The Impact of Education on Environmental Attitudes

Doctor of Business Administration Dissertation

By

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(1032480)

In Partial Fulfillment

of the Requirements for the Degree

of Doctor of Business Administration

Abu Dhabi University

College of Business

Abu Dhabi, UAE

2019

The Impact of Education on Environmental Attitudes

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The Impact of Education on Environmental Attitudes

Abstract

The term "environmental attitudes" reflects one's propensity (of either favorable or unfavorable) towards a given environmental cause in terms of beliefs or perceived values. Studies on environmental attitudes have gained numerous criticisms for not being theoretical exhaustive. Addressing that, this study systematically developed a comprehensive measurement model that addresses the multidimensionality of environmental attitudes. This study specifically assessed the validity and internal consistency of the proposed measurement model of environmental attitudes within the context of education for sustainability (EfS) using SEM-AMOS. This study also evaluated the utility of the proposed measurement model through the testing of measurement invariance across genders, nationalities, and courses among the undergraduates in Abu Dhabi. With respect to these specific objectives, this study successfully sampled 130 respondents using an online-based questionnaire survey. The instrument used in this study was adapted from the original items of Environmental Attitudes Inventory (EAI) (Milfont & Duckitt, 2010), with the considerations on both preservation and utilization as the higher-order dimensions of environmental attitudes. Following the analysis, the obtained results revealed a refined seven-factor model of EAI with 21 items, in which

both convergent validity and discriminant validity were validated. The environmental attitudes demonstrated multidimensionality hierarchically, as demonstrated by the obtained results of the first-order, second-order, and the third-order models. Besides that, this study also found that the undergraduates of science and technology courses, compared to the social science courses, demonstrated higher propensity to preserve the environment. Conclusively, this study systematically explored the horizontal and vertical structures of environmental attitudes in the development of the proposed measurement model to assess the environmental attitudes. Nonetheless, this study revealed that pro-environmental attitudes undergraduate students tend to be limited to certain group within the context of EfS, thus would incline to constrain the resolution of environmental problems. Thirdly, The confirmation of the relevance of human and perceived environmental threat according to culture-specific perspective in the formation and determination of environmental attitudes.

Keywords: *Environment attitudes, preservation, utilization, education for sustainability, undergraduates.*

List of Abbreviations

UAE	:	United Arab Emirates
ESD		Education for Sustainable Development
EfS		Education for Sustainability
UK		United Kingdom
NEP		New Ecological Paradigm
MENA		Middle East and North Africa
NAM		Norm Activation Model
TRA		Theory of Reasoned Action
GCC		Gulf Cooperation Council
EAI		Environmental Attitudes Inventory
ADEC		Abu Dhabi Education Council
TPB		Theory of Planned Behavior
VBN		Value-Belief-Norm
NEP-R		NEP-Revised
EN		Enjoyment of Nature
SI		Support for Interventionist Conservation Policies
EM		Environmental Movement Activism
CM		Conservation Motivated by Anthropocentric Concern
CST		Confidence in Science and Technology
ET		Environmental Threat

AN	Altering Nature
PC	Personal Conservation Behavior
HD	Human Dominance Over Nature
HU	Human Utilization of Nature
EC	Ecocentric Concern
SP	Support for Population Growth Policies
IRB	Institutional Review Board for Human Subjects Research
SEM	Structuring Equation Modeling
PCA	Principal Component Analysis
EFA	Exploratory Factor Analysis
AVE	Average Variance Extracted
x^2	Chi-square
df	Degree of Freedom
NFI	Normed-fit Index
CFI	Comparative fit index
TLI	Tucker-Lewis index
GFI	Goodness-of-fit
RMSEA	Root Mean Square Error of Approximation
NNFI	Non-Normed Fit Index
CMIN	Normed Chi-square
D^2	Squared Mahalanobis Distance
CA	Cronbach's Alpha

CR	Composite Reliability
VIF	Variance Inflation Factor
r^2	Squared Correlation
ICC	Interclass Correlation Coefficient
ΔCMIN	Difference between Chi-square
p	Significance Value
N	Total Sample
TPB	Theory of Planned Behavior

Acknowledgments

Firstly, I would like to express my sincere gratitude to my advisor Dr. Khalizani Khalid for the continuous support of my study and related research, for her patience, motivation, and massive knowledge. Her guidance helped me in all the time of the research. Besides my advisor, I would like to thank the rest of my thesis committee: Dr. Shilpa Iyanna for her insightful comments and encouragement. In addition, I thank my friends and colleagues for their encouragement and valued comments.

Last but not the least, I would like to thank my family: my parents, especially my mother for her support and encouragement, to my brothers and sister for supporting me spiritually throughout the journey of my study and my life in general and my angles Hamad and Hoor for being patience during my study.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In line with sustainable development, the Stockholm Declaration of the United Nations Conference on the Human Environment in 1972 has emphasized the significance of combining education and sustainability in tackling global environmental issues. Environmentally conscious leaders and public would bring UAE closer to the realization of Abu Dhabi Vision 2030. With the incorporation of environmental education into the national curriculum, the development of environmental policies for a green higher education system has gained increasing attention in the United Arab Emirates (UAE). This environmental commitment has propelled the development of Education for Sustainable Development (ESD) or also known as Education for Sustainability (EfS). Students discover both global and local environmental issues and gain in-depth environmental knowledge through education. It is anticipated that the future generations of the UAE, particularly leaders, possess environmental attitudes in realizing environmental sustainability. However, there are certain issues and challenges in incorporating EfS into the higher education system (Sutton & Gyuris, 2015). Besides that, most studies emphasized on the overall

framework and implementation of EfS (Fernández-Sánchez et al., 2014), such as the measurement of environmental attitudes among students (e.g., Abramovich & Loria, 2015; Young, et al., 2015). On the other hand, studies on the effects of EfS towards environmental attitudes among these students remain inadequate; thus, the lack of understanding on the effects of EfS towards environmental attitudes and environmental concern.

Environmental awareness, knowledge, and mechanism to measure the student's responsible behavior have become well recognized (Jim Wu et al., 2015; Sutton & Gyuris, 2015; Wen Xue & Shouying Zhao, 2015) and universities have put effort to embed environmental education through the curricular.

1.2 BACKGROUND OF STUDY

1.2.1 National Environmental Awareness and Strategy 2015–2021

One of the key strategic objectives of the National Environmental Awareness and Strategy 2015–2021 is the incorporation of environmental education into the existing curriculum of the higher education system to promote environmental awareness towards a sustainable future through students—as the future generation and leaders of the UAE. The proposed programs and initiatives under this key strategic objective are fundamental to formally educate the students on the emerging environmental issues and encourage pro-environmental behavior in realizing one of the key agenda on environmental sustainability in the UAE Vision 2021 as well as the Abu Dhabi Vision 2030.

This approach aims to address embedding sustainability into the tertiary education (Abu Dhabi Week, 2016).

1.2.2 Celerant YouGov Poll

In line with UAE Vision 2021, the business operations in the UAE are pressured to adopt sustainable practices without affecting their costs and profits. The Celerant YouGov Poll, which involved 1,100 UAE respondents in 2011 (UAE Today, 2016), highlighted the significance of environmental attitudes and environmental practices towards sustainability in the UAE. Although this survey did not involve students, the following results reflected the importance of education to increase public awareness on the significance, implications, and practices of sustainability: (1) 45% considered the significance of sustainability; (2) 51% considered sustainability in their decision-making; (3) 17% considered neither the significance of sustainability nor the sustainability in their decision-making; (4) 76% confessed that they do not have the knowledge on sustainability practices; and (5) 31% confessed of not having the slightest idea on sustainability practices. The concern of sustainability does not mean a hit to the bottom line but, the findings of this survey found the issue in embracing sustainability must not be disconnected with the company's recruitment efforts.

1.2.3 Cortese's Model of Campus Sustainability

Cortese's model of campus sustainability encompasses education, university operation, external community, and research, which interact with one another in an integrated framework within the scope of higher education system

(Cortese, 2003). This model addresses the integration of four crucial aspects into a system under the purview of the university sustainability efforts; effects on student's attitudes and environmental attitudes as displayed in Figure 1.1. Nonetheless, Miller (2013) highlighted the inadequacy of this model as a tool to assess the students' environmental attitudes towards sustainability—which complicates the elucidation on how students' intention and knowledge drive their sustainable behavior. Moreover, these four constituents of the model do not have the capacity to classify between the management of sustainability and the utility of sustainability in tertiary education; neither for current nor future orientation. Therefore, the implications of sustainability interventions for students cannot be assessed in detail; thus, any necessary improvements cannot be taken.

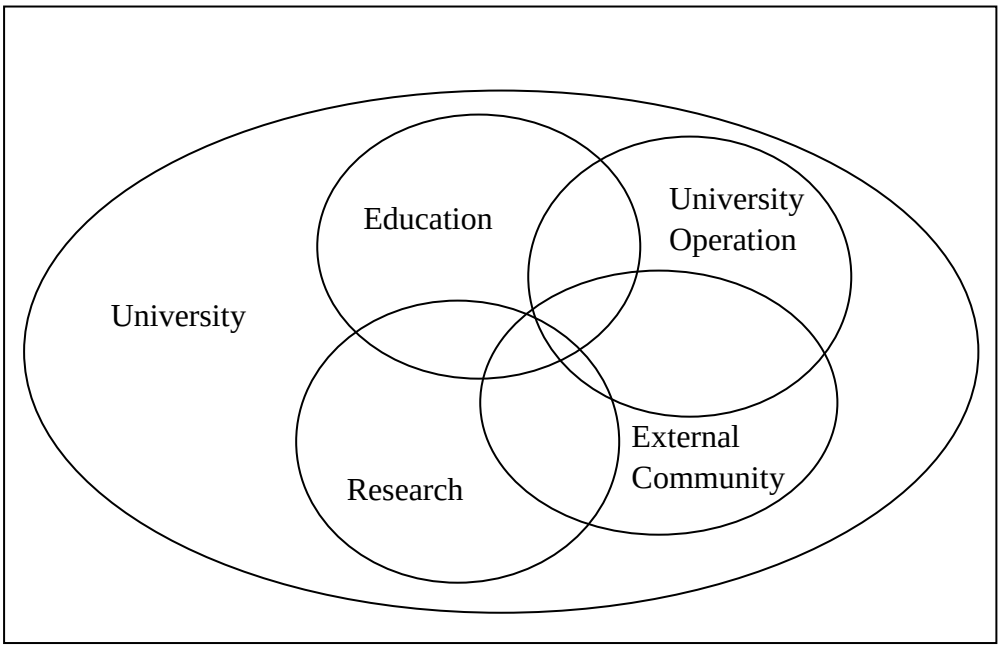

Figure 1.1. Cortese's Model of Campus Sustainability

(Source: Cortese, 2003)

1.2.4 Systems Model Framework for Approach to EfS across the University

Littledyke et al. (2013) introduced a systems model framework for EfS approach in the higher education system, which deals with three distinct constituents, namely curriculum, governance, and infrastructure (Figure 1.2). Specifically, the model framework addresses the needs for effective EfS in terms of what students learn and encounter. This model defined the structures and processes that intersect between categories in devising strategies for action. Majority of the sustainable practices within the higher education system that are incorporated into the model framework are adopted in other countries, such as Australia, Greece, and the United Kingdom (UK). Considering that these practices may differ across countries, this study addressed the need to identify significant aspects that may influence the implementation of EfS in the UAE. Pro-sustainability effects are found to rely on implications for interdisciplinary connections (Jickling & Wals, 2012; Walshe, 2016) and tend to be comparable with environmental interdependence (Corral-Verdugo & Frias-Armenta, 2016; Sterling, 2004). Furthermore, the understanding of the importance and nature of sustainability issue to actively engage with pro-sustainability behavior was not deliberated. As a result, the utility and the management aspect of sustainability that linked to the alteration of student's attitudes towards pro-sustainability behavior may be undermined.

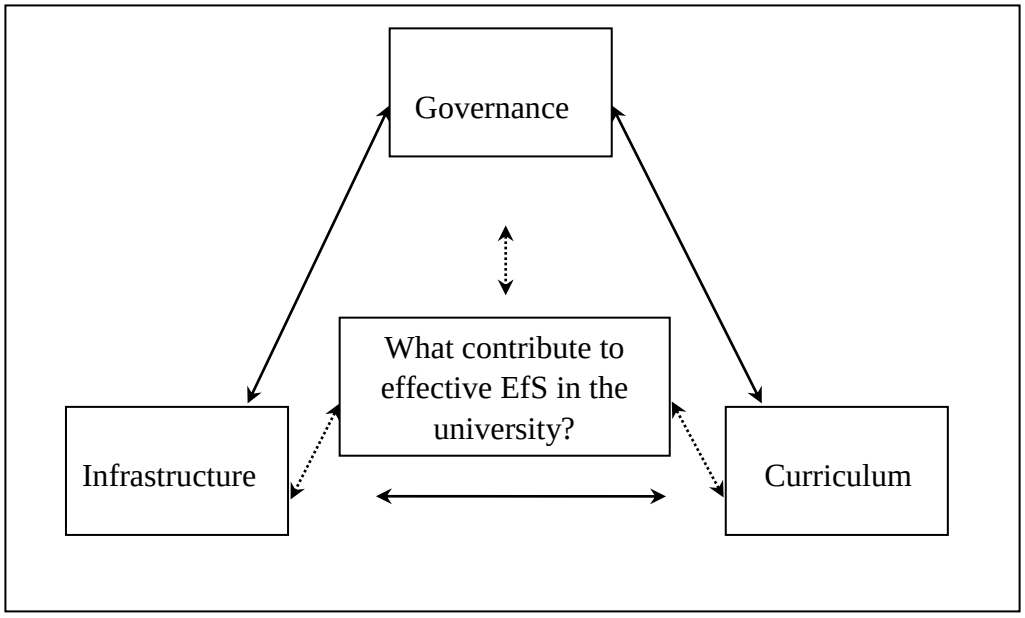

Figure 1.2. Systems Model Framework for Approach to EfS across the University (Source: Littledyk et al., 2013)

1.2.5 UAE State of Green Economy Report 2016

According to the UAE State of Green Economy Report (UAE Ministry of Environment and Water, 2016), the environmental awareness rate was at 63 percent in overall; in which UAE young generation contributed to only 53 percent. The report on environmental awareness was more focused on air quality, climate change, and waste, compared to other environmental issues such as biodiversity and water quality. The average rate of pro-environmental actions by general community is 55 percent in comparable to the average rate of environmental awareness at 63 percent. Pro-environment actions are more prominent in energy saving and waste segregation rather than transportation initiatives. The report further highlighted the low participation among youths (51%) in environmental initiatives. These figures provide a substantial gap

between awareness and their actual behavior; even though the overall difference was 5 percent. Thus, this gap between environment awareness and actual behavior on environment needs to be explored more comprehensive area of environmental subjects and dimensions to capture the environmental attitudes sustainability of youth fully; consisting the major pie of population in the UAE.

This measurement is important for the implementation and acceleration of greening effort as the environmental attitudes must be reinforced in a more coordinated manner through encouragement to adopt more environmentally sound behavior. The attitude context to predict the intent of the agent of sustainability requires measuring and monitoring process. It is pivotal to assess the environmental attitudes of students—who make up of the future generation, future workforce, and leaders of the UAE—following the integration of EfS into the existing higher education system. With that, in-depth insights to establish effective sustainability initiatives, particularly within the context of the UAE, can be acquired.

1.3 PROBLEM STATEMENT

It is a challenge to stimulate environmental attitudes at the individual level in order to attain sustainability. Studies concluded that individual attributes influenced environmental attitudes (e.g., Aoyagi-Usui et al., 2003; Felonneau & Becker, 2008; Eilam & Trop, 2012; Bronfman et al., 2015). The prediction of one's specific behavior can be enhanced with improved understanding on how these psychological constructs are cognitively influenced. The dimensionality of these psychological constructs was said to be explained by

various attributes, such as personality (Costa & McCrae, 1992), value (Schwartz, 1970; 1992), social attitudes (Saucier, 2000), social axioms (Leung & Bond, 2004), and rational (Ajzen, 1991; Kaiser & Gutscher, 2003). Meanwhile, the effects of attitudes towards behavior were found to be relatively small (Bamberg, 2003; Felonneau & Becker, 2008; Osbaldiston & Schott, 2012; Pereira & Forster, 2015), which were substantiated by claims that attitudes are influenced by different factors compared from those that influenced behaviors. One plausible rationalization to explain the relationship between attitudes and behavior was the lack of understanding on the dimensionality of these attitudes (Steg & Vlek, 2009; Eilam & Trop, 2012).

Besides that, the transformation of one's environmental attitudes or behavior is not necessarily recorded using a self-reported measurement (Gatersleben et al., 2002; Felonneau & Becker, 2008; Young et al., 2015). Various issues on the prominent self-reported measurements such as the New Ecological Paradigm (NEP) and other modified versions were highlighted, such as obsolete measurements (Lalonde & Jackson, 2002), low predictive capacity for the assessment of environmental attitudes (Scott & Willits, 1994), unidimensionality issue (Albrecht et al., 1982; Milfont & Duckitt, 2010), and incompatible for certain cultural contexts in other countries (as most studies were performed in developed Western countries) (Chatterjee, 2008). Majority of these studies on environmental attitudes (of more than 68 studies across 36 countries among 58,000 respondents from 140 diverse samples) did not explore the context of EfS, specifically in the region of Middle East and North Africa (MENA)—including the UAE (Howcroft & Milfont, 2010).

EfS is established to understand better how moral norms are incorporated into the rational choice about student's environmental attitudes. Conditions of EfS are activated from curriculum involving learning and experiencing sustainability, shared practice and collaborative learning via co-curricular activities, experiences through sustainability research, and interdisciplinary collaboration (Littledyke et al., 2013), but the student's environment attitudes did not significantly change (Yount & Horton, 1992; Abdel Raman, 2016). Moreover, prior studies emphasized on the overall framework and the implementation of EfS initiatives (Fernández-Sánchez et al., 2014). Therefore, the necessary institutional tools and processes remain inadequate to comprehensively assess the implications of the proposed interventions towards the environmental attitudes among these students (Shephard, et al., 2011). As a result, the effectiveness of these interventions remains uncertain without proper measurement and monitoring of possible shortcomings.

Additionally, prior studies did not assess environmental attitudes across diverse cultural contexts (Kline, 2015; Cheung & Rensvold, 2002), which disallow the generalization of psychological attributes across groups (with different cultural notions) in similar environmental settings (Eilam & Trop, 2012). Moreover, these studies did not perform the three-steps testing of measurement invariance (Vandenberg & Lance, 2000) across groups with different cultural contexts to address the issues of cross-cultural validity (Arnett, 2008). The influence of cultural-based attributes towards the environmental attitudes among students offers comprehensive insights for the development and

implementation of EfS. Arguably, the EfS should nurture the necessary affective attributes in terms of attitudes, dispositions, and values among students (Shephard, 2008). The measurement of attitudes among students should be grounded on their awareness on the implications of their behavior towards others as well as the sense of responsibility in the specified behavior (Schwartz, 1970). Markle (2013) suggests prior studies on environmental attitudes can be utilized to support the measurement, assessment, and evaluation of effective sustainability attitudes of university's students. Therefore, the study of the dimensionality of environmental attitudes might enable the promotion of attitude change and the utility of environment attitudes scale.

1.4 RESEARCH OBJECTIVES

In general, this study examined the development of relevant constructs as the underlying basis of assessing the environmental attitudes among the undergraduates within the EfS context in Abu Dhabi, UAE. The specific objectives of this study are provided in the following:

1) To assess the validity and internal consistency of the proposed measurement model of environmental attitudes among the undergraduates within the EfS context in Abu Dhabi
2) To evaluate the utility of the proposed measurement model of environmental attitudes among the undergraduates within the EfS context in Abu Dhabi

1.5 RESEARCH QUESTIONS

With respect to the objectives of this study, this study addressed the following research questions:

i) What are the factor structure and psychometric features of the proposed measurement model of environmental attitudes among the undergraduates within the EfS context in Abu Dhabi?

ii) How does the proposed measurement model evaluate the environmental attitudes among the undergraduates within the EfS context in Abu Dhabi?

1.6 SIGNIFICANCE OF STUDY

1.6.1 Theoretical Contributions

This study extends the role of environmental attitudes when moral norms model is incorporated into the rational choice model. Referring to the Norm Activation Model (NAM) theory (Schwartz, 1977), the systems model framework of EfS (Littledyke et al., 2013), and Theory of Reasoned Action (TRA) (Ajzen, 1991; Fishbein & Ajzen, 2010), the role of student's influence on their own environmental attitudes is critical and covers awareness, beliefs, attitudes moral. This classification between awareness, attitudes and actions includes the baseline framework's factors of moral motivation on the environment, EfS content, environmental self-efficacy, social-situational factors and environmental attitudes. According to Schwartz (1977), the awareness of consequences and the ascription of responsibility reflect the personal norms, which further rationalize the moral motivations. Meanwhile, Milfont & Duckitt (2010) propounded both preservation and utilization in representation of

environmental attitudes. Despite the extensive studies on contributing factors of pro-environmental behavior (Yount & Horton, 1992; Gatersleben et al., 2002; Chatterjee, 2008; Bronfman et al., 2015), similar studies in the context of higher education system remain scarce. This study developed a refined measurement model in assessing environmental attitudes based on the existing empirical evidences provided by studies that focused on the regions of Gulf Cooperation Council (GCC) and MENA. These empirical evidences may be limited but the proposed model in this study provided an initial standard that addressed the challenges of promoting environmental attitudes among students.

1.6.2 Practical Contributions

The present study challenged the current perception of environmental education that perceived environmental behavior as the end outcome of the educational process; while has left intervening acquisition of environmental attitudes. This study propounded the significant need of assessing the formal integration of EfS into the existing higher education system—which provided comprehensive insights, particularly on the formation of environmental attitudes among these students in the current context of EfS. This study also provided enhanced understanding on how the environmental attitudes of students are influenced, which prompted further exploration on the pro-environmental behavior. Although behavioral change may not be contributed by the changes in the environmental attitudes, the strength of environmental attitudes should not be disregarded for a self-reported behavior.

The implementation of EfS potentially influences the environmental attitudes among students in the higher education system, which is of immense importance that EfS initiatives facilitate the students' participation in pro-environmental behavior. Students are prompted to nurture their altruistic attitudes and the sense of responsibility for their behavior within the environmental context through EfS. These contextual factors have provided university leadership with insight on barriers and challenges of EfS intervention on potential environmental attitudes. The culture and awareness of the students can be more amenable to implementing the sustainable strategies. Student's environmental attitudes can be improved when students are conscious of environmental issues or policies for a domestic setting. The delivery of practical and procedural knowledge regarding sustainable actions might resort to environmental performance, even in the absence of techniques directed at attitude change. In other words, once students know why, and how to switch-off the lights before leaving the classroom, they may do so even without having to change their environmental attitudes because of the context structure, culture, and rewards for doing so. Hence, a reliable and comprehensive construct that reflects the culture and tertiary education structure can be proposed to act as a baseline framework in the UAE with the view to monitor the impacts of EfS interventions at tertiary education context.

1.7 LIMITATIONS OF STUDY

Firstly, this study adopted self-reported measurement from prior studies (e.g., Markle, 2013; Fernández-Sánchez et al., 2014; Bronfman et al., 2015). Considering the approach taken, the scope of responses provided by these self-reported questionnaires was limited in elucidating and providing supplementary rationalizations for the obtained results on environmental attitudes among the sampled respondents.

This study considered the Environmental Attitudes Inventory (EAI) in assessing the extent of tolerance towards natural environment cross-culturally despite the prominence of New Ecological Paradigm (NEP), which may contribute to another limitation in assessing the environmental attitudes among the sampled respondents. Nonetheless, the environmental orientation based on the general beliefs is generally unobservable—thus, the selection of EAI in this study.

This study involved respondents, specifically undergraduates, in the selected sampling location—Abu Dhabi, the capital of the UAE. These respondents may not undergo similar curriculum that incorporates environmental education as mandated by the Abu Dhabi Education Council (ADEC). This study was unable to observe this variation, which posed another limitation to this study.

1.8 OPERATIONAL DEFINITION OF KEY TERMS

1.8.1 Environmental Attitudes

Kollmus and Agyeman (2002) defined environmental attitudes as one's volitionary act of reducing the adverse consequences of a specific action towards the environment. Similarly, Vlek and Steg (2008) referred environmental attitudes as one's act of minimizing the negative implications or optimizing the positive implications towards the environment. Accordingly, Bern (1972) proposed that one's beliefs and attitudes guide one's environmental attitudes. As such, environmental attitudes also can be the judge as the consideration given by the society in a protective way of environmental behavior or compliment to the environmental well-being. The present study referred this term as a moral deed for environmental sustainability.

1.8.2 Education for Sustainability (EfS)

Cloud (2010; 2014) denoted EfS as an educational process that puts forward the best teaching and learning strategies in attaining the knowledge and essential thinking means towards economic success. Students are taught to apply content, core competencies, and habits of mind in the context of environmental sustainability. In this study, EfS was considered as a transformative learning process for undergraduates in acquiring critical knowledge, skills, and understanding for their decision-making and involvement in the establishment of sustainable future.

1.8.3 Pro-Environmental Behavior

Yin (1999, p.63) argued that affective, cognitive, and evaluative environmental propensities, in reflecting pro-environmental behavior, as "perception and awareness, feelings or emotional responses, and judgments or opinions of people about environmental problem". Meanwhile, Schultz et al. (2004) explicitly propounded that pro-environmental behavior encompasses affective, behavioral, and cognitive attributes. However, Fabrigar et al. (2005) asserted that, rather than being considered as independent constituents of attitudes, these attributes are derived from an evaluative overview towards a certain object. On a similar note, Albarracin et al. (2005) highlighted that affect, beliefs, and behavior are acting together with attitudes rather as being an independent. Hence, it can be concluded that traditional view of attitude structure and new theoretical approaches of attitudes have conceptualized that attitudes can be both inferred from and have an influence on beliefs, affect and behavior.

1.9 CHAPTER SUMMARY

Prior studies extensively explored the concept of environmentalism and the measurement of relevant constructs. Most of these studies emphasized on the use of multiple constructs, specifically based on affective, behavioral, and cognitive attributes, as a measurement tool, without considering the influence of environmental attitudes—as demonstrated in certain recent studies. However, the recent studies have evidenced that attitudes should be interacting with effective and beliefs to shape behavior. Adding to that, there was no consensus found for the relationship between environmental attitudes and pro-

environmental behavior. The subsequent chapter presents the review of prior studies, which led to the development of hypotheses for this study.

CHAPTER 2

LITERATURE REVIEW

2.1 ENVIRONMENTALISM AND ENVIRONMENTAL ORIENTATION

Pepper et al. (1984) initially portrayed "environmentalism" as an act of tackling the global environmental issues. The term "environmentalism" is further defined as the tendencies to act based on environmental considerations (Stern, 2000). Stern (2000) further propounded that pro-environmental behavior has immense potentials to influence the availability of resources and change the ecosystem. The further argues that environmental movement is about to search for elements to the gap between development and sustainability. Therefore, the assessment on one's intention or behavior in the environmental context provides in-depth comprehension on the contributing factors or resultant outcomes of one's environmental orientation. This has propelled various studies across diverse disciplines to explore the concept of environmentalism and environmental behavior (e.g., Price et al., 2014; Newman & Fernandes, 2016; Soga & Gaston, 2016; Goldman et al., 2017), but most studies demonstrated emphasis on the relationships between human and environment and between environmental attitudes and sustainable practices.

2.2 THEORY OF PLANNED BEHAVIOR

The Theory of Planned Behavior (TPB) conceptually explores the underlying basis of human behaviors based on a specific framework (Ajzen, 1991) without the inclusion of moral considerations—which put the rational choice theory as the main premise, given its applicability for attitudinal studies (Thogersen, 2004) with diverse approaches of environmental attitudes (Kaiser & Gutscher, 2003). As shown in Figure 2.1, this behavioral theory postulates that attitude, subjective norm, and perceived behavioral control, which are directly linked to specific beliefs, influence one's behavioral intention and eventually the actual behavior. Specifically, this behavioral theory puts forward the predictive capacity of one's attitude towards the behavior (personal behavioral evaluation), subjective norms (socially accepted behavior), and perceived behavioral control (self-efficacy), which forms the intention to behave in a certain manner and subsequently acts on it (Ajzen, 2002).

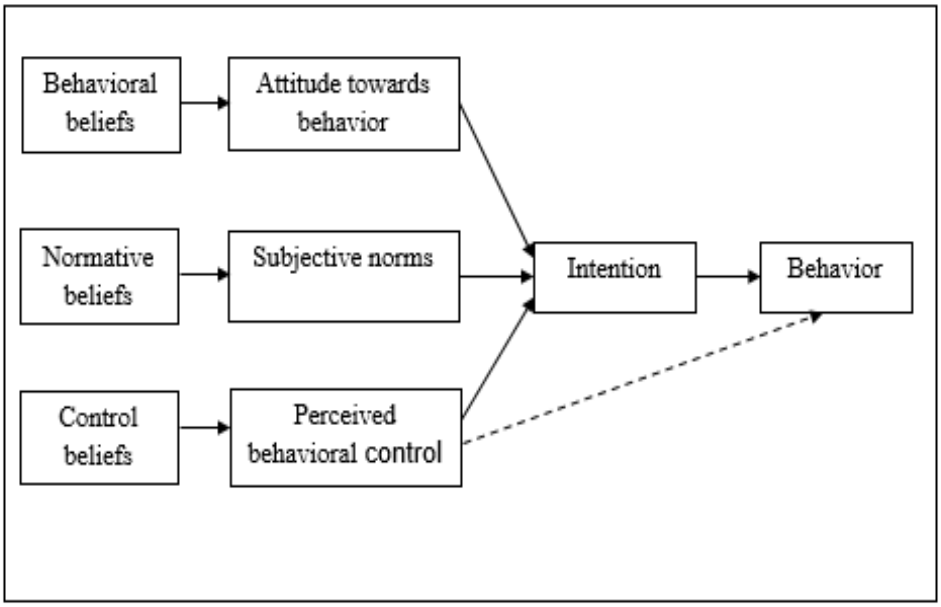

Figure 2.1. Theory of Planned Behavior

(Source: Ajzen, 1991)

Noar and Zimmerman (2005) propounded another plausibility of the effects of perceived behavioral control, both directly and indirectly, towards the behavioral intention and the actual behavior. With the necessary degree of volitional control over the behavior, the intention to behave in a certain manner may increase and subsequently translate into the actual behavior when one has favorable attitude towards the behavior and subjective norms. However, there are certain circumstantial drawbacks that affect the translation of behavioral intention into the actual behavior (Norberg et al., 2007), which demonstrated that after all, one may have incomplete volitional control over the behavior and the behavioral intention may not exclusively represent all factors that lead to a specific behavior. This highlighted the need to include perceived behavioral

control into the overall framework to account for other factors beyond one's control.

Meanwhile, Han et al. (2010) demonstrated the predictive capacity of TPB for behavioral intention in the environmental context. This study found TPB was robust and predicted attitudes, subjective norms and perceived behavioral control. Although pro-environmental behavior is typically linked to positive normative belief, one's control over the behavior may be subjected to certain limitations, resulting to an unfavorable conviction, such as one's behavior does not deliver any effects (Stern, 2005; Koger & Winter, 2010). To rectify this problem, application of TPB in environmental-related behavior situations may explain the inconsistencies between environmental attitudes and environmental behavior.

Besides that, TPB has received criticisms for not taking into account the affective attributes, such as fear, intimidated, or mood (Dutta-Bergman, 2005), as well as past behavior (particularly, the relationship between the past behavior and predicted behavior) (Knussen et al., 2004). Apart from past behavior, habit was also argued to significantly contribute to the overall understanding on environmental attitudes (Reid et al., 2010), but was not exclusively considered in TPB. However, Ajzen and Manstead (2007) expounded that both behavioral beliefs and normative beliefs considered the effects of both habit and past behavior. Another argument was that the rational choice theory does not have the underlying basis to address altruistic behavior; thus, demonstrating inadequacy in predicting environmental attitudes (Blamey, 1998). The intention of putting the interest of others over individual needs reflects the manifestation

of altruistic behavior, which in this case, through environmental attitudes (Kaiser & Gutscher, 2003; Thogersen, 2004). Although Bamberg and Moser (2007) have linked self-interest motives to environmental attitudes, but Schultz et al. (2004) argues no evidence has found to support the positive impact of self-enhancing orientations on such behavior.

In view of the above, moral norms, rather than self-interest norms, seemed to provide higher relevancy in explaining environmental attitudes. Thus, the NAM theory (Schwartz, 1977) was included to complement the overall framework of predicting environmental attitudes in this study. Despite its limitations, TPB offers robust predictive capacity in assessing environmental attitudes, which has established its prominence within the existing literature on pro-environmental behavior (Reid et al., 2010). Integration of framework is important as environmental attitudes belongs more in the moral domain that TPB (Kaiser & Gutscher, 2003).

2.3 NORM ACTIVATION MODEL THEORY

The Norm Activation Model (NAM) theory (Schwartz 1970; 1977; 2012) postulates the influence of moral norms towards a certain altruistic behavior in a given situation. The application of NAM theory has been demonstrated across different environmental contexts (Van Liere & Dunlap, 1981; Eilam & Trop, 2012). Essentially, the behavior itself is governed by personal norms of responsibility for a specific action and beliefs on the implications of a specific action (Schwartz, 1970). In other words, the realization of these personal norms is when one possesses the sense of being accountable for a specific action and

aware of the implications of the action. As Blamey (1998), Milfont and Duckitt (2010), and Schwartz (2012) propounded, environmental attitudes, which may be driven by personal responsibility, may explain one's personal beliefs. Blamey (1998) found that qualitative study can be used to expand the model in the context of public goods in the domain of environmental issues. Other research has established that norm-activation model can be generalized as a moderating effect on the relationship between values and environmental behavior in cross-cultural studies (Milfont & Duckitt, 2010; Schwartz, 1992).

Meanwhile, Stern (2005) extended the NAM theory with the value theory or Value-Belief-Norm (VBN) model to provide further understanding on environmental attitudes. In particular, the VBN model serves to elucidate pro-environmental behavior, particularly among non-activists (Stern et al., 1999), and establish causal relations as a reliable means to assess environmental attitudes (Stern, 2005). There are different responses according to the various factors involved (Stern, 2000), which affect one's behavior towards the environment. Evidences have shown that personal norms can be changed by indirect or direct information to shape individual's beliefs (Stern, 2005; Howcroft & Milfont, 2010; Milfont & Duckitt, 2010). Nonetheless, the results of VBN model in explaining pro-environmental behavior remained rather inconclusive (Eilam & Trop, 2012; Bronfman et al., 2015; Cortes et al., 2016).

With that. Schwartz (2012) identified 57 universal values (from 97 samples across 44 countries), with varying degree of significance that serve as a benchmark for a certain behavior, and subsequently categorized these values of distinct motivational goals into two primary dimensions and four sub-

dimensions (Figure 2.2)—an extended work of Rokeach (1973). Generally, there are values that are compatible with one another, while certain values oppose one another. For instance, tradition and conformity, which share similar underlying motivational goal, are grouped in a single section because the interrelation between motivational goal and tradition may be conflicted when influenced by opposing value. Meanwhile, Schwartz (2012) introduced dotted lines for hedonism considering that the value is a grouping of both openness to change and self-enhancement.

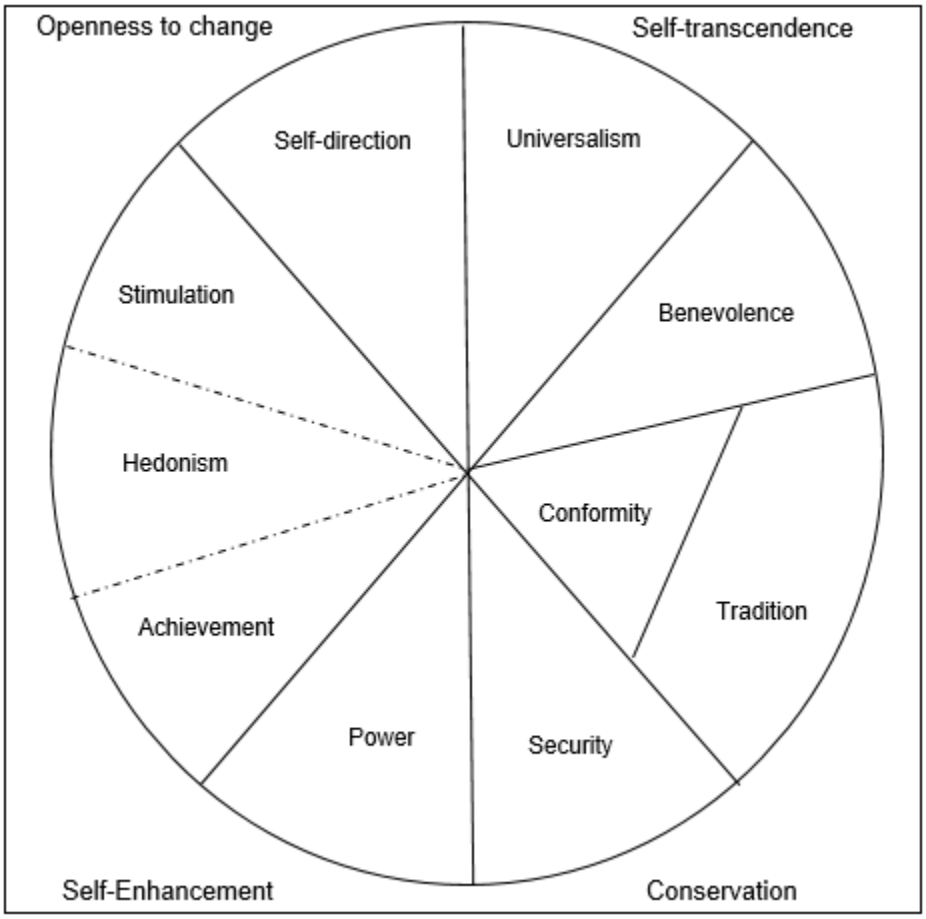

Figure 2.2. Theoretical Model of Values

(Source: Schwartz, 2012)

The association of environmental attitudes and values at cultural-level analysis and individual-level analysis (Newman & Fernandes, 2016) has prompted studies to predict environmental attitudes based on these categorized values (e.g., Schultz et al., 2004; Stern, 2005; Milfont & Duckitt, 2010), which unraveled significant findings, such as (1) conservation and openness to change were found to not affect environmental attitudes; (2) the relationship between environmental attitudes and self-transcendence was found positive; and (3) the relationship between environmental attitudes and self-enhancement was found

negative. The manifestation of environmental considerations was found more apparent among those who put emphasis on values beyond materialistic needs, as opposed to others with materialistic orientations—which supported the importance of cultural-level analysis in grasping the relationship between humans and the environment (Schwartz, 1992). Furthermore, consistent effects of both cultural values and individual values towards environmental attitudes across diverse societal distinctions (Schwartz, 1992; Milfont & Duckitt, 2010) further reaffirmed the application of the value theory in assessing environmental attitudes.

2.4 ENVIRONMENTAL ATTITUDES AND PRO-ENVIRONMENTAL BEHAVIOUR

Numerous factors and resultant outcomes contribute to the varying levels of environmental concern. Moreover, it is rather complex to establish a precise definition to describe the concept of environmental attitudes, given the inclusion of both affective and cognitive attributes. Certain studies on environmental attitudes encompass specific contexts, such as waste management (Barba-Sanchez & Atienza-Sahuquillo, 2016; Lieder & Rashid, 2016) and recycling (Baxter & Gram-Hanssen, 2016; Menikpura, 2016). There were also studies that addressed the broad concept on environmental attitudes (Rahman & Reynolds, 2016; Wang, et al., 2016). These studies are consistent with the specific issues that have been emphasized by previous studies and have been treated as the same construct as environmental attitudes, however in different ways.

Van Liere and Dunlap (1981) pinpointed two varying measures of environmental orientation, namely substantive issues and theoretical conceptualization, which have ruled out the option of comparing studies on environmental attitudes. The "substantive issues" addresses the corresponding implications and the relative importance of specific environmental issues in explaining the concept of environmental attitudes (of different affective and cognitive states). Meanwhile, the variation in the level of concern for the environment based on certain encounters (resulting to different judgments) is addressed in the "theoretical conceptualization".

Meanwhile, certain studies propounded that pro-environmental behavior may reflect one's propensity to exhibit environmental attitudes (Stern, 2000; Aoyagi-Usui et al., 2003; Eilam & Trop, 2012; Felonneau & Becker, 2008), but other studies highlighted otherwise (Tarrant & Cordell, 1997; Milfont & Duckitt, 2010; Eilam & Trop, 2012). Despite the evidences of pro-environmental behavior, the relationship between pro-environmental behavior and environmental attitudes was not substantiated (Van Liere & Dunlap, 1981; Milfont & Duckitt, 2010). For instance, Evans et al. (2007) demonstrated insignificant relationship between environmental attitudes and pro-environmental behavior among children of first- and second-grade in New York. Eilam and Trop (2012) revealed that pro-environmental behavior does not contribute to the formation of environmental attitudes in the community (students' parents) despite the manifestation of pro-environmental behavior through the environmental schools in Israel. The other study by the same authors found that the factors that influence attitudes are different from those that

influence behavior. The formation of environmental attitudes typically undergoes the psychological processes that involve personal and social experiences whereas environmental behavior involves rapid intake process. Study to measure the environmental behavior of a Chilean community found that a weak model's explanatory power to explain the relationship between ecologically aware consumer behavior (environmental attitudes) and ecological waste management (environmental behavior) (Bronfmane et al., 2015).

In view of the above, the translation of environmental attitudes into pro-environmental behavior is not warranted based on the prior studies that revealed incongruous relationship between both constructs. Moreover, the concept of environmental attitudes incorporates one's affects and beliefs that are subjected to indefinite psychological processes. Due to incubation of mental process, environmental attitudes significantly impact the later environmental actions.

2.5 EDUCATION FOR SUSTAINABILITY (EfS)

The assessment on the incorporation of environmental education into the higher education system is often performed based on the overall number of academic years or the implementation of required curriculum or courses, which was demonstrated to positively influence these students in the context of pro-environmental behavior (e.g., Sutton & Gyuris, 2015; Cortes et al., 2016; Abdel Raman, 2016; Arroyo, 2017). However, the exploration on the students' environmental attitudes through the environmental education remains scarce despite the growing interest on environmental education. Most studies only assessed environmental attitudes within the curriculum context of EfS.

Abdel Raman (2016) assessed environmental attitudes among undergraduates in the College of Ajman University of Science and Technology, UAE, which revealed the following findings: (1) there were significant differences between undergraduates of environmental sciences background and undergraduates of other academic backgrounds; (2) the environmental attitudes among female undergraduates were more apparent than the environmental attitudes among male undergraduates; (3) undergraduates of dentistry and pharmacy backgrounds displayed higher environmental attitudes than undergraduates of other academic backgrounds, namely humanities, information technology, law, and mass communication; and (4) the environmental attitudes among undergraduates of engineering backgrounds was the least apparent.

Besides that, Cortes et al. (2016) demonstrated positive relationship between environmental attitudes and environmental concern among Brazilian and Portuguese undergraduates. The study further reaffirmed that the integration of environmental education and the access to environmental knowledge through various media defined the environmental attitudes as well as environmental concern among Brazilian and Portuguese undergraduates. For instance, green consumption—the concern over this issue was rather apparent among the sampled undergraduates although it is not widely practiced due to the limited accessibility to green products in the current market.

Meanwhile, Arroyo (2017) assessed the role of higher education system in promoting sustainability within the context of environmental management accounting between two selected universities. In particular, Arroyo (2017)

measured the multiple roles of campus sustainability assessments in the organizational change that may trigger the changes in environmental attitudes among the students. The findings suggest that sustainability campus assessment is a social construct emerging from the interaction of different stakeholders. In this context, student's environmental attitudes are driven by the change agents to create alliances with other stakeholders group to get institutional support and may trigger the organizational change process. Social construction characteristics are seen as a valuable tool to understand the existence of multiple roles of campus sustainability assessment that may contribute to the change in environmental attitudes.

2.6 ENVIRONMENTAL ATTITUDES SCALES

Most studies on environmental psychology subjectively measured environmental attitudes and environmental cognitions (Kormos & Gifford, 2014; Tyrväinen et al., 2014; de Leeuw et al., 2015). After all, it is implausible to directly measure latent constructs, such as attitudes (Kormos & Gifford, 2014). Conventionally, the measurement of attitudes mainly depends on self-report methods (Lönnqvist et al., 2015; Stupple et al., 2017), rather than implicit methods. Despite the extensive measurements available for environmental attitudes, the Ecology Scale, the Environmental Concern Scale, and the New Environmental Paradigm (NEP) are widely applied and assessed in terms of both validity and reliability (Dunlap, 2008; Milfont & Duckitt, 2010). Basically, these three measurements are multiple-topic assessment methods (Dunlap & Jones, 2002) with extensive scope of analysis, including attitudes, beliefs,

intentions, and behaviors in diverse environmental topics, such as pollution, waste management, recycling, and natural resources.

Maloney and Ward (1973) initially proposed 130 items (such as actual commitment, affect, knowledge, and verbal commitment) for the Ecology Scale as four-multidimensional scales, which were later reduced to only 45 items with similar dimensions (Maloney et al., 1975). However, the Ecology Scale has certain limitations, especially when it concerns the measurement of both intention and behavior. Kaiser and Gutscher (2003) propounded that the relationship between environmental intention and environmental behavior was only enhanced through environmental influence. Moreover, certain studies demonstrated either weak (Kaiser & Gutsher, 2003; Bronfman et al., 2015) or insignificant (Hasyim, 2013) relationship between environmental intention and environmental behavior. The measurement process for the Ecology Scale was also deemed complex for studies to assess environmental behavior (Kaiser & Gutscher, 2003).

Following that, Weigel and Weigel (1978) developed the Environmental Concern Scale with 16 items (denoted as general attitudes) (Dunlap & Van Liere, 1978), which included cognitive, evaluative, and conative expressions of environmental concern. However, factors influencing and influenced by environmental concern were not be given attention is attitude research by later studies (Weigel, 1983). It was contended that knowledge is crucial in measuring certain facts and it influences toward environmental attitudes. Besides that, the measurement scale to assess the relationship between attitudes and behavior was found to be insufficient. Both attitudes and behavior should be measured for the

same environmental contexts within a common time domain. Besides that, Ajzen (1991) disapproved that the environmental behavior should not be exclusively subjected to the conditions that are not within one's control. Nevertheless, the emerging, complex environmental issues over the recent years have made this measurement rather obsolete (Dunlap & Jones, 2002).

Meanwhile, Dunlap and Van Liere (1978) initially established the NEP scale to assess the general relationship between the environment and humans to avoid the dated issues in general environmental topics. Following that, Dunlap et al. (2000) established a more theoretically sound version of NEP (NEP-Revised: NEP-R) with 15 items of refined psychometric features. The alternative version of NEP has been extensively applied in various studies to grasp the beliefs (which emphasized ecocentrism, rather than anthropocentrism) (Dunlap, 2008) and values of environmental attitudes towards the environment quality and management. The present study considered to focus on environmental beliefs instead, although the NEP-R covers a wide range of ecological worldview (Dunlap et al., 2000). As Dunlap (2008) elaborated, the environmental beliefs measure one's ecological views—which offers in-depth elucidation on their environmental attitudes. Nonetheless, there may be a unidimensionality issue for the NEP-R as recent studies demonstrated multidimensionality for the overall constructs of 15 items, ranging from two-multidimensional structure (Wen Xue & Shouying Zhao, 2015), four-multidimensional structure (Shephard, 2009), to five-multidimensional structure (Amburgey & Thoman, 2012). Given its wide range of assessing and categorizing the variations of ecological views, the NEP-R has served as a

benchmark in examining the implementation of EfS (Lundmark, 2007; Shephard, et al., 2011; Harraway et al., 2012). However, Milfont and Schultz (2016) argue that environmental beliefs should be supported by environmental attitudes to define environmental responsibility that reflected from the evaluation of environmental consequences.

Addressing the shortcomings of NEP, Milfont and Duckitt (2010) recommended the Environmental Attitudes Inventory (EAI) to assess the environmental beliefs using 12 factors through a multifaceted multidimensional structure of environmental attitudes (Milfont & Duckitt, 2006; Milfont & Duckitt, 2010) based on 200 items of pro-environmental behavior from NEP (Dunlap & Van Liere, 1978; Dunlap, 2008), Ecological World View Scale (Blaikie, 1992), and Environmental Perception Scale (Bogner & Wiseman, 1999; Milfont & Duckitt, 2010). Referring to the reliability (of both unidimensionality and multidimensionality), validity, and intercorrelation results, a refined EAI with a total of 72 items and 12 factors (six items per scale) was produced (Milfont & Duckitt, 2010). Sutton and Gyuris (2015) demonstrated the significance of the refined EAI as a standard tool for measuring the environmental attitudes between first-year undergraduates and final-year undergraduates in Australia with respect to their existing EfS curriculum.

However, certain studies yielded contradictory results, particularly on the number of factors for EAI—there were evidences of six factors (Yu et al., 2014; Koc & Kuvaca, 2016), seven factors (Ferreira et al., 2015), nine factors (Milfont & Duckitt, 2006), 10 factors (Milfont et al., 2010), 11 factors (Milfont

et al., 2010; Milfont & Duckitt, 2010), and one-factor of environmental movement activism (Tam, 2014). Additionally, the adequacy of EAI on the generalization of environmental attitudes across various studies of different cultural settings remains rather inconclusive—which has prompted more studies to assess environmental attitudes in terms of perceived environmental responsibility (preservation) and environmental consequences (utilization) across various distinctive cultures.

2.7 ENVIRONMENTAL ATTITUDES ACROSS CULTURES

The formation of environmental attitudes at an individual level was suggested to be influenced by cultures (Schultz et al., 2004). Despite this suggestion, previous studies have failed to consider environmental differences into environmental attitudes-behavior research (Bronfman et al., 2015; Felix & Braunsberger, 2016; Reyes, 2016; Fielding & Hornsey, 2017; Nilsson et al., 2017). Recent studies began to explore environmental attitudes across cultures (Cortes et al., 2016; Milfont & Duckitt, 2010; Milfont et al., 2010; Yu, 2014) using different environmental attitudes scales, which revealed contradictory findings.

For instance, Milfont et al. (2010) obtained similar results across Brazil, New Zealand, and South Africa, which categorized environmental attitudes into "preservation" and "utilization" with respect to the awareness of consequences and the ascription of responsibility (Schwartz, 2012) as well as consistent relationships among the EAI constructs across these diverse cultures. Likewise,

Milfont and Duckitt (2010) produced consistent findings using EAI to assess the notions on beliefs in relation to environmental attitudes across 50 countries.

On the other hand, the evaluation of environmental attitudes using NEP scale developed by Dunlap and Van Liere (1978) between Brazilian and Portuguese university's students found a clear correlation between environmental concerns and environmental attitudes when the student were given access to different environmental media and contents related to their topics and practices in undergraduate courses (Cortes et al., 2016). Meanwhile, Yu (2014) revealed that Chinese in the urban areas and rural areas depicted different levels of environmental attitudes due to the different levels of access to education and exposure to environmental knowledge—in which Chinese in the urban areas demonstrated higher environmental attitudes. In another study using NEP, Leung and Rice (2002) found significant differences between Anglo-Australians and Chinese-Australians in terms of environmental concern and the correlation between environmental attitudes and pro-environmental behavior. In particular, Anglo-Australians were found to exhibit higher environmental concern, while the correlation between environmental attitudes and pro-environmental behavior was only significant among Anglo-Australians. Likewise, Johnsaon et al. (2004) found significant differences in various environmental beliefs and pro-environmental behaviors across various cultural backgrounds in the United States using NSP, as well. Schultz (2004) assessed environmental concern across diverse countries within the South America region (Brazil, Colombia, Costa Rica, El Salvador, the Dominican Republic, Paraguay, and Venezuela) and compared these samples with the

samples from the United States, which revealed higher egoistic environmental concern for the samples from the United States and higher biospheric environmental concern for the remaining samples. Similarly, Milfont et al. (2006) found similar significant differences in the environmental concern for New Zealanders of Asian ancestry (who demonstrated higher egoistic environmental concern) and New Zealanders of European ancestry (who demonstrated higher biospheric environmental concern). However, the biospheric environmental concern of European ancestry was found to positively predict their pro-environmental behavior, while both biospheric environmental concern and egoistic environmental concern of Asian ancestry positively predicted their pro-environmental behavior. Deng et al. (2006) also demonstrated disparities between Chinese-Canadians and Anglo-Canadians, in which the former displayed higher altruistic environmental concern.

2.8 HYPOTHESES

In view of the above, this study developed the following four hypotheses for testing:

H1: Enjoyment of nature, support for interventionist conservation policies, environmental movement activism, conservation motivated by anthropocentric concern, confidence in science and technology, environmental threat, altering nature, personal conservation behavior, human dominance over nature, human utilization of nature, ecocentric concern, and support for population growth policies are the dimensions of environmental attitudes among the undergraduates in Abu Dhabi.

H2: Preservation and utilization are the higher order model of environmental attitudes among undergraduates in Abu Dhabi.

H3: The environmental attitudes among undergraduates in Abu Dhabi are different across cultures.

H4: The utility of environmental attitudes within the EfS context is demonstrated among undergraduates in Abu Dhabi.

2.9 CHAPTER SUMMARY

This chapter reviewed the fundamental concepts and theories of prior studies, which served as the underlying basis of this study. Based on the literature review, the effects of environmental attitudes towards pro-environmental behavior remain inconclusive, which propelled the need to comprehensively explore environmental attitudes using comprehensive and reliable measurement scales in terms of beliefs, values, and the relationship between humans and environment across diverse cultures. The subsequent chapter presents the research gap and framework of this study.

CHAPTER 3

RESEARCH FRAMEWORK

3.1 RESEARCH GAPS

Both environmental attitudes and pro-environmental behavior share rather contradictory distinctions, which reaffirm the significance of grasping the concept of environmental attitudes (Tarrant & Cordell, 1997; Milfont & Duckitt, 2010; Eilam & Trop, 2012). There have been attempts to assess environmental attitudes across cultures in the recent studies, but similar studies within the context of EfS remains scarce which was addressed in this study. The identified research gaps are explored in the following sub-sections.

3.1.1 Gap in the Effects of EfS towards Environmental Attitudes

It has been widely acknowledged that students' environmental awareness, knowledge, and mechanism reflects their responsible behavior (Jim Wu et al., 2015; Sutton & Gyuris, 2015; Wen Xue & Shouying Zhao, 2015), which propels the formal integration of environmental education into the existing higher education system. There may be certain issues and challenges for the higher education system to commit to the implementation of EfS initiatives (Fernández- Rajaram, 2013). Nevertheless, the implementation of EfS has

gained increasing attention, which has propounded the significance of introducing environmental issues of both locally and globally, promoting environmental attitudes, and expanding the existing environmental knowledge base among students.

Prior studies focused on the overall organization and implementation of EfS initiatives (Fernández-Sánchez et al., 2014) without addressing the effects of the existing environmental education in the higher education towards students. Without a comprehensive and reliable measurement tool, it has become rather challenging to gauge the effectiveness or limitations of the introduced initiatives in influencing students' environmental attitudes and pro-environmental behavior (Shephard, et al., 2011); thus, resulting to certain drawbacks for the assessment, monitoring, and improvement of EfS.

3.1.2 Gap in the Environmental Attitudes Scales

Markle (2013) recommended performing the assessment, monitoring, and improvement of EfS based on the findings of prior studies. For instance, the proposed Ecology Scale (Maloney & Ward, 1973) and the Environmental Concern Scale (Weigel & Weigel, 1978)—which have been used to assess environmental intention and pro-environmental behavior among students in the higher education system. Amongst the proposed environmental attitudes scales, the prominence of NEP-R (Dunlap et al., 2000) in grasping environmental attitudes among these students is widely acknowledged based on the extensive number of studies (over 49 studies) that adopted this scale.

Despite that, as previously highlighted, the NEP-R yielded inconclusive results on the unidimensionality of 15 items (Shephard, 2009; Amburgey & Thoman, 2012; Wen Xue & Shouying Zhao, 2015). The concept of unidimensionality assumes no correlated residuals between these items with respect to the notion of local independence (Lazarsfeld, 1959). Accordingly, Erdogan (2009) and Amburgey and Thoman (2012) propounded that five correlated dimensions are ideal for NEP-R based on the analysis on 72 items and the presence of statistical bias for the 15-item NEP as a predictive score or outcome measure. Apart from that, the NEP-R was also found to be significantly influenced by the types of samples and the length of measurement scale based on a meta-analysis across 69 studies, which disallow the necessary comparisons across studies on NEP-R (Howcroft & Milfont, 2010). Thus, NEP-R was considered to be incompetent to address the complex environmental issues within the context of EfS in terms of preservation and utilization among these students—instead, EAI (Milfont& Duckitt, 2010) was recommended as the appropriate option. Moreover, the NEP-R with 72 items may be a liability to these students for psychometric studies across cultures (Sutton & Gyuris, 2015).

Following the shortcomings of NEP-R, EAI was considered to address the complex environmental issues within the context of EfS (Milfont & Duckitt, 2006; Milford & Duckitt, 2010; Sutton & Gyuris, 2015). Nevertheless, Tam (2014), Yu et al. (2014), Ferreira et al. (2015), and Koc and Kuvaca (2015) demonstrated variations in the number of extracted factors of EAI through factor analysis. Apart from the overall structure and language (Okafor, 2010), the plausibility of non-response bias may likely to occur for the EAI of 12-factors

with six items per scale, which is seen as a liability for the respondents to provide the necessary feedback (Rolstad et al., 2011). Therefore, the applicability of EAI, particularly among non-native English speakers, may offer unreliable results. Although the EAI may comprehensively assess the effects of EfS initiatives, the scale is potentially subjected to cultural bias (Grendstad & Sundback, 2003) and social desirability bias (Milfont, 2009) across diverse samples, especially when the self-reported measurement is considered; thus, resulting to internal inconsistency. Meanwhile, Dunlap (2008) propounded several rationalizations for the plausible occurrence of social desirability bias: (1) the extensive media access to environmental issues may influence the public beliefs and values, which subsequently influence their environmental attitudes; (2) the institutions may form one's environmental attitudes; (3) one's likelihood towards environmental attitudes and pro-environmental behavior may be initiated by one's readiness to act upon the environmental intention; (4) environmental knowledge may influence environmental attitudes; (5) the social and political leadership in promoting environmental awareness may influence the public environmental awareness. In view of the above, assessing these possible considerations may provide insights on the internal inconsistency for environmental attitudes across cultures.

3.1.3 Gap of the Environmental Attitudes between Cultures

Earlier studies have failed to consider cultural differences into environmental attitudes-behavior research (Bronfman et al., 2015; Felix & Braunsberger, 2016; Fielding & Hornsey, 2017; Nilsson et al., 2017; Reyes, 2016; Schultz et al.,

2004). Recent studies began to explore environmental attitudes across cultures (Cortes et al., 2016; Milfont & Duckitt, 2010; Milfont et al., 2010; Yu, 2014), but less attention is given to the cultural differences between the respondents. The cultural differences are significant because students' environmental concerns and environmental attitudes were depending on different environmental exposure and contents related to their topics and practices in undergraduate courses (Cortes et al., 2016). Further, cultural differences between developed, developing, and least developed countries depict the environmental attitudes of students due to the different levels of access to education and exposure to environmental knowledge (Yu, 2014).

The ancestry of samples was recommended as future research direction by the earlier research. Much research found the differences in ancestry as the basis of the variation in environmental attitudes. Earlier studies demonstrated cultural disparities among samples positively predicted significant differences in the environmental concern (Deng et al., 2006; Johnsaon et al., 2004; Leung & Rice, 2002; Milfont et al., 2006; Schultz, 2004).

Overall, these studies were mostly based in the Western context and the selected Asians were of those who have conformed to the foreign culture despite the substantial evidences obtained on the environmental attitudes across cultures. Therefore, the findings based on these Asians particularly may not exclusively reflect the beliefs and values within the authentic Asian context. Additionally, studies on environmental attitudes within the regions of GCC, including of those developing and developed countries, remain scarce. Moreover, the applicability of both EAI and NEP within these regions of

different cultures, beliefs, and values has been disputed to vary from Western contexts. Thus, it is pivotal to extend the assessment of environmental attitudes across cultures to establish an inclusive global benchmark for cross-culture comparisons.

3.2 RESEARCH FRAMEWORK

This study considered EAI (Milfont & Duckitt, 2010) to assess the utility of environmental attitudes within the context of EfS among the undergraduates. Milfont and Duckitt (2010) highlighted that EAI offered internal consistency for environmental attitudes across cultures, but ensuing studies provided contradictory evidences of social desirability bias. Thus, this study psychometrically assessed the EAI. Besides that, Milfont et al. (2010) propounded the underlying basis of NAM theory (Schwartz, 2012) that identifies both preservation and utilization as higher-order dimensions of environmental attitudes. This study proceeded to examine the convergent validity and discriminant validity for every scale and higher-order dimensions as well as the internal consistency of the constructs. Table 3.1 provides the EAI scale as well as the definition of constructs, while Figure 3.1 displays the order model of EAI for this study.

Table 3.1. EAI Scale and Definition of Constructs

Scale (Label)	Definition of construct	Example of items
Scale 1: Enjoyment of nature (EN)	The belief of pleasure for the time spent in nature (favor to spend time in nature) *versus* the belief of pleasure for the time spent away from nature	I like going on trips into the countryside, for example, to forests or fields. [r] I think spending time in nature is boring. [r] I would not want to donate money to support an environmentalist cause.
Scale 2: Support for interventionist conservation policies (SI)	The support for conservation policies (to regulate the industry, to promote the use of raw materials, and to subsidize the alternative eco-friendly energy sources and practices) *versus* the disapproval of conservation policies	[r] Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up [r] I am opposed to governments controlling and regulating the way raw materials are used to try and make them last longer.

Scale (Label)	Definition of construct	Example of items
		People in developed societies are going to have to adopt a more conserving lifestyle in the future.
Scale 3: Environmental movement activism (EM)	The willingness to actively advocate any organized action for environmental cause *versus* the refusal to be involved in any organized action for environmental cause	I do not want to be involved in an environmental organization. I am willing to contribute to the fundraising initiatives for environmental causes that are likely to be costly. [r] I would not want to donate money to support an environmentalist cause.
Scale 4: Conservation motivated by anthropocentric concern (CM)	Motivated by the anthropocentric concern to support conservation policies and environmental protection for the benefits	[r] Conservation is important even if it lowers peoples' standard of living. [r] We need to keep rivers and lakes clean to protect

Scale (Label)	Definition of construct	Example of items
	and demands of humans *versus* motivated by the biocentric concern to support conservation policies and environmental protection as having value in themselves	the environment, and not as places for people to enjoy water sports. [r] We should protect the environment even if it means peoples' welfare will suffer.
Scale 5: Confidence in science and technology (CST)	The belief that human ingenuity (particularly in science and technology) to address all environmental issues and implications *versus* the belief that human ingenuity (particularly in science and technology) cannot address all environmental issues and implications	Science and technology will eventually solve our problems with pollution, overpopulation and diminishing resources. [r] The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided. Modern science will solve our environmental problems.

Scale (Label)	Definition of construct	Example of items
Scale 6: Environmental threat (ET)	The belief that the environment is susceptible to human activities, resulting to irreversible negative implications towards both environment and humans *versus* the belief that the environment is robust with reversible negative implications	[r] People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong. Humans are severely abusing the environment. [r] The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic.
Scale 7: Altering nature (AN)	The belief that humans have the right to alter the environment to fulfill their needs and demands *versus* the belief that humans have no right to alter the environment and should preserve it in its original state	[r] I'd prefer a garden that is wild and natural to a well-groomed and ordered one. [r] Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us. [r] The conversion of new or unused land into

Scale (Label)	Definition of construct	Example of items
		agricultural or cultivation land should be prohibited.
Scale 8: Personal conservation behavior (PC)	The interest to conserve resources and protect the environment through personal behavior *versus* the disinterest to conserve resources and protect the environment in the personal behavior	[r] I am not the kind of person who makes efforts to conserve natural resources. Whenever possible, I try to save natural resources. I always switch the light off when I don't need it on anymore.
Scale 9: Human dominance over nature (HD)	The belief that the environment is primarily for humans to exploit *versus* the belief that the environment and humans have the same rights	[r] Humans are no more important than any other species. Human beings were created or evolved to dominate the rest of nature. Plants and animals exist primarily to be used by humans.

Scale (Label)	Definition of construct	Example of items
Scale 10: Human utilization of nature (HU)	The belief that the economic growth and development should be prioritized over the environmental protection *versus* the belief that the environmental protection should be prioritized over the economic growth and development	Protecting peoples' jobs is more important than protecting the environment. [r] Humans do not have the right to damage the environment just to get greater economic growth. The benefits of modern consumer products are more important than the pollution that results from their production and use.
Scale 11: Ecocentric concern (EC)	The sense of apprehension over the environmental destruction *versus* the lack sense of apprehension over the environmental destruction	[r] I do not believe protecting the environment is an important issue. Despite our special abilities, humans are still subject to the laws of nature.

Scale (Label)	Definition of construct	Example of items
		[r] It does not make me sad to see natural environments destroyed.
Scale 12: Support for population growth policies (SP)	The support for policies to regulate the population growth due to the concern for overpopulation issues *versus* the disapproval for policies to regulate the population growth with no concern for overpopulation issues	Families should be encouraged to limit themselves to two children or less. [r] We should not limit the number of children in a family. We would be better off if we dramatically reduced the number of people on Earth.

Note: [r] denotes the item was reverse-coded for analysis.

(Source: Milfont et al., 2010)

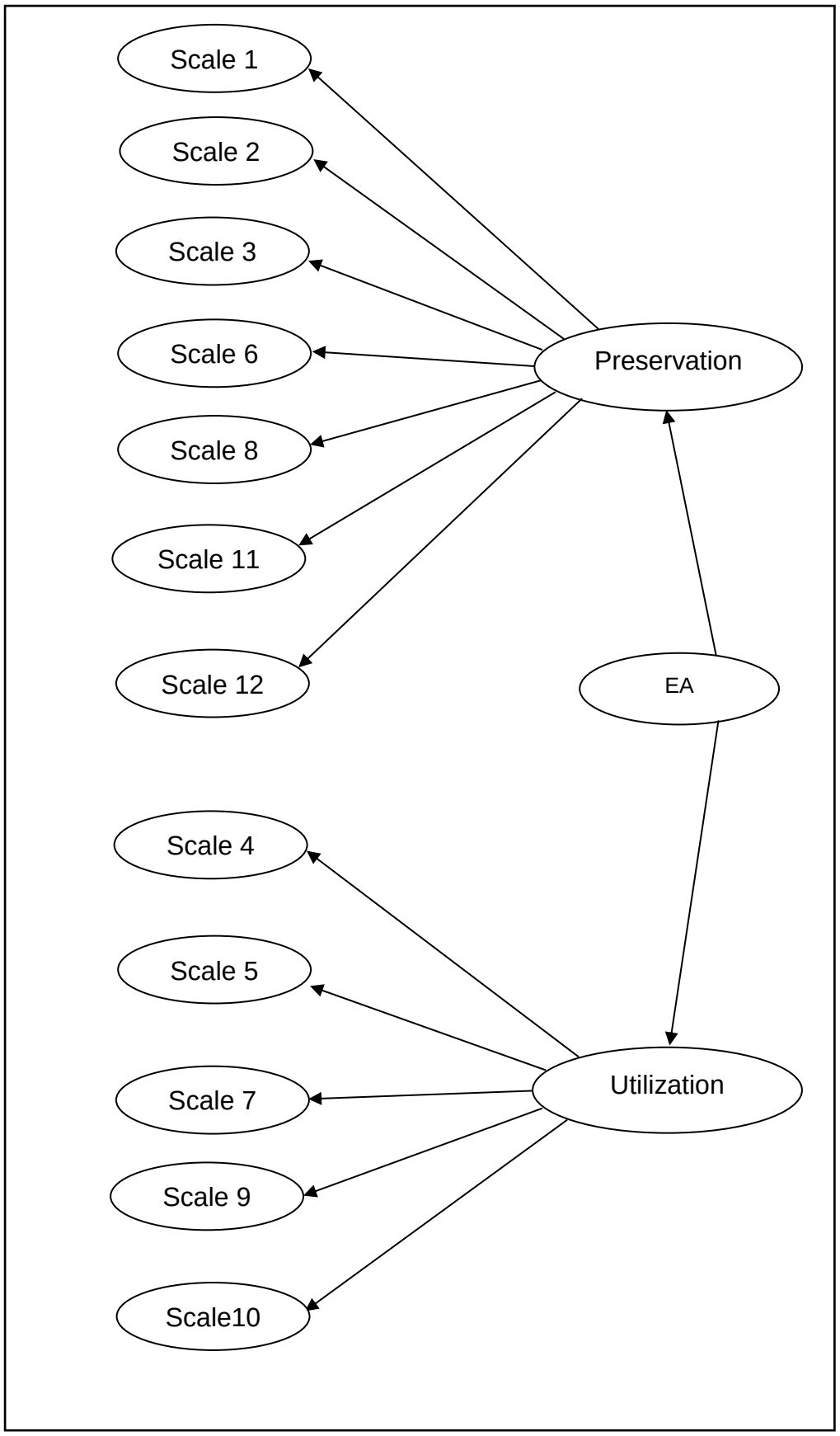
Scale 1
Scale 2
Scale 3
Scale 6
Scale 8
Scale 11
Scale 12
Preservation
EA
Scale 4
Scale 5
Scale 7
Scale 9
Scale10
Utilization

Figure 3.1. Research Framework

Notes: **Scale 1** denotes enjoyment of nature (EN); **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes conservation motivated by anthropocentric concern (CM); **Scale 5** denotes confidence in science and technology (CST); **Scale 6** denotes environmental threat (ET); **Scale 7** denotes altering nature (AN); **Scale 8** denotes personal conservation behavior (PC); **Scale 9** denotes human dominance over nature (HD); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC); **Scale 12** denotes support for population growth policies (SP).

3.3 CHAPTER SUMMARY

This study developed the relevant constructs based on the EAI and other prominent theories as the underlying basis for the research framework to assess the effects of EfS within the higher education system towards the environmental attitudes of students. The developed research framework served to guide this study in the hypotheses testing. Meanwhile, the subsequent chapter describes the performed data collection and the corresponding data analysis of this study.

CHAPTER 4

METHODOLOGY

4.1 OVERVIEW OF RESEARCH PROCESS

As presented in Figure 4.1, this study adapted the research process from Sekaran (2003) and Zikmund et al. (2010) to ensure systematic research process. The study initially acknowledged the primary research interest to set off the preliminary data collection, which involved the identification of research gaps based on the prior studies. Following that, the study outlined the overall framework as a guideline for the ensuing data collection and data analysis. The overall research framework and instruments were refined accordingly based on the obtained preliminary results.

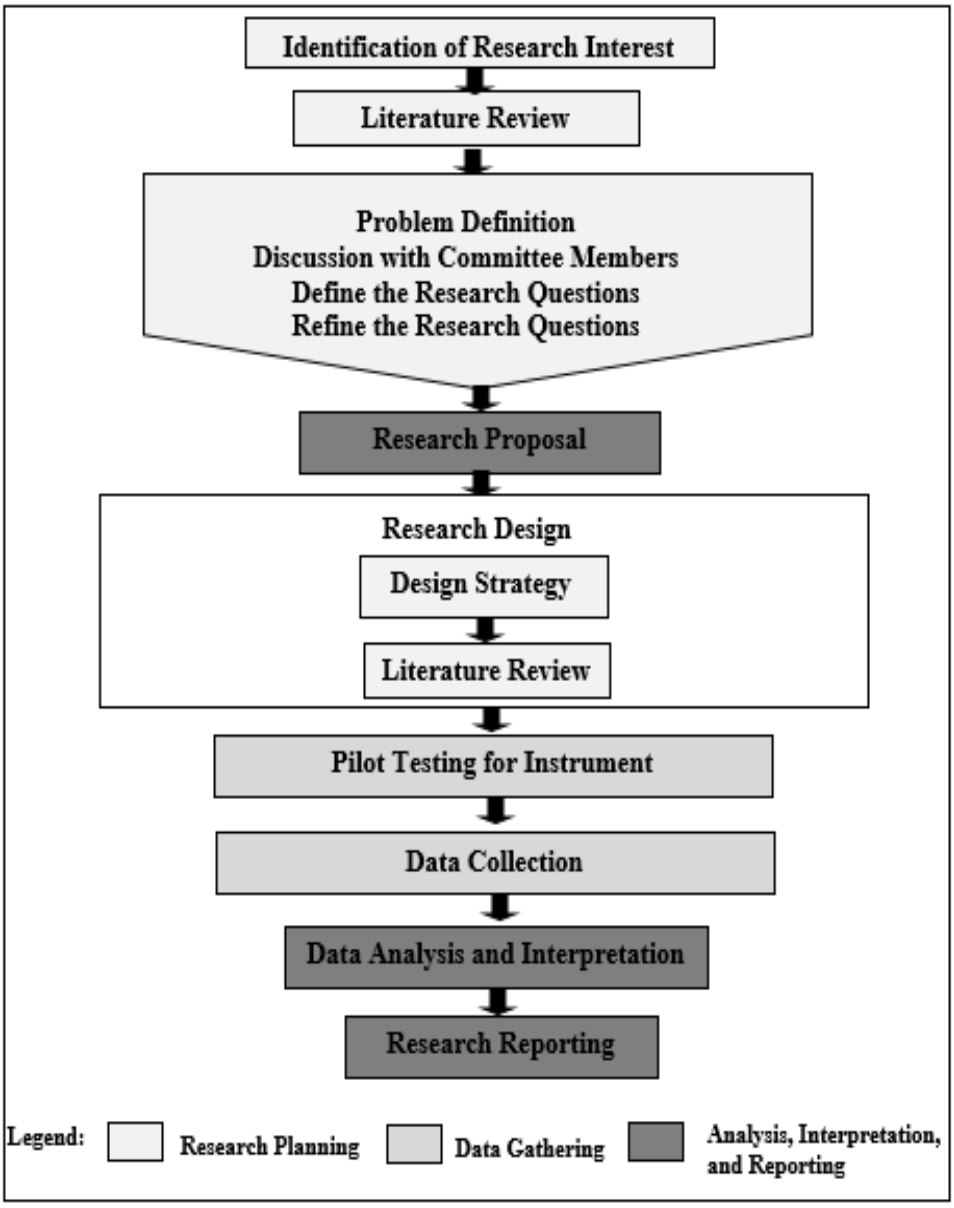

Figure 4.1. Research Process

4.2 RESEARCH DESIGN

The developed research design served to guide the present study to systematically perform data collection and data analysis (Zikmund et al., 2010), which ensured the necessary data were acquired and analyzed to present reliable findings with respect to the objectives of this study (Sekaran, 2003). According to Zikmund et al. (2010), the research background, research objectives, the obtainability of the data, and the availability of both costs and time influence the selection of methodology for a particular study. This study considered the exploratory approach considering that this study explored unfamiliar subject (Sekaran, 2003). In particular, this study explored the utility of EAI within the context of Arab culture to assess the environmental attitudes. Meanwhile, this study considered the descriptive approach to assess the demographic profile of respondents in supporting the exploratory approach.

4.3 POPULATION AND SAMPLE SIZE

The considered population for the present study comprised of undergraduates in various universities in the capital of the UAE, Abu Dhabi. With respect to the objectives of this study, the study only considered undergraduates who have experienced the formal integration of environmental education into their curriculum and co-curricular activities as well as research and interdisciplinary collaborations on environmental sustainability (Littledyk et al., 2013). The direct learning experiences among these undergraduates were expected to minimize the occurrence of common-method bias (Podsakoff et al., 2012).

With that, the overall sampling frame for this study was based on the admission of undergraduates for the academic session of 2013–2014, in which 69.7% of the total university students (50,809) were undergraduates (Statistical Centre Abu Dhabi, 2016). Considering that, the recommended sample size for the population in this study was set at 382 (Krejcie & Morgan, 1970), which was also in line with the proposed sample size by Roscoe (1975). A sample size of between 30 and 500 is considered sufficient for most studies (Roscoe, 1975). Cohen (1992) introduced a calculation formula for studies on behavioral sciences—in which a sample size of between 85 and 217 is considered adequate for statistical analysis, such as correlation. Accordingly, this study performed simple random sampling strategy for the generalization of findings, which was demonstrated by other studies (Tipton et al., 2016; Fosnacht et al., 2017). Adding to that, this sampling strategy ensured all individuals within the population had equal chances of being selected as the respondents for this study.

4.4 Selection of Quantitative Approach

A quantitative research is more objective in its nature (Zikmund et al., 2010), which allows statistical assessment on the relationships between constructs as well as the testing of hypotheses (Roscoe, 1975). Unlike qualitative approach (focuses on the process aspect), the quantitative approach in a study mainly focuses on the overall structure aspect of the research for hypotheses testing (Saunders et al., 2007), which provides an objective viewpoint of the selected respondents (Hair et al., 2010). The inclusion of hypotheses testing in a quantitative research ensures the generation of reliable interpretations and the

normalization of the empirical results. Therefore, this study selected the quantitative approach based on the nature of this study and the need to obtain measurable data to generalize over the selected population.

4.5 DATA COLLECTION

The data collection for this study involved two phases (1) data collection for pilot test and (2) actual data collection. The pilot test serves to assess the relevance of the considered methodology in order to minimize the plausible errors pertaining to the research design (Zikmund et al., 2010). Besides that, the reliability and validity of the developed instrument are evaluated through the pilot test, which allows the necessary modifications for the instrument (Sekaran, 2003) prior to the actual data collection. Testing the equivalence of manipulations and measures to constructs tested in the origical research prior to the actual replication attempt is necessary due to the severity of the context change of the original EAI (Brandt et al., 2014). The pilot test was able for replication in the main study.

Essentially, the actual data collection systematically acquires the required data with respect to the objectives of the study. It is necessary to accurately define the applied approaches as well as the considered constructs in the instrument for solid interpretations for the obtained results (Shenton, 20024) and reliability of the overall study (Zikmund et al., 2010) with the minimization of plausible bias or error (Sekaran, 2003). The process provides both a baseline from which to measure and indicate of what to improve.

4.6 Consideration of Primary Data

This study considered the primary data since the secondary data were deemed inadequate to allow generalization of the obtained findings and to address the needs of this study. As Cohen et al. (2007) highlighted, the use of primary data ensures the validity and reproducibility of the results through the recognized procedures and analyses. Additionally, the obtained data offer recent insights that are directly acquired from selected respondents of a specific population. The sources of primary data include interview (in different settings, such as face-to-face interview, telephone interview, or computerized interview), questionnaire survey (using different strategies, such as mail, electronic mail, or self-administered), focus group, observation, and experimentation (Sekaran, 2003).

In particular, this study performed the online-based questionnaire survey. This approach has received criticisms in terms of its low response rate (compared to the paper-and-pencil questionnaire survey) despite its wide acceptance as a data collection method across diverse contexts (Kwak & Radler, 2002). Thus, this study ensured the respondents of their anonymity, confidentiality, and understanding on the purpose of this study to optimize the response rate of this questionnaire survey. In particular, the appropriate response rate may range between 30% and 35% (Frohlich, 2002) or at least, 119 returned questionnaire surveys (Bartlett et al., 2001) for a quantitative study (to generalize the findings).

4.7 DEVELOPMENT OF INSTRUMENT

With respect to the ethical conduct of research, this study acquired the approval (Appendix C) from the Institutional Review Board for Human Subjects Research (IRB) of Abu Dhabi University for the instrument. Considering its consistent adaptability as a measurement model across cultures, this study included all 12 factors of the 72-item questionnaire, which were proposed by Milfont and Duckitt (2010), to assess the environmental attitudes among undergraduates within the context of Arab culture. It was ensured that there were no ethical issues for the constructed instrument following the permission provided by the original contributors of the questionnaire.

Besides that, the negatively worded items were assigned as they were without any modifications to sustain the respondents' interest in providing their responses for validity purpose, specifically the issue of construct irrelevant variance. Accordingly, van Sonderen et al. (2013) demonstrated no significant difference when the items were reverse coded or otherwise; thus, reaffirming the consideration of the wording in this study. Additionally, the underlying authenticity of the questionnaire can be preserved (Chiavaroli, 2017). The various wordings for the questionnaire ensure internal consistency (Salazar, 2015) and minimize the possible negative effects towards the validity of the responses (Lin et al., 2015). Table 4.1 presents the original EAI items, which were considered in this study. The adapted questionnaire and its translated version for the present study are provided in Appendix A (English version) and Appendix B (Arabic version).

Table 4.1. Original EAI items

Scale 1*: Enjoyment of nature (EN)* ***CA: 0.79** *The belief of pleasure for the time spent in nature (favor to spend time in nature) versus the belief of pleasure for the time spent away from nature* I really like going on trips into the countryside, for example, to forests or fields. [r] I think spending time in nature is boring. Being out in nature is a great stress reducer for me. I have a sense of well-being in the silence of nature [r] I find it more interesting in a shopping mall than out in the forest looking at trees and birds. [r] I find it very boring being out in wilderness areas.
Scale 2*: Support for interventionist conservation policies (SI)* ***CA: 0.88** *The support for conservation policies (to regulate the industry, to promote the use of raw materials, and to subsidize the alternative eco-friendly energy sources and practices) versus the disapproval of conservation policies* [r] Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up. [r] I am opposed to governments controlling and regulating the way raw materials are used to try and make them last longer.

People in developed societies are going to have to adopt a more conserving lifestyle in the future. [r] I don't think people in developed societies are going to have to adopt a more conserving lifestyle in the future. Governments should control the rate at which raw materials are used to ensure that they last as long as possible. Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more.
***Scale 3**: Environmental movement activism (EM)* ***CA: 0.89** *The willingness to actively advocate any organized action for environmental cause versus the refusal to be involved in any organized action for environmental cause* [r] I would not get involved in an environmentalist organization. Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort. [r] I would not want to donate money to support an environmentalist cause. I would like to join and actively participate in an environmentalist group. [r] I don't think I would help to raise funds for environmental protection. I would like to support an environmental organization.
***Scale 4**: Conservation motivated by anthropocentric concern (CM)* ***CA: 0.62** *Motivated by the anthropocentric concern to support conservation policies and environmental protection for the benefits and demands of humans*

versus motivated by the biocentric concern to support conservation policies and environmental protection as having value in themselves [r] Conservation is important even if it lowers peoples' standard of living. [r] We need to keep rivers and lakes clean to protect the environment, and not as places for people to enjoy water sports. [r] We should protect the environment even if it means peoples' welfare will suffer. One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports. Nature is important because of what it can contribute to the pleasure and welfare of humans. The thing that concerns me most about deforestation is that there will not be enough lumber for future generations.
***Scale 5**: Confidence in science and technology (CST)* ***CA: 0.73** *The belief that human ingenuity (particularly in science and technology) to address all environmental issues and implications versus the belief that human ingenuity (particularly in science and technology) cannot address all environmental issues and implications* Science and technology will eventually solve our problems with pollution, overpopulation, and diminishing resources. [r] The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided. Modern science will solve our environmental problems.

[r] Modern science will not be able to solve our environmental problems. [r] We cannot keep counting on science and technology to solve our environmental problems. Humans will eventually learn how to solve all environmental problems.
***Scale 6**: Environmental threat (ET)* ***CA: 0.84** *The belief that the environment is susceptible to human activities, resulting to irreversible negative implications towards both environment and humans versus the belief that the environment is robust with reversible negative implications* [r] People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong. Humans are severely abusing the environment. [r] The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic. [r] I do not believe that the environment has been severely abused by humans. If things continue on their present course, we will soon experience a major ecological catastrophe. When humans interfere with nature, it often produces disastrous consequences.
***Scale 7**: Altering nature (AN)* ***CA: 0.89**

The belief that humans have the right to alter the environment to fulfill their needs and demands versus the belief that humans have no right to alter the environment and should preserve it in its original state

[r] I'd prefer a garden that is wild and natural to a well-groomed and ordered one.

[r] Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us.

[r] Turning new unused land over to cultivation and agricultural development should be stopped.

When nature is uncomfortable and inconvenient for humans, we have every right to change and remake it to suit ourselves.

Grass and weeds growing between pavement stones really looks untidy.

I'd much prefer a garden that is well-groomed and ordered to a wild and natural one.

***Scale 8**: Personal conservation behavior (PC)* ***CA: 0.90**

The interest to conserve resources and protect the environment through personal behavior versus the disinterest to conserve resources and protect the environment in the personal behavior

[r] I am not the kind of person who makes efforts to conserve natural resources.

Whenever possible, I try to save natural resources.

I always switch the light off when I don't need it on any more.

In my daily life, I try to find ways to conserve water or power.

[r] I bothered to save water or other natural resources. [r] In my daily life, I'm just not interested in trying to conserve water and/or power.
***Scale 9**: Human dominance over nature (HD)* ***CA: 0.89** *The belief that the environment is primarily for humans to exploit versus the belief that the environment and humans have the same rights* [r] Humans are no more important than any other species. Human beings were created or evolved to dominate the rest of nature. Plants and animals exist primarily to be used by humans. [r] I do not believe humans were created or evolved to dominate the rest of nature. [r] Plants and animals have as much right as humans to exist. Humans were meant to rule over the rest of nature.
***Scale 10**: Human utilization of nature (HU)* ***CA: 0.84** *The belief that the economic growth and development should be prioritized over the environmental protection versus the belief that the environmental protection should be prioritized over the economic growth and development* Protecting peoples' jobs is more important than protecting the environment. [r] Humans do not have the right to damage the environment just to get greater economic growth. The benefits of modern consumer products are more important than the pollution that results from their production and use.

[r] Protecting the environment is more important than protecting economic growth.

[r] Protecting the environment is more important than protecting peoples' jobs.

The question of the environment is secondary to economic growth.

***Scale 11**: Ecocentric concern (EC)* ***CA: 0.82**

The sense of apprehension over the environmental destruction versus the lack sense of apprehension over the environmental destruction

[r] I do not believe protecting the environment is an important issue.

Despite our special abilities, humans are still subject to the laws of nature

[r] It does not make me sad to see natural environments destroyed.

It makes me sad to see forests cleared for agriculture.

[r] The idea that nature is valuable for its own sake is naïve and wrong.

Nature is valuable for its own sake.

***Scale 12**: Support for population growth policies (SP)* ***CA: 0.85**

The support for policies to regulate the population growth due to the concern for overpopulation issues versus the disapproval for policies to regulate the population growth with no concern for overpopulation issues

Families should be encouraged to limit themselves to two children or less.

[r] We should never put limits on the number of children a couple can have.

We would be better off if we dramatically reduced the number of people on Earth.

[r] The government has no right to require married couples to limit the number of children they can have. [r] A married couple should have as many children as they wish, as long as they can adequately provide for them. Our government should educate people concerning the importance of having two children or less.

Notes: All items were measured on a seven-point Likert scale (1: Strongly disagree; 2: Disagree; 3: Somewhat disagree; 4: Neutral; 5: Somewhat agree; 6: Agree; 7: Strongly agree). [r] denotes the item was reverse-coded for analysis. ***** indicates the obtained Cronbach's alpha value from the original study of Milfont and Duckitt (2010).

As for this study, the questionnaire comprised of two sections: (1) Section A focused on the demographic profile (such as age, gender, nationality, and course) of the respondents; (2) Section B presented the 12-dimensions of EAI. Similarly, the respondents in this study were required to indicate their agreement or disagreement for every item according to the seven-point Likert scale with endpoints of strongly disagree (1) and strongly agree (7).

4.8 DATA ANALYSIS

This study analyzed the obtained data from the pilot study using IBM SPSS (version 18.0) and performed the structuring equation modeling (SEM) using AMOS (version 18.0) for hypotheses testing. SEM simultaneously estimates multiple equations to assess the hypothesized measurement model (Hair et al.,

2010). Besides that, this study performed the descriptive and frequency analysis for the demographic profile of respondents.

4.8.1 Pilot Study

The pilot test primarily serves to minimize the possible limitations in the constructed instrument and to assess the validity and reliability of the constructs for reproducibility of the results. This study performed the principal component analysis (PCA) to evaluate the unidimensionality of the constructs (Hagel, 2014). Additionally, the exploratory factor analysis (EFA) was performed to evaluate the dimensionality of the items with respect to the underlying construct (Ziegler & Hagemann, 2015). In particular, this study considered the varimax rotation method in maximizing the variance of factor loadings for all constructs with the reduced number of factors. In other words, these items and underlying constructs are represented by a lower number of factors. Both PCA and EFA are able to extract factors from the original constructs (Russell, 2002) based on the structure of its interrelationship. These analyses categorize the factors (which represent significant dimensions for the items and underlying constructs of the study) that affect the structure and criterion constructs in the ensuing analyses. The resultant outcomes of these analyses provide insights on the structure and intercorrelations among these items (Field, 2013). To ensure the pilot test result can be replicated, measurement model was also conducted to evidence the enable replicability of the model construct (Cohen et al., 2007; Brandt et al., 2014; Maniadis et al., 2017).

4.8.2 Data Examination and Preparation

The obtained responses were examined and prepared for subsequent analysis. Data editing identifies any errors and necessary modifications to attain the required data quality (Cooper & Schindler, 2008). Any incomplete responses were identified and removed as meaningful data may be overlooked with the presence of non-response bias. It is pivotal to address the non-response bias to ensure the validity of results and to mitigate higher variances for the estimates (Yüksel, 2017). The remaining data were recorded and ready for analysis using IBM SPSS (version 18.0).

4.8.3 Model Specification

The measurement model, which is the primary component in SEM, reflects the relationships between the latent constructs and their corresponding items. Hagel (2014) advocates that a psychometric theory requires unidimensionality, while Ziegler and Hagemann (2015) posited that this technique is parallel to testing the dimensionality of items. At this point, the confirmatory factor analysis (CFA) was performed in order to identify the items in representing the underlying latent constructs. Similar to PCA and EFA, it is essential to determine the significant factors that potentially affect the structure and criterion constructs in the following analyses. First order, second order and third order models specification were measured to effect of differentiating the original variables by extracted factors (Russell, 2002) due to factor inter-correlations. As a result, it reduces many items and latent constructs into fewer numbers of factors.

4.8.4 Convergent Validity and Divergent Validity

Essentially, validity reflects the degree of which the constructs correspond to the underlying concepts (Guion, 1980). Cooper and Schindler (2008) contended the adaptability of instrument in obtaining meaningful data, which was also in line with the notion propounded by Kline (2010) that the items of an instrument measure only specific constructs. The instrument has to be tested in terms of convergent validity for the model fit. The first-order, second-order, and third-order models were tested to establish the validity of the instrument of this study (Cooper & Schindler, 2008) using average variance extracted (AVE) (Fornell & Larcker, 1981). Through AVE, the amount of variance captured by a construct was compared to the amount of variance due to the measurement error. Specifically, high convergent validity is assumed when the AVE exceeds 0.5, which also reaffirms the discriminant validity at the construct level. Factor loading is another important attribute to assess the discriminant validity at the construct level, in which factor loading of more than 0.5 ($\lambda > 0.5$) demonstrates high convergent validity (Hair et al., 2010).

Meanwhile, the discriminant validity reflects the relationships between the latent constructs. The unidimensionality of the constructs should be assessed prior to the ensuing model tests for multidimensionality (Hagel, 2014; Ziegler & Hagemann, 2015). It is crucial to establish the unidimensionality of the well-defined constructs for solid interpretations and reproducibility of the given structural model. Field (2013) highlighted that the unidimensionality of the constructs provides insights on the underlying structure and correlation among these constructs for the first-level measurement model, which was particularly

addressed in this study. Using CFA, the extent of which these constructs demonstrate that they are truly distinct from one another was evaluated. The AVEs of two underlying constructs must exceed the corresponding square of the correlation coefficient (r^2) in order to attain adequate discriminant validity (Fornell & Larcker, 1981), which was demonstrated in this study.

4.8.5 Test for Model Fit

Following that, this study assessed the model fit to validate the adequacy of the first-order, second-order, and third-order models. The test for model fit is essential in SEM that forms the fundamental aspect of these models. Apart from relying on the chi-square (χ^2) index and degree of freedom (*df*), the model fit is recommended to undergo several fit indices (Bollen, 1990; Miles & Shevlin, 2007; Hooper et al., 2008; Byrne, 2010) of at least four common fit indices (Arbuckle, 2006; Hooper et al., 2008; Byrne, 2010). There are normed-fit index (NFI), comparative fit index (CFI), Tucker-Lewis index (TLI), goodness-of-fit (GFI), and root mean square error of approximation (RMSEA) (Byrne, 2010; Hair et al., 2010), which were considered in this study. Other proposed combination of fit indices includes the relative χ^2 (χ^2/df), NFI, CFI, TLI, and RMSEA due to their sensitivity to the sample size (Bollen, 1990; Miles & Shevlin, 2007; Kline, 2010).

Conventionally, the χ^2 of the model chi-square (χ^2) in SEM measures the inconsistencies between the sample and fitted covariance matrices (Hu & Bentler, 1999) or the differences between the observed and estimated covariance matrices (Hair et al., 2006). With a sample size of between 100 and

200, the recommended cut-off value for χ^2 is either less than 3.0 (Kline, 2005) or 5.0 (Tabachnick & Fidell, 2007).

On the other hand, Bentler and Bonnet (1980) proposed the NFI with the threshold minimum value of greater than 0.90 for good model fit—suggesting that the measured variables are not correlated based on the comparison of the χ^2 of the null model. Meanwhile, Forza & Filippini (1998) and Greenspoon & Saklofske (1998) recommended the threshold minimum value of greater than 0.80 instead. On the contrary, Kline (2005) asserted the inadequacy of NFI when the sample size is less than 200. As demonstrated by Mulaik et al. (1989) and Bentler (1990), the reliability of NFI when the sample size exceeds 200 is validated. Certain studies opted NFI because of its statistic propensity towards good fit for models that are more complex (Bentler, 1990; Kline, 2005; Tabachnick & Fidell, 2007).

Addressing the issue of underestimating the model fit for small sample size, Bentler (1990) introduced the CFI—a revised form of NFI (Bentler, 1990; Tabachnick & Fidell, 2007). Nevertheless, the capacity of CFI as a common index in SEM was debated due to its less sensitivity over the sample size (Fan et al., 1999; Tabachnick & Fidell, 2007). Recognizing this issue beforehand, Bentler (1990) proposed the use of CFI in AMOS. Essentially, as for the CFI, all constructs are assumed uncorrelated and the fit of a target model to that of an independent model is compared (Bentler, 1990; Kline, 2005) with the cut-off value of more than 0.90 for a good fit (Bentler, 1990; Hatcher, 1994). However, Forza and Filippini (1998) suggested that the cut-off value of more

than 0.80 for a good model fit is adequate. Meanwhile, Hu and Bentler (1999) subsequently recommended the value of 0.95 reflects superior model fit.

Another common fit index is the TLI or also known as the non-normed fit index (NNFI), which is of an incremental fit index, to address the shortcomings of the NFI, particularly on the sample size (Anderson & Gerbing, 1988). The TLI is not significantly influenced by the sample size compared to other indexes (Hu & Bentler, 1999; Byrne, 2010). In principle, the higher the value of TLI, the better fit the model is—with the cut-off value of 0.90, as what most prior studies demonstrated (Byrne, 2010) despite the acceptable range for satisfactory model fit of as low as 0.80 (Bentler, 1990; Hair et al., 2010) or larger than 0.95 (Hu & Bentler, 1999; Tabachnick & Fidell, 2007).

Last but not least, the RMSEA, with a value range of zero to one (1.00), measures the error of approximation in the population and recognized as important criteria in covariance structure modelling (Byrne, 2010). Browne and Cudeck (1993) have explained that RMSEA is crucial in determining model with unknown parameter values however best possible to fit into population covariance. According to MacCallum et al. (1996), Steiger (1998), and Byrne (2010), the proposed cut-off value for this index is 0.08. However, Browne and Cudeck (1993) and Hu and Bentler (1999) suggested it is a good fit even with the value of less than 0.05. The following Table 4.2 summarizes the discussed model fit indices with the recommended threshold value.

Table 4.2. Observed model fit indices and acceptable threshold value for this study

Fit indices	Recommended threshold value	References
Chi-square (χ^2) (CMIN) (reported if sample size between 100 and 200)	< 0.50* < 0.30	Kline (2005) Tabachnick & Fidell (2007)
Comparative fit index (CFI)	> 0.80* > 0.90 > 0.90 > 0.95	Bentler (1990) Hatcher (1994) Forza & Filippini (1998) Hu & Bentler (1999)
Normed-fit Index (NFI)	> 0.80* > 0.80* > 0.90	Bentler & Bonnet (1980) Forza & Filippini (1998) Greenspoon & Saklofske (1998)
Tucker-Lewis index (TLI)	> 0.80* > 0.80* > 0.90 > 0.95 > 0.95	Bentler (1990) Hu & Bentler (1999) Tabachnick & Fidell (2007) Byrne (2010) Hair et al. (2010)
Root mean square error of approximation (RMSEA)	< 0.08* < 0.08*	Browne & Cudeck (1993) MacCallum et al. (1996)

Fit indices	Recommended threshold value	References
	< 0.08* < 0.06 < 0.05	Steiger (1998) Hu & Bentler (1999) Byrne (2010)

Note: * denotes the selected threshold value for this study.

4.8.6 Test of Normality and Outliers

The normality is based on the results of kurtosis and skewness (Hair et al., 2010)—specifically, the kurtosis describes the "peakness" or "flatness" of the distribution, while the skewness describes the balance of the distribution (positive skewness is assumed when the distribution shifts to left whereas negative skewness is assumed when the distribution shifts to right). Normality is typically assumed when both kurtosis and skewness values are between -1 and 1 (Marcoulides & Hershberger, 1997) at 0.05 level with z-statistic of less than 5.0 (Bentler, 2005). As Arbuckle (2006) propounded, the data for SEM-AMOS must be multivariate normal. Accordingly, the normality of data for SEM-AMOS has different assumptions—the kurtosis value of ±7 (Byrne, 2010) and skewness value of ±2 (George & Mallery, 2003) indicate normality at 0.05 level. Following the testing of normality for this study, the normality of data was assumed with both values of kurtosis and skewness were within the acceptable range with z-statistic of less than 5.0 (3.476).

Meanwhile, those items with values that significantly deviate from the majority are outliers. Unlike univariate outliers with extreme scores on a single item, a multivariate outlier contains extreme scores on more than one item (Kline, 2005). This study considered the squared Mahalanobis distance (D^2) using SEM-AMOS for the identification of multivariate outliers. Accordingly, a critical case of multivariate outliers exists if the obtained D^2 significantly deviates from other values of D^2 (Byrne, 2010). The distance in standard deviation units were calculated among a set of scores for one case and the sample means for all variables (centroid) (Blair & Zinkhan, 2006). Commonly, high D^2 values with both p1 and p2 equal to 0.000 and 0.000 respectively are identified as potential of outliers (Kline, 2005). As a result, these cases may be considered for deletion to reduce the serious multivariate outliers.

4.8.7 Strategies of Measurement Invariance

Kline (2015) proposed the multi-group CFA as one of the most widely used strategies to assess the measurement invariance. Unlike CFA that assesses the measurement model fit, the multi-group CFA specifically compares the measurement model across groups, which comprises three stages with specific invariance conditions of (1) configural invariance, (2) metric invariance, and (3) scalar invariance (Kline, 2015; Vandenberg & Lance, 2000).

In the first stage (to examine the configural invariance), the measurement model is independently evaluated for each group using CFA. In particular, this study performed the measurement fit of these models based on the proposed common criteria by Hu & Bentler (1999)—robust chi-square, CFI

(< 0.90), and RMSEA (< 0.08). The configural invariance is assumed supported when similar measurement model fits across groups.

In the second stage (to examine the metric invariance), a baseline model and an invariance model are compared. The factor loadings are estimated across groups without any constraint in a baseline model, while the factor loadings are constrained to be equivalent across groups in an invariance model. The chi-square difference test (Muthén, 1989) and the ΔCFI (Cheung & Rensvold, 2002; Meade & Lautenschlager, 2004) are applied to assess the differences between these two nested models. The invariance model is assumed to possess better fit (compared to the baseline model) if the chi-square difference test reveals insignificant result (Muthén, 1989). On the contrary, the baseline model is assumed to possess better fit if the chi-square difference test reveals significant result; thus, indicating that the underlying constructs differ across groups.

However, there are certain limitations to the chi-square difference test, such as high sensitivity to the sample size and indifference to a lack of invariance (Cheung & Rensvold, 2002; Meade & Lautenschlager, 2004). This places the ΔCFI (value of less than 0.01 suggests invariance) as a better alternative, which was reaffirmed in certain studies on the comparison of several goodness-of-fit indices (Cheung & Rensvold, 2002; Meade & Lautenschlager, 2004), with its indifference to the sample size and model complexities. Besides that, Meade et al. (2008) indicated that any observed differences across groups based on a sample size of more than 200 are likely to be negligible if the ΔCFI result suggests invariance—even when the chi-square difference test reveals that the underlying constructs differ across groups (significant result).

On another note, the full metric invariance, which assumes similar underlying meanings across groups, is realistically uncommon, but the partial metric invariance, which propounds only several latent constructs have similar underlying meanings across groups, highlights the need to perform the next stage (to examine the scalar invariance). With that, the means of these latent constructs are compared using the similar nested model comparison strategy. In this case, instead of factor loadings, the means are estimated across groups without any constraint in a baseline model, while the means are constrained to be equivalent across groups in an invariance model.

4.9 CHAPTER SUMMARY

This chapter presented the overall research design, data collection, and data analysis of this study. The development of the instrument for this study and the original EAI items were also provided in detail.

CHAPTER 5

RESULTS

5.1 PILOT STUDY

The pilot study distributed the questionnaires to 100 undergraduates in their final academic year, resulting to a response rate of 50%. There were no missing data identified in the gathered responses. The analysis proceeded by assessing the unidimensionality of EAI using PCA with oblique rotation method, which revealed the statistical significance of EAI factors. The number of factors was reduced based on the cross-loadings as well as the factor loadings (of less than 0.5) (Hair et al., 2010; Kline, 2010). The Kaiser-Meyer-Olkin measure of sampling adequacy revealed 0.799, while the Bartlett's test of sphericity (χ^2) recorded 2480.818 (df = 666, $p < 0.000$); which suggests no multicollinearity issues and the adequacy of intercorrelations between items. Besides that, the obtained eigenvalues for seven extracted factors exceeded 1.0 with the cumulative variance of 54.820%. The analysis removed five scales from the EAI of 12-scale: (1) **Scale 1** (Enjoyment of nature); (2) **Scale 6** (Environmental threat); (3) **Scale 8** (Personal conservation behavior); (4) **Scale 9** (Human dominance over nature); (5) **Scale 12** (Support for population growth policies.

The analysis for the pilot study then proceeded with EFA using varimax rotation method to assess the dimensionality of items on the refined model with seven extracted factors (21 items). As shown in Table 5.1, 21 items were rotated into seven-factor model of EAI, while retaining the underlying meanings and internal consistency. The kurtosis and skewness results in Table 5.2 demonstrated acceptable normality with the values within the threshold values of ±7.0 (Byrne, 2010) and ±2.0 (Gravetter & Wallnau, 2014), respectively. This study also performed CFA to assess the convergent validity and discriminant validity for the present seven-factor model. The adequacy of both convergent validity and discriminant validity were validated based on the following results with respect to the recommended threshold values: (1) **AVEs** of more than 0.5 (Kline, 2010); (2) **Cronbach's alpha** of more than 0.60; (3) **composite reliability** of 0.60 and above (Nunally & Bernstein, 1994; Raykov, 1998); (4) **factor loadings** of 0.50 and above (Hair et al., 2010; Kline, 2010). Meanwhile, the results of goodness-of-fit indices revealed satisfactory model fit and reproducibility of study (Cohen et al., 2007; Brandt et al., 2014; Maniadis et al., 2017) as follows (Figure 5.1) based on the proposed threshold values (Table 4.2): (1) CMIN = 209.373; (2) *df* = 163; (3) CFI = 0.959 (> 0.80); (4) NFI = 0.845 (> 0.80); (5) TLI = 0.948 (> 0.80); (6) RMSEA = 0.076 (< 0.80).

Table 5.1. Results of factor analysis for EAI

Factors/ Items	Factor loadings	Eigen values	% of Variance	AVE	CA	CR
Scale 2: Support for interventionist conservation policies (SI)						
SI1	0.865	2.463	82.088	0.73	0.85	0.89
	(0.868)			2	5	1
SI2	0.825					
	(0.821)					
SI3	0.876					
	(0.872)					
Scale 3: Environmental movement activism (EM)						
EM1	0.862	2.535	84.489	0.76	0.87	0.90
	(0.862)			8	6	8
EM2	0.897					
	(0.898)					
EM3	0.868					
	(0.868)					
Scale 4: Conservation motivated by anthropocentric concern (CM)						
CM1	0.915	2.441	81.357	0.73	0.85	0.89
	(0.914)			5	1	1
CM2	0.934					
	(0.936)					

Factors/ Items	Factor loadings	Eigen values	% of Variance	AVE	CA	CR
CM3	0.703					
	(0.702)					
Scale 5: Confidence in science and technology (CST)						
CST1	0.883	2.561	85.369	0.79	0.88	0.91
	(0.883)			1	5	8
CST2	0.991					
	(0.993)					
CST3	0.780					
	(0.779)					
Scale 7: Altering nature (AN)						
AN1	0.905	2.620	65.500	0.67	0.81	0.86
	(0.910)			4	5	0
AN2	0.856					
	(0.853)					
AN4	0.683					
	(0.683)					
Scale 10: Human utilization of nature (HU)						
HU1	0.896	2.618	87.259	0.81	0.90	0.92
	(0.896)			0	0	7
HU2	0.920					
	(0.921)					

Factors/ Items	Factor loadings	Eigen values	% of Variance	AVE	CA	CR
HU3	0.882					
	(0.882)					
Scale 11: Ecocentric concern (EC)						
EC1	0.881	2.622	87.415	0.78	0.88	0.91
	(0.888)			4	5	6
EC2	0.938					
	(*0.886)*					
EC3	0.884					
	(0.882)					

Notes: The factor loadings of CFA are provided in parentheses; AVE denotes average variance extracted; CA denotes Cronbach's alpha; CR denotes composite reliability.

Table 5.2. Normality result for the pilot study

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Stat	Stat	Std. Error	Stat	Std. Error
AN1	50	3	7	5.74	.828	-1.044	.337	1.811	.662
AN2	50	3	7	5.90	.814	-.992	.337	2.311	.662
AN4	50	3	7	5.66	.848	-.527	.337	.886	.662
CM1	50	3	7	5.74	.965	-1.007	.337	1.226	.662
CM2	50	2	7	5.76	1.135	-1.074	.337	1.438	.662
CM3	50	2	7	5.46	1.054	-1.035	.337	1.791	.662
CST1	50	1	7	5.56	1.146	-1.341	.337	4.016	.662
CST2	50	1	7	5.50	1.199	-1.441	.337	3.272	.662
CST3	50	3	7	5.54	1.110	-.477	.337	-.167	.662
HU1	50	3	7	5.68	.794	-.625	.337	1.550	.662
HU2	50	3	7	5.74	.899	-.679	.337	.708	.662
HU3	50	4	7	5.60	.833	.000	.337	-.506	.662

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Stat	Stat	Stat	Stat	Stat	Stat	Std. Error	Stat	Std. Error
EC1	50	4	7	5.56	.812	-.440	.337	-.272	.662
EC2	50	4	7	5.66	.745	-.271	.337	-.032	.662
EC3	50	4	7	5.70	.789	-.182	.337	-.270	.662
EM1	50	4	7	6.02	.742	-.657	.337	.760	.662
EM2	50	4	7	6.10	.707	-.505	.337	.395	.662
EM3	50	4	7	6.04	.807	-.802	.337	.659	.662
SI1	50	4	7	6.00	.700	-.744	.337	1.423	.662
SI2	50	4	7	6.08	.695	-.867	.337	1.892	.662
SI3	50	4	7	6.02	.769	-.876	.337	1.188	.662
Valid N	50								

Note: Stat. denotes statistic.

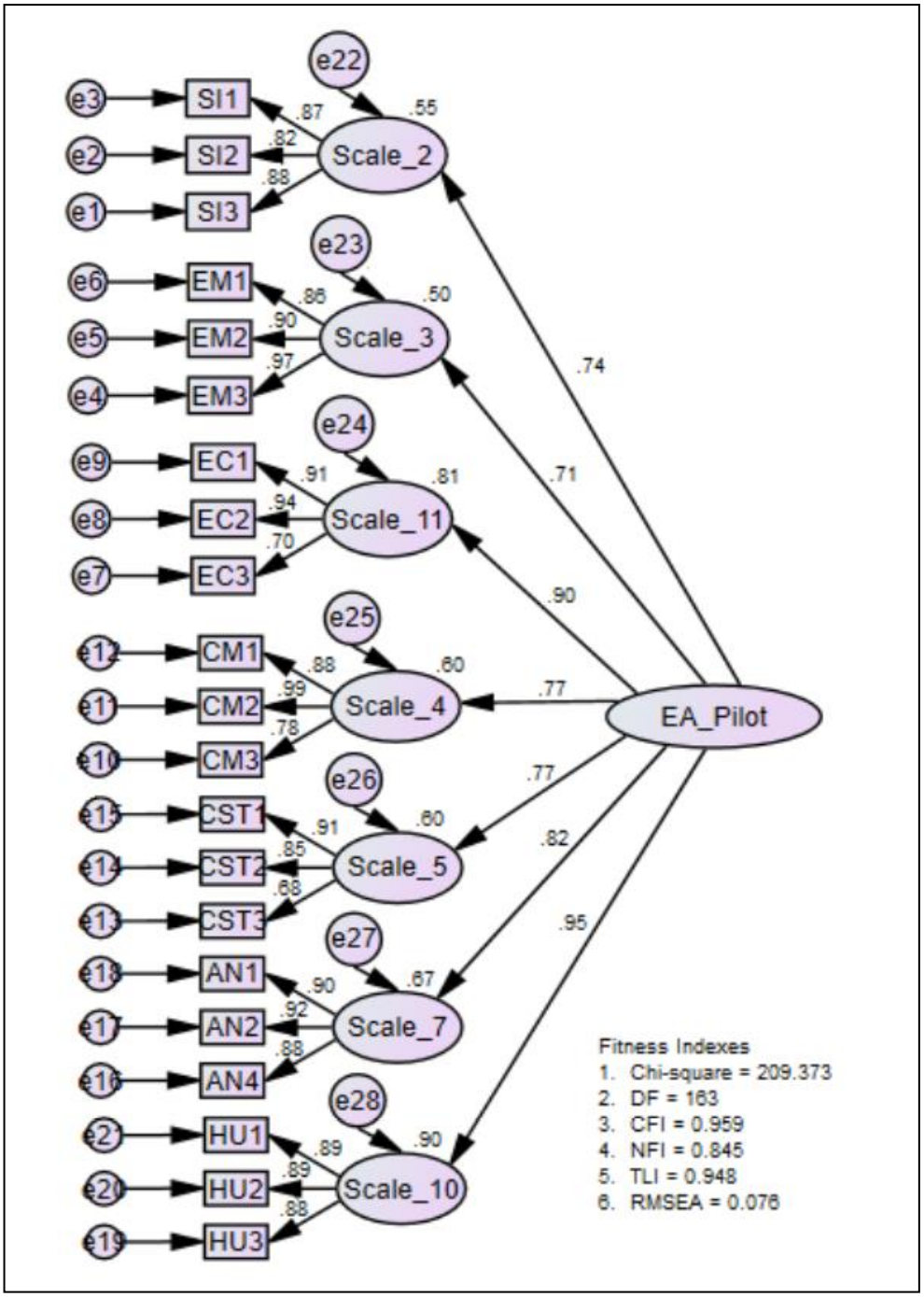

Figure 5.1. Seven-Factor Model of EAI in Pilot Study

Notes: **EA** denotes environmental attitudes; **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes conservation motivated by

anthropocentric concern (CM); **Scale 5** denotes confidence in science and technology (CST); **Scale 7** denotes altering nature (AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

5.2 MAIN STUDY

Following a month after the pilot study, this study performed the online-based questionnaire survey among 400 undergraduates in their final academic year in Abu Dhabi, UAE, which resulted to 32.5% completed questionnaires with a non-response rate of 65.0% and the removal of ten incomplete questionnaires (which had similar demographic profile attributes in terms of gender (male) and age group). The respondents of this study were mainly female (70.8%) and of age between 21 and 53 years (M = 25; SD = 0.955). Large proportion of these respondents (65.4%) took science and technology courses, while the remaining (34.6%) were of social science courses. The psychometric analysis in the pilot study was similarly performed in the main study to assess the EAI (Milfont & Duckitt, 2010).

5.2.1 First-Order Models

This study performed CFA on the 72 items of EAI with 12 factors, which reaffirmed the reduction of factors to seven factors with 21 items of EAI for the final measurement model. In particular, the removal of five factors (Scale 1, Scale 6, Scale 8, Scale 9, and Scale 12) was substantiated based on the results of r^2 (higher than AVEs), which implied inadequate discriminant validity (Kline, 2010). The inadequacy was further reaffirmed based on the obtained

tolerance values (< 0.20) and the VIF (> 5.0) (Montgomery et al., 2001; Thompson et al., 2017). The obtained values suggested multicollinearity with poor estimation of regression coefficients. Thus, this study proceeded with the factor reduction to the current model of seven factors with 21 items.

As shown in Table 5.3, the obtained data demonstrated normality (Cain et al., 2017; Yalçınkaya et al., 2018) based on the results of kurtosis and skewness, which were within the respective acceptable range of ±7.0 (Byrne, 2010) and ±2.0 (Gravetter & Wallnau, 2014). Adding to that, the obtained factor loadings and AVEs exceeded 0.50 (Hair et al., 2010; Kline, 2010). Besides that, the data also demonstrated adequate convergent validity (Byrne, 2010) with both CAs and CRs exceeded 0.60 (Nunally & Bernstein, 1994; Raykov, 1998).

Table 5.3. Normality result for the main study

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
HU1	3.000	7.000	-.684	-3.183	.894	2.081
HU2	2.000	7.000	-.893	-4.159	1.627	3.788
HU3	3.000	7.000	-.203	-.947	.148	.346
AN1	3.000	7.000	-.552	-2.567	.509	1.185
AN2	3.000	7.000	-.672	-3.127	1.314	3.058
AN4	2.000	8.000	-.685	-3.187	1.876	4.366
CST1	1.000	7.000	-1.091	-5.078	2.015	4.689
CST2	1.000	7.000	-1.104	-5.139	1.668	3.882
CST3	1.000	7.000	-.993	-4.621	1.206	2.807

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
CM1	3.000	7.000	-.857	-3.988	.808	1.879
CM2	2.000	7.000	-1.137	-5.294	1.354	3.151
CM3	2.000	7.000	-1.052	-4.895	1.165	2.711
EC1	3.000	7.000	-.747	-3.475	.540	1.256
EC2	3.000	7.000	-.624	-2.906	1.042	2.425
EC3	3.000	7.000	-.550	-2.562	.820	1.908
EM1	4.000	7.000	-.401	-1.865	.279	.649
EM2	4.000	7.000	-.414	-1.927	.262	.611
EM3	4.000	7.000	-.661	-3.079	.576	1.340
SI1	4.000	7.000	-.488	-2.272	.261	.608
SI2	4.000	7.000	-.558	-2.597	.452	1.052
SI3	4.000	7.000	-.620	-2.884	.331	.770
Multivariate					206.736	37.920

Referring to Table 5.4, the correlation between seven factors ranged between 0.347 ($r^2 = 0.120$) and 0.858 ($r^2 = 0.736$) at 0.01 level. The obtained AVEs exceeded the values of r^2; thus, demonstrating adequate discriminant validity. The reliability of model (Shrout & Fleiss, 1979; McGraw & Wong, 1996) and appropriate agreement measures (Cicchetti, 1994) were also reaffirmed based on the interclass correlation coefficient (ICC), which ranged between 0.800 and 0.888 at 0.05 level. Furthermore, the obtained tolerance values ranged between 0.360 and 0.697 with the variance inflation factor (VIF)

of less than 5.0 (Montgomery et al., 2001; Thompson et al., 2017). Evidently, there was no multicollinearity issue (Hair et al., 2010). Meanwhile, the following figures (Figure 5.2 – Figure 5.8) present the first-order models for each considered factor. Overall, the first-order models demonstrated satisfactory goodness-of-fit (CMIN = 294.835; *df* = 168; CFI = 0.939; NFI = 0.872; TLI = 0.924; RMSEA = 0.077). Figure 5.9 provides the final structural model of the seven-factor model.

Table 5.4. Results of bivariate correlation for seven-factor EAI model

	SI	EM	EC	CM	CST	AN	HU
SI	1						
EM	0.858**	1					
	(0.736)						
EC	0.468**	0.454**	1				
	(0.219)	(0.206)					
CM	0.576**	0.559**	0.639**	1			
	(0.332)	(0.312)	(0.408)				
CST	0.463**	0.477**	0.551**	0.839**	1		
	(0.214)	(0.228)	(0.304)	(0.704)			
AN	0.620**	0.566**	0.613**	0.529**	0.711**	1	
	(0.384)	(0.320)	(0.376)	(0.280)	(0.506)		

HU	0.452**	0.347**	0.677**	0.497**	0.509**	0.659**	1
	(0.204)	(0.120)	(0.458)	(0.247)	(0.259)	(0.434)	
AVE	0.747	0.743	0.784	0.733	0.680	0.561	0.746
CA	0.864	0.862	0.885	0.854	0.817	0.740	0.863
CR	0.899	0.897	0.916	0.891	0.862	0.789	0.898

Notes: ***** denotes significant correlation at 0.05 level (one-tailed); ****** denotes significant correlation at 0.01 level (two-tailed); The values of $\mathbf{r^2}$ are provided in parentheses; **SI** denotes Scale 2 (support for interventionist conservation policies); **EM** denotes Scale 3 (environmental movement activism); **EC** denotes Scale 11 (ecocentric concern); **CM** denotes Scale 4 (conservation motivated by anthropocentric concern); **CST** denotes Scale 5 (confidence in science and technology); **AN** denotes Scale 7 (altering nature); **HU** denotes Scale 10 (human utilization of nature); **AVE** denotes average variance extracted; **CA** denotes Cronbach's alpha; **CR** denotes composite reliability.

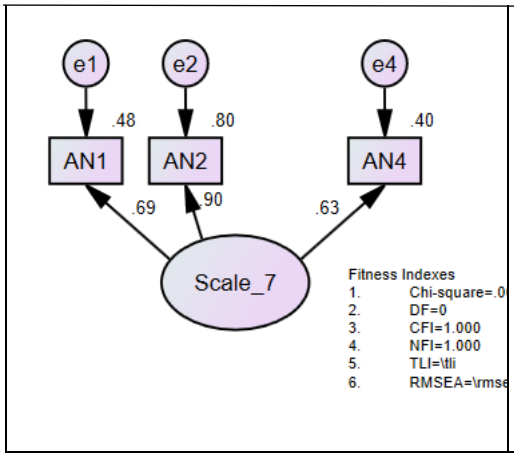

Figure 5.2. First-Order Model for Scale 7 (Altering Nature—AN)

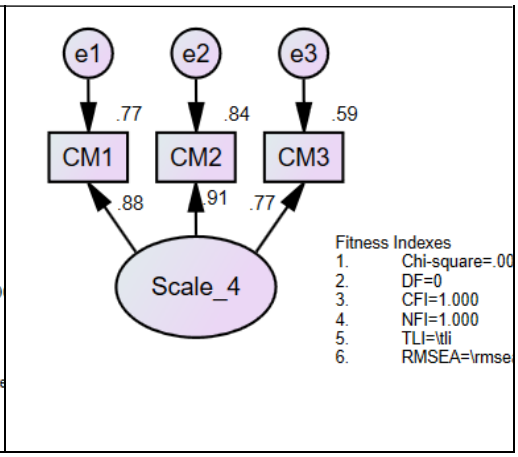

Figure 5.3. First-Order Model for Scale 4 (Conservation Motivated by Anthropocentric Concern—CM)

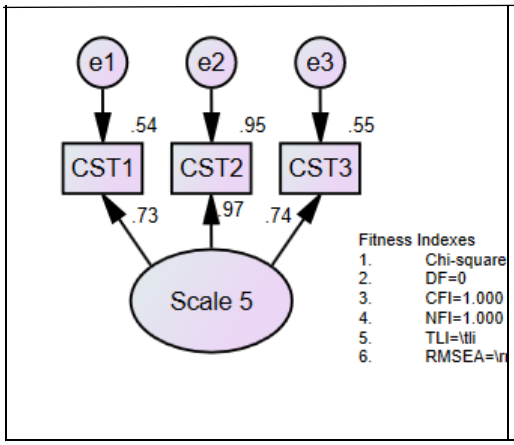

Figure 5.4. First-Order Model for Scale 5 (Confidence in Science and Technology—CST)

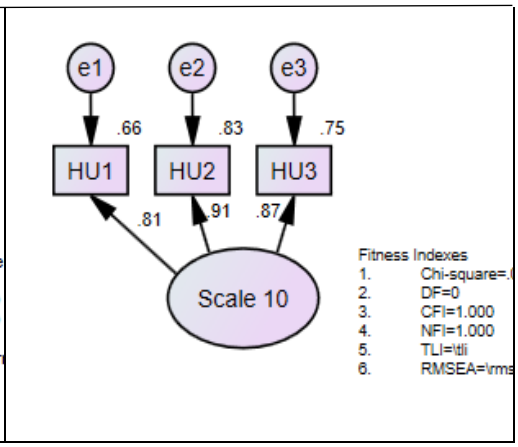

Figure 5.5. First-Order Model for Scale 10 (Human Utilization of Nature—HU)

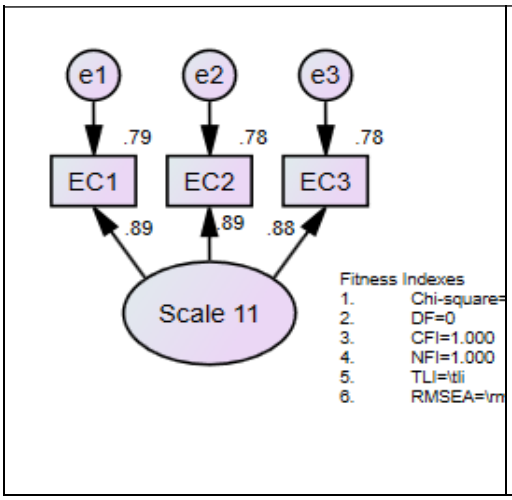

Figure 5.6. First-Order Model for Scale 11 (Ecocentric Concern—EC)

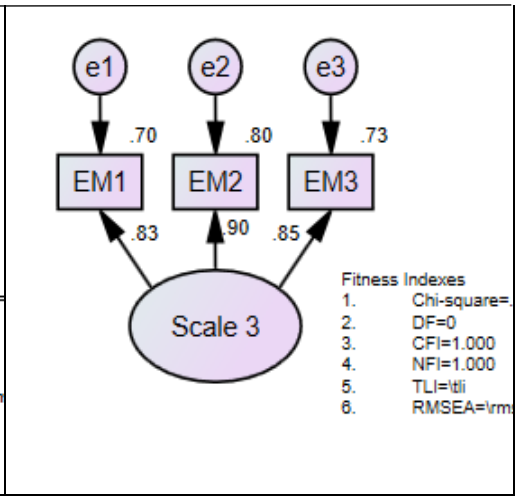

Figure 5.7. First-Order Model for Scale 3 (Environmental Movement Activism—EM)

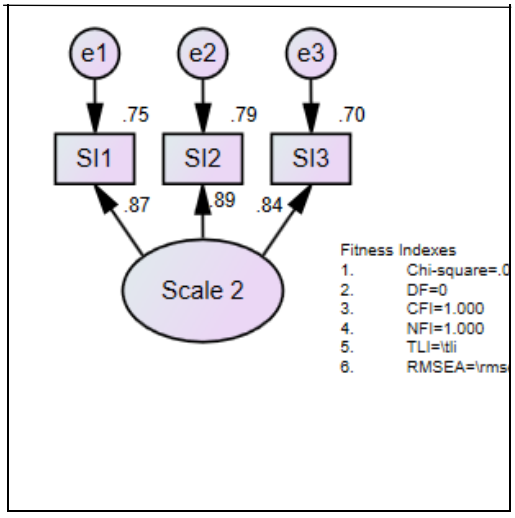

Figure 5.8. First-Order Model for Scale 2 (Support for Interventionist Conservation Policies—SI)

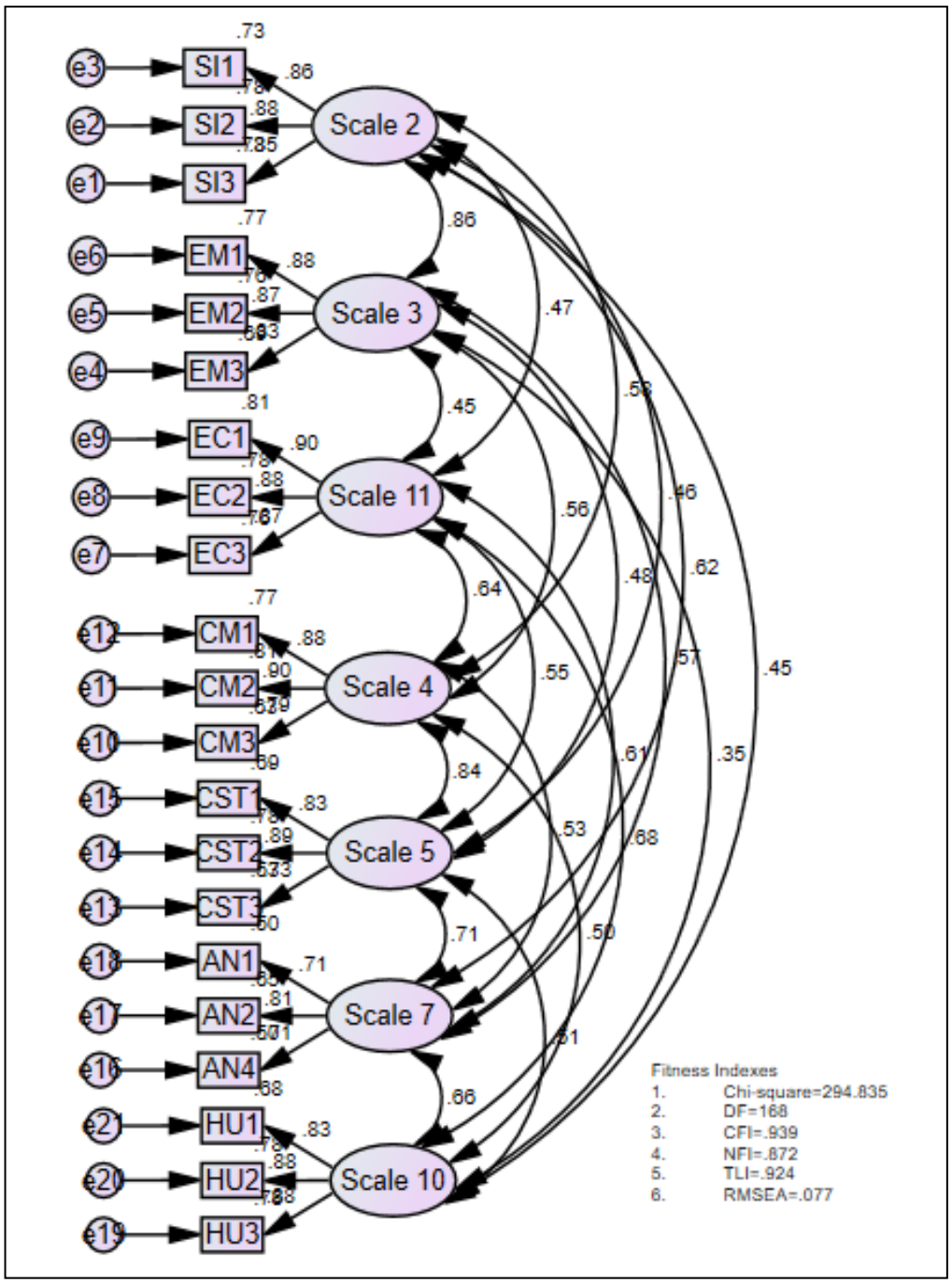

Figure 5.9. Seven-Factor Model of EAI

Notes: **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes

conservation motivated by anthropocentric concern (CM); **Scale 5** denotes confidence in science and technology (CST); **Scale 7** denotes altering nature (AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

5.2.2 Second-Order Models

This study also assessed the convergent validity and discriminant validity to validate the NAM theory (Schwartz, 2012)—in which preservation and utilization are identified as the higher-order dimension of environmental attitudes. The following sub-sections discuss the second-order model, second-order model (preservation), second-order model (utilization), and correlated second-order model in detail.

5.2.2.1 Second-Order Model

The internal consistency analysis revealed the utility of environmental attitudes construct in the second-order model. As shown in Table 5.5, the second-order model demonstrated the necessary normality requirement based on the acquired results of kurtosis (Byrne, 2010) and skewness (Gravetter & Wallnau, 2014). The goodness-of-fit for the model was also established (CMIN = 306.137; *df* = 178; CFI = 0.939; NFI = 0.867; TLI = 0.927; RMSEA = 0.075). Meanwhile, Figure 5.10 displays the structural model of the second-order model.

Table 5.5. Normality result for the second-order model

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
HU1	3.000	7.000	-.684	-3.183	.894	2.081
HU2	2.000	7.000	-.893	-4.159	1.627	3.788
HU3	3.000	7.000	-.203	-.947	.148	.346
AN1	3.000	7.000	-.552	-2.567	.509	1.185
AN2	3.000	7.000	-.672	-3.127	1.314	3.058
AN4	2.000	8.000	-.685	-3.187	1.876	4.366
CST 1	1.000	7.000	-1.091	-5.078	2.015	4.689
CST 2	1.000	7.000	-1.104	-5.139	1.668	3.882
CST 3	1.000	7.000	-.993	-4.621	1.206	2.807
CM1	3.000	7.000	-.857	-3.988	.808	1.879
CM2	2.000	7.000	-1.137	-5.294	1.354	3.151
CM3	2.000	7.000	-1.052	-4.895	1.165	2.711
EC1	3.000	7.000	-.747	-3.475	.540	1.256
EC2	3.000	7.000	-.624	-2.906	1.042	2.425
EC3	3.000	7.000	-.550	-2.562	.820	1.908
EM1	4.000	7.000	-.401	-1.865	.279	.649
EM2	4.000	7.000	-.414	-1.927	.262	.611
EM3	4.000	7.000	-.661	-3.079	.576	1.340
SI1	4.000	7.000	-.488	-2.272	.261	.608

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
SI2	4.000	7.000	-.558	-2.597	.452	1.052
SI3	4.000	7.000	-.620	-2.884	.331	.770
Multivariate					206.736	37.920

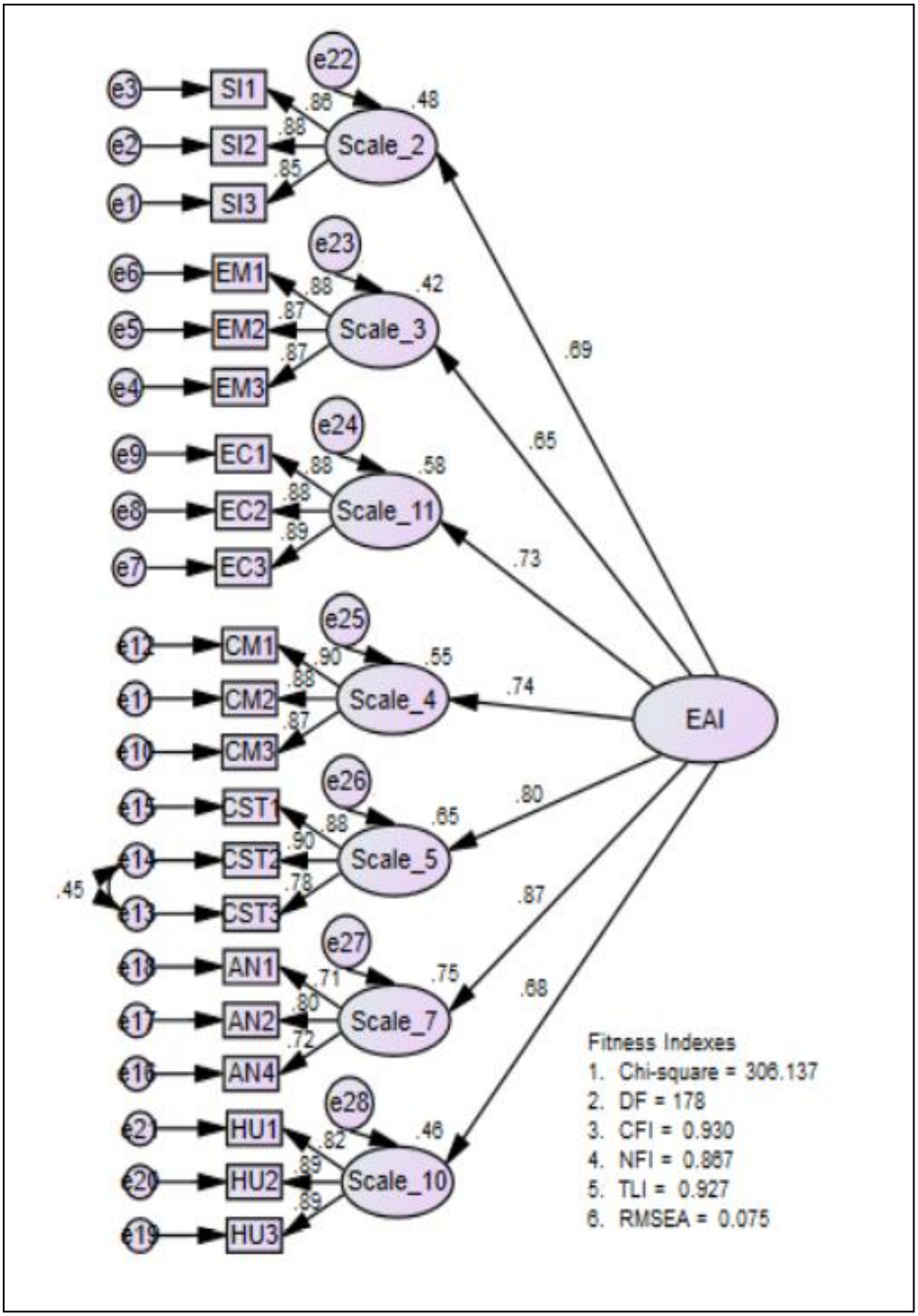

Figure 5.10. Second-Order Model

Notes: **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes

conservation motivated by anthropocentric concern (CM); **Scale 5** denotes confidence in science and technology (CST); **Scale 7** denotes altering nature (AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

5.2.2.2 Second-Order Model of Preservation

The internal consistency analysis revealed the utility of environmental attitudes construct in the second-order model of preservation, as well. The second-order model of preservation comprised of three factors, which were **Scale 2** (Support for interventionist conservation policies—SI), **Scale 3** (Environmental movement activism—EM), and **Scale 11** (Ecocentric concern—EC). As shown in Table 5.6, the obtained results of kurtosis (Byrne, 2010) and skewness (Gravetter & Wallnau, 2014) for the second-order model of preservation demonstrated normality.

Table 5.6. Normality result for the second-order model of preservation

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
EC1	3.000	7.000	-.747	-3.475	.540	1.256
EC2	3.000	7.000	-.624	-2.906	1.042	2.425
EC3	3.000	7.000	-.550	-2.562	.820	1.908
EM1	4.000	7.000	-.401	-1.865	.279	.649
EM2	4.000	7.000	-.414	-1.927	.262	.611
EM3	4.000	7.000	-.661	-3.079	.576	1.340
SI1	4.000	7.000	-.488	-2.272	.261	.608

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
SI2	4.000	7.000	-.558	-2.597	.452	1.052
SI3	4.000	7.000	-.620	-2.884	.331	.770
Multivariate					81.289	32.934

Referring to Table 5.7, both factor loadings and AVEs exceeded 0.50 (Hair et al., 2010; Kline, 2010) and both CRs and CAs exceeded 0.60 (Nunally & Bernstein, 1994; Raykov, 1998), which demonstrated appropriate convergent validity (Byrne, 2010). The three identified factors revealed significant correlation at 0.01 level, which ranged between 0.455 ($r^2 = 0.207$) and 0.858 ($r^2 = 0.736$). In other words, the discriminant validity was reaffirmed. This study also validated the reliability of model (McGraw & Wong, 1996; Shrout & Fleiss, 1979) and appropriate agreement measures (Cicchetti, 1994) based on the interclass correlation coefficient (ICC), which ranged between 0.687 and 0.828 at 0.05 level. Additionally, the model did not encounter any multicollinearity issues (Hair et al., 2010) according to the obtained tolerance values (> 0.20) and VIF (< 5.0) (Montgomery et al., 2001; Thompson et al., 2017). Figure 5.11 presents the second-order model of preservation with three factors. Similarly, the second-order model of preservation demonstrated goodness of fit (CMIN = 27.438; *df* = 24; CFI = 0.996; NFI = 0.970; TLI = 0.994; RMSEA = 0.033).

Table 5.7. Results of bivariate correlation for second-order model of preservation

	Preservation	SI	EM	EC
Preservation	1			
SI	0.941**	1		
	(0.885)			
EM	0.911**	0.858**	1	
	(0.830)	(0.736)		
EC	0.500**	0.470**	0.455**	1
	(0.250)	(0.221)	(0.207)	
AVE	0.655	0.747	0.739	0.783
CA	0.784	0.864	0.860	0.885
CR	0.842	0.899	0.895	0.916

Notes: ***** denotes significant correlation at 0.05 level (one-tailed); ****** denotes significant correlation at 0.01 level (two-tailed); The values of $\mathbf{r^2}$ are provided in parentheses; **SI** denotes Scale 2 (support for interventionist conservation policies); **EM** denotes Scale 3 (environmental movement activism); **EC** denotes Scale 11 (ecocentric concern); **AVE** denotes average variance extracted; **CA** denotes Cronbach's alpha; **CR** denotes composite reliability.

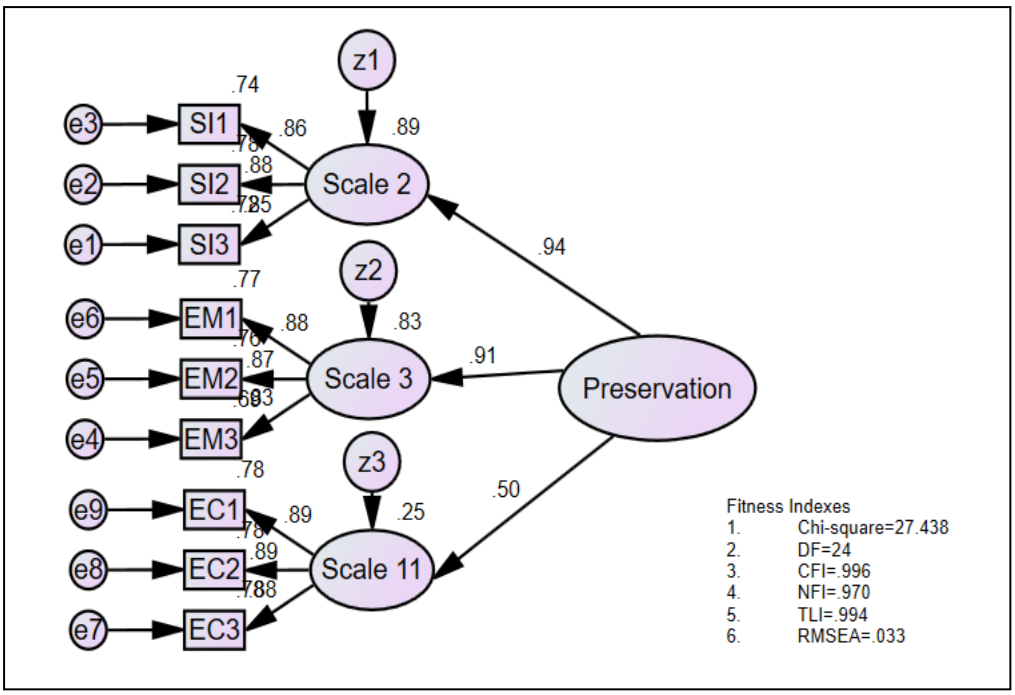

Figure 5.11. Second-Order Model of Preservation

Notes: **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 11** denotes ecocentric concern (EC).

5.2.2.3 Second-Order Model of Utilization

As for the second-order model of utilization, four factors were included, which were **Scale 4** (Conservation motivated by anthropocentric concern—CM), **Scale 5** (Confidence in science and technology—CST), **Scale 7** (Altering nature—AN), and **Scale 10** (Human utilization of nature—HU). The internal consistency analysis also revealed the utility of environmental attitudes construct in the second-order model of utilization. Likewise, the second-order model of utilization exhibited normality according to the obtained results of kurtosis (Byrne, 2010) and skewness (Gravetter & Wallnau, 2014) (Table 5.8)

Table 5.8. Normality result for the second-order model of utilization

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
CST1	1.000	7.000	-1.091	-5.078	2.015	4.689
CST2	1.000	7.000	-1.104	-5.139	1.668	3.882
CST3	1.000	7.000	-.993	-4.621	1.206	2.807
AN4	2.000	8.000	-.685	-3.187	1.876	4.366
AN1	3.000	7.000	-.552	-2.567	.509	1.185
AN2	3.000	7.000	-.672	-3.127	1.314	3.058
HU1	3.000	7.000	-.684	-3.183	.894	2.081
HU2	2.000	7.000	-.893	-4.159	1.627	3.788
HU3	3.000	7.000	-.203	-.947	.148	.346
CM1	3.000	7.000	-.857	-3.988	.808	1.879
CM2	2.000	7.000	-1.137	-5.294	1.354	3.151

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
CM3	2.000	7.000	-1.052	-4.895	1.165	2.711
Multivariate					107.615	33.469

Meanwhile, the convergent validity of the constructs in this model was also determined based on the obtained results (Table 5.9) of factor loadings (> 0.50) (Hair et al., 2010; MacCallum et al., 1996; Tabachnick & Fidell, 2007), AVEs (> 0.50) (Hair et al., 2010; Kline, 2010), CRs (> 0.60), and CAs (> 0.60) (Nunally & Bernstein, 1994; Roykov, 1998). These four factors showed significant correlation at 0.01 level with a range of values between 0.472 (r^2 = 0.222) and 0.881 (r^2 = 0.776); thus, reaffirming the discriminant validity. There were also evidences of good reliability (Shrout & Fleiss, 1979; McGraw & Wong, 1996) and acceptable agreement measures (Chicchetti, 1994) based on the interclass correlation coefficient (ICC), which ranged between 0.759 and 0.863 at 0.05 level. Evidently, there was no multicollinearity issue (Hair et al., 2010) based on the tolerance values (> 0.20) and VIF (< 0.50) (Montgomery et al., 2001; Thompson et al., 2017). Figure 5.12 displays the second-order model of utilization with four factors—in which its goodness-of-fit was validated (CMIN = 77.381; *df* = 45; CFI = 0.969; NFI = 0.930; TLI = 0.954; RMSEA = 0.075).

Table 5.9. Results of bivariate correlation for second-order model of utilization

	Utilization	CM	CST	AN	HU
Utilization	1				
CM	0.848**	1			
	(0.719)				
CST	0.912**	0.879**	1		
	(0.832)	(0.774)			
AN	0.821**	0.695**	0.851**	1	
	(0.674)	(0.483)	(0.724)		
HU	0.516**	0.437**	0.535**	0.423**	1
	(0.266)	(0.191)	(0.286)	(0.179)	
AVE	0.617	0.730	0.610	0.746	0.566
CA	0.771	0.853	0.774	0.865	0.751

	Utilization	CM	CST	AN	HU
CR	0.861	0.890	0.822	0.898	0.796

Notes: ***** denotes significant correlation at 0.05 level (one-tailed); ****** denotes significant correlation at 0.01 level (two-tailed); The values of $\mathbf{r^2}$ are provided in parentheses; **CM** denotes Scale 4 (conservation motivated by anthropocentric concern); **CST** denotes Scale 5 (confidence in science and technology); **AN** denotes Scale 7 (altering nature); **HU** denotes Scale 10 (human utilization of nature); **AVE** denotes average variance extracted; **CA** denotes Cronbach's alpha; **CR** denotes composite reliability.

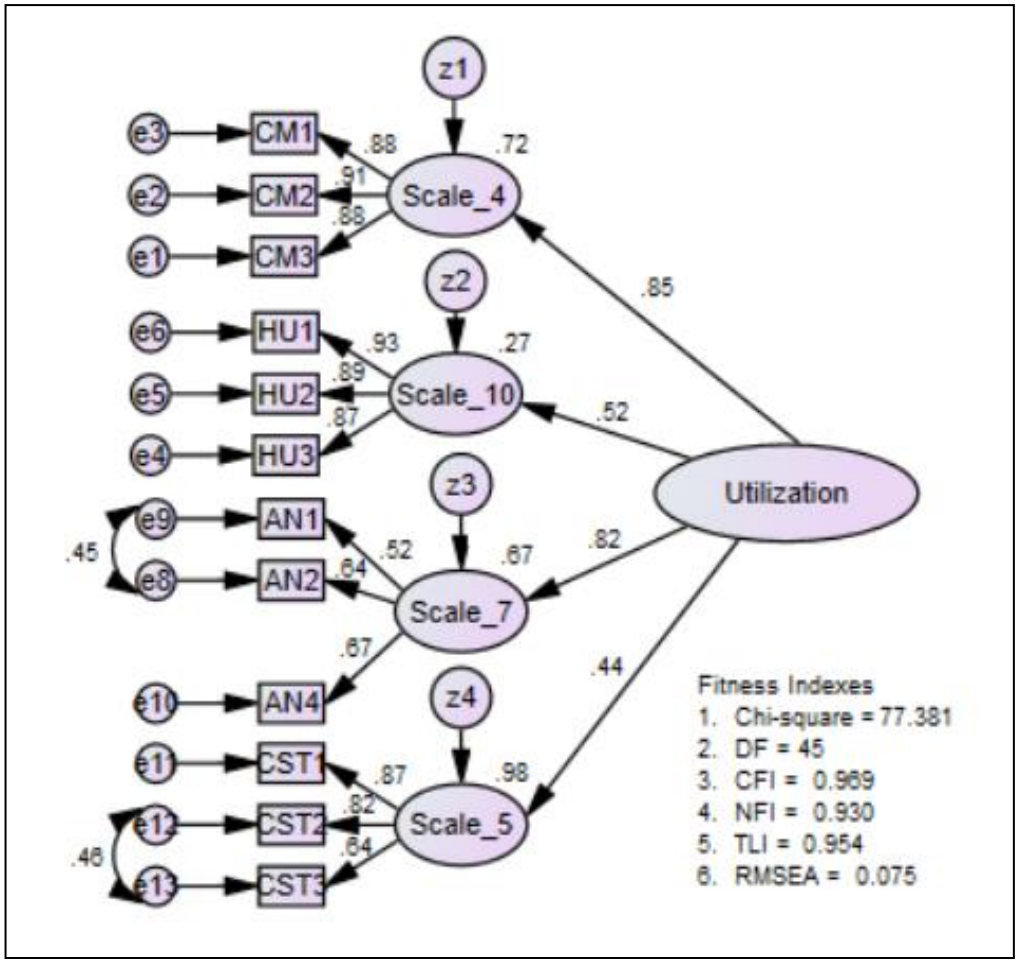

Figure 5.12. Second-Order Model of Utilization

Notes: **Scale 4** denotes conservation motivated by anthropocentric concern (CM); **Scale 7** denotes altering nature (AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

5.2.2.4 Correlated Second-Order Model

Similar to the prior models, the correlated second-order model also provided evidences on the utility of environmental attitudes using the internal consistency analysis. In particular, the correlated second-order model demonstrated normality (Cain et al., 2017; Yalçınkaya et al., 2018) according to the obtained

results of kurtosis (Byrne, 2010) and skewness (Gravetter & Wallnau, 2014) (Table 5.10). As demonstrated in Figure 5.13, both preservation and utilization were found correlated (0.664; $r^2 = 0.441$) at 0.01 level; thus, indicating adequate discriminant validity. Besides that, the goodness-of-fit of the correlated second-order model was validated (CMIN = 301.548; *df* = 172; CFI = 0.938; NFI = 0.869; TLI = 0.924; RMSEA = 0.076) (Figure 5.13).

Table 5.10. Normality result for the correlated second-order model

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
HU1	3.000	7.000	-.684	-3.183	.894	2.081
HU2	2.000	7.000	-.893	-4.159	1.627	3.788
HU3	3.000	7.000	-.203	-.947	.148	.346
AN1	3.000	7.000	-.552	-2.567	.509	1.185
AN2	3.000	7.000	-.672	-3.127	1.314	3.058
AN4	2.000	8.000	-.685	-3.187	1.876	4.366
CST1	1.000	7.000	-1.091	-5.078	2.015	4.689
CST2	1.000	7.000	-1.104	-5.139	1.668	3.882
CST3	1.000	7.000	-.993	-4.621	1.206	2.807
CM1	3.000	7.000	-.857	-3.988	.808	1.879
CM2	2.000	7.000	-1.137	-5.294	1.354	3.151

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
CM3	2.000	7.000	-1.052	-4.895	1.165	2.711
EC1	3.000	7.000	-.747	-3.475	.540	1.256
EC2	3.000	7.000	-.624	-2.906	1.042	2.425
EC3	3.000	7.000	-.550	-2.562	.820	1.908
EM1	4.000	7.000	-.401	-1.865	.279	.649
EM2	4.000	7.000	-.414	-1.927	.262	.611
EM3	4.000	7.000	-.661	-3.079	.576	1.340
SI1	4.000	7.000	-.488	-2.272	.261	.608
SI2	4.000	7.000	-.558	-2.597	.452	1.052
SI3	4.000	7.000	-.620	-2.884	.331	.770
Multivariate					206.736	37.920

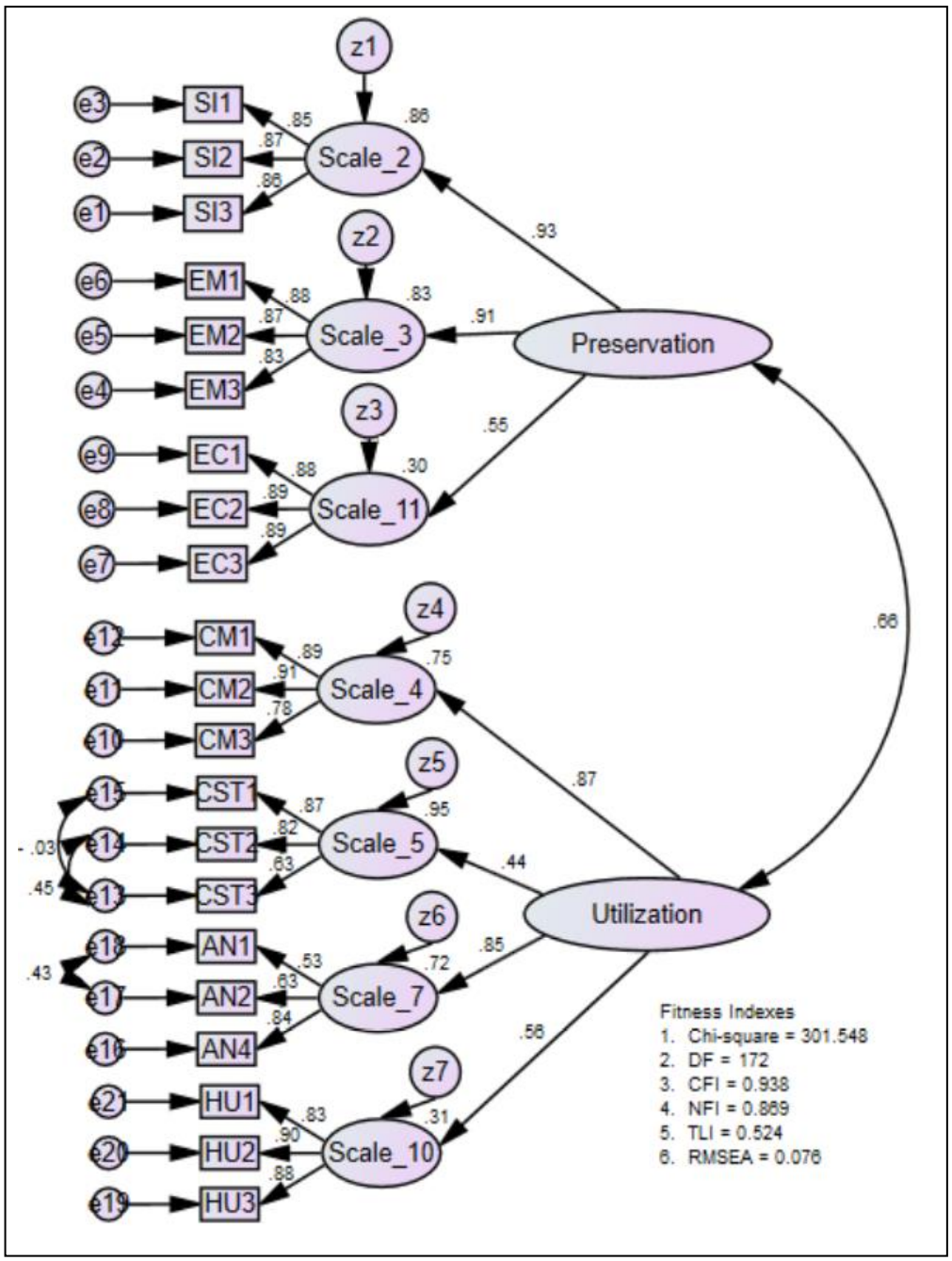

Figure 5.13. Correlated Second-Order Model

Notes: **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes conservation motivated by anthropocentric concern (CM); **Scale 5** denotes confidence in science and technology (CST); **Scale 7** denotes altering nature

(AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

5.2.3 Third-Order Model

This study attempted to assess environmental attitudes across cultures through the third-order model of higher-order dimensions. The utility of environmental attitudes construct was demonstrated in the third-order model through the internal consistency analysis. The obtained results of kurtosis (Gravetter & Wallnau, 2014) and skewness (Byrne, 2010) exhibited normality (Cain et al., 2017; Yalçınkaya et al., 2018) (Table 5.11). Adding to that, the obtained factor loadings for both preservation ($\lambda = 0.862$) and utilization ($\lambda = 0.770$) clearly exceeded 0.50 (Hair et al., 2010; Kline, 2010). At this point, the CR and CA for the third-order model, respectively, recorded 0.827 and 0.806, which exceeded 0.60 (Nunally & Bernstein, 1994; Raykov, 1998). There was a significant correlation between preservation and utilization at 0.01 level (0.664; AVE > r^2). In other words, adequate convergent validity and discriminant validity were acquired for this model (Byrne, 2010). Figure 5.14 presents the third-order model with seven factors, which revealed the results of indices (CMIN = 269.945; *df* = 170; CFI = 0.952; NFI = 0.882; TLI = 0.941; RMSEA = 0.068) that validated the goodness-of-fit of the third-order model.

Table 5.11. Normality result for the third-order model

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
HU1	3.000	7.000	-.684	-3.183	.894	2.081
HU2	2.000	7.000	-.893	-4.159	1.627	3.788
HU3	3.000	7.000	-.203	-.947	.148	.346
AN1	3.000	7.000	-.552	-2.567	.509	1.185
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AN4	2.000	8.000	-.685	-3.187	1.876	4.366
CST1	1.000	7.000	-1.091	-5.078	2.015	4.689
CST2	1.000	7.000	-1.104	-5.139	1.668	3.882
CST3	1.000	7.000	-.993	-4.621	1.206	2.807
CM1	3.000	7.000	-.857	-3.988	.808	1.879
CM2	2.000	7.000	-1.137	-5.294	1.354	3.151

Item	Minimum	Maximum	Skewness	CR	Kurtosis	CR
CM3	2.000	7.000	-1.052	-4.895	1.165	2.711
EC1	3.000	7.000	-.747	-3.475	.540	1.256
EC2	3.000	7.000	-.624	-2.906	1.042	2.425
EC3	3.000	7.000	-.550	-2.562	.820	1.908
EM1	4.000	7.000	-.401	-1.865	.279	.649
EM2	4.000	7.000	-.414	-1.927	.262	.611
EM3	4.000	7.000	-.661	-3.079	.576	1.340
SI1	4.000	7.000	-.488	-2.272	.261	.608
SI2	4.000	7.000	-.558	-2.597	.452	1.052
SI3	4.000	7.000	-.620	-2.884	.331	.770
Multivariate					206.736	37.920

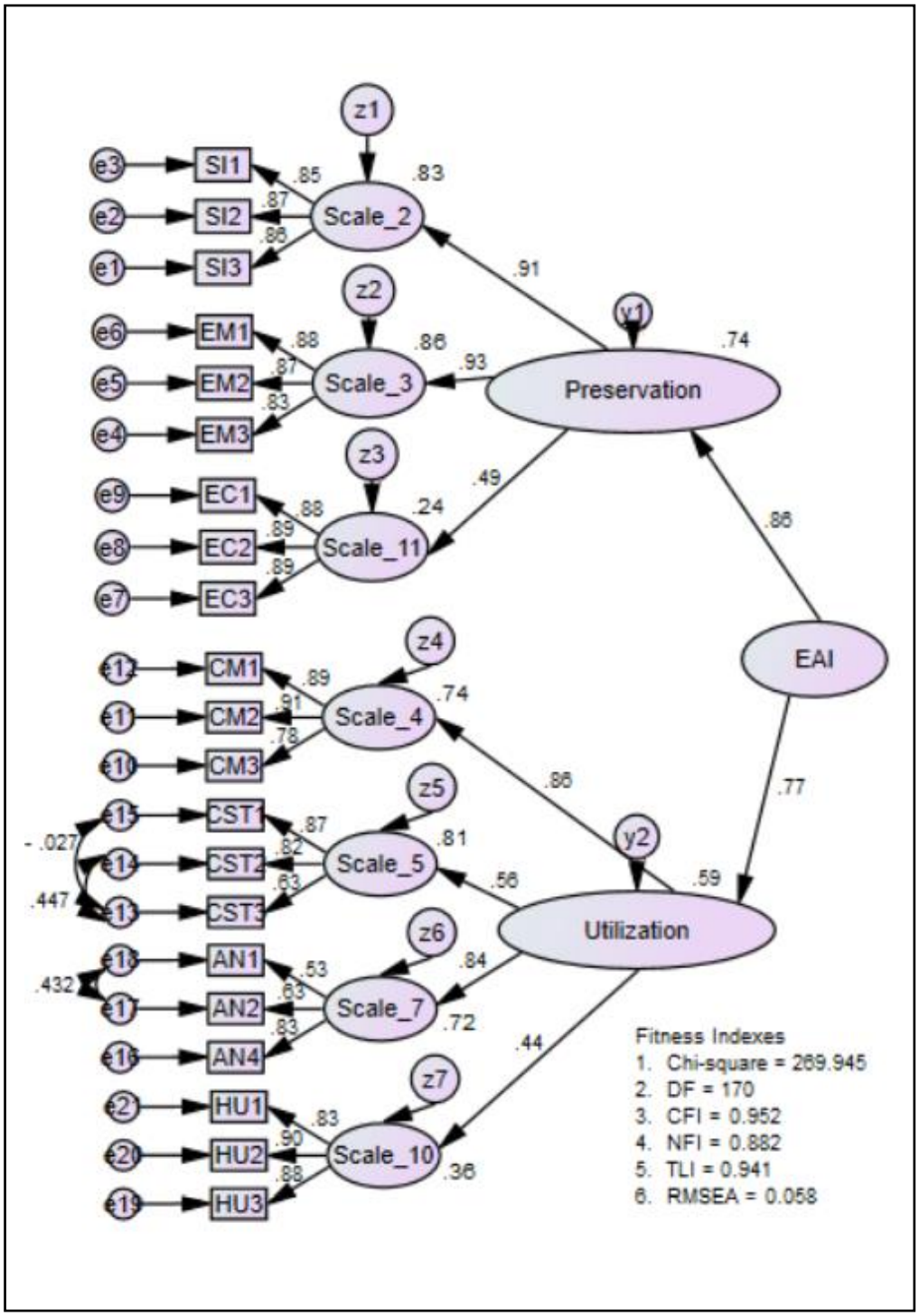

Figure 5.14. Third-Order Model

Notes: **EA** denotes environmental attitudes; **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes conservation motivated by anthropocentric concern (CM); **Scale 5** denotes confidence in science and

technology (CST); **Scale 7** denotes altering nature (AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

5.2.4 Testing of Measurement Invariance for EAI

The analysis ensued with the multi-group confirmatory factor analysis to assess the measurement invariance—of whether the third-order model of EAI applies across groups (gender, courses, and nationality). The measurement invariance reflects the extent of the underlying constructs measures across groups through configural invariance, metric invariance, and scalar invariance (Kline, 2015). In other words, it is expected that the model is similarly perceived across groups despite the distinctiveness in terms of cultures through the testing for measurement invariance (Tam & Chan 2017; Arnold et al., 2018; Domingues & Gonçalves, 2018).

Table 5.12 provides the summary of the model comparisons. Overall, the third-order model achieved better goodness-of-fit (CMIN = 301.548; *df* = 172; CFI = 0.938; NFI = 0.869; TLI = 0.924; RMSEA = 0.076) (Figure 5.14). The additional constraints of these equal factor loadings with respect to the specific constructs across different courses (ΔCMIN = 24.098; *df* = 172; $p > 0.05$) revealed no significant difference, which was in support of the baseline model, despite the observed statistical significance for most path coefficients ($p < 0.05$) at 0.05 level. In other words, the measurement invariance across different courses was assumed. On the contrary, the nested model comparisons of both gender (ΔCMIN = 34.225; *df* = 172; $p < 0.05$) and nationality (ΔCMIN = 38.137; *df* = 172; $p < 0.05$) demonstrated statistically significance—thus,

indicating the rejection of the baseline model. In other words, the imposition of constraints for equality across different genders and nationalities that resulted to weak model fit should not be constrained due to the measurement variance. Figure 5.15 illustrates the environmental perceptions across courses.

Table 5.12. Summary of model comparisons in testing measurement invariance

Path estimates			Gender				Course				Nationality			
			Male		Female		Social Sciences		Science & Technology		GCC		Other	
			N = 38		N = 92		N = 45		N = 85		N = 103		N = 27	
			Invariant	Variant	Invariant	Variant	Invariant	Variant	Invariant	Variant	Invariant	Variant	Invariant	Variant
Preservation	←	EAI	0.900*	0.897*	0.873*	0.870*	0.759*	0.783*	0.930*	0.913*	0.866*	0.890*	0.839*	0.697*
Utilization	←	EAI	0.840*	0.760*	0.774*	0.767*	0.780*	0.719*	0.740*	0.751*	0.757*	0.748*	0.787*	0.777*
EM	←	Preservation	0.882*	0.834*	0.933*	0.941*	0.912*	0.996*	0.938*	0.910*	0.898*	0.913*	0.902*	0.806*
EC	←	Preservation	0.498*	0.613*	0.494*	0.475*	0.576*	0.580*	0.483*	0.442*	0.500*	0.517*	0.418*	**0.208**

SI	←	Preservation	0.914*	0.833*	0.987*	0.982*	0.881*	0.796*	0.985*	0.920*	0.957*	0.948*	0.982*	0.831*
CM	←	Utilization	0.864*	0.920*	0.954*	0.949*	0.912*	0.894*	0.954*	0.934*	0.949*	0.960*	0.998*	0.924*
CST	←	Utilization	0.794*	0.774*	0.933*	0.926*	0.887*	0.765*	0.854*	0.912*	0.846*	0.842*	0.927*	0.983*
AN	←	Utilization	0.955*	0.889*	0.984*	0.923*	0.882*	0.875*	0.896*	0.947*	0.932*	0.975*	0.897*	0.733*
HU	←	Utilization	0.553*	**0.170**	0.692*	0.732*	0.490*	0.393*	0.593*	0.599*	0.582*	0.606*	0.437*	0.410*
SI3	←	SI	0.876*	0.847*	0.870*	0.874*	0.933*	0.921*	0.837*	0.849*	0.867*	0.858*	0.919*	0.956*
SI2	←	SI	0.859*	0.905*	0.897*	0.890*	0.893*	0.867*	0.856*	0.869*	0.880*	0.891*	0.846*	0.786*
SI1	←	SI	0.908*	0.846*	0.852*	0.860*	0.917*	0.918*	0.819*	0.808*	0.836*	0.847*	0.866*	0.824*
EM3	←	EM	0.880*	0.950*	0.826*	0.809*	0.877*	0.889*	0.781*	0.759*	0.823*	0.847*	0.789*	0.738*
EM2	←	EM	0.821*	0.769*	0.924*	0.926*	0.890*	0.909*	0.839*	0.816*	0.865*	0.872*	0.848*	0.807*
EM1	←	EM	0.889*	0.812*	0.897*	0.904*	0.856*	0.845*	0.914*	0.924*	0.885*	0.884*	0.936*	0.920*
EC3	←	EC	0.805*	0.803*	0.898*	0.904*	0.787*	0.821*	0.923*	0.917*	0.854*	0.873*	0.915*	0.778*
EC2	←	EC	0.892*	0.897*	0.891*	0.890*	0.844*	0.818*	0.921*	0.928*	0.903*	0.893*	0.975*	0.983*

EC1	←	EC	0.937*	0.942*	0.886*	0.887*	0.814*	0.878*	0.896*	0.883*	0.877*	0.887*	0.925*	0.868*
CM3	←	CM	0.821*	0.804*	0.784*	0.791*	0.727*	0.651*	0.810*	0.831*	0.787*	0.782*	0.715*	0.751*
CM2	←	CM	0.884*	0.907*	0.901*	0.897*	0.904*	0.935*	0.895*	0.893*	0.897*	0.902*	0.909*	0.915*
CM1	←	CM	0.925*	0.940*	0.883*	0.879*	0.870*	0.875*	0.900*	0.897*	00.876*	0.886*	0.880*	0.862*
CST3	←	CST	0.626*	0.577*	0.570*	0.605*	0.499*	0.515*	0.584*	0.602*	0.645*	0.603*	0.863*	0.889*
CST2	←	CST	0.848*	0.830*	0.797*	0.794*	0.813*	0.832*	0.809*	0.828*	0.871*	0.852*	0.742*	0.706*
CST1	←	CST	0.938*	0.957*	0.863*	0.845*	0.919*	0.896*	0.858*	0.867*	0.890*	0.896*	0.741*	0.697*
AN4	←	AN	0.766*	0.919*	0.820*	0.783*	0.963*	0.973*	0.776*	0.769*	0.839*	0.808*	0.925*	0.985*
AN2	←	AN	0.749*	0.631*	0.697*	0.724*	0.616*	0.628*	0.711*	0.718*	0.608*	0.691*	0.771*	0.624*
AN1	←	AN	0.575*	**0.264**	0.589*	0.665*	0.504*	0.570*	0.607*	0.585*	0.565*	0.582*	0.556*	0.395*
HU3	←	HU	0.875*	0.784*	0.884*	0.902*	0.864*	0.841*	0.878*	0.881*	0.887*	0.883*	0.956*	0.983*
HU2	←	HU	0.891*	0.895*	0.905*	0.905*	0.882*	0.900*	0.880*	0.860*	0.890*	0.893*	0.869*	0.768*
HU1	←	HU	0.830*	0.767*	0.862*	0.869*	0.866*	0.866*	0.839*	0.830*	0.843*	0.852*	0.810*	0.699*

Nested Model Comparisons						
Model Fit Summary	**Group Invariant**	**Group Variant**	**Group Invariant**	**Group Variant**	**Group Invariant**	**Group Variant**
CMIN	456.535	422.310	510.431	486.333	577.148	539.011
df	329	310	329	310	329	310
p < 0.05	0.000	0.000	0.000	0.000	0.000	0.000
CFI	0.944	0.951	0.920	0.923	0.896	0.904
NFI	0.831	0.843	0.811	0.820	0.795	0.808
TLI	0.928	0.933	0.898	0.0895	0.867	0.870
RMSEA	0.055	0.053	0.066	0.067	0.077	0.076
ΔCMIN	34.225		24.098		38.137	
Δdf	19		19		19	
p < 0.05	0.017		0.192		0.006	
Result	**Baseline model is rejected**		**Baseline model is accepted**		**Baseline model is rejected**	

Notes: ***** denotes significance at 0.05 level; **EA** denotes environmental attitudes; **Scale 2** denotes support for interventionist conservation policies (SI); **Scale 3** denotes environmental movement activism (EM); **Scale 4** denotes conservation motivated by anthropocentric concern (CM); **Scale 5** denotes confidence in science and technology (CST); **Scale 7** denotes altering nature (AN); **Scale 10** denotes human utilization of nature (HU); **Scale 11** denotes ecocentric concern (EC).

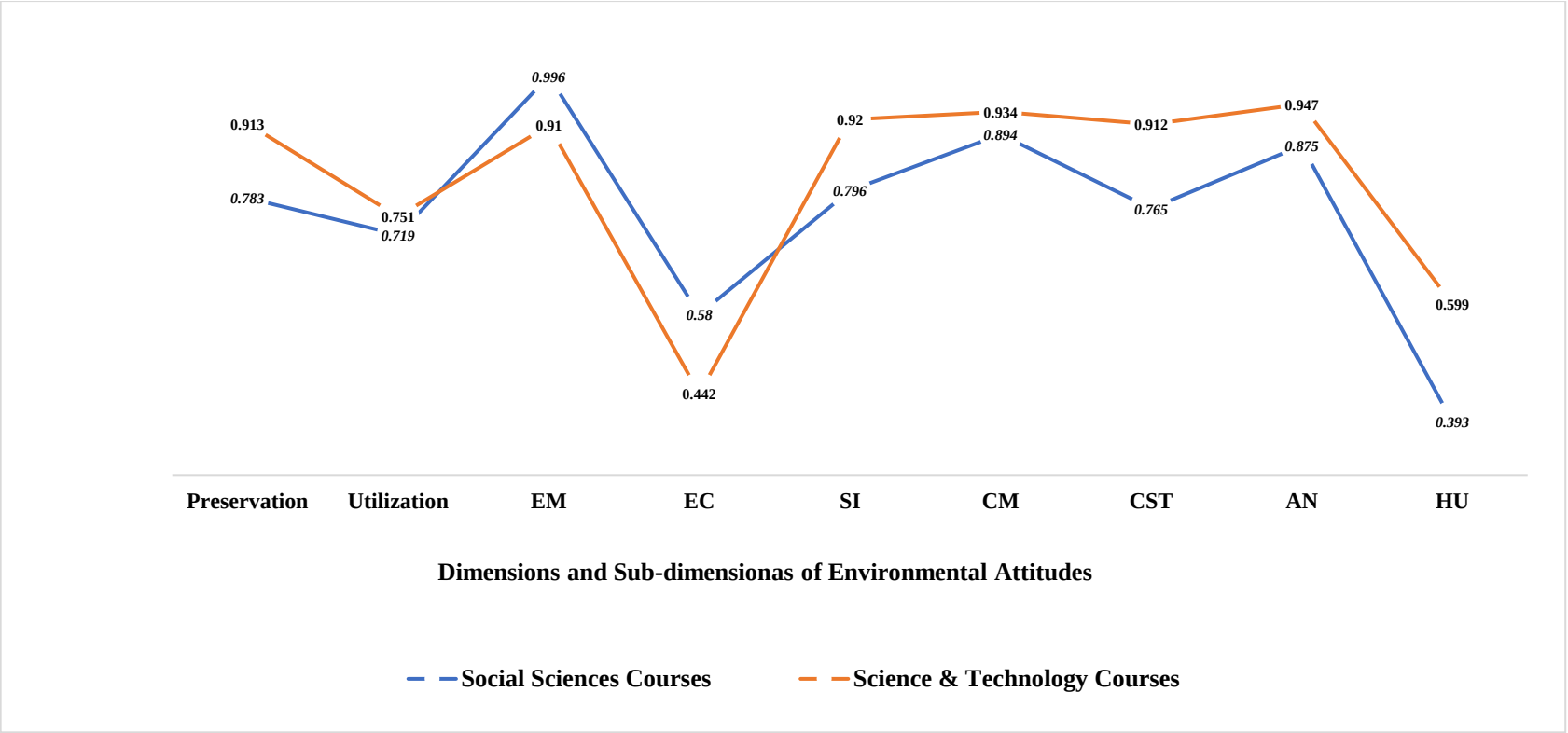

Figure 5.15. Environmental Perception across Courses

5.3 CHAPTER SUMMARY

This chapter presented the resultant outcomes of the pilot study and the main study. Specifically, this study assessed the validity of the constructs as well as the model fit. CFA was initially performed to reaffirm the overall structure of the measurement model before proceeding to the subsequent data analysis using SEM. The obtained results demonstrated satisfactory goodness-of-fit for the identified seven-factor model of EAI. Table 5.13 presents the summary of the overall findings with respect to each hypothesis.

Table 5.13. Results of hypotheses testing

Hypothesis		Result
H1:	Enjoyment of nature, support for interventionist conservation policies, environmental movement activism, conservation motivated by anthropocentric concern, confidence in science and technology, environmental threat, altering nature, personal conservation behavior, human dominance over nature, human utilization of nature, ecocentric concern, and support for population growth policies are the dimensions of environmental attitudes among the undergraduates in Abu Dhabi.	Partially supported

H2:	Preservation and utilization are the higher order model of environmental attitudes among undergraduates in Abu Dhabi.	Supported
H3:	The environmental attitudes among undergraduates in Abu Dhabi are different across cultures.	Supported
H4:	The utility of environmental attitudes within the EfS context is demonstrated among undergraduates in Abu Dhabi.	Supported

CHAPTER 6

DISCUSSION AND CONCLUSIONS

6.1 INTRODUCTION

This study attempted to extend the existing knowledge base on the factor structure and psychometric features of the proposed measurement model of environmental attitudes in evaluating the environmental attitudes among the undergraduates within the EfS context in Abu Dhabi.

6.2 DISCUSSION OF FINDINGS

The following sub-sections present the interpretations and justifications for the obtained results with respect to each research question and corresponding hypothesis.

6.2.1 The factor structure and psychometric features of the proposed measurement model of environmental attitudes

H1: Enjoyment of nature, support for interventionist conservation policies, environmental movement activism, conservation motivated by

anthropocentric concern, confidence in science and technology, environmental threat, altering nature, personal conservation behavior, human dominance over nature, human utilization of nature, ecocentric concern, and support for population growth policies are the dimensions of environmental attitudes among the undergraduates in Abu Dhabi.

H2: Preservation and utilization are the higher order model of environmental attitudes among undergraduates in Abu Dhabi.

H3: The environmental attitudes among undergraduates in Abu Dhabi are different across cultures.

There have been substantial criticisms on the adequacy of prior studies in assessing environmental attitudes in terms of the dimensionality of attitudes (Steg & Vlek, 2009; Eilam & Trop, 2012), obsolete measurements (Lalonde & Jackson, 2002), low predictive capacity for the assessment of environmental attitudes (Scott & Willits, 1994), and unidimensionality issues (Albrecht et al., 1982; Milfont & Duckitt, 2010). There were limited studies that assessed the vertical structure of environmental attitudes in detail, particularly with their emphasis on the higher-order dimensions, instead (Amburgey & Thoman, 2012; Eilam & Trop, 2012; Thomas et al., 2018)—even though the opportunity of a general environmental attitudes factor has also been examined (Tarrant & Cordell, 1997; Kaiser et al., 1999; Chen et al., 2016; Dunlap et al., 2000). Besides that, studies on the multidimensionality of environmental attitudes remain rather scarce (Sutton & Gyuris, 2015; Amerigo et al., 2017; AlMenhali et al., 2018)—which propelled this study to explore the horizontal and vertical

structures of environmental attitudes in a systematic manner to establish a comprehensive framework to assess the environmental attitudes.

The obtained results of both EFA and CFA demonstrated consistency in the performance of first-order model. Evidently, the environmental attitudes demonstrated multidimensionality hierarchically. Similarly, the second-order model with both preservation and utility as the higher-order dimensions of environmental attitudes demonstrated similar consistency in its performance; thus, subsequently reaffirming the NAM theory (Schwartz, 2012). The third-order model of environmental attitudes was also assessed in line with Milfont et al. (2010) and Domingues and Gonçalves (2018), which provided significant insights on the dimensionality of environmental attitudes.

Apart from that, it is understood that the capacity of EAI as a measurement model to assess environmental attitudes across diverse cultures was demonstrated in prior studies, as propounded by Milfont and Duckitt (2010) and Sutton and Gyuris (2015). Nonetheless, the application of these EAI items to assess the environmental attitudes specifically within the Arab context remains unexplored. With that, this study adopted the original EAI items within the context of Arab culture, which produced the modifications in the number of factors in describing the environmental attitudes. However, the obtained factor structure of the measurement model in this study was found dissimilar from the obtained results on the factor structure of EAI in prior studies. This may be plausible due to the different cultural contexts across these studies, which possibly led to the occurrence of social desirability bias. This is supported by scholars and previous studies who stated that dismissing cultural context factor

may result in a statistical bias (Milfont & Duckitt, 2010; Milfont et al., 2010; Yu et al., 2014; Ferreira et al., 2015; Koc & Kuvaca, 2016). On the contrary, other studies highlighted the inadequacy of prior studies in considering cultural differences instead (Hammer et al., 2003; Kopnina & Cocis, 2017; Kudo et al., 2017; Wee et al., 2017). Therefore, this study critically considered the plausibility of social desirability bias given that the beliefs and perceived values may vary among the members of a population with similar demographic profile attributes.

Nevertheless, the multidimensionality of environmental attitudes was reaffirmed in this study with the identification of seven factors as the operational scales for the horizontal structure of environmental attitudes: (1) **Scale 2**: Support for interventionist conservation policies (SI); (2) **Scale 3**: Environmental movement activism (EM); (3) **Scale 4**: Conservation motivated by anthropocentric concern (CM); (4) **Scale 5**: Confidence in science and technology (CST); (5) **Scale 7**: Altering nature (AN); (6) **Scale 10**: Human utilization of nature (HU); (7) **Scale 11**: Ecocentric concern (EC). Meanwhile, the other five factors were deemed unnecessary in assessing environmental attitudes among the undergraduates within the EfS context in Abu Dhabi: (1) **Scale 1**: Enjoyment of nature (EN); (2) **Scale 6**: Environmental threat (ET); (3) **Scale 8**: Personal conservation behavior (PC; (4) **Scale 9**: Human dominance over nature (HN); (5) **Scale 12**: Support for population growth policies (SP). Even so, the multidimensionality of environmental attitudes remained unaffected with adequate validity and reliability given that the seven remaining

factors were recognized to primarily reflect the horizontal structure of environmental attitudes in the prior studies.

The obtained results on the vertical structure of environmental attitudes are hierarchically presented either as one second-order model or two second-order model, which were demonstrated in this study as first-order model (Figure 5.2 – Figure 5.8) and correlated second-order model (Figure 5.13). Conventionally, a one second-order model views environmental attitudes as unidimensional with bipolar scales of either environmentally concerned or not environmentally concerned (Dunlap et al., 2000; Schultz, 2004). Both factor models have support in the literature. Jagers et al. (2016), Panno et al. (2017), and Ziegler (2017) described the environmental attitudes as the linkage of beliefs that subsequently forms the underlying basis of one's environmental orientation.

Apart from reaffirming the generalization of the identified seven-factor model (Figure 5.9) within the context of Arab culture, the positive statistically significant correlations between the items reaffirmed that undergraduate students who support environmental attitudes in a specific domain will tend to support environmental attitudes in other domains, and certain undergraduate students will tend to be more favorable to such domain in general. This statement was demonstrated in this study by the strong and significant loadings of all seven dimensions of environmental attitudes on the second order model of environmental attitudes as supported by Blaikie (1992), Maloney et al. (1975), Van Liere and Dunlap (1981).

Accordingly, both preservation and utilization are said to theoretically establish the vertical structure of environmental attitudes, which were demonstrated in the present study—the former reflects the overall belief to prioritize the environmental needs over the needs of humans, while the latter assumes the overall belief to modify the environment according to the needs of humans. Primarily, the concepts of both beliefs are explicitly explored by Dunlap and Van Liere (1978), Stern (2005), and Schwartz (2012). Dunlap and Van Liere (1978) highlighted that one's belief may vary according to the personal experience or circumstance. However, Schwartz (1970) propounded the influence of moral norms instead. With that, one's pro-environmental behavior encompasses the norms of personal responsibility over the considered actions (i.e., the ascription of responsibility) as well as the personal beliefs over the implications of the concerned actions (i.e., the awareness of consequences). As Stern (2005) highlighted, it is pivotal to rationalize how one's environmental attitudes is stimulated. It can be concluded that the theories provide a direction that enviornmental attitudes are rooted in two philosophical principles that can be conveyed in two-correlated higher order sets of environmental values. These environmental values reflect conservation and protection of the environment (Preservation), and consumption of natural resources (Utilization) (Wiseman & Bogner, 2003), segregating the dilemma to decide between preserving and developing natural resources (Blaikie, 1992; Eilam & Trop, 2012).

Evidently, the third-order model with seven factors in this study demonstrated distinctive exemplification of environmental attitudes among the undergraduates in Abu Dhabi. Although the second-order model revealed better

model fit, this study opted the third-order model as a better fit given the need of this study to highlight the vertical structure of the environmental attitudes. After all, the difference between the second-order model (CMIN = 306.137; CFI = 0.939; RMSEA = 0.075) and the third-order model (CMIN = 269.945; CFI = 0.952; RMSEA = 0.068) was almost negligible (ΔCMIN = 36.192, ΔCFI = 0.013 and ΔRMSEA = 0.007). Besides that, the results of both preservation and utilization delivered favorable theoretical prospects through the distinctiveness of both beliefs found in the third-order model (Figure 5.14) compared to the parsimonious second-order model (Figure 5.10). In fact, this established the underlying basis for prominent behavioral theories that addresses various environmental issues at the individual level and at the cultural level (Newman & Fernandes, 2016), namely the Theory of Planned Behavior (TPB) (Reid et al., 2010) as well as NAM theory in assessing the environmental attitudes (Schwartz, 1992; Milfont & Duckitt, 2010).

The conceptual and empirical distinctiveness of both preservation and utilization are agreed in other studies, as well. Despite the distinctiveness, their interconnected values provide in-depth insights on the development and enhancement of environmental initiatives (Bennet et al., 2017). Besides that, there may be different theoretical expressions for one's attitudes towards sustainability, but they tend to revolve around the relationships between humans and the environment (Abson et al., 2014; Curran et al., 2016). Other studies evidenced that knowledge exhange affects the correlation between ecosystem, social interdependencies and collective action thinking to reflect in increasing people's attitudes to diversity and complexity of ecological processes

underlying human activities (Eilam & Trop, 2012; Reed et al., 2014). For instance, the mutually exclusive beliefs contributed to high covariances in the overall factor structure of NEP within the Western context (Corral-Verdugo & Armendariz, 2000; Xiao & Buhrmann, 2017). However, NEP studies in other countries, such as Japan, Peru, Mexico (Bechtel et al., 2006), Brazil (Bechtel et al., 1999), Sinegal (Grunova et al., 2018), China (Xue et al., 2018), and Malaysia (Lau et al., 2016) revealed otherwise. Likewise, there were inconclusive findings on the overall factor structure of EAI across studies (Yu et al., 2014; Tam, 2014; Ferreira et al., 2015; Dean et al., 2016; Koc & Kuvaca, 2016) with the plausibility of cultural bias (Grendstand & Sundback, 2003), social desirability bias (Milfont & Schultz, 2016), and non-response bias (Sutton & Gyuris, 2015). As demonstrated, the obtained results on EAI in this study revealed contradictory results on the number of factors from the original 12-factor model. There may be inadequate evidences to establish the dimensionality of environmental attitudes in cross-cultural studies (Boyer et al., 2012; Sircova et al., 2015; Kågesten et al., 2016). As a result, the generalization of findings in terms of beliefs, perceived values, and even environmental attitudes across diverse cultures remain inconclusive.

In view of the above, both preservation and utilization provided in-depth insights in grasping the environmental attitudes among the undergraduates within the EfS context in Abu Dhabi. The multidimensionality of environmental attitudes in a hierarchical manner was validated through the third-order model of this study. Conclusively, this study successfully developed a valid and reliable measurement model to comprehensively assess environmental attitudes.

6.2.2 The utility of the proposed measurement model in evaluating environmental attitudes

H4: The utility of environmental attitudes within the EfS context is demonstrated among undergraduates in Abu Dhabi.

The pattern of demographic and psychological characteristics was also empirical and theoretical evidence supporting the third order model (Milfont et al., 2010; Milfont & Schultz, 2016). The obtained results on the measurement invariance for the third-order model, which demonstrated better model fit, revealed that the baseline model for different courses was accepted (demonstrating measurement invariance), while gender and nationality demonstrated measurement variance for the environmental attitudes within the context of Arab culture. This suggests that the undergraduates in Abu Dhabi demonstrated different levels of preservation and utilization across genders and nationalities. In other words, the underlying psychological interpretations may vary across genders and nationalities within the context of Arab culture. However, the science and technology courses and the social science courses did not reflect any distinctiveness in the environmental attitudes among the undergraduates in Abu Dhabi. Thus, it may interfere the interaction of contribution to effective EfS that was proven to be the factor to environment attitudes in cross-cultural contexts. These findings were consistent with suggestion by Cheung and Rensvold (2002) and Kline (2015) that previous

research has put less emphasized for assessment of environment attitudes in cross-cultural contexts in EfS platform.

The undergraduates of science and technology courses indicated high level of preservation with the propensity to appreciate the environment, which may be due to their interest in sciences and matured development of environmental awareness; thus, recognizing the significance of EfS (Le Hebel et al., 2014). Likewise, Meinhold & Malkus (2005) and Heyl et al. (2013) also revealed similar findings, in which the students of environmental sciences exhibited higher level of environmental attitudes. After all, the integration of EfS into the existing curriculum as well as the co-curricular activities are reported to promote the environmental attitudes (Le Hebel et al., 2014; Abdel Raman, 2016) and the propensity of being involved in environmental initiatives and prioritizing the environmental causes over personal interest (Jagers et al., 2016; Amerigo et al., 2017) among the students. Besides that, conducting lessons beyond the classroom setting, which allows direct experience with the nature (Bechtel et al., 2006; Grunova et al., 2018), positively influences these students and eventually promotes environmental attitudes (Boyer et al., 2012). These research results show the importance of the role of EfS in developing curricular and extra-curricular activities that linked to environment accessible for all students. Findings from this study is consistent with earlier EfS studies that confirmed the impact of curriculum and extra curriculum activities on the development of students environmental attitudes (Shephard, 2008; Eilam & Trop, 2012; Sutton & Gyuris, 2015).

One's culture may have different notions on how one perceives the environment (Eilam & Trop, 2012), which prompted the testing of measurement invariance in this study to grasp the environmental attitudes among these undergraduates within the context of EfS. This study performed the testing of measurement invariance with specific invariance conditions of configural invariance, metric invariance, and scalar invariance in addressing the cross-cultural validity issues raised by multicultural movement of environment psychology (Vandenberg & Lance, 2000; Arnett, 2008). Essentially, this approach allows the comparison of scores across different groups (Vandenberg & Lance, 2000). The results of measurement invariance for the third-order model in this study reaffirmed the variations in the underlying environmental psychology within the EfS context among groups of diverse cultures. As a result, the implementation of EfS cannot be used to generalized the university undergradute students' environmental attitudes. Consistent with prior studies (e.g., Sterling, 2004; Jickling & Wals, 2012; Littledyke et al., 2013, Corral-Verdugo & Frias-Armenta, 2016; Walshe, 2016), EfS interpretation is highly depending on the courses offers in the university programs. As a result, the sustainability explanation and understanding tend to similar cross-disciplinary with environmental independence due to shared practice and collaborative learning via co-curricular activities, experiences through sustainability research, and interdisciplinary collaboration (Sterling, 2004; Littledyke et al., 2013; Corral-Verdugo & Frias-Armenta, 2016).

Further, the results also support the argument from previous studies that claim invariant measurement is an important analysis to further understanding

how undergraduate student's environmental attitudes are perceived cross-culturally. Careful examination also affects the strategic planning of ongoing and upcoming development of EfS. As Shephard (2008) propounded, the EfS should consider the affective attributes of perceived values as well as attitudes. Essentially, the environmental attitudes among students at the tertiary level must be assessed in terms of preservation and utilization (Schwartz, 1970). Further, this study also adopting Markle (2013) suggestion that prior studies on can be utilized to support the measurement, assessment, and evaluation of effective sustainability attitudes of university's students.

The assessment on the third-order model of environmental attitudes in this study provided essential insights to grasp the environmental attitudes across genders, nationalities, and courses for the effective integration of EfS into the existing curriculum, which were rarely explored in prior studies (Sayles & Mulrennan, 2010; Hope & Jones, 2014). The assessment on the pro-environmental behavior alone is inadequate to assess the effectiveness of EfS across various groups (Kennedy et al., 2009) given the uniqueness of cultures—which propels the need to distinguish individual beliefs, perceived values, and even the environmental attitudes of a population with respect to the concerned environmental issue (López & Amerigo, 2008). For that, the questionnaire approach is proposed to assess environmental attitudes and other perceived environmental values among young adults given the need to acquire explicit responses for latent constructs, such as attitudes (Wicker, 1969; Schwartz, 2012). Overall, the obtained results of this study provided a valid and reliable culturally-fit measurement model in addressing the inadequacy of institutional

tools and formal procedure to measure the effectiveness of EfS initiatives (Shephard et al., 2011) in promoting environmental attitudes.

6.2.3 Limitations of findings

This study may not be able to generalize the obtained findings to the overall population due to the inclusion of only undergraduates from specific courses—science and technology courses and social science courses. Pan et al. (2018) revealed that students of different courses attained different instrument scores in the environmental context. This suggests that general programs without program's specialization or major may limit the generalizability of the findings reported in this study. However, the generalization of reported findings in this study may be assumed with caution considering that the demographic profile attributes were not the primary considerations in the proposed measurement model.

Besides that, the use of online-based questionnaire surveys may introduce certain limitations to the reported findings. This study opted to make use of electronic mail to reach out to the targeted respondents. However, this may have increased the self-selection bias, but unlikely to affect the validity and reliability of the obtained results in this study. However, this is not specific to the current study, nor is it a result of the data collection methodology utilized. Studies in the environmental domain using the same (AlMenhali et al., 2018), or other survey methodology such as mailing questionnaire (Kaiser & Gutscher, 2003) and self-administrated questionnaire (Eilam & Trop, 2012; Sutton & Gyuris, 2015; Abdel Raman, 2016) may also subjected to the same knowledge

and information about “green”, “sustainability”, or “environmental-friendly” bias (Eilam & Trop, 2012; AlMenhali et al., 2018). Apart from that, the adoption of self-reporting in this study, which was also found in substantial studies on environmental attitudes (Dunlap et al., 2000; Milfont & Duckitt, 2010; Dean et al., 2016; Kopnina & Cocis, 2017; AlMenhali et al., 2018), potentially led to certain inconsistencies in the reported results and findings (Corral-Verdugo & Frias-Armenta, 2016).

Furthermore, this study specifically assessed the causal relationship, rather than correlation (Milfont et al., 2006; Milfont & Duckitt, 2010; Milfont et al., 2010), between these scales and items. As a result, the reported findings propounded only theoretical basis of establishing valid interpretations for environmental attitudes. Thus, it is recommended to further explore the environmental attitudes using experimental or longitudinal research designs.

Despite the above limitations, the validity, reliability, and consistency of the obtained results were demonstrated in this study. Nevertheless, it remains necessary to replicate the overall study with the consideration of a more representative sample from the general population using different methodologies.

6.3 CONCLUSIONS

This study demonstrated that the values and the perceived environmental threat define the environmental attitudes, which extended the proposed model by Schwartz (1977). This study assessed the dimensionality of environmental attitudes using EAI (Milfont & Duckitt, 2010), which developed a refined

seven-factor model in relation to the higher-order dimensions of environmental attitudes, namely preservation and utilization. Going beyond the testing the correlations between these scales and items, the proposed extensive theoretical model, which also considered the NAM theory (Schwartz, 1977), TRA (Ajzen, 1991; Fishbein & Ajzen, 2010), and the systems model framework of EfS (Littledyke et al., 2013), may also contribute to the testing of specific causal hypotheses in predicting pro-environmental behavior within the EfS context. The proposed measurement model serves to facilitate the efforts of promoting environmental attitudes among the students through the implementation of EfS in the higher education setting, specifically in the region of Middle East and North Africa (MENA).

Adding to that, this study provided a culture-specific measurement model with proven validity and reliability to assess the multidimensionality of environmental attitudes among the students within the EfS context in the UAE—rather than depending on the generalized EAI items (Milfont & Duckitt, 2010). This offers meaningful insights on how the young adults perceive environmental issues in terms of their beliefs, perceived values, and environmental attitudes in grasping the underlying psychological structure of pro-environmental behavior. Further, the higher order dimension of environmental attitudes could be related to psychologcial variables that is important to measure in investigating the cultural dimensions of values and could be related to socio-economic indicators of environmental indices, competitivenes indices, corruption perception indices and doing business

indices (Diekmann & Franzen, 1999; Boeve-de Pauw & Van Petegem, 2010; Duarter et al., 2017; Pisano & Lubell, 2017).

Conclusively, this study pioneered the exploration of environmental attitudes using EAI within the context of Arab culture. Evidently, the reported findings of this study demonstrated the significance of environmental education, particularly the EfS initiatives, in shaping environmental attitudes among the students. This study developed a seven-factor model with proven validity and reliability to comprehensively assess the multidimensionality of environmental attitudes within the EfS context. The reduction of factors and items involved minimizes the occurrence of cultural bias, social desirability bias, and non-response bias with potentially higher response rate as well as the completion rate for the questionnaire. It is expected that the refined seven-factor model of EAI with 21 items, which maintains the dimensionality of the original EAI items, offer a reliable framework to assess the environmental attitudes within the context of Arab culture. Besides that, this study contributed an enhanced understanding on the overall relationship between humans and the environment in terms of environmental attitudes, which contributed valuable insights to effectively design and improve the EfS initiatives. Hence, a reliable and comprehensive construct that reflects the culture and tertiary education structure can be proposed to act as a baseline framework in the UAE with the view to monitor the impacts of EfS interventions at tertiary education context.

6.4 RECOMMENDATIONS FOR FUTURE RESEARCH

Firstly, it is recommended to assess the dimensionality of the higher-order dimensions of environmental attitudes, namely preservation and utilization, within the context of EfS across diverse Arab cultures in the future research. The research may acquire noteworthy insights on the environmental attitudes among the students, particularly on how both preservation and utilization interact with personal environmental experiences, co-curricular activities offered in the universities (Pan et al., 2018), or other relevant cultural attributes that may capture the distinctiveness of preservation and utilization (AlMenhali et al., 2018) using the proposed measurement model in this study.

Following that, it is recommended for the future research to explore environmental attitudes in a controlled environmental setting. The future research may assess the effects of manipulating situational changes (or threats) towards environmental attitudes and considerations through the experimental approach (Milfont & Schultz, 2016). This is aligned with sugegstion by Arnold et al. (2018), and Grunova et al. (2018) that people must be convinced of something severa to happen to enforce believing rather tha providing information that can be forsaken.

It is also recommended to establish a specific criterion for the demographic profile attributes to ensure the validity and reliability of the comparison in environmental attitudes. Zsoka et al. (2013) clarified that previous studies have focused on the importance of attitude modeling. Sutton & Gyuris (2015) have urged for future studies to explicitly address the need to measure change in people's affective environmental attributes or actual

behavior as a consequence of their ecological experiences. Although many studies have associated environmental attitudes with education and measures for a significant duration of the university experience, Chen et al. (2016) argued that the effort to study environmental attitudes could be extended to less educated people, those with low employment status, and inhabitants of smaller cities. The uncommon function of the psychosocial aspect in environmental psychology studies in measuring environmental attitudes is consistent with suggestions that the social cost of environmental attitudes varies by social and cultural contexts. Thus, educational level may be helpful but not necessarily sufficient (Chen et al., 2011; Evans-Lacko & Knapp, 2014; Le Hebel et al., 2014; Newman & Fernandes, 2016).

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Appendix A

Date: 1 May 2017

Dear Participant:

My name is Entesar Ali Al Menhali and I am a doctoral student at Abu Dhabi University. For my dissertation, I am measuring the utility of environmental attitudes of university's students within the Environmental for Sustainability context in the UAE. Because you are undergraduate students, and your attitudes towards environmental for is crucial, I am inviting you to participate in this research study by completing the attached survey link.

The following questionnaire will require approximately 6 to 8 minutes to complete. There is no compensation for responding nor there any known risk. To ensure that all information will remain confidential, please do not include your name.

If you choose to participate in this project, please answer all questions as honestly as possible. Participation is strictly voluntary, and you may refuse to participate at any time. Thank you for taking the time to assist me in my educational endeavors. The data collected will provide useful information regarding determining whether environmental attitude measure can be used as a baseline framework in the UAE with the view to monitor the impacts of Education for Sustainability interventions at tertiary education context. Completion of the questionnaire will indicate your willingness to participate in this study. If you require additional information or have questions, please contact me at the email address listed below. If you are not satisfied with the manner in which this study is being conducted, you may report (anonymously if you so choose) any complaints to the Dr Khalizani Khalid, Doctoral Committee Chair, khalizani.khalid@adu.ac.ae

Sincerely,
Entesar Ali Al Menhali
entesar_ali@hotmail.com

ENVIRONMENT ATTITUDES SURVEY

* Required

Tell us your opinion

Could you please tell us what you think ...?

The purpose of this survey is to measure the utility of environmental attitudes of university's students within the Environmental for Sustainability context in the UAE. The survey is totally anonymous. Thus no individual's responses can or will be identified. Please answer the following questions honestly and accurately. Read each question carefully, and select the response that best reflects your "gut reaction" to the question or item. There is no right or wrong answers. We are interested in your own personal opinions and perceptions; whatever they are. Please try to answer all questions, as the success of the research depends on each questions being as fully completed as possible.

Demographic

1. What is your gender? *

- ○ Male
- ◉ Female

2. What is your age group? *

- ○ 20 and below
- ○ 21 - 25
- ○ 26 - 30
- ○ 31 - 35
- ○ 36 - 40
- ◉ 41 and above

3. Which nationality best describes you? *

- ○ Emirati
- ○ GCC
- ○ North American
- ◉ Asian
- ○ European
- ○ African
- ○ Other:

4. You are in which program? *

- ○ Arts & Sciences
- ○ Business Administration & Accounting
- ○ Engineering & Computer Science
- ○ Law & Humanities
- ◉ Education
- ○ Other: _____

5. What year you are? *

- ○ 1st year
- ○ 2nd year
- ◉ 3rd year
- ○ 4th year

6. Are you working student? *

- ◉ Yes
- ○ No

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Tell us your opinion

Please indicate the extent to which you agree or disagree with each of the following statements. The definition of the scales is included under each scale to provide the understanding of the meaning. Kindly choose one of the set of numbers in the following statements that best reflects your degree of agreement or disagreement according to the following scale.

Scale 1: Enjoyment of nature (EN)

Belief that enjoying time in nature is pleasant and preferred to spending time in urban areas, versus belief that enjoying time in nature is dull, boring and not enjoyable, and not preferred over spending time in urban areas

1. I really like going on trips into the countryside, for example, to forests or fields. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. I think spending time in nature is boring. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. Being out in nature is a great stress reducer for me. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. I have a sense of well-being in the silence of nature. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. I find it more interesting in a shopping mall than out in the forest looking at trees and birds. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. I find it very boring being out in wilderness areas. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 2: Support for interventionist conservation policies (SI)

Support for conservation policies regulating industry and the use of raw materials, and subsidizing and supporting alternative eco-friendly energy sources and practices, versus opposition to such measures and policies.

1. Industries should be able to use raw materials rather than recycled ones if this leads to lower prices and costs, even if it means the raw materials will eventually be used up. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. I am opposed to governments controlling and regulating the way raw materials are used to try and make them last longer. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. People in developed societies are going to have to adopt a more conserving lifestyle in the future. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. I don't think people in developed societies are going to have to adopt a more conserving lifestyle in the future. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. Governments should control the rate at which raw materials are used to ensure that they last as long as possible. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. Controls should be placed on industry to protect the environment from pollution, even if it means things will cost more. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 3: Environmental movement activism (EM)

Personal readiness to actively support or get involved in organized action for environmental protection, versus disinterest in or refusal to support or get involved in organized action for environmental protection.

1. I would NOT get involved in an environmentalist organization. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Environmental protection costs a lot of money. I am prepared to help out in a fund-raising effort. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. I would not want to donate money to support an environmentalist cause. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. I would like to join and actively participate in an environmentalist group. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. I don't think I would help to raise funds for environmental protection. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. I would like to support an environmental organization. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 4: Conservation motivated by anthropocentric concern (CM)

Support for conservation policies and protection of the environment motivated by anthropocentric concern for human welfare and gratification, versus support for such policies motivated by concern for nature and the environment as having value in themselves.

1. Conservation is important even if it lowers peoples' standard of living. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. We need to keep rivers and lakes clean to protect the environment, and NOT as places for people to enjoy water sports. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. We should protect the environment even if it means peoples' welfare will suffer . *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. One of the most important reasons to keep lakes and rivers clean is so that people have a place to enjoy water sports. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. Nature is important because of what it can contribute to the pleasure and welfare of humans. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. The thing that concerns me most about deforestation is that there will not be enough lumber for future generations. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 5: Confidence in science and technology (CST)

Belief that human ingenuity, especially science and technology, can and will solve all environmental current problems and avert or repair future damage or harm to the environment, versus belief that human ingenuity, especially science and technology, cannot solve all environmental problems.

1. Science and technology will eventually solve our problems with pollution, overpopulation and diminishing resources. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. The belief that advances in science and technology can solve our environmental problems is completely wrong and misguided. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. Modern science will solve our environmental problems. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. Modern science will NOT be able to solve our environmental problems. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. We cannot keep counting on science and technology to solve our environmental problems. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. Humans will eventually learn how to solve all environmental problems. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 6: Environmental fragility (EF)

Belief that environment is fragile and easily damaged by human activity, and that serious damage from human activity is occurring and could soon have catastrophic consequences for both nature and humans, versus belief that nature and the environment are robust and not easily damaged in any irreparable manner, and that no damage from human activity that is serious or irreparable is occurring or is likely.

1. People who say that the unrelenting exploitation of nature has driven us to the brink of ecological collapse are wrong. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Humans are severely abusing the environment. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. The idea that the balance of nature is terribly delicate and easily upset is much too pessimistic. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. I do not believe that the environment has been severely abused by humans. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. If things continue on their present course, we will soon experience a major ecological catastrophe. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. When humans interfere with nature, it often produces disastrous consequences. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 7: Altering nature (AN)

Belief that humans should and do have the right to change or alter nature and remake the environment as they wish to satisfy human goals and objectives, versus belief that nature and the natural environment should be preserved in its original and pristine state and should not be altered in any way by human activity or intervention.

1. I'd prefer a garden that is wild and natural to a well-groomed and ordered one. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Human beings should not tamper with nature even when nature is uncomfortable and inconvenient for us. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. Turning new unused land over to cultivation and agricultural development should be stopped. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. When nature is uncomfortable and inconvenient for humans, we have every right to change and remake it to suit ourselves. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. Grass and weeds growing between pavement stones really looks untidy. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. I'd much prefer a garden that is well-groomed and ordered to a wild and natural. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 8: Personal conservation behavior (PC)

Taking care to conserve resources and protect the environment in personal everyday behavior, versus lack of interest in or desire to take care of resources and conserve in one's everyday behavior.

1. I am NOT the kind of person who makes efforts to conserve natural resources. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Whenever possible, I try to save natural resources. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. I always switch the light off when I don't need it on any more. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. In my daily life, I try to find ways to conserve water or power. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. I could not be bothered to save water or other natural resources. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. In my daily life, I'm just not interested in trying to conserve water and/or power. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 9: Human dominance over nature (HD)

Belief that nature exists primarily for human use, versus belief that humans and nature have the same right.

1. Humans are no more important than any other species. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Human beings were created or evolved to dominate the rest of nature. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. Plants and animals exist primarily to be used by humans. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. I DO NOT believe humans were created or evolved to dominate the rest of nature. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. Plants and animals have as much right as humans to exist. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. Humans were meant to rule over the rest of nature. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 10: Human utilization of nature (HU)

Belief that economic growth and development should have priority rather than environmental protection, versus belief that environmental protection should have priority rather than economic growth and development.

1. Protecting peoples' jobs is more important than protecting the environment. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Humans do NOT have the right to damage the environment just to get greater economic growth. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. The benefits of modern consumer products are more important than the pollution that results from their production and use. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. Protecting the environment is more important than protecting economic growth. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. Protecting the environment is more important than protecting peoples' jobs. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. The question of the environment is secondary to economic growth. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 11: Eco-centric concern (EC)

A nostalgic concern and sense of emotional loss over environmental damage and loss, versus absence of any concern or regret over environmental damage.

1. I do not believe protecting the environment is an important issue. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. Despite our special abilities, humans are still subject to the laws of nature. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. It does NOT make me sad to see natural environments destroyed. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. It makes me sad to see forests cleared for agriculture. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. The idea that nature is valuable for its own sake is naive and wrong. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. Nature is valuable for its own sake. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

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Scale 12: Support for population growth policies (SP)

Support for policies regulating the population growth and concern about overpopulation, versus lack of any support for such policies and concern.

1. Families should be encouraged to limit themselves to two children or less. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

2. We should never put limits on the number of children a couple can have. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

3. We would be better off if we dramatically reduced the number of people on Earth. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

4. The government has no right to require married couples to limit the number of children they can have. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

5. A married couple should have as many children as they wish, as long as they can adequately provide for them. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

6. Our government should educate people concerning the importance of having two children or less. *

	1	2	3	4	5	6	7	
STRONGLY DISAGREE	○	○	○	○	○	○	○	STRONGLY AGREE

THANK YOU.. YOUR COOPERATION AND PARTICIPATION ARE MUCH APPRECIATED.

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Appendix B

التاريخ: 1 مايو 2018

عزيزي المشارك:

اسمي انتصار علي المنهالي وأنا طالبة دكتوراه في جامعة أبوظبي. في بحثي هذا، أهدف إلى قياس مدى فائدة السلوك البيئي لطلاب الجامعة ضمن سياق مبادئ الاستدامة البيئية في دولة الإمارات. نظرًا لأنك طالب جامعي، وسلوكك البيئي أمر بالغ الأهمية، فإنني أدعوك للمشاركة في هذه الدراسة البحثية من خلال إكمال الاستبانة المرفقة.

يتطلب الاستبيان التالي ما يقارب 6 إلى 8 دقائق لإكماله، وجميع المعلومات التي سيدلى بها ستعامل بسرية تامة.

إذا اخترت المشاركة في هذا الإستبانة، يرجى الإجابة على جميع الأسئلة بدقة وشفافية قدر الإمكان.

المشاركة غير إلزامية ولك الحرية بعدم المشاركة. شكرا لوقتك في مساعدتي في مساري التعليمي. ستوفر البيانات التي تم جمعها معلومات مفيدة فيما يتعلق بتحديد ما إذا كان يمكن استخدام مقياس السلوك البيئي كإطار عمل أساسي في دولة الإمارات العربية المتحدة بهدف مراقبة آثار مدخلات التعليم من أجل الاستدامة في سياق التعليم العالي.

إذا كنت تحتاج إلى معلومات إضافية أو لديك أسئلة، يرجى الاتصال بي على عنوان البريد الإلكتروني الوارد أدناه. إذا لم تكن راضيًا عن الطريقة التي يتم بها إجراء هذه الدراسة، فيمكنك أن تقدم ملاحظاتك (بدون تحديد هويتك إذا اخترت) إلى الدكتورة كاليزاني خالد، رئيس لجنة الدكتوراه، khalizani.khalid@adu.ac.ae

قسم أ: أسئلة العامة

1. ما هو جنسك؟

ذكر ☐

انثى ☐

2. كم عمرك؟

20 أو أقل ☐

21 - 25 ☐

26 - 30 ☐

31 - 35 ☐

36 – 40 ☐

41 أو أكثر ☐

3. ماهي جنسيتك؟

إماراتي ☐

دول مجلس التعاون الخليجي ☐

أمريكا الشمالية ☐

دول آسيا ☐

أوروبي ☐

أفريقي ☐

آخرى ..... ☐

4. ما هو مجال تخصصك؟

الفنون والعلوم ☐

إدارة الأعمال والمحاسبة ☐

الهندسة وعلوم الحاسوب ☐

القانون والعلوم الإنسانية ☐

التعليم ☐

آخرى ..... ☐

5. في أي سنة دراسية تدرس حالياً

سنة أولى ☐

سنة ثانية ☐

سنة ثالثة ☐

سنة رابعة ☐

6. هل انت طالب يعمل؟

نعم ☐

لا ☐

القسم ب: أسئلة تخصصية

يرجى الإشارة إلى مدى موافقتك أو عدم موافقتك مع كل عبارة من العبارات التالية. يتم تضمين تعريف المقاييس تحت كل مقياس (الخط المائل) لتوفير فهم المعنى. يرجى وضع دائرة واحدة من مجموعة الأرقام في العبارات التالية التي تعكس على أفضل وجه درجة موافقتك أو عدم موافقتك وفقًا للمقاييس التالية.

1	2	3	4	5	6	7

أوافق بشدة	أوافق	أوافق إلى حد ما	محايد	لا أوافق إلى حد ما	لا أوافق	لا أوافق بشدة

مقياس 1: التمتع بالطبيعة *الاعتقاد بأن الاستمتاع بالوقت في الطبيعة أمر ممتع ويفضل قضاء الوقت في المناطق الحضرية، مقابل الاعتقاد بأن الاستمتاع بالوقت في الطبيعة ممل وغير ممتع، وغير مفضل على قضاء الوقت في المناطق الحضرية.*								
1	أنا حقا أحب الذهاب في رحلات إلى الريف ، على سبيل المثال ، إلى الغابات أو الحقول	1	2	3	4	5	6	7
2	أعتقد أن قضاء الوقت في الطبيعة أمر ممل	1	2	3	4	5	6	7
3	التواجد في الطبيعة يساعد في تخفيف الضغط عني	1	2	3	4	5	6	7
4	لدي شعور بالارتياح العام في صمت الطبيعة	1	2	3	4	5	6	7
5	التواجد في مراكز للتسوق بالنسبة لي أكثر متعة من الذهاب إلى الغابة والتأمل في الأشجار والطيور	1	2	3	4	5	6	7
6	أجد أن التواجد في المناطق البرية مملاً للغاية	1	2	3	4	5	6	7
مقياس 2: دعم سياسات الحفظ التدخلية (SI) **دعم سياسات المحافظة على تنظيم الصناعة واستخدام المواد الخام، ودعم مصادر الطاقة البديلة والصديقة للبيئة، مقابل معارضة هذه التدابير والسياسات.**								
1	يجب أن تكون الصناعات قادرة على استخدام المواد الخام بدلاً من المواد المعاد تدويرها إذا أدى ذلك إلى انخفاض الأسعار والتكاليف، حتى لو كان ذلك يعني أن المواد الخام ستستخدم في النهاية	1	2	3	4	5	6	7
2	أنا أعارض الحكومات التي تتحكم في طريقة استخدام المواد الخام في جعلها تدوم لفترة أطول	1	2	3	4	5	6	7
3	سيتعين على الناس في المجتمعات المتقدمة أن يتبنوا أسلوب حياة أكثر تحفظًا في المستقبل	1	2	3	4	5	6	7

4	لا أعتقد أن الناس في المجتمعات المتقدمة سوف يضطرون إلى تبني أسلوب حياة أكثر محافظة في المستقبل	1	2	3	4	5	6	7
5	يجب أن تتحكم الحكومات في معدل استخدام المواد الخام لضمان استمراريتها لأطول فترة ممكنة	1	2	3	4	5	6	7
6	يجب وضع ضوابط على الصناعة لحماية البيئة من التلوث، حتى لو كان ذلك يعني أن الأمور سوف تكلف أكثر	1	2	3	4	5	6	7
مقياس 3: نشاط الحركة البيئية*(EM)* **الاستعداد الشخصي لتقديم الدعم الفعال أو المشاركة في العمل المنظم لحماية البيئة ، مقابل عدم الاهتمام أو رفض الدعم أو المشاركة في العمل المنظم لحماية البيئة.**								
1	لن أشترك في منظمة بيئية	1	2	3	4	5	6	7
2	تكلف الحماية البيئية الكثير من المال. أنا على استعداد للمساعدة في جهد جمع الأموال	1	2	3	4	5	6	7
3	لا أريد التبرع بالمال لدعم قضية بيئية	1	2	3	4	5	6	7
4	أود الانضمام والمشاركة بفعالية في مجموعة بيئية	1	2	3	4	5	6	7
5	لا أعتقد أنني سأساعد في جمع الأموال لحماية البيئة	1	2	3	4	5	6	7
6	أود أن أدعم منظمة بيئية	1	2	3	4	5	6	7
مقياس رقم 4: الحفظ بدوافع قلق بشري*(CM)* **دعم سياسات الحفظ وحماية البيئة بدافع الاهتمام بشؤون الإنسان من أجل رفاه الإنسان وإشباعه ، مقابل دعم هذه السياسات بدافع الاهتمام بالطبيعة والبيئة باعتبارها قيمة في حد ذاتها.**								
1	المحافظة مهمة حتى لو على مستويات المعيشة الدنيوية للشعوب	1	2	3	4	5	6	7
2	للمحافظة على البيئة نحن بحاجة للحفاظ على الأنهار والبحيرات نظيفة، وليس كأماكن للناس للاستمتاع بالرياضات المائية	1	2	3	4	5	6	7
3	يجب أن نحمي البيئة حتى لو كان ذلك يعني أن رفاهية الشعوب ستعاني	1	2	3	4	5	6	7

4	أحد أهم أسباب إبقاء البحيرات والأنهار نظيفة حتى يتمكن الناس من الاستمتاع بالرياضات المائية	1	2	3	4	5	6	7
5	الطبيعة مهمة بسبب ما يمكن أن تسهم به في متعة البشر ورفاههم	1	2	3	4	5	6	7
6	إن الشيء الذي يثير قلقي أكثر حول إزالة الغابات هو أنه لن يكون هناك ما يكفي من الأخشاب للأجيال القادمة	1	2	3	4	5	6	7
مقياس 5: الثقة في العلوم والتكنولوجيا*(CST)*								
الاعتقاد بأن الإبداع البشري، لا سيما العلوم والتكنولوجيا، يمكن أن يحل جميع مشاكل البيئة الحالية ويمنعها أو يصدّح الأضرار المستقبلية أو الأذى للبيئة ، مقابل الإيمان بأن الإبداع البشري ، وخاصة العلم والتكنولوجيا ، لا يمكن أن يحل جميع المشاكل البيئية.								
1	سوف يحل العلم والتكنولوجيا في نهاية المطاف مشاكلنا مع التلوث، والاكتظاظ السكاني وتضاؤل الموارد	1	2	3	4	5	6	7
2	إن الاعتقاد بأن التقدم في العلوم والتكنولوجيا يمكن أن يحل مشاكلنا البيئية أمر خاطئ تماما ومضللا	1	2	3	4	5	6	7
3	العلم الحديث سوف يحل مشاكلنا البيئية	1	2	3	4	5	6	7
4	لن يتمكن العلم الحديث من حل مشاكلنا البيئية	1	2	3	4	5	6	7
5	لا يمكننا الاستمرار في الاعتماد على العلم والتكنولوجيا لحل مشاكلنا البيئية	1	2	3	4	5	6	7
6	سيتعلم البشر في نهاية المطاف كيفية حل جميع المشاكل البيئية	1	2	3	4	5	6	7
مقياس 6: الهشاشة البيئية*(EF)*								
الاعتقاد بأن البيئة هشة ويمكن أن تتضرر بسهولة بسبب النشاط البشري ، وأن الضرر الجسيم من النشاط البشري يحدث ويمكن أن يكون له عواقب كارثية على الطبيعة والبشر على حد سواء ، في مقابل الاعتقاد بأن الطبيعة والبيئة قوية ولا تتضرر بسهولة بأي طريقة لا يمكن إصلاحها ، وأنه لا يوجد أي ضرر ناتج عن نشاط بشري جاد أو غير قابل للإصلاح أو يحدث على الأرجح.								

1	إن الأشخاص الذين يقولون إن الاستغلال الذي لا هوادة فيه للطبيعة قد دفعنا إلى حافة الانهيار الإيكولوجي هم على خطأ	1	2	3	4	5	6	7
2	البشر يسيئون بشدة للبيئة	1	2	3	4	5	6	7
3	إن الفكرة القائلة بأن توازن الطبيعة حساس بشكل مخيف ومزعج هو متشاؤم أكثر من اللازم	1	2	3	4	5	6	7
4	لا أعتقد أن البيئة قد أساءت بشدة من قبل البشر	1	2	3	4	5	6	7
5	إذا استمرت الأمور على مسارها الحالي ، فسنواجه قريباً كارثة بيئية كبيرة	1	2	3	4	5	6	7
6	عندما يتدخل البشر مع الطبيعة ، فإنه غالباً ما يؤدي إلى عواقب وخيمة	1	2	3	4	5	6	7
مقياس 7: تغيير الطبيعة*(AN)*								
الاعتقاد بأن البشر يجب أن يكون لهم الحق في تغيير أو تغيير الطبيعة وإعادة صنع البيئة لأنهم يرغبون في إرضاء الأهداف والغايات البشرية ، مقابل الإيمان بأن الطبيعة والبيئة الطبيعية يجب الحفاظ عليها في حالتها الأصلية والبكر ويجب ألا يتم تغييرها بأي شكل من الأشكال عن طريق النشاط البشري أو التدخل.								
1	أنا أفضل حديقة البرية والطبيعية لواحدة مهندم وأمر واحد	1	2	3	4	5	6	7
2	يجب ألا يعبث الإنسان بالطبيعة حتى عندما تكون الطبيعة غير مريحة وغير مريحة بالنسبة لنا	1	2	3	4	5	6	7
3	ينبغي وقف تحويل الأراضي غير المستخدمة إلى الزراعة والتنمية الزراعية	1	2	3	4	5	6	7
4	عندما تكون الطبيعة غير مريحة وغير مريحة للبشر ، لدينا كل الحق في التغيير وإعادة صنعه ليتناسب مع أنفسنا	1	2	3	4	5	6	7
5	الأعشاب والحشائش المتزايدة بين حجارة الرصيف تبدو حقا غير مرتب	1	2	3	4	5	6	7
6	كنت أفضّل كثيرًا حديقة مهيّأة وأمرت بها إلى الطبيعة والبرية	1	2	3	4	5	6	7
مقياس 8: سلوك الحفظ الشخصي								
الاهتمام بالحفاظ على الموارد وحماية البيئة في السلوك اليومي الشخصي ، مقابل عدم الاهتمام أو الرغبة في الاهتمام بالموارد والحفاظ عليها في السلوك اليومي للشخص.								

1	أنا لست من النوع الذي يبذل جهودًا للحفاظ على الموارد الطبيعية	1	2	3	4	5	6	7
2	كلما أمكن، أحاول حفظ الموارد الطبيعية	1	2	3	4	5	6	7
3	أقوم دائمًا بإطفاء الضوء عندما لا أحتاج إليه	1	2	3	4	5	6	7
4	أحاول في حياتي اليومية إيجاد طرق للحفاظ على الماء أو الطاقة	1	2	3	4	5	6	7
5	لم أكن أزعج لتوفير المياه أو الموارد الطبيعية الأخرى	1	2	3	4	5	6	7
6	في حياتي اليومية ، لا أهتم فقط بمحاولة الحفاظ على المياه و / أو الطاقة	1	2	3	4	5	6	7
Scale 9: Human dominance over nature (HD) *Belief that nature exists primarily for human use, versus belief that humans and nature have the same right.* **مقياس 9: الهيمنة البشرية على الطبيعة*(HD)*** **الاعتقاد بأن الطبيعة موجودة في المقام الأول للاستخدام البشري ، مقابل الاعتقاد بأن البشر والطبيعة لديهم نفس الحق.**								
1	البشر ليسوا أكثر أهمية من أي نوع آخر	1	2	3	4	5	6	7
2	تم إنشاء البشر أو تطورت للسيطرة على بقية الطبيعة	1	2	3	4	5	6	7
3	توجد النباتات والحيوانات في المقام الأول لاستخدامها من قبل البشر	1	2	3	4	5	6	7
4	لا أعتقد أن البشر قد خلقوا أو تطوروا ليسيطروا على بقية الطبيعة	1	2	3	4	5	6	7
5	النباتات والحيوانات لديها الحق في وجود البشر	1	2	3	4	5	6	7
6	كان من المفترض أن يحكم البشر على بقية الطبيعة	1	2	3	4	5	6	7
مقياس 10: الاستخدام البشري للطبيعة*(HU)* **الاعتقاد بأن النمو الاقتصادي والتنمية يجب أن يكون لهما الأولوية بدلاً من الحماية البيئية ، في مقابل الاعتقاد بأن حماية البيئة يجب أن يكون لها الأولوية بدلاً من النمو الاقتصادي والتنمية.**								
1	إن حماية وظائف الناس أكثر أهمية من حماية البيئة	1	2	3	4	5	6	7
2	ليس لدى البشر الحق في الإضرار بالبيئة فقط للحصول على نمو اقتصادي أكبر	1	2	3	4	5	6	7

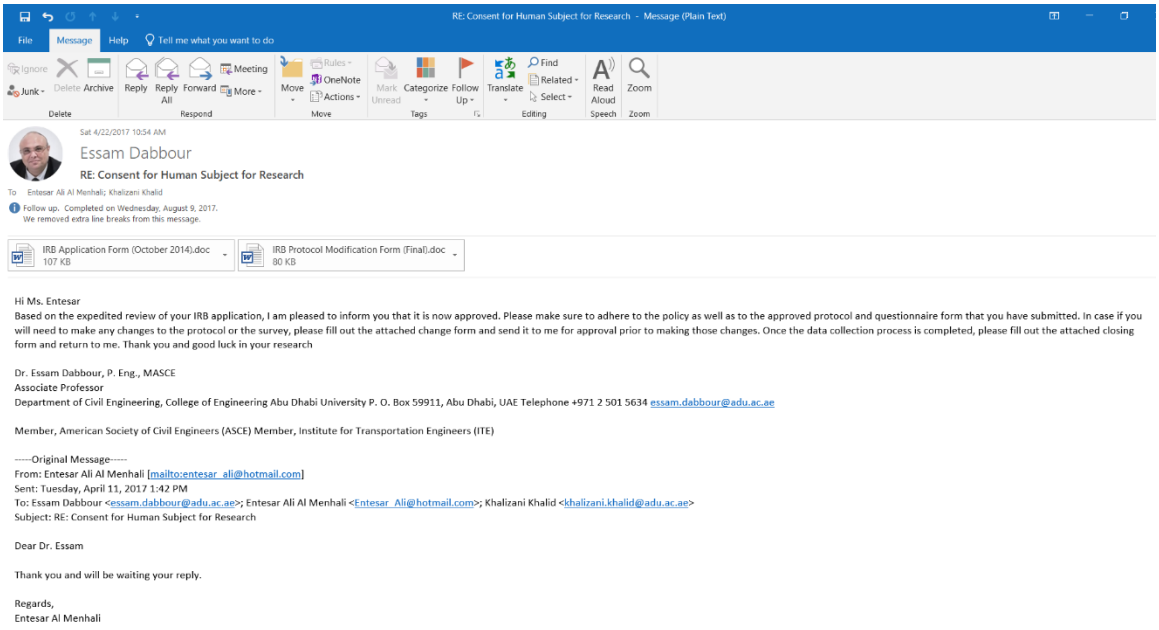
3	تعد فوائد المنتجات الاستهلاكية الحديثة أكثر أهمية من التلوث الناتج عن إنتاجها واستخدامها	1	2	3	4	5	6	7
4	حماية البيئة أكثر أهمية من حماية النمو الاقتصادي	1	2	3	4	5	6	7
5	إن حماية البيئة أكثر أهمية من حماية وظائف الناس	1	2	3	4	5	6	7
6	مسألة البيئة هي ثانوية للنمو الاقتصادي	1	2	3	4	5	6	7
مقياس رقم 11: الاهتمام المركزى (*EC*) **شعور بالحنين والشعور بالضياع العاطفي بسبب الأضرار والخسائر البيئية ، مقابل غياب أي قلق أو ندم على الأضرار البيئية.**								
1	لا أعتقد أن حماية البيئة قضية مهمة	1	2	3	4	5	6	7
2	على الرغم من قدراتنا الخاصة، لا يزال البشر يخضعون لقوانين الطبيعة	1	2	3	4	5	6	7
3	لا يجعلني حزينا لرؤية البيئات الطبيعية التي دمرت	1	2	3	4	5	6	7
4	يجعلني أشعر بالحزن لرؤية الغابات المطهرة للزراعة	1	2	3	4	5	6	7
5	الفكرة القائلة بأن الطبيعة ذات قيمة في حد ذاتها هي فكرة ساذجة وخاطئة	1	2	3	4	5	6	7
6	الطبيعة لها قيمة بحد ذاتها	1	2	3	4	5	6	7
مقياس 12: دعم سياسات النمو السكاني (*SP*) **دعم السياسات التي تنظم النمو السكاني والقلق بشأن الزيادة السكانية ، مقابل عدم وجود أي دعم لهذه السياسات والقلق.**								
1	ينبغي تشجيع الأسر على الحد من الإنجاب لطفلين أو أقل	1	2	3	4	5	6	7
2	يجب ألا نضع قيودًا على عدد الأطفال الذي يمكن أن يحصل عليه الزوجان	1	2	3	4	5	6	7
3	سنكون أفضل حالا إذا خفضنا بشكل كبير عدد الأشخاص على الأرض	1	2	3	4	5	6	7
4	لا يحق للحكومة أن تطلب من المتزوجين الحد من عدد الأطفال الذين يمكنهم الحصول عليهم	1	2	3	4	5	6	7
5	يجب أن يكون لدى الزوجين عدد الأطفال كما يحلو لهما، طالما أنهما يمكنهما توفيرها بشكل كافٍ	1	2	3	4	5	6	7

6	يجب على حكومتنا تثقيف الناس فيما يتعلق بأهمية وجود طفلين أو أقل	1	2	3	4	5	6	7

إن تعاونكم ومشاركتكم محل تقدير كبير.

شكرا لكم.

Appendix C



Hi Ms. Entesar
Based on the expedited review of your IRB application, I am pleased to inform you that it is now approved. Please make sure to adhere to the policy as well as to the approved protocol and questionnaire form that you have submitted. In case if you will need to make any changes to the protocol or the survey, please fill out the attached change form and send it to me for approval prior to making those changes. Once the data collection process is completed, please fill out the attached closing form and return to me. Thank you and good luck in your research

Dr. Essam Dabbour, P. Eng., MASCE
Associate Professor
Department of Civil Engineering, College of Engineering Abu Dhabi University P. O. Box 59911, Abu Dhabi, UAE Telephone +971 2 501 5634 essam.dabbour@adu.ac.ae

Member, American Society of Civil Engineers (ASCE) Member, Institute for Transportation Engineers (ITE)

-----Original Message-----
From: Entesar Ali Al Menhali [mailto:entesar_ali@hotmail.com]
Sent: Tuesday, April 11, 2017 1:42 PM
To: Essam Dabbour <essam.dabbour@adu.ac.ae>; Entesar Ali Al Menhali <Entesar_Ali@hotmail.com>; Khalizani Khalid <khalizani.khalid@adu.ac.ae>
Subject: RE: Consent for Human Subject for Research

Dear Dr. Essam

Thank you and will be waiting your reply.

Regards,
Entesar Al Menhali