aside from other theories, the 3M Model emphasized that the surface trait was at the top of the hierarchy and must be fully supported by the elemental traits, compound traits, and situational traits. And these different traits should be integrated and supported together like a hierarchy to reinforce the green adoption behaviors. Although the 3M model has rarely been adopted in the context of green purchase behavior. This model could provide a significant contribution to understanding the complex

phenomenon of green environmental concerns, green customer value, and green adoption behavior.

Second, this study adopted ABC Theory and signaling Theory to explain consumers, green adoption behavior, ABC (Attitude Behavior context) Theory assumed that consumers act consistently with their expectations from a specific action. (Feldmann & Hamm, 2015; Guagnano, Stern, & Dietz, 1995). In the context of green environment, attitude, and green adoption, the application of ABC theory is still limited. This study further integrated Signaling Theory (Connelly, Gerto, Ireland & Ruetzel, 2011) into ABC Theory and argued that when the signal from the senders is strong enough, the application of ABC Theory could be smoother.

Third, this study contributes to the literature by integrating the VBN Theory and Consumption Value Theory to elucidate the influence of beliefs and values on green environmental self-identity and green adoption behavior. Both theoretical perspectives emphasize the significance of individuals' beliefs and values pertaining to environmental degradation and the subsequent development of norms and self-identity in addressing environmental challenges. By incorporating these theories, the study sheds light on the mechanisms through which individuals' environmental beliefs and values shape their identification with pro-environmental behaviors and their subsequent adoption of green practices.

Fourth, social responsibility one of the most influential factors in consumers' green adoption (Milfont & Duckitt, 2010). This study used individual’ perceived social responsibility as the moderator. The study argued that a higher level of perceived social responsibility will influence consumers' environmental concern, value system subject norms, and self-identity toward the environment, which further, strengthened the level of green adoption behavior. However, this study focused on social responsibility, the other

dimensions such as social contribution, environmental ethics, moral obligation, etc., was not included in this study and may be subject to further validation.

Finally perceived psychological benefits were also recognized as a key factor for promoting consumers' green adoption behavior. This study utilized the Symbolic and Conspicuous Consumption Model to elucidate the impact of psychological benefits, specifically self-expressive benefits, warm glow, and nature experience. By adopting this model, the study aimed to understand how these psychological benefits influence consumers' behavior and decision-making in the context of green consumption. The model provided a theoretical framework to explore the role of self-expression, emotional satisfaction, and connection with nature in shaping consumers' attitudes and intentions towards adopting green practices. However, a more in-depth discussion about the components of psychological benefit was not included in the study and may be subject to further validation.

This study used Mowen's 3M models to explore the influence of personality traits on environment concerns; green environmental attitude and green customer values. This study used ABC Theory to explain the influence of environmental concerns on attitude, value and identity. This study further adopted VBN Theory to explain the effect of perceived value on green self-identity and green adoption behavior. This study suggested that the combination of these theories could be very useful and beneficial for the development of the research model.

6.3. Managerial implications

The results of this study have important implications for managers and professionals in understanding and influencing consumers' green adoption behavior. First, one key finding is the significant role of personal traits in shaping environmental concern, attitudes, values, self-identity, and green adoption behavior. This aspect has been relatively understudied in previous

research. Therefore, this study offer valuable insights for professionals to gain a better understanding of factors that drive consumers' intention to purchase green products. Moreover, it highlights the potential for implementing tailored green marketing strategies that take into account consumers' unique elemental traits, compound traits, situational traits, and surface traits. By recognizing the influence of personality traits on green adoption behavior, managers can develop targeted approaches to encourage and promote environmentally friendly choices among specific consumer segments.

Second, another managerial implication of this study is related to the characteristics of environmentally friendly individuals. Drawing from the work of Milfont and Sibley (2013), it is evident that individuals who prioritize environmental concerns also tend to demonstrate a heightened sense of care for others and a desire to contribute to the well-being of society. Therefore, it is crucial for green marketers to actively promote awareness of environmental issues among consumers. Additionally, it is imperative for companies to uphold ethical conduct and avoid practices that could lead to accusations of pollution, dishonesty, or other negative consequences such as public backlash or boycotts. By aligning their actions with environmentally responsible practices, companies can enhance their reputation and appeal to environmentally conscious consumers.

Third, based on VBN Theory, it is very important for marketers or managers to consider the issues of consumer beliefs, attitude, norms, and self-identity. The findings highlight the pivotal role of beliefs, such as environmental concerns and perceived social responsibility, in shaping consumers' personal norms, attitudes, values, and commitment to environmental preservation (Ghazali, Soon & Mutum, 2017). Marketers and managers should prioritize efforts to influence consumer beliefs regarding environmental concerns and consider them as a crucial factor when designing

effective marketing strategies that align with the preferences of environmentally conscious customers. By focusing on changing consumer beliefs and fostering a sense of environmental responsibility, companies can better cater to the needs and values of environmentally aware individuals.

Fourth, considering the mediating roles of green environmental attitude, green environmental self-identity, and green customer value in influencing consumers' green adoption behavior, marketers and managers should actively promote and endorse these mediators through the implementation of targeted green marketing initiatives. By emphasizing the importance of environmental concerns and fostering positive attitudes, a sense of environmental self-identity, and customer values aligned with green principles, companies can encourage and facilitate consumers' adoption of environmentally friendly behaviors. This could involve various strategies, such as highlighting the environmental benefits of products or services, promoting eco-friendly brand values, and engaging in sustainability campaigns to reinforce consumers' commitment to green adoption.

Fifth, as more and more people are focusing on environmental issues, sustainability issues have become increasingly important. Thus, green marketing activities with innovative green products should be more critical to promote green adoption behavior. Marketers or managers should exert more efforts to promote consumers' perceived social responsibility, which could further facilitate their green adoption behavior (Eckhardt, Beck & Devinney, 2010).

Sixth, in addition to perceived social responsibility, consumers' perception of psychological benefits emerges as another crucial factor in accelerating green adoption behavior. Previous studies have demonstrated that consumers are willing to purchase green products or services that provide them with self-expressive benefits and a sense of self-satisfaction (Oskamp et al.,

1991). Individuals driven by empathy experience a warm glow when helping others, which further enhances their pro-environmental behavior (Vander Linden, 2018). Moreover, consumers with a heightened sense of nature experience exhibit greater awareness of nature preservation (Hwang & Choi, 2017). Therefore, marketers and managers should recognize the significance of promoting psychological benefits, such as self-expression, warm glow, and nature experience, to encourage consumers' engagement in green adoption behavior. Earlier research has also suggested that self-expressive benefits, warm glow, and nature experiences, as components of perceived psychological benefits, can act as moderators to enhance the impact of consumer attitude, value, and self-identity on green adoption behavior (Hartmann et al., 2017). It is crucial for marketers and managers to implement various marketing activities that offer psychological benefits to foster consumers' engagement in green adoption behavior. By providing opportunities for self-expression, evoking positive emotions, and facilitating nature experiences, marketers can effectively promote consumers' willingness to adopt environmentally friendly practices.

Finally, the research model proposed in this study offers valuable insights for practitioners in understanding the diverse perceptions of individuals with varying personality traits regarding environmental concerns and perceived social responsibility. It also highlights the role of mediators such as attitude, value, and self-identity in promoting green adoption behavior. This model provides practical implications for practitioners, enabling them to tailor their strategies and interventions based on individuals' unique characteristics and effectively leverage the mediators to encourage sustainable and environmentally friendly behaviors. Marketers or managers should try to design effective marketing strategies to promote their consumers, with a sense of environmental concern and social responsibility to improve the global

environment which can further promote green adoption behavior through the changes in consumers, attitude value, and self-identity. The research model and the study results could also carry important implications for policymakers who could design public policies and make necessary communication about environmental issues and also try to change consumers' concepts toward the environmental issue, and toward green adoption behavior.

6.4. Limitation and future research directions.

This study collected 352 respondents through the Mturk of Amazon Survey Platform. While Amazon Mechanical Turk (MTurk) has gained popularity as a platform for data collection in various research fields, it is important to consider its limitations. MTurk consists of a diverse pool of participants, but it may not always represent the broader population. The majority of MTurk workers are from the United States and have specific demographics, such as younger, more educated individuals with lower incomes. This limited diversity may affect the generalizability of research findings and restrict their applicability to other populations. MTurk participants choose which studies to participate in based on the available incentives and their own interests. This self-selection introduces a potential bias, as individuals who are more motivated or have specific characteristics may be more likely to participate. This bias can limit the generalizability of findings, particularly when studying behaviors or attitudes that differ from the general population. While MTurk provides tools for quality control, such as screening questions and approval ratings, ensuring the quality of responses can be challenging. Some participants may rush through tasks or provide inaccurate or unreliable responses. Researchers need to invest time and effort in developing appropriate checks and measures to minimize the impact of low-quality or fraudulent responses. Despite quality control measures, there is a possibility of participants creating multiple accounts or using automated scripts to complete

tasks, leading to duplicate or fraudulent responses. Researchers need to implement additional checks and measures to identify and remove such responses to ensure data integrity. While MTurk provides access to a large pool of participants, researchers have limited control over the recruitment process. They rely on the availability and willingness of workers to participate, which may affect the sample size or composition. Additionally, researchers may face challenges in ensuring demographic diversity or specific target groups in their studies. It is important for researchers to consider these limitations and carefully evaluate the suitability of MTurk as a data collection platform for their specific research objectives. Supplementing MTurk data with other sources or employing diverse data collection methods can help mitigate some of these limitations and provide a more comprehensive understanding of the research topic.

Second, this study intended to provide a thorough research framework, that includes the antecedents, mediators, and moderators of consumers' green adoption behavior. However, it could be very difficult to justify the comprehensiveness of this research framework. Several of the most important constructs might still be ignored in the study. Thus, more validation should be encouraged to identify the impact of other constructs on consumers' green adoption behavior.

Third, this study focused on collecting data from a survey platform using the self-reporting method. Although this study has already validated the relevant constructs and research hypothesis through literature review, co-citation analysis, and meta-analysis before implementing data collection, future studies should be applied using multiple resources rather than pure self-reports. Research, such as qualitative interviews, case studies, ground theory, longitudinal study, and time series analysis could be very helpful to enhance the reliability and validity of the research.

Fourth, the study collected opinions from respondents regarding general types of green products, without focusing on specific brands. Subsequent research could further investigate this research model by examining specific green brands, allowing for a more precise understanding of consumers' perceptions and behaviors towards particular products. Additionally, it is important to note that certain research hypotheses in this study did not receive statistical support. Therefore, future studies should aim to conduct more rigorous empirical validations to ascertain the viability of these hypotheses and further enhance the robustness of the research findings.

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APPENDIX

Research Questionnaire (English version)

Toward a Comprehensive Model of Green Adoption Behavior: The Moderating Roles of Perceived Social Responsibility and Perceived Psychological Benefits

Dear Respondents,

My name is Vu Minh Quan, a Ph.D. Candidate in Business Administration at Nanhua University, Chiayi, Taiwan. I am working on academic research about "Toward a Comprehensive Model of Green Adoption Behavior: The Moderating Roles of Perceived Social Responsibility and Perceived Psychological Benefits" as part of the program completion process. Your countenance and assistance will be greatly appreciated. Please be assured that your answers will be kept in strict confidentiality. We deeply appreciate your kind cooperation.

Sincerely yours,

Wann-Yih Wu, Ph.D
Ying-Kai Liao, Ph.D
College of Management, Nanhua University, Taiwan

Ph.D candidate: Vu Minh Quan
Department of Business Administration, Nanhua University, Taiwan

Part 1: Personal Information

1. Gender

☐ Male ☐ Female ☐ Other

2. Age

☐ Less than 26

☐ From 26 – 35

☐ From 36 – 45

☐ From 46 – 55

☐ From 56 – 65

☐ Above 65 years old

3. Education

☐ Bachelor degree

☐ Master degree

☐ Doctorate degree

4. Working experience

☐ Less than 5 years

☐ 5-10 years

☐ More than 10 years

5. Industry

☐ Service industry

☐ Electronic and information

☐ Manufacturing

☐ Retailing/Wholesale

☐ Financial service

☐ Logistics

☐ Education

☐ Tourism

☐ Advertising

☐ Agricultural

☐ Others

6. Current position

☐ Working staff

☐ Supervisor

☐ Manager

☐ Senior manager

7. Current working country

☐ United States

☐ Taiwan

☐ European Union

☐ Others

Part 2: Research Content

The purpose of this study is to survey your opinion about the environmental concern and green adoption behavior. Therefore, please use your knowledge and experience to answer all the questions below:

Please take a short look on the question below related to positive personality factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Positive personality							
Introversion (INTR)							
[INTR1] Quite when with people	1	2	3	4	5	6	7
[INTR2] Preferred to be alone rather than in a large group	1	2	3	4	5	6	7
[INTR3] Introverted	1	2	3	4	5	6	7
Conscientiousness (CONS)							
[CONS1] Orderly	1	2	3	4	5	6	7
[CONS2] Precise and efficient	1	2	3	4	5	6	7
[CONS3] Organized	1	2	3	4	5	6	7
Emotional Stability (EMO)							
[EMO1] Remain calm and composed	1	2	3	4	5	6	7
[EMO2] A stable and consistent mood	1	2	3	4	5	6	7
[EMO3] Good control of my anger and frustration	1	2	3	4	5	6	7
[EMO4] Easy to adapt to change	1	2	3	4	5	6	7
Openness to Experience (OPEN)							

[OPEN1] Frequently feel high creative	1	2	3	4	5	6	7
[OPEN2] Imaginative	1	2	3	4	5	6	7
[OPEN3] More original than others	1	2	3	4	5	6	7
Agreeableness (AGRE)							
[AGRE1] Kind to others	1	2	3	4	5	6	7
[AGRE2] Tender-hearted with others	1	2	3	4	5	6	7
[AGRE3] Sympathetic	1	2	3	4	5	6	7
Please take a short look on the question below related to Environmental concern factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Environmental Concern (ENVI)							
[ENVI1] Environment is severely abused by humans	1	2	3	4	5	6	7
[ENVI2] Uncontrolled expansion of the industrialized society must be checked	1	2	3	4	5	6	7
[ENVI3] We must maintain the balance of nature for our survival	1	2	3	4	5	6	7
[ENVI4] The balance of nature is very delicate and easily upset	1	2	3	4	5	6	7
[ENVI5] If things continue on their present course, we will soon experience a major ecological catastrophe	1	2	3	4	5	6	7
	Level of Agreement						

Please take a short look on the question below related to Green environmental attitude factor and then Circle the level of agreement on each of the item based on your opinion.	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Green environmental attitude (GEA)							
[GEA1] I consider the potential environmental impact of my actions when making many of my consumption decisions.	1	2	3	4	5	6	7
[GEA2] I am concerned about wasting the resources of our planet.	1	2	3	4	5	6	7
[GEA3] I would describe myself as environmentally responsible.	1	2	3	4	5	6	7
[GEA4] It has become inevitable to protect the environment for future generations	1	2	3	4	5	6	7
Please take a short look on the question below related to Green customer value factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Green customer value (GCV)							
[GCV1] I value products/services that are environmentally friendly	1	2	3	4	5	6	7
[GCV2] I am willing to pay a premium for products/services that are environmentally sustainable	1	2	3	4	5	6	7
[GCV3] I consider the environmental impact of a products/services when making purchase decision	1	2	3	4	5	6	7
[GCV4] I believe that adopting environmentally friendly products/services contribute to a better future	1	2	3	4	5	6	7
[GCV5] Environmental benefits are very important factors in my overall satisfaction with a products/service	1	2	3	4	5	6	7

Please take a short look on the question below related to Green environmental self-identity factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Green environmental self-identity (GES)							
[GES1] I think of myself as someone who is concerned about environmental issues.	1	2	3	4	5	6	7
[GES2] I see myself as begin an environmentally friendly consumer	1	2	3	4	5	6	7
[GES3] I would want my family and friend s to think of me as someone who is concerned about the environment	1	2	3	4	5	6	7
[GES4] I would be embarrassed not to be seen as having an environmentally friendly lifestyle	1	2	3	4	5	6	7
Please take a short look on the question below related to Green adoption behavior factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Green adoption behavior (GAB)							
[GAB1] In the near future, I am willing to purchase products made from recyclable materials.	1	2	3	4	5	6	7
[GAB2] I will make an effort to purchase this product because of its environmental concerns	1	2	3	4	5	6	7
[GAB3] I have changed my principal products for ecological reasons	1	2	3	4	5	6	7

[GAB4] I intend to invest in eco-friendly products in the future because of its environmental concern.	1	2	3	4	5	6	7
[GAB5] I expect to invest in eco-friendly products in the future because of its environmental performance.	1	2	3	4	5	6	7
[GAB6] I am glad to invest in green products in the future because it is environmentally friendly.	1	2	3	4	5	6	7
Please take a short look on the question below related to Perceived social responsibility factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Perceived social responsibility [PSR]							
[GES1] I would recommend eco-friendly products to my friends and family.	1	2	3	4	5	6	7
[GES2] I feel morally obliged to purchase green products.	1	2	3	4	5	6	7
[GES3] I participate in activities that aim to protect and improve the quality of the environment.	1	2	3	4	5	6	7
[GES4] I support nongovernmental organizations working to minimize the negative impacts	1	2	3	4	5	6	7
Please take a short look on the question below related to Perceived social responsibility factor and then Circle the level of agreement on each of the item based on your opinion.	Level of Agreement						
	Totally Disagree	Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Agree	Totally Agree
Perceived psychology benefit [PPB]							

Nature experience (NAE)							
[NAE1] In the near future, I am willing to purchase products made from recyclable materials.	1	2	3	4	5	6	7
[NAE2] I will make an effort to purchase this product because of its environmental concerns	1	2	3	4	5	6	7
[NAE3] Nature experience always inspires me towards the buying of organic products and services	1	2	3	4	5	6	7
[NAE4] Nature provides me with a sense of peace and tranquility	1	2	3	4	5	6	7
Self-expressive (SEB)							
[SEB1] I always self-expressive to buy eco-friendly products and services	1	2	3	4	5	6	7
[SEB2] My personality does not accept the product or service that is hazardous for the environment	1	2	3	4	5	6	7
[SEB3] My purchase intention always triggers by the inner conscious that support the eco-friendly product or service	1	2	3	4	5	6	7
[SEB4] Through self-expression, I feel a sense of liberation and freedom	1	2	3	4	5	6	7
[SEB5] Engaging in self-expression activities boots my self-confidence and self-esteem	1	2	3	4	5	6	7
[SEB6] Self-expression empowers me to challenge environmental issues and express my authentic self	1	2	3	4	5	6	7
Warm glow (WAG)							
[SEB1] Warm glow always could be achieved through buying eco-friendly products and services	1	2	3	4	5	6	7
[SEB2] The pro-environmental strategies of any product or organization provide a significant sense of warm glow	1	2	3	4	5	6	7
[SEB3] Warm glow always be a significant psychological benefit of eco-friendly services and products' buying	1	2	3	4	5	6	7

[SEB4] Doing something good for others bring me joy	1	2	3	4	5	6	7
[SEB5] I feel a sense of fulfillment when I make a positive impact on the lives of others	1	2	3	4	5	6	7
[SEB6] Warm glow always brings me a sense of satisfaction	1	2	3	4	5	6	7