



**Factors influencing the International Tourist Perception on the Environmental
Impacts of Tourism Development in Phuket, Thailand**

Jaruwan Manui

**A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Science in Technology and Environmental Management
Prince of Songkla University**

2018

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Thesis Title Factors influencing the international tourist perception on the environmental impacts of tourism development in Phuket, Thailand

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Abstract

This study examines the viewpoints of international tourists in Phuket Island towards the development of tourism and its environmental impacts in Phuket, Thailand. Data was collected from the 350 visitors leaving from the Phuket International Airport, during March-April, 2016, using the structured questionnaire. Factor analysis was applied to group highly correlated outcome variables in four perception dimensions; water environment, waste and traffic management, urban environment, and land environment. One-way ANOVA analysis was then applied to examine the effects of demographic characteristics and trip profile on the perception dimensions. Our findings revealed that, in the sample of 350 respondents there was statistically significant difference in the perceptions of different country of origin and the number of visits of the respondents. The country of origin was the primary factor affecting the perceptions toward the environmental impacts of water environment and waste and traffic management whereas the number of visits influenced all the four environmental impact dimensions. Most tourists from Australia and New Zealand and those who were repeat visitors showed negative perceptions on environmental impacts about water environment and waste and traffic management. The more often the individual tourists come to visit this island the more they have experienced negative perceptions on the environmental impacts. Demographic characteristics and behaviors of tourists were highly influential in the perceptions of the environmental impacts in Phuket tourism.

Keywords: Perception, environmental impacts, tourism, demographic factor, factor analysis, Phuket, Thailand

ชื่อวิทยานิพนธ์ ปัจจัยที่ส่งผลต่อการรับรู้ของนักท่องเที่ยวต่างชาติต่อผลกระทบต่อสิ่งแวดล้อมจากการท่องเที่ยวในจังหวัดภูเก็ต ประเทศไทย

ผู้เขียน นางสาวจรรววรรณ มาน้อย

สาขาวิชา เทคโนโลยีและการจัดการสิ่งแวดล้อม

ปีการศึกษา 2560

บทคัดย่อ

การศึกษานี้เป็นการศึกษาทัศนคติของนักท่องเที่ยวชาวต่างชาติในเกาะภูเก็ตต่อการพัฒนาการท่องเที่ยวและผลกระทบต่อสิ่งแวดล้อมในจังหวัดภูเก็ต ประเทศไทย การเก็บรวบรวมข้อมูลจากนักท่องเที่ยว 350 คน ที่เดินทางออกจากสนามบินนานาชาติภูเก็ตในช่วงเดือนมีนาคมถึงเมษายน พ.ศ. 2559 โดยใช้แบบสอบถามที่มีโครงสร้าง การวิเคราะห์องค์ประกอบ (Factor analysis) ถูกนำมาประยุกต์ใช้กับตัวแปรผลลัพธ์ที่มีความสัมพันธ์สูงในมิติการรับรู้ทั้ง 4 มิติ ได้แก่ สิ่งแวดล้อมทางน้ำ การจัดการขยะมูลฝอยและการจราจร สิ่งแวดล้อมในเมือง และสิ่งแวดล้อมบนบก การวิเคราะห์ความแปรปรวนทางเดียว (One-Way ANOVA) ถูกนำมาประยุกต์ใช้เพื่อตรวจสอบผลกระทบของลักษณะทางประชากรศาสตร์ และรายละเอียดการเดินทางในมิติการรับรู้ ผลการวิจัยของเราพบว่า ในกลุ่มตัวอย่างของผู้ตอบแบบสอบถาม 350 คน มีความแตกต่างอย่างมีนัยสำคัญทางสถิติในการรับรู้ของเชื้อชาติ และจำนวนการเข้าชมของผู้ตอบแบบสอบถาม เชื้อชาติเป็นปัจจัยหลักที่มีผลต่อการรับรู้ต่อผลกระทบต่อสิ่งแวดล้อมของสิ่งแวดล้อมทางน้ำ และการจัดการขยะมูลฝอยและการจราจร ในขณะที่จำนวนการเข้าชมมีอิทธิพลต่อมิติผลกระทบด้านสิ่งแวดล้อมทั้งสิ้น ด้าน นักท่องเที่ยวส่วนใหญ่มาจากประเทศออสเตรเลีย และนิวซีแลนด์ที่มาเยือนซ้ำ มีความรู้สึกเชิงลบต่อผลกระทบต่อสิ่งแวดล้อมที่เกี่ยวกับสิ่งแวดล้อมทางน้ำ และการจัดการขยะมูลฝอยและการจราจร นักท่องเที่ยวมาเยี่ยมชมเกาะแห่งนี้บ่อยครั้งจะมีประสบการณ์การรับรู้เชิงลบเกี่ยวกับผลกระทบต่อสิ่งแวดล้อมมากขึ้น ลักษณะทางประชากรศาสตร์ และพฤติกรรมของนักท่องเที่ยวมีอิทธิพลอย่างมากต่อการรับรู้ผลกระทบต่อสิ่งแวดล้อมในการท่องเที่ยวจังหวัดภูเก็ต

คำสำคัญ: การรับรู้ ผลกระทบสิ่งแวดล้อม การท่องเที่ยว ปัจจัยทางประชากร การวิเคราะห์องค์ประกอบ ภูเก็ต ประเทศไทย

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Contents

	Page
Abstract (English)	(5)
Abstract (Thai)	(6)
Acknowledgements	(7)
Contents	(8)
List of Tables	(10)
List of Figures	(11)
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Objectives	3
1.3 Research questions	3
1.4 Hypothesis questions	3
1.5 Expected outcomes	6
CHAPTER 2 LITERATURE REVIEW	7
2.1 Tourism in Phuket Island, Thailand	7
2.2 Destination Image	9
2.3 Demographic and Behavior Variables	10
2.4 Perception of environmental impacts of tourism	11
CHAPTER 3 RESEARCH METHODOLOGY	14
3.1 Questionnaire design	14
3.2 Scoring Rubrics	16
3.3 Desktop research	17
3.4 Sampling method	17
3.5 A pilot study	18
3.6 Data Analysis	19
3.6.1 Analysis to frequency count and percentage distributions.	19
3.6.2 Inferential Statistics	19

Contents (cont.)

	Page
3.6.3 Factor analysis	19
3.6.4 One-way ANOVA	23
CHAPTER 4 RESULTS	24
4.1 Demographic and behavioral data	24
4.1.1 Demographic data of respondents	24
4.1.2 Behavior data of respondents	25
4.2 Factors of environmental impacts of tourism	26
4.3 Demographic and behavioral factors of the environmental impacts of tourism in Phuket	28
4.3.1 Demographic factors affecting tourists' perceptions of environment impacts	28
4.3.2 Behavioral factors affecting tourists' perceptions on environmental impacts	34
CHAPTER 5 CONCLUSIONS AND LIMITATIONS	37
5.1 Conclusions	37
5.2 Limitations	39
REFERENCES	40
APPENDICES	47
Appendix I: Questionnaire	48
Appendix II: Factors analysis of environmental impacts of tourism	51
VITAE	61

List of Tables

	Page
Table 3.1 List of citations in the questionnaire on the perceptions of environmental impacts of tourism	14
Table 3.2 Questionnaire on perceptions of environmental impacts	15
Table 4.1 Demographic characteristics of tourists (n = 350)	25
Table 4.2 Factor analysis for the environmental impacts of tourism in Phuket Island	27
Table 4.3 One-way ANOVA results on variations of perceptions of environmental impacts with demographic factors and behavioral characteristics factors of visitors to Phuket	30
Table 4.4 Tukey's HSD multiple comparisons of water environment (FC1) with country of origin at the 95% confidence interval (CI)	30
Table 4.5 Tukey's HSD multiple comparisons of waste and traffic management (FC2) with country of origin at the 95% confidence interval (CI)	31
Table 4.6 Tukey's HSD multiple comparisons of environment impact outcomes among repeaters and first-timers at the 95% confidence interval (CI)	34

List of Figures

	Page
Figure 1.1 A model of international tourists' perception toward the environmental impacts of tourism	5
Figure 2.1 Location of Phuket Island	9
Figure 3.1 Data was collected from tourists departing from the Phuket International Airport	18
Figure 3.2 A plot of eigen-values and the number of factors	21
Figure 3.3 Parallel analysis scree plots	22
Figure 4.1 Effect of country of origin on the water environment (FC1) perception at the 95% confidence interval	33
Figure 4.2 Effect of country of origin on the waste and traffic management (FC2) perception at the 95% confidence interval	33
Figure 4.3 Effect of number of visits on the environmental factors at the 95% confidence interval	35

CHAPTER 1

INTRODUCTION

1.1 Introduction

Competition in tourist destinations and changes in tourists' travel behaviors lead to the changes of tourist destinations. The attributes that define the destination in its various dimensions have a strong influence on tourists' travel behaviors in the tourism sector (Push-pull and Framework, 2002; Thiumsak and Ruangkanjanases, 2016). In addition, limitations of knowledge about tourists destinations play an important role in discriminatory and recognizable images and the probability of a destination being chosen by the tourists (Goodrich, 1978; Hunt, 1975; Pearce, 1982; Ross, 1992; Woodside and Lysonski, 1989). Tourism and environment have a relationship of interdependence. The environment has been by its natural, cultural-historical, social climate potential, and the motivation of tourists' travels (Stefanica and Butnaru, 2015). However, when there are advantages of tourism the disadvantage is apparent in the destruction of its resources. Tourist activities can lead to the degradation of natural resources for example degradation of natural landscape/scenery, competition for the natural resources, loss of marine ecosystem and biodiversity, import of invasive species, wildlife disturbance. Tourism impacts include traffic congestion (Beerli and Josefa, 2004; Gildea and Hanrahan, 2009; Johnson and Snepenger, 2006; Naidoo and Sharpley, 2016; Sharma and Dyer, 2012; Stylidis and Terzidou, 2014), urbanization (construction and expansion of hotels and shops) (Choi and Sirakaya, 2006; Dickinson and Hoffmann, 2016; Ditchkoff, *et al.*, 2006; Edwards, *et al.*, 2008; Handy, *et al.*, 2002; Ishii, 2012; Law, 2002; Leepreecha, 2005; Marzuki, 2012; Nicula and Elena, 2014; Shoval and Cohen-Hattab, 2001; Thanvisitthpon, 2016; Wu and Chen, 2015), large quantities of waste products (Chi and Qu, 2008; Dickinson and Hoffmann, 2016; Ditchkoff, *et al.*, 2006; Jeffrey and Xie, 1995; Li, *et al.*, 2017; Ruhanen, *et al.*, 2015; Sinclair-Maragh, *et al.*, 2015) and poor waste management

(e.g. lack of waste separation or sorting) (Del Mar Alonso-Almeida, 2013; Stefanica and Butnaru, 2015; Udomsri, *et al.*, 2011). These are major issues for the areas where tourist activity is dependent on the existence of special natural attractions. Inappropriate tourist activities can lead to the degradation of natural resources and biodiversity.

Each year, Thailand sees the arrival of around 35 million tourists and this number is growing (Department of Tourism, 2017). Thailand's tourism industry makes up about 6.5 percent of the country's GDP but has counter-productive environmental impacts all across the country. Thailand has a mediocre but improving performance in the global Environmental Performance Index (EPI) with an overall ranking of 91 out of 180 countries in 2016 (Malaysia Productivity Corporation (MPC), 2016). Two major reasons maybe responsible for the low performance. Firstly, Thailand lacks the effective approach to handle the waste disposal effectively. The second is that despite the common knowledge that this kind of tourism causes such massive damage, the residents and the tourists are still putting their personal desires above that of the environment. Therefore, the development of tourist destinations must go hand in hand with natural resource management.

Rapid growth in tourism development has tremendously transformed Phuket, the island in the south, to become one of the most popular destinations in Thailand (Marzuki, 2012). The economic activities of local community in Phuket have largely changed since a large number of tourists have come to visit Phuket. It has created economic benefits and the island population. There are expansions of infrastructure facilities to support tourism. While technology and construction facilities were developed in the province, local lifestyle has changed, and people become more extravagant. The significance of local social elements with culture, community, economy and environment were affected by tourism development. This study explored the views of foreign tourists on the environmental impacts of tourism in Phuket Island. It did so by asking the following questions: Do visitors think that they have an environmental impact? If there are, What are they? It used demographic and behavior characteristics in designing an instrument to measure perceived tourist environmental impacts. The research results will be presented to the relevant authorities in order to plan tourism development that promotes to environmental sustainability in Phuket.

1.2 Objectives

The purpose of this study is to examine demographic and behavior characteristics that influence perceptions of tourists on environmental impacts of tourism in Phuket.

1.3 Research questions

What are the demographic and behavioral effects of international tourists' perception on the environmental impacts of tourism in Phuket.

1.4 Hypothesis questions

A questionnaire survey was designed according to the nine hypotheses on the perceived environmental impacts of tourism (Figure 1.1)

Hypothesis 1:

H0: There is no significant difference in the perception of tourists from different gender towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different gender towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 2:

H0: There is no significant difference in the perception of tourists from different age group towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different age group towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 3:

H0: There is no significant difference in the perception of tourists from different marital status towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different marital status towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 4:

H0: There is no significant difference in the perception of tourists from different country of origin towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different country of origin towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 5:

H0: There is no significant difference in the perception of tourists from different number of visits including this trip towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different number of visits including this trip towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 6:

H0: There is no significant difference in the perception of tourists from different length of trip towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different length of trip towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 7:

H0: There is no significant difference in the perception of tourists from different travel party towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different travel party towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 8:

H0: There is no significant difference in the perception of tourists from different purpose of trip towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different purpose of trip towards the environmental impacts of tourism while visiting the Phuket Island.

Hypothesis 9:

H0: There is no significant difference in the perception of tourists from different travel arrangement towards the environmental impacts of tourism while visiting the Phuket Island.

H1: There is a significant difference in the perception of tourists from different travel arrangement towards the environmental impacts of tourism while visiting the Phuket Island.

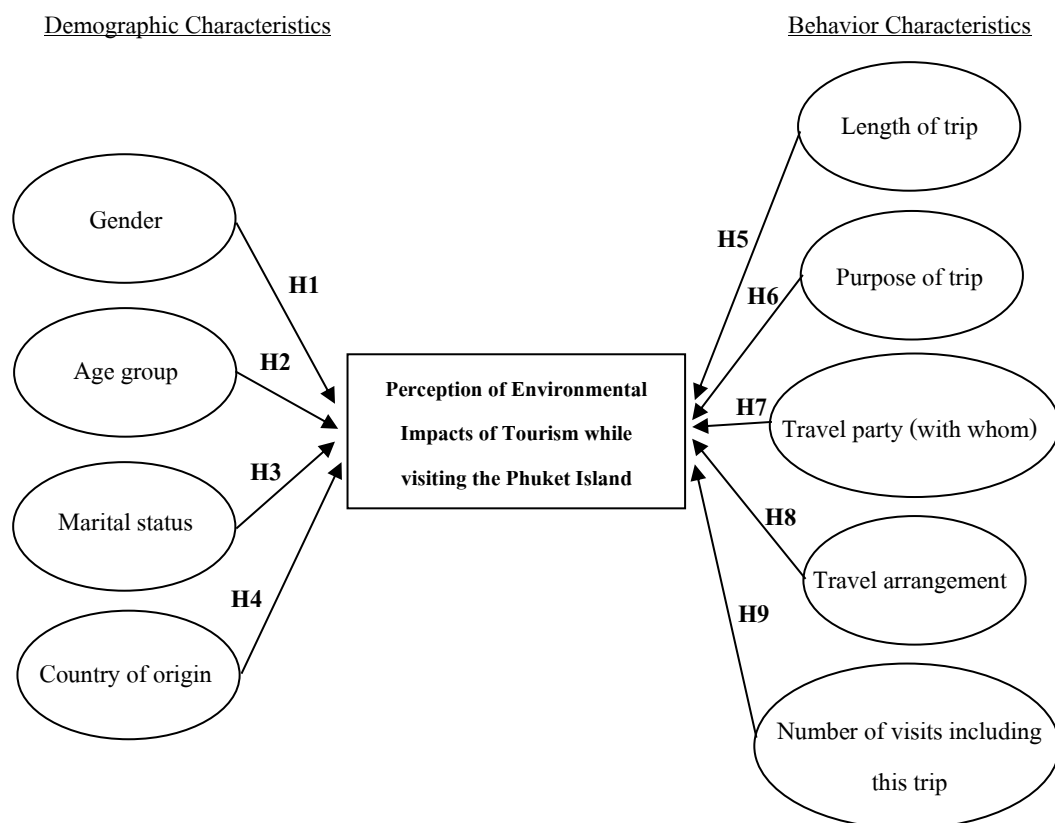


Figure 1.1 A model of international tourists' perception toward the environmental impacts of tourism

1.5 Expected outcomes

The study reveals the tourists' perception on the environmental impacts of tourism. The results can help the relevant authorities to plan tourism development and solve problems. They can also set the direction for tourism development in Phuket in order to meet the needs of tourists and people in Phuket effectively.

CHAPTER 2

LITERATURE REVIEW

This research is about the image of Phuket tourism in the eyes of foreign tourists. Related theories on the importance and meaning of destination image, composition and image search process are explained in this research. The review of concepts, theories, and the relevant research is important to help create a clear framework. In addition, methodological literature on survey area and analysis of the results are reviewed.

2.1 Tourism in Phuket Island, Thailand

Thailand currently receives over 29 million international tourists, with international tourism inbound receipts of over USD 40 billions, travel and tourism industry GDP USD 36,407.1 billion, and travel and tourism industry employment creating 2,402,320 jobs. According to the travel and tourism competitiveness Index Report in 2017, Thailand ranked 7th out of 136 countries on its natural resources, 16th on its Tourist service infrastructure, and 37th on its cultural resources. Business travel was also considered in good rank. However, it ranked 122nd out of 136 countries for its environmental sustainability. This demonstrates the importance of environmental sustainability for tourists visiting Phuket (Forum, 2017). Understanding and measuring the components of tourist destination image are vital for enhancing the development in tourism-driven economy. Destination images provide a contribution to the destination as they are perceived by the tourists and help them decide to travel or to avoid the place (Push-pull and Framework, 2002).

Phuket is the largest island in Thailand that also includes 39 smaller islands with the total area of 570 square kilometer (Phuket Provincial Governor's Office, 2001). Figure 2.1

shows the location of Phuket Island. It is located in the Andaman Sea off the west coast of Thailand. Phuket Island is globally renowned as the sea-sun-sand destination and one of the best world-class tropical beach resorts on the Andaman coast because of its beautiful beaches, crystal-clear blue sea, and mountain greenery (Kontogeorgopoulos, 2005). In 2014, Phuket welcomed more than 11 million visitors and brought in about 260 billion Baht (nearly 7.3 USD billion), accounting for 50% of the country's tourism revenue (National Statistical Office, 2016). The economy in the region is heavily derived from the tourism industries. Phuket's top earner has been tourism, which has transformed the island into Thailand's wealthiest province as a travel destination. Phuket offers a wide variety of tourism products ranging from urban social life, night entertainment, shopping and many more. One of the prominent attractions of Phuket are its beautiful beaches. The beaches are an important focus for holidaying tourists. However, Phuket Island is faced with heavy traffic flow and vehicle movement, poor waste management and degraded water environment (e.g., increased garbage along the coast / beaches and destruction of coral reef). Tourists may face some environmental issues in the main tourist attractions which influenced their decision whether or not to repeat the visit in the future (Bigne, *et al.*, 2001; Chon, 1990; Court and Lupton, 1997; Joppe, *et al.*, 2001). Therefore, the study of environmental sustainability is significant to highlight the need for improvements in the quality of Phuket tourism and to maintain its destination image. This research study focuses on Phuket and collected information from international tourists at Phuket International Airport during March-April 2016.

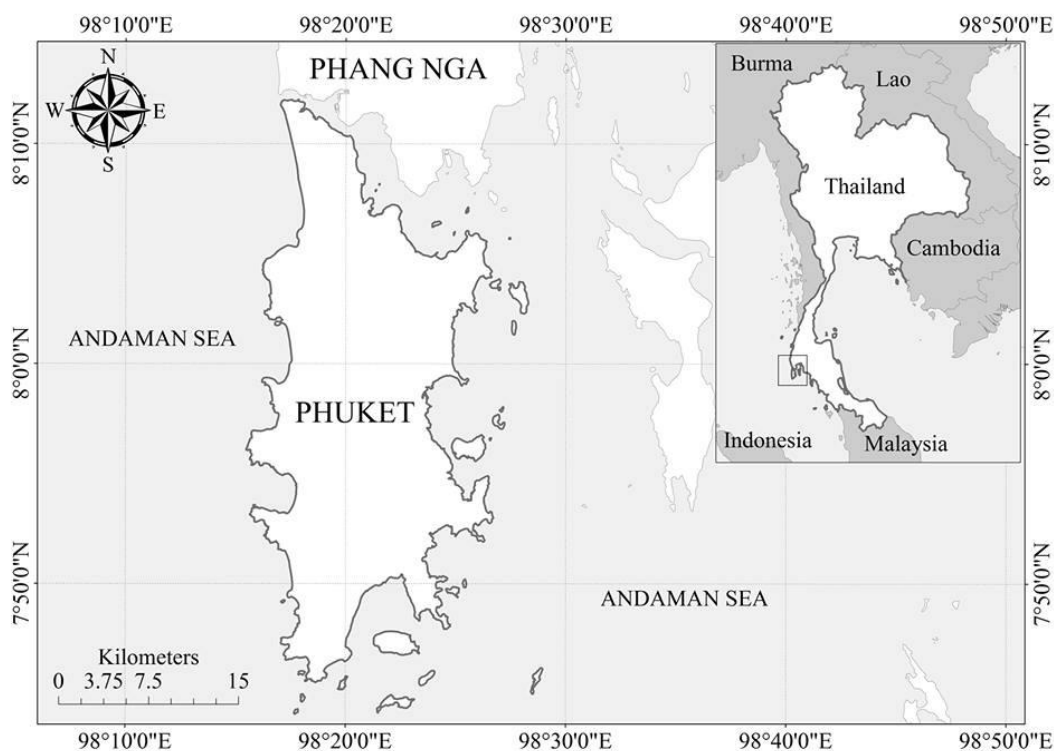


Figure 2.1 Location of Phuket Island

2.2 Destination Image

The importance of understanding tourists' perceptions is crucial for sustainable development of destination (Choi and Sirakaya, 2006). Destination image is overall impression influencing a place or perception of a place. The image resulting from the valuation of tourists to a location or the environment of the place affect the decision to travel to the attractions (Beerli and Josefa, 2004; Echtner and Ritchie, 1991; Papadimitriou, *et al.*, 2015; Rajesh, 2013; Seyhmus and McCleary, 1999). Another meaning of a destination is the perception from seeing or hearing from the media including the recognition they have seen or experienced in various destinations. This perceived image are caused by beliefs or knowledge about the tourist attractions and traditions and culture in each area. The beliefs or knowledge about tourist destinations derived from media sources are one factor to attract or stimulate tourists to be curious and interested in visiting the attractions. This is especially true for new tourists who have not experienced the destination before (Ayyildiz

and Turna, 2013; Beerli and Josefa, 2004; Qu, *et al.*, 2011; Zhang, *et al.*, 2014). Tourists are likely to choose to travel to a place with a good image such as famous, beautiful, clean, and safe place. In contrast, tourists will avoid traveling to places with a negative image. Most tourists do not choose to travel to places with toxic air, waste water, traffic congestion, ecological destruction, dirty beaches or degraded coral, and unsafe places (Push-pull and Framework, 2002). Therefore, it is necessary to monitor the destination image in tourism. The destination image assessment is beneficial for developing a more efficient tourism system that can have positive impacts on the development of communities and better quality of residents' lives.

2.3 Demographic and Behavior Characteristics

As stated by many literature the factors that influence perceptions of tourists can be classified into the following groups: demographic, personal, and behavioral characteristics. These same characteristics, with other names, are found in other studies, such as Harrill (2004) and Thiumsak and Ruangkanjanases (2016) called them socioeconomic factors, spatial factors, and factors of economic dependence. The literature did not reveal a clear conceptualization or definition of these classifications, nor did it clearly express the criteria for these classifications. Therefore, in this study, each tourist may evaluate the environmental impacts of tourism differently. The factors chosen in this study are demographic characteristics and behavior characteristics. Demographic characteristics associated with perceptions of tourists include (1) gender (Del Mar Alonso-Almeida, 2013), (2) age group (Andereck, *et al.*, 2005; Beerli and Josefa, 2004; Sharma and Dyer, 2012; Sinclair-Maragh, *et al.*, 2015), (3) marital status (Johnson and Snepenger, 2006; Thipsingh, 2015), and (4) country of origin (Beerli and Josefa, 2004; Gibson, *et al.*, 2008; Seidl, 2014).

Behavior characteristics (so-called as Travel Behavior) associated with perceptions of tourists are generally defined as the movement from one street address to another, and dissected into several components. Number of visits or experience of travel may also influence perceptions of tourists. Schreyer, Lime and Willams (1984) suggested that present situations were interpreted in comparison with past experiences, due to the connection between information coming

from past experiences and the subjective interpretation of a leisure trip. In tourism context, past experience may be more important than information obtained from external sources, meaning that tourists tend to place more weight on their past experience. When there is past experience, the need to receive information from external sources becomes weaker (Beerli and Josefa, 2004; Mazursky, 1989; Qu, *et al.*, 2011; Reza, *et al.*, 2012; Schreyer, *et al.*, 1984). The length of trip (involving at least one overnight stay) may influence the perception of tourists differently (Amir, *et al.*, 2015; Seidl, 2014). In addition, travel party (with whom tourists travel) is one of the factors that affect their perception. Travel party is divided into 3 types; accompanied (e.g., couple, colleagues, and spouse), family, and alone (Handy, *et al.*, 2002). Purpose of trip or the type of activity found at the destination, can be categorized as traveling for pleasure and relaxation (e.g., holiday, shopping, health or spa), for business purposes (e.g., meetings, incentives, conventions, exhibitions), and special interest or the purpose of one or many (e.g., spiritual tourism, visit friend/family), and so on (Amir, *et al.*, 2015). Travel arrangement can be classified into two groups: Firstly, tour-organized travel is a form of tourism where tourists buy tour packages from tour companies and travel in a group. The tour operator will act as a manager for transportation, accommodation, food and tour guide to tourists. Secondly, self-organized travel is a style of tourism that tourists travel on their own. The main reason tourists choose to travel by themselves is the independence. In a group tour, tourists often visit the sights of tourists, but not thoroughly or lack of opportunity to learn the culture, so tourists experience the place superficially. On the other hand independent travelers have the opportunity to experience the place profoundly because a lot of time and complete control of their travel plan which they organize by themselves (Nicula and Elena, 2014).

2.4 Perception of environmental impacts of tourism

This study was designed based on the review of literature on the of tourists' perceptions of tourism for the purposes of generalization. Thus, it is helpful to first elaborate on the bases of the literature on the tourists' perception on environmental impact of tourism. Sampling and methodology, study characteristics, data analysis techniques, and findings were identified as

the bases for this study. Though tourism is often considered a relatively clean industry, in reality this is not always the case. It can cause significant environmental damage because it is often developed in attractive but fragile environments. In addition, tourism development policy in local community becomes focused on meeting the needs of tourists, often without the regard for the environment (Green, 2005). While many studies over the past several years have revealed residents' concern with the negative impacts of tourism on the environment, including perceived environmental pollution. Some suggested tourists that are most aware of traffic, congestion and overcrowding, and noise as the major negative impacts such as Styliadis and Terzidou (2014), Beerli and Josefa (2004), Sharma and Dyer (2012) and Andereck, *et al.* (2005). Perceived natural environment includes degradation of natural landscape/scenery due to poor waste management (e.g., waste separation, waste sorting) Improper waste management causes severe environmental impact, which has been pointed out by Udomsri, *et al.* (2005) and Thailand Environment Monitor (2003). Natural resources depletion highlight by Stefanica and Butnaru (2015), Gildea and Hanrahan (2009) and Naidoo and Sharpley (2016) which pointed out that largescale tourism developments in small islands, 'not only degrade the natural environment, but also destroy the economic value of natural resources for tourism in the long run' (Lee, 1997). The deterioration of the natural environment is caused by daily human activities and considerable tourism development of the latest decades (Stefanica and Butnaru, 2015; Gildea and Hanrahan, 2009; Ditchkoff, *et al.*, 2006; Hughes, 2002; Chi and Qu, 2008). This is endangering the biodiversity potential by the diminution or even destruction of its resources. Consequently, the specialists consider that tourist activities can lead to the degradation of biodiversity by: destruction or deterioration of habitats, competition concerning the natural resources, changes in animal behavior by import of invasive species, and disturbance of wildlife (e.g., loss of forest wealth, effect on plant life) (Ditchkoff, *et al.*, 2006). Other studies that have found that tourists recognize the environment impacts on water of tourism, including the destruction of coral reef, loss of marine ecosystem and biodiversity, sea water pollution, health risks (water, soil, air, human, wildlife, plant) and increased garbage along the coast or beaches. This has been pointed out by Wongthong and Harvey (2014) study about integrated coastal management and sustainable tourism. The results show that coastal ecosystems and reef-based tourism has become more important in tourism growth as well as to the wellbeing of local communities. However, unplanned tourism growth can cause environmental degradation and social and cultural conflicts which undermine the long-term sustainability of the tourism

industry. This concept complies with the study of Stefanica and Butnaru (2015) on tourists' perception of the relationship between tourism and environment. The results show that waste increase and storage constitutes a major issue for the areas where there are tourist activities. The improper management can be a major factor causing the degradation of the natural environment.

CHAPTER 3

RESEARCH METHODOLOGY

This study is based on a quantitative research using a structured questionnaire as a tool to study the perceptions of international tourists towards the environmental impacts of tourism in Phuket, Thailand.

3.1 Questionnaire design

A questionnaire was designed as the survey instrument to include all constructs of the proposed model to investigate the hypotheses of interest. The questions in the questionnaire were based on a review of the literature and specific destination characteristics. There were two sections with 16 impact statements on the environmental impacts that tourism caused in the Phuket, Thailand. First, demographic information included gender, age, marital status, education, country of origin, and travel behaviors comprised travel arrangement, length of trip, travel party, number of visits, and purpose of trip. Second part focused on the perception levels of international tourists towards environmental impacts of tourism in Phuket, Thailand. The citation of the questions on the environmental impacts while visiting Phuket were listed in the Table 3.1 and Table 3.2 with the reference to the questionnaire in Appendix I.

Table 3.1 List of citations in the questionnaire on the perceptions of the environmental impacts of tourism

Paper ID	Citation	Paper ID	Citation
1	Andereck, <i>et al.</i> (2005)	21	Hughes (2002)
2	Berli and Josefa (2004)	22	Green (2005)

Table 3.1 List of citations in the questionnaire on the perceptions of the environmental impacts of tourism (cont.)

Paper ID	Citation	Paper ID	Citation
3	Choi and Sirakaya (2006)	23	Wu and Chen (2015)
4	Stylidis and Terzidou (2014)	24	Chi and Qu (2008)
5	Sharma and Dyer (2012)	25	Ruhanen, <i>et al.</i> (2015)
6	Stefanica and Butnaru (2015)	26	Dickinson and Hoffmann (2016)
7	Johnson and Snepenger (2006)	27	Jeffrey and Xie (1995)
8	Naidoo and Sharpley (2016)	28	Wongthong and Harvey (2014)
9	Gildea and Hanrahan (2009)	29	Ditchkoff, <i>et al.</i> (2006)
10	Udomsri, <i>et al.</i> (2011)	30	Stefan Gossling (2002)
11	Thailand Environment Monitor (2003)	31	Stratan, <i>et al.</i> (2015)
12	Del Mar Alonso-Almeida (2013)	32	Line and Costen (2014)
13	Sinclair-Maragh, <i>et al.</i> (2015)	33	Li, <i>et al.</i> (2017)
14	Wong (1998)	34	Amir, <i>et al.</i> (2015)
15	Thanvisitthpon (2016)	35	Nicula and Elena (2014)
16	Papadimitriou, <i>et al.</i> (2015)	36	Marzuki (2012)
17	Handy, <i>et al.</i> (2002)	37	Ishii (2012)
18	Shoval and Cohen-Hattab (2001)	38	Leepreecha (2005)
19	Law (2002)	39	Michailidou, <i>et al.</i> (2016)
20	Edwards, <i>et al.</i> (2008)		

Table 3.2 Questionnaire on perceptions of environmental impacts

Questionnaire item	List of citations
Q1: Congestion and overcrowding	1, 2, 3, 4
Q2: Heavy, urban type arrangement (construction and expansion of hotels, shops etc.)	3, 15, 17, 18, 19, 20, 35, 36, 37, 38, 39
Q3: Air and noise pollution due to lots of vehicles	2, 3, 4, 5, 6
Q4: Traffic congestion	2, 4, 5, 7, 8, 9
Q5: Large quantities of waste products	9, 10, 11

Table 3.2 Questionnaire on perceptions of environmental impacts (cont.)

Questionnaire item	List of citations
Q6: Poor waste management (e.g., waste separation, waste sorting)	6, 10, 11, 12
Q7: Degradation of natural landscape/scenery due to inadequate waste disposal	8, 12, 16, 22
Q8: Aesthetic appeal losing due to improper management of waste	9, 12
Q9: Changes in animal behavior (due to, for example, feeding animals)	26, 29
Q10: Disturbance of wildlife (e.g., loss of forest wealth, effect on plant life)	13, 24, 25, 27
Q11: Biodiversity destruction	6, 9, 33
Q12: Increased garbage along the coast / beaches	9, 13, 22
Q13: Seawater pollution	3, 14, 39
Q14: Destruction of coral reef	8, 21
Q15: Loss of marine ecosystem and biodiversity	23, 28
Q16: Health risks (water, soil, air, human, wildlife, plant)	3, 30, 31, 32, 34

3.2 Scoring rubrics

Researchers have determined a score to measure variables in the calculation of statistical values using a 5-point Likert scale (Ayyildiz and Turna, 2013; Choi and Sirakaya, 2006; Johnson and Snepenger, 2006; Lauderdale, *et al.*, 2012; Puh, 2014). Measurement of perception levels of international tourists towards 16 environmental impacts of tourism in Phuket Island was done through rating a message with the number that represented Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree.

Strongly Agree	=	5 scores
Agree	=	4 scores
Neutral	=	3 scores
Disagree	=	2 scores
Strongly Disagree	=	1 scores

3.3 Desktop research

To develop objective indicators, this study reviewed the concepts, theories and literature on the environmental impacts of tourism. Related articles were retrieved mainly from the Science Direct and peer-reviewed journals on environmental impacts of tourism such as the *Tourism Management*, *Annals of Tourism Research*, *Journal of Destination Marketing and Management*, *Journal of Hospitality and Tourism Management*, *Tourism Management Perspectives*, *Ocean and Coastal Management*, and *Tourism Management Perspectives* during September-November 2015. The desktop research was based on 39 publications which were to provide a framework for creating the questionnaire.

3.4 Sampling method

Data was collected from the international tourists departing from the Phuket International Airport during March-April, 2016 (Figure 3.1). Five interviewers fluent in English were trained before they carried out the field survey for the research. Questionnaire was distributed both on weekdays and weekends from 7 am to 6 pm to ensure the coverage for all possible target population. Data was collected by simple sampling technique to get a sample group that included 373 from international tourists. However, 23 were excluded from the data analysis due to incomplete responses. Therefore, 350 completed questionnaires were used in the study.



Figure 3.1 Data was collected from tourists departing from the Phuket International Airport

3.5 A pilot study

Before the actual study, the researcher conducted a pilot study at the Phuket International Airport. A questionnaire was deployed with a sample of 30 international tourists who were at the departure hall at the Phuket International Airport. A reliability test was performed to check the internal consistency of the items using the Cronbach's alpha. Overall Cronbach's alpha was 0.95 and for each variable, the value was greater than 0.90, indicating the reliability of the questionnaire (Cronbach, 1970).

3.6 Data Analysis

3.6.1 Analysis to frequency count and percentage distributions

A percentage frequency distribution is a display of data that specifies the percentage of observations that exist for each data point or grouping of data points. It is a particularly useful method of expressing the relative frequency of survey responses and other data. This study used percentage frequency distribution in the analysis of the survey which was concerned with demographic characteristics (e.g., gender, age, marital status, education, and continent of origin) and behavior characteristics (e.g., travel behaviors comprised travel arrangement, length of trip, travel party, number of visits, and purpose of trip) because it helped visualize how a variable behaved across its range of possible values.

3.6.2 Inferential Statistics

Statistical analysis in this study was carried out using the R Statistical Package (R Development Core Team, 2015). Analysis for hypothesis testing by using factor analysis reduced the number of variables by combining multiple correlated variables. A new variable that is a feature behind those variables was created. A new variable made up of several variables or indicators that measure the same feature (factor) (Kerlinger and Lee, 2000). One-way ANOVA was then employed to compare the different perceptions of tourists on the environmental impacts of tourism development in Phuket Island and to examine the relationships between the perception factors and demographic determinants that were tourists' gender, age, marital status, country of origin (nationality), and travel behaviors comprised travel arrangement, length of trip, travel party, number of visits, and purpose of trip. A series of multiple comparisons testing for hypothesis testing were then conducted.

3.6.3 Factor analysis

A principal axis factoring (PAF) estimation and rotation method (varimax with Kaiser Normalization) were carried out on a set of 16 environmental impacts measurements. There were three steps in this procedure (Kaiser, 1960) (See Appendix II).

Step 1: Assumptions for Factor Analysis

1) Normality

Statistical tests of the assumption of normality used the Skewness and Kurtosis statistics (PFA) to test the assumption that sample data were drawn from a normally-distributed population. The techniques require interval data and can be run in R programming package and test the null hypothesis that the data come from a normally-distributed population (Field, 2009).

2) Linear relations

Factor analysis is also based on linearity assumption. By a linear relationship is one where increasing or decreasing one variable n times will cause a corresponding increase or decrease of n times in the other variable. In simpler words, if one variable is doubled, the other will double as well.

3) Factorability (KMO and Bartlett test)

Bartlett's test makes it possible to compare the variances of two or more samples to determine if they were being pulled out of a population where the variances are equal or not. It is suitable for normally distributed data. The test has the null hypothesis that the fluctuations are equal. Very small values of significance (below 0.05) indicate that the data is appropriate for factor analysis (Bartlett, 1954).

Kaiser Meyer Olkin test (KMO) is performed to determine the adequacy of the sampling that predicts that the information are likely to factor well, depending on the relationship and some relationships. KMO ranges from 0 to 1.0 and KMO should have approximately 0.60 or higher value to continue the analysis of the factors. KMO values less than 0.5 indicate the sampling is not adequate (Kaiser, 1974).

Step 2: How many factors?

1) Eigenvalues

The eigenvalue equals to the sum of squares of the loadings in a column in the factor matrix. Eigenvalues are also referred to as latent roots and represent the amount of variance accounted for by a factor. Kaiser's Eigenvalue Greater than 1.0 Rule (Kaiser, 1960) looks at how many factors have eigen-values more than 1 and scree-plot. A plot of eigen-values vs the number of factors is examined by looking for the elbow for the cliff and the scree (constant eigen-values) (Figure 3.2).

2) Parallel Analysis

Parallel analysis involves creating a random sampling factors by analyzing these factors and comparison of characteristic values with the characteristics of the information notice. The idea behind this method is that the higher the coefficient, the randomness of their similarity is likely to come from "meaningful factors" that observed eigenvalues which was lower than the identity of random eigenvalues. Scree-plot is a plot of eigen-values = the number of factors which is used by looking for the elbow for the cliff and the scree (constant eigen-values) (Figure 3.3).

```
eigen(cor(fac1))$values
```

```
[1] 8.1126014 1.5191532 1.1372499 0.8577971 0.6944352 0.6192400 0.4583143 0.4468517  
0.3848895 0.3709458 0.3164457 0.2686719 0.2306408 0.2087820 0.2019294 0.1720521
```

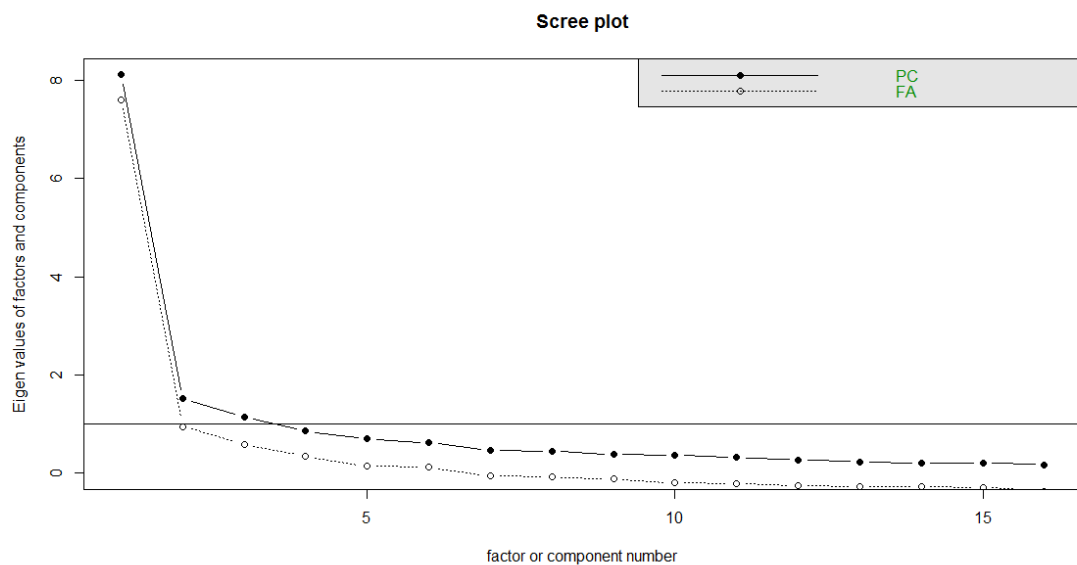


Figure 3.2 A plot of eigen-values and the number of factors

fa.parallel (fac1)

Parallel analysis suggests that the number of factors = 4 and the number of components = 2

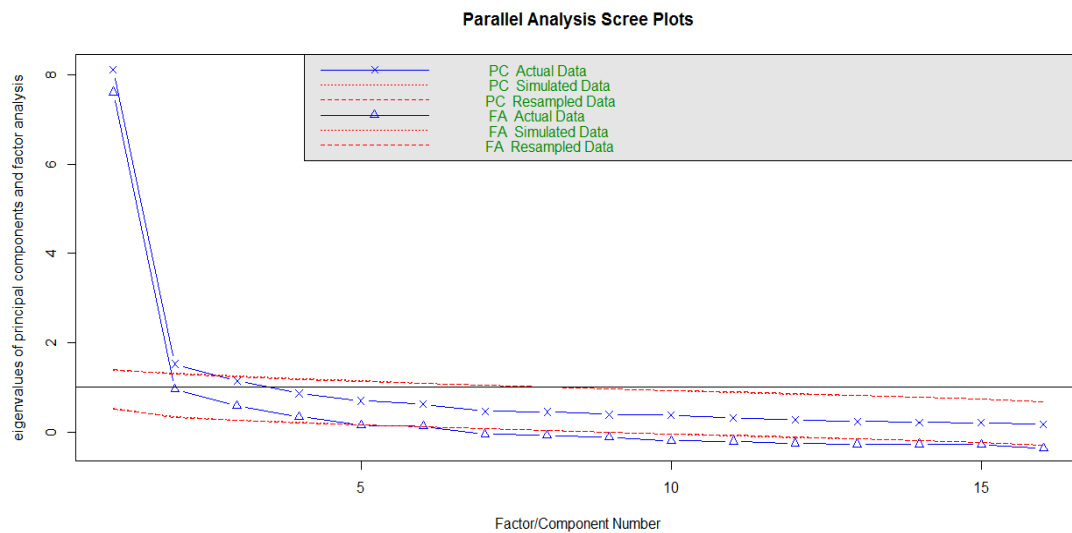


Figure 3.3 Parallel analysis scree plots

Step 3: Perform a factor analysis

1) Criteria for selecting items

Communality indicates the variance in each item explained by the extracted factors which ideally should be above 0.5 for each item.

Unique factor is the estimate of the uniqueness for each item. The value above 0.7 for each item is used to create a new element called component scores.

2) Factor loading

Factor loadings represent how much a factor explains a variable in factor analysis. Loadings can range from -1 to 1. Loadings close to -1 or 1 indicate that the factor strongly affects the variable. Loadings close to zero indicate that the factor has a weak effect on the variable. The score should generally be above 0.5 for each item (Hair, *et al.*, 1998).

3) Reliability

The purpose of a reliability analysis is to determine how well a set of items and how strongly each item in the scale is associated with the overall scale. The statistic that results from a commonly used reliability analysis is the Cronbach's alpha coefficient. This coefficient has a maximum value of 1.0. Generally speaking, when a collection of items (i.e., a scale) has a

Cronbach's alpha of 0.70 or larger, the scale is considered to be reliable. This type of reliability analysis refers to the internal consistency of a set of variables.

3.6.4 One-way ANOVA

To compare the different perceptions of tourists on the environmental impacts of tourism development in Phuket Island, the one-way analysis of variance (One-way ANOVA) was used. One-way ANOVA is part of the two sample t-test comparison method in the event that a group of more than two groups (Murrell, 2006; R Development Core Team, 2015). In one-way ANOVA, information is organized into several groups based on a single variable grouping. This study used one-way analysis in analyzing specific demographic characteristics that were related to tourists' perceptions of the environmental impacts in Phuket Island. A cross-tabulation analysis was used to investigate whether there was any significant relationship between characteristics and perceptions. To determine the difference between whether or not it is statistically significant the p-value was used to determine the level of significance. Usually, a significance level of 0.05 works well. In one-way ANOVA test, a significant p-value indicates that some of the groups have different means but does not specify which groups different. It is possible to perform multiple comparisons to determine if the average of the differences between a couple of groups are important and significant (McHugh, 2011). Tukey's HSD (honest significant difference) test can be used as a single-step multiple comparison procedure and statistical test. It also compares all possible pairs of means and depends on the studentized range distribution (q), this distribution is similar to the distribution of t from the t-test (Hui, *et al.*, 2007; Lauderdale, *et al.*, 2012).

CHAPTER 4

RESULTS

The analysis performed in this chapter was based on the data obtained from the 350 completed questionnaires. The data analysis comprised the major sections. The first section was the descriptive analysis of respondents' demographic information and behaviors. The second part was factor analysis of the influence perception on the environmental impacts of Phuket Island. The third section examined the hypothesis testing that investigates the relationship between the independent variables and the dependent variables. The major tool utilized to analyze the data was the R program.

4.1 Demographic and behavioral data

4.1.1 Demographic data of respondents

Table 4.1 shows the demographic characteristics of 350 respondents who visited Phuket Island during March-April 2016. Of the 350 respondents, 22.6% were from Australia and New Zealand and 20.9% were from the United Kingdom, 17.1% were from European countries (Northern Europe, Eastern Europe, Southern Europe, and Western Europe), 12.3% were from China, 11.7% were from other Asian countries (Hong Kong, India, Iran, Japan, Korea, Malaysia, Myanmar, Pakistan, Philippines, Singapore, and Taiwan), 8.6% were from Russia and 6.8% were from America. Majority of the participants were married 54.6% and were male 53.7%. In terms of age group 34.6% of the participants were 20-29 years old (See Table 4.1).

Table 4.1 Demographic characteristics of respondents (n = 350)

Variable	n	%	Variable	n	%
Gender			Number of visits		
Male	188	53.7	First timer	205	58.6
Female	162	46.3	Repeater	145	41.4
Age group			Length of trip		
20 - 29	121	34.6	≤ 2 days	18	5.1
30 - 39	113	32.3	3 - 4 days	76	21.7
40 - 49	67	19.1	5 - 7 days	85	24.3
50 - 59	33	9.4	8 - 14 days	141	40.3
≥ 60	16	4.6	≥ 15 days	30	8.6
Marital status			Travel party		
Married	191	54.6	Accompanied	202	57.7
Single	113	32.3	Family	130	37.1
Other	46	13.1	Alone	18	5.2
Country of origin			Purpose of trip		
Australia and New Zealand	79	22.6	Holiday	288	82.3
United Kingdom	73	20.9	Others	62	17.7
European countries	60	17.1	Travel arrangement		
China	43	12.3	Self-organized	261	74.6
Other Asian countries	41	11.7	Tour-organized	89	25.4
Russia	30	8.6			
America	24	6.8			

Source: Data processed by the researcher

4.1.2 Behavior data of respondents

According to the results, most of respondents were first time visitors, and by self-organized arrangement (74.6%). More than half of the respondents (57.7%) traveled to Phuket Island with accompany while 5.2% traveled alone. The majority of them come for holiday purpose (82.3%). Once they arrived, 40.3% stayed for 8-14 days and 24.3% stayed for 5-7 days in Phuket

Island. This finding was consistent with the result from a research carried out by Thiumsak and Ruangkanjanases (2016) which demonstrated that the majority of tourists in Bangkok come for leisure purpose with their friends. Further details are shown in Table 4.1.

4.2 Factors of environmental impacts of tourism

Exploratory factor analysis using principal axis factoring (PAF) estimation and rotation method (varimax with Kaiser Normalization) was carried out on a set of high dimensions of 16 environmental impact measurements. To determine the number of factors retained and the total variance explained, the eigenvalue and the scree plot were used. All 16 environmental impacts were not eliminated because their factor loadings were more than 0.5. Table 4.2 shows the results of factor analysis. Total variability explained by the four factors (water environment, waste and traffic management, urban environment, and land environment) was 66.5%. The overall reliability test generated a good result, with Cronbach's alpha of 0.95, and the internal consistency of each of these four factors ranging from 0.90, 0.90, 0.85, and 0.85 (Joseph, *et al.*, 2010). The assumptions in factor analysis were met as the Bartlett's Test of Sphericity was significant at the 0.0001 level (Chi-squared statistics = 3684.557, $df = 120$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.92. Factor analysis with principal axis factoring estimation and the varimax rotation was carried out for reducing the number variables of perception of the environmental impacts of tourism while visiting the Phuket Island to a smaller set of highly correlated variables, resulting in four perceptions. Factor 1 (FC1: Water Environment) illustrates the potential environmental consequences by actions of tourists and residents in the area resulting in increased garbage along the coast or beaches, sea water pollution destruction of coral reef, loss of marine ecosystem and biodiversity, and health risks (water, soil, air, human, wildlife, plant). Factor 2 (FC2: Waste and Traffic Management) includes environmental impacts of tourism caused by poor waste management (e.g., waste separation, waste sorting), large quantities of waste products problems, degradation of natural landscape/scenery due to inadequate waste disposal, and losing aesthetic appeal due to improper management of waste. However, the results show traffic congestion is classified in this factor. Factor 3 (FC3: Urban Environmental) which highlights the

potential environmental consequences from congestion and overcrowding heavy, urban type arrangement (i.e., construction and expansion of hotels, shops etc.), air and noise pollution from traffic problems, vehicles and population density in areas (Johnson, *et al.*, 1994; Santana-jimenez and Hernandez, 2011). Factor 4 (FC4: Land Environment) illustrates the potential environmental issues from destruction of biodiversity, changes in animal behavior (due to feeding animals) and disturbance of wildlife (e.g., loss of forest wealth, animal).

Table 4.2 Factor analysis for the environmental impacts of tourism in Phuket Island

Environmental impact factor	Mean	SD	Loading	
FC1: Water Environment				
Q14: Destruction of coral reef	3.420	0.99	0.781	
Q15: Loss of marine ecosystem and biodiversity	3.451	0.96	0.734	
Q13: Sea water pollution	3.440	1.04	0.688	
Q16: Health risks (water, soil, air, human, wildlife, plant)	3.477	0.93	0.627	
Q12: Increased garbage along the coast / beaches	3.566	1.04	0.614	
FC2: Waste and Traffic Management				
Q5: Large quantities of waste products	3.551	1.00	0.757	
Q6: Poor waste management (e.g., waste separation, waste sorting)	3.560	1.00	0.745	
Q7: Degradation of natural landscape/scenery due to inadequate waste disposal	3.557	1.00	0.665	
Q8: Aesthetic appeal losing due to improper management of waste	3.563	1.01	0.611	
Q4: Traffic congestion	3.574	0.96	0.509	
FC3: Urban Environment				
Q2: Heavy, urban type arrangement(construction and expansion of hotels, shops etc.)	3.451	0.87	0.702	
Q1: Congestion and overcrowding	3.403	0.88	0.687	
Q3: Air and noise pollution due to lots of vehicles	3.489	0.89	0.602	
FC4: Land Environment				
Q10: Disturbance of wildlife (e.g., loss of forest wealth, effect on plant life)	3.471	0.93	0.747	
Q9: Changes in animal behavior (due to feeding animals)	3.417	0.95	0.652	
Q11: Biodiversity destruction	3.414	0.94	0.550	
	FC1	FC2	FC3	FC4
Eigen value	8.11	1.51	1.13	0.85
Cronbach's alpha	0.90	0.90	0.85	0.85
% Variance explained: 66.5; Overall Cronbach's alpha = 0.95; KMO for overall MSA = 0.92				
Bartlett's test of Sphericity; Chi-squared statistics = 3684.557at df = 120 with a p-value of < 0.0001				

4.3 Demographic and behavioral factors of the environmental impacts of tourism in Phuket

A series of hypotheses was developed to investigate the influence of demographic and behavioral characteristics on tourists' perception of environmental impacts of tourism while visiting Phuket Island. These hypotheses, one-way analysis of variance was used. The results of One-way ANOVA analysis of factors composing tourists' perception of environmental impacts of tourism while visiting Phuket Island were provided in Table 4.3. Results show that there were statistically significant differences in the perception levels by age group for the FC2, by the country of origin for the FC1 and FC2, by number of visits for the FC1, FC2, and FC4, and by purpose of trip for the FC2. Gender, marital status, length of trip, travel party, and travel arrangement did not affect their perceptions on the environmental impacts toward the destination. Table 4.3 provides more details.

4.3.1 Demographic factors affecting tourists' perceptions of the environment impacts

Gender

This research showed that there was no difference in all four dimensions toward the environmental impacts perception while visiting Phuket among male and female tourists. Accordingly, these results reject of hypotheses 1. It can therefore, be assumed that no significant differences in male/female perceptions of environmental impacts in the tourism. This result opposed the research result of Alonso-Almeida (2013) on the students' perceptions in environmental management in tourism from a gender perspective. The findings showed that in the case of both the group of students and the group of managers, women were more concerned about environmental management than men (Del Mar Alonso-Almeida, 2013).

Age group

The age of tourists significantly influenced the perceptions of environmental impacts on waste and traffic management (p-value = 0.033). For other dimensions (water environment, urban environment and land environment) there was no significant difference among age groups. These results support the H1 of hypotheses 2 and reject the Null Hypothesis (H0) of hypothesis 2. The result is consistent to those from the study of George (2010) on visitor perceptions

of crime-safety of Table Mountain National Park, Cape Town. The test for One-way ANOVA found that age influenced visitors perceptions (up to 55 years) as they were more likely to have felt worried about their personal safety. This is consistent with Gibson and Yiannakis (2002) who reported that preference for risk in tourism decreases with age (George, 2010; Gibson and Yiannakis, 2002).

Marital status

Our results showed no statistically significant difference in all four dimensions toward the environmental impacts while visiting Phuket according to marital status of tourists. This means that marital status of tourists whether they were single or married had no influence on the perception of tourists on the environmental impacts in Phuket. These results support the H0 of hypotheses 3 and reject the alternative H1.

Country of origin

Country of origin is the most important determinant that influences four dimensions of the perceptions of environmental impacts in Phuket Island. There was statistically significant difference between country of origin of tourists' perception on the environmental impacts about FC1 (p-value = 0.025), and FC2 (p-value = 0.0001). In this study, a group of Australians and New Zealanders showed negative perceptions on the environmental impacts about FC1 (Table 4.4 and Figure 4.1) and FC2 (Table 4.5 and Figure 4.2), compared to respondents from China. The respondents from Russia showed negative perceptions on the environmental impacts about FC2 compared to those from China. However, there was no difference between the country of origin of tourists' regarding the perception of the environmental impacts about FC3 and FC4. The effect of country of origin, the significance level in the relationship between a country of origin and perceptions of the environmental impacts support the H1 of hypotheses 4 and reject the Null Hypothesis (H0) of hypothesis 4. Details are displayed in Tables 4.4, 4.5, Figures 4.1, and 4.2.

The findings have the major implication on Phuket destination positioning to welcome international tourists from diverse cultures and countries of origin. During 2010-2015, the majority of international visitors to Phuket were British, Chinese, European, and Oceania tourists (Department of Tourism, 2015). Chinese visitors are known as a new, large and fast-growing market for tourist destinations worldwide (European Travel Commission, 2014; WTO, 1997), with no exception for Phuket Island. Survey results of Kasikorn Research Center, Thailand (2016) pointed out that in view of Chinese tourists who were traveling in Thailand perceived the

destination as one of the most popular places in Asia. This is consistent with the research of Ruhanen, *et al.* (2015) about the Chinese visitor demand for Australia's indigenous tourism experiences. They were impressed with natural attractions, sports, Thai food and shopping activities. Therefore, the relevant authorities in tourism development planning should target specific traveler segments, focusing on need recognitions, desires, and expectations in order to create effective customer loyalty strategies to keep repeated visitors.

Table 4.3 One-way ANOVA results on variations of perceptions of environmental impacts with demographic factors and behavioral characteristics factors of visitors to Phuket

Determinant	Factors of environmental impact of tourism							
	FC1		FC2		FC3		FC4	
	F-Value	P-Value	F-Value	P-Value	F-Value	P-Value	F-Value	P-Value
Gender	2.386	0.123	0.964	0.327	0.030	0.863	0.166	0.684
Age group	0.866	0.484	2.351	0.053	1.244	0.292	1.071	0.371
Marital status	0.078	0.925	1.926	0.147	1.289	0.277	0.373	0.689
Country of origin	2.548	0.0199*	4.659	0.000****	0.669	0.675	1.366	0.228
Number of visits	6.682	0.0101*	10.690	0.001***	4.339	0.038*	7.379	0.006***
Length of trip	2.220	0.066	1.081	0.366	1.349	0.252	1.948	0.102
Travel party	0.286	0.752	0.134	0.875	0.459	0.632	0.048	0.953
Purpose of trip	0.002	0.964	0.016	0.090	0.772	0.380	0.108	0.742
Travel arrangement	0.236	0.628	0.740	0.390	0.319	0.573	0.003	0.958

FC1: Water Environment, FC2: Waste and traffic management, FC3: Urban Environment, and FC4: Land Environment

* P < 0.05, ** P < 0.01, *** P < 0.001 and **** P < 0.0001

Table 4.4 Tukey's HSD multiple comparisons of water environment (FC1) with country of origin at the 95% confidence interval (CI)

Country of origin	mean different	lower CI	upper CI	adjusted p-value
China-Asia	-0.269	-0.802	0.264	0.745
EU-Asia	0.055	-0.440	0.550	1.000
UK-Asia	0.037	-0.439	0.513	1.000
Russia-Asia	0.256	-0.331	0.842	0.855

Table 4.4 Tukey's HSD multiple comparisons of water environment (FC1) with country of origin at the 95% confidence interval (CI) (cont.)

Country of origin	mean different	lower CI	upper CI	adjusted p-value
America-Asia	0.228	-0.399	0.856	0.934
Australia-Asia	0.282	-0.188	0.752	0.561
EU-China	0.324	-0.163	0.812	0.434
UK-China	0.306	-0.163	0.776	0.458
Russia-China	0.525	-0.056	1.106	0.106
America-China	0.498	-0.124	1.120	0.213
Australia-China	0.552	0.089	1.014	0.008
UK-EU	-0.018	-0.444	0.407	1.000
Russia-EU	0.200	-0.345	0.746	0.931
America-EU	0.173	-0.416	0.763	0.976
Australia-EU	0.227	-0.191	0.645	0.675
Russia-UK	0.219	-0.311	0.748	0.884
America-UK	0.191	-0.383	0.766	0.956
Australia-UK	0.245	-0.151	0.642	0.525
America-Russia	-0.027	-0.696	0.641	1.000
Australia-Russia	0.027	-0.497	0.550	1.000
Australia-America	0.054	-0.515	0.623	1.000

Table 4.5 Tukey's HSD multiple comparisons of waste and traffic management (FC2) with country of origin at the 95% confidence interval (CI)

Country of origin	mean different	lower CI	upper CI	adjusted p-value
China-Asia	-0.404	-0.930	0.123	0.260
EU-Asia	0.029	-0.460	0.517	1.000
UK-Asia	-0.030	-0.501	0.440	1.000
Russia-Asia	0.391	-0.189	0.970	0.416
America-Asia	0.115	-0.505	0.735	0.998
Australia-Asia	0.314	-0.151	0.778	0.414

Table 4.5 Tukey's HSD multiple comparisons of waste and traffic management (FC2) with country of origin at the 95% confidence interval (CI) (cont.)

Country of origin	mean different	lower CI	upper CI	adjusted p-value
EU-China	0.432	-0.049	0.914	0.111
UK-China	0.373	-0.090	0.837	0.206
Russia-China	0.794	0.221	1.368	0.001
America-China	0.518	-0.096	1.133	0.162
Australia-China	0.717	0.260	1.174	0.000
UK-EU	-0.059	-0.479	0.361	1.000
Russia-EU	0.362	-0.177	0.901	0.422
America-EU	0.086	-0.496	0.668	0.999
Australia-EU	0.285	-0.128	0.698	0.388
Russia-UK	0.421	-0.102	0.944	0.207
America-UK	0.145	-0.423	0.712	0.989
Australia-UK	0.344	-0.048	0.735	0.128
America-Russia	-0.276	-0.936	0.384	0.878
Australia-Russia	-0.077	-0.594	0.440	0.999
Australia-America	0.199	-0.363	0.761	0.942

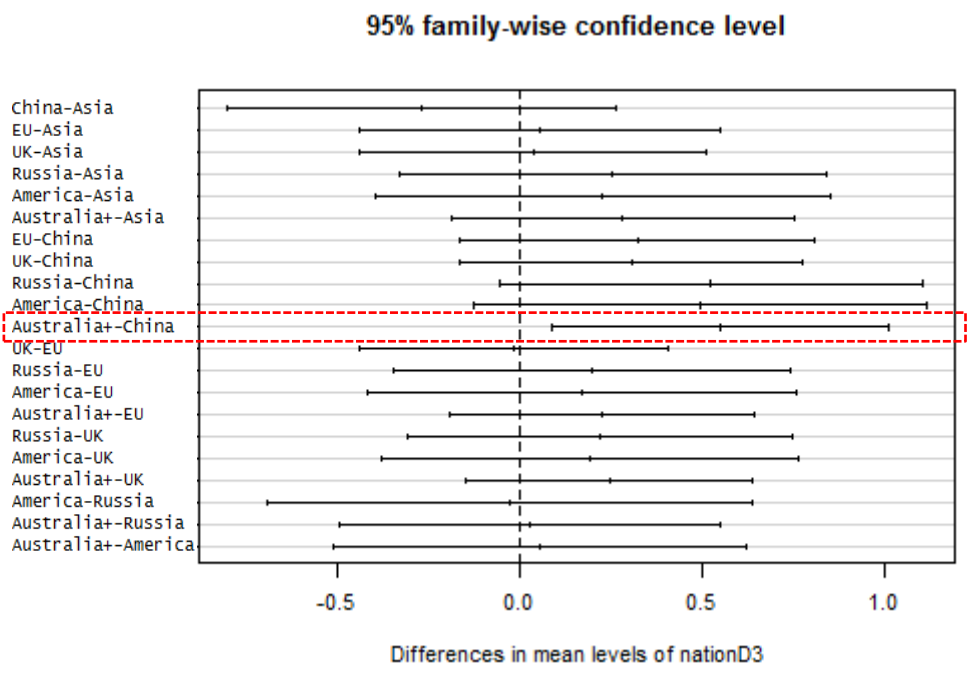


Figure 4.1 Effect of country of origin on the water environment (FC1) perception at the 95% confidence interval

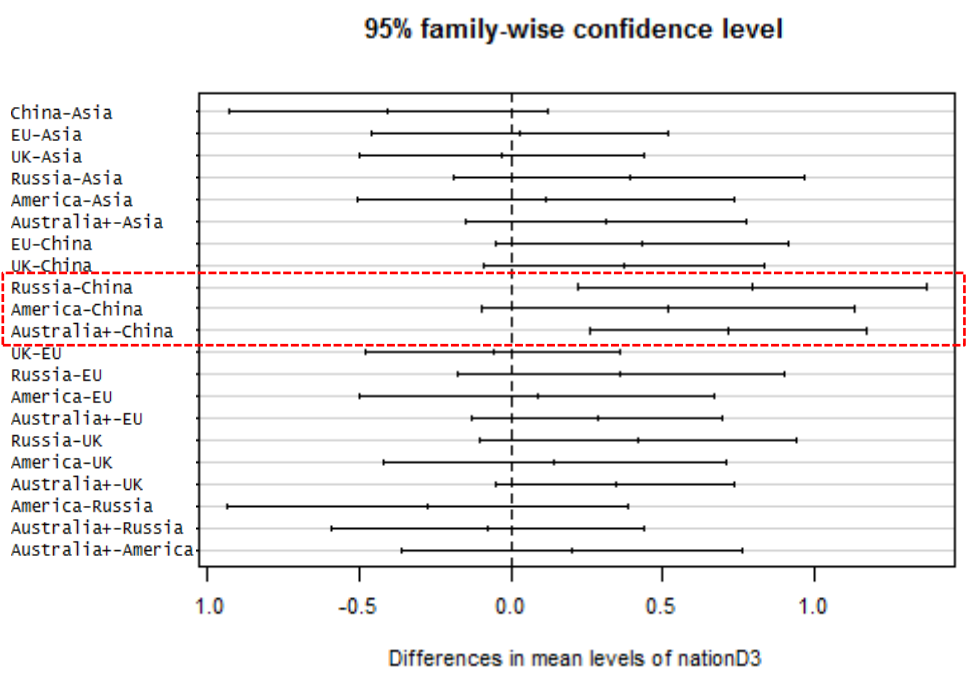


Figure 4.2 Effect of country of origin on the waste and traffic management (FC2) perception at the 95% confidence interval

4.3.2 Behavioral factors affecting tourists' perceptions on environmental impacts

Number of visits

Number of visits or experience of travel may also influence the perceptions of tourists on the environmental impacts of tourism in Phuket. As Tables 4.3 show, number of visits is the most important determinant that influences of the perceptions of the environmental impacts in Phuket Island. There was a significant difference between number of visits on perception on environmental impacts about FC1 (p-value =0.010), FC2 (p-value = 0.001), FC3 (p-value = 0.038) and FC4 (p-value = 0.006). In this study, tourist who come more than once showed negative perceptions on environmental impacts (Table 4.6 and Figure 4.3), compared to tourists who were first timers. However, there was no difference regarding the perception on the environmental impacts about FC3 according to the number of visit. Accordingly, these results support the H1 of hypotheses 5 and reject the Null Hypothesis (H0). This is consistent with the research of Beerli and Josefa (2004) about the relationships between the perceived image and the tourists' motivations. Their accumulated experience of vacation travel and the socio-demographic characteristics and relationship with the perception on natural environment (e.g., beauty of the scenery, beauty of the cities and towns cleanliness, overcrowding, air and noise pollution, and traffic congestion) were studied. The result showed that there was negative relationships between some factors in the perceived images and repeat tourists. This may be due to the fact that when tourists make a repeat visit to a destination, they see more negative aspects of a destination in comparison to the previous visits. Therefore, we can say that the tourists' previous experience of traveling influences the perceptions of the environmental impacts the most (Beerli and Josefa, 2004; George, 2010; Gildea and Hanrahan, 2009).

Table 4.6 Tukey's HSD multiple comparisons of environment impact outcomes among repeaters and first-timers at the 95% confidence interval (CI)

Factor	mean different	lower CI	upper CI	adjusted p-value
FC1: Water Environment	0.232	0.055	0.409	0.010
FC2: Waste and traffic management	0.293	0.117	0.470	0.001
FC3: Urban Environment	0.165	0.009	0.321	0.038
FC4: Land Environment	0.242	0.067	0.417	0.007

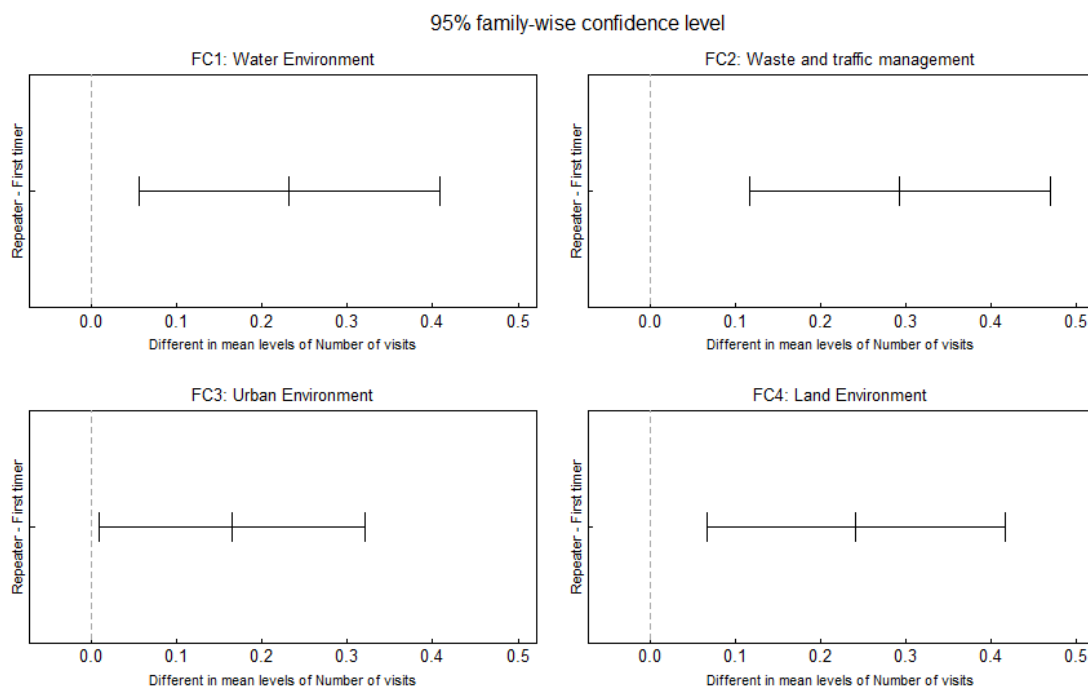


Figure 4.3 Effect of number of visits on the environmental factors at the 95% confidence interval

Length of trip

According to the Tourism Statistics on the characteristics of tourism trips reported by Eurostat Statistics Explained (2017), the majority of outbound tourists would prefer to take longer trips of at least four overnight stays and more likely to be further away from home. In the present study, the results showed that the majority of tourists stayed for 8-14 days which was good time to plan a holiday trip in Phuket Island. However, length of trip did not affect the four perception dimensions toward the environmental impacts while visiting Phuket. Accordingly, the results support the H0 of hypotheses 6 and reject the H1.

Travel party

In terms of travel planning difference, several components, including travel arrangement, length of trip, number of visits, purpose of trip, and travel party, were reported to be the factors that affect perception differences (Handy, *et al.*, 2002). The results showed more than half of the tourists traveled to Phuket Island with other people (e.g., couple, colleagues, and spouse) and family while tourists who traveled alone were very little. However, travel party (accompanied, family, and alone) had no influence on the perception of tourists on the environmental impacts in Phuket. Accordingly, the results support the H0 of hypotheses 7 and reject the H1.

Purpose of trip

Our results showed no significant difference between purpose of trip in all four dimensions toward the environmental impacts while visiting Phuket. This means that purpose of trip has no influence on the perception of tourists on the environmental impacts in Phuket. Accordingly, the results support the H0 of hypotheses 8 and reject the H1. However, this is different to the study of visitor perceptions on crime-safety of Cape Town. It was found that respondents traveling to Cape Town for visiting friends and relatives reason were more likely to feel unsafe than those visitors for business and on holiday purpose. This was consistent with George's (2010) finding that purpose of visit is an important factor in visitors' perceptions of crime-safety (George, 2010).

Travel arrangement

There was no significant difference in all four dimensions of the perceptions on the environmental impacts in the tourism according to different travel arrangement (self-organized and tour-organized). This means that tourists who were self-organized or tour-organized did not influence the perception of tourists on the environmental impacts in Phuket. These results support the H0 of hypotheses 9 and reject the alternative H1. Generally, these tourists travel to various places in groups with a tour bus and the company's guides for navigation and narration about the sights. This is especially true for first-time visitors who are not familiar with the place. This provides less opportunity to experience the environmental impacts of tourism in Phuket Island. On the other hand, Foreign Individual Tourism model is a style of tourism that tourists plan the travel on their own. This model need more quality of tourism experience rather than the number of sights visited. Tourists in this model have the opportunity to experience the destination profoundly because they have a lot of time and plan their travel by themselves, so they may have more chance to come across environmental issues in the destinations.

CHAPTER 5

CONCLUSIONS AND LIMITATIONS

5.1 Conclusions

The expansion of the global tourism industry, with a growing number of international tourists and emergent new island destinations leads to competition of tourism in the international marketplace. In order to stay competitive, destinations are forced to find new ways of attracting tourists. The purpose of this study is to evaluate the effects of perceptions of the environmental impacts in the tourism on destination image in Phuket Island. It is important to gain better understanding of international tourists' perceptions on the environmental impacts in the tourism, and whether they are likely to revisit and recommend a destination.

Understanding the perceived environmental impacts in tourism of the international visitors in relation to their demographic factors and behavioral characteristics is important for the tourism-driven economy in the Phuket. Study results contribute to the body of knowledge in two areas. First, key components of the environmental impacts of Phuket Island in terms of water environment, waste and traffic management, urban environment, and land environment. Various environmental impacts were analyzed with a multi-facet perception. These included 1) natural impacts from loss of marine ecosystem and biodiversity (e.g., sea water pollution, destruction of coral reef), changes in animal behavior, increased garbage along the coast/beaches, and health risks (water, soil, air, human, wildlife, plant); 2) Human impacts on the environment such as poor waste and traffic management resulting in the degradation of natural landscape/scenery, air and noise pollution (due high volume of vehicles), and urban type arrangement (construction and expansion of hotels, shops etc.). Secondly, the relationships between tourists' demographics and behaviors and their perceptions with the environmental impacts of Phuket Island were revealed.

Our study disclosed that there were statistically significant difference in the perception levels of the environmental impacts of tourism among different countries of origin and number of visits of the respondents. Most tourists from Australia and New Zealand and those who were repeat visitors showed negative perceptions on the environmental impacts about water environment and traffic management. The problem on water environment and waste and traffic management should be resolved. A result that tourists concerned about waste and traffic management in Phuket was in line with the findings from previous studies such as Styliadis and Terzidou (2014), Beerli and Josefa (2004), Sharma and Dyer (2012) and Andereck, *et al.* (2005). Furthermore, tourists feel very negative with the destruction of the water environment (e.g., increased garbage along the coast / beaches and destruction of coral reef) in Phuket and other destinations in Thailand (Wongthong and Harvey, 2014). In addition, the environmental impacts on urban environment should be a priority for corrective action. Tourists are most aware of the congestion and overcrowding in urban environment, and air and noise pollution due to lots of vehicles. This was in agreement with the study by Stefanica and Butnaru (2015). The environmental impacts on land environment in Phuket include destruction of biodiversity, changes in animal behavior (due to feeding animals) and disturbance of wildlife (e.g., loss of forest wealth, animal). This was consistent with the research of Gildea and Hanrahan (2009), Li, *et al.* (2017), Dickinson and Hoffmann (2016), Ditchkoff, *et al.* (2006), Sinclair-Maragh, *et al.* (2015), Chi and Qu (2008), Ruhanen, *et al.* (2015), and Jeffrey and Xie (1995). However, there was no significant demographic (gender, age group, marital status) and behavioral (length of trip, travel party, purpose of trip, and travel arrangement) effects on international tourists' perception on the environmental impacts of tourism in Phuket. Finally, in regards to the environmental impacts, demographic characteristics and behaviors of tourists highly influence the perceptions of the environmental impacts in the tourism. This study provides a strong evidence to support the notion that destination image can be directly affected by the perceptions of the environmental impacts. Therefore, tourism organizations should pay attention on improving their environmental impacts to achieve sustainability in order to create a positive effect on the tourists' intention to return and to recommend the destinations to other people.

5.2 Limitations

The limitations of this study were that the questionnaire was designed from the reviewed the concepts, theories and literature which were retrieved mainly from the Science Direct and peer-reviewed journals on environmental impacts of tourism. The use of Likert five-point scale which may not have an ability to distinguish the importance of perception evaluation from the opinion of respondents in terms of reasoning and logic. Therefore, the findings may not be generalized to the tourism industry properly. Future research should use a combination of Likert five-point scale with an in-depth interview. Future studies should use a mixed method of qualitative and quantitative approaches in order to effectively evaluate the opinion of the tourists. In the future, the study should be conducted to explore different types of destinations and deepen the multidimensional nature of the variables.

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APPENDICES

Appendix I
Questionnaire



Dear Friends of Phuket

We are a part of researching team, gathering your feedback on how you see Phuket as a destination. This questionnaire has been designed a part of the thesis Master of Science in Technology and Environmental Management, Prince of Songkla University. We appreciate your support. Should you wish to write more to us, please send your feedback to jaruwan_j_manui@hotmail.com or you could give us your contact here. Your Email: Country of origin.....City.....THANK YOU.

Part 1: Please tick the box and answer the questions which are applicable to you.

1. Gender	<input type="checkbox"/> Male	<input type="checkbox"/> Female		
2. Age	<input type="checkbox"/> 20-29	<input type="checkbox"/> 30-39	<input type="checkbox"/> 40-49	<input type="checkbox"/> 50-59
	<input type="checkbox"/> 60-69	<input type="checkbox"/> Over 70		
3. Marital status	<input type="checkbox"/> Single	<input type="checkbox"/> Married	<input type="checkbox"/> Other	
4. Nationality	<input type="checkbox"/> Australia	<input type="checkbox"/> China	<input type="checkbox"/> India	<input type="checkbox"/> Japan
	<input type="checkbox"/> Korea	<input type="checkbox"/> Malaysia	<input type="checkbox"/> Russia	<input type="checkbox"/> Singapore
	<input type="checkbox"/> Thai	<input type="checkbox"/> UK	<input type="checkbox"/> U.S.A	<input type="checkbox"/> Other (specified).....
5. Length of trip	<input type="checkbox"/> Less than full day	<input type="checkbox"/> 1-2 days	<input type="checkbox"/> 3-4 days	<input type="checkbox"/> 5-7 days
	<input type="checkbox"/> 8-14 day	<input type="checkbox"/> > 14 days (specified).....		
6. Purpose of trip	<input type="checkbox"/> Visit friend/family	<input type="checkbox"/> Business	<input type="checkbox"/> Education	<input type="checkbox"/> Health/Spa
	<input type="checkbox"/> Sports	<input type="checkbox"/> Shopping	<input type="checkbox"/> Spiritual tourism	<input type="checkbox"/> Holiday
	(event/activity)			
	<input type="checkbox"/> MICE (Meetings, Incentives, Conferences, Exhibitions)	<input type="checkbox"/> Other (specified).....		
7. Travel party (with whom)	<input type="checkbox"/> Alone	<input type="checkbox"/> Colleagues	<input type="checkbox"/> Family	<input type="checkbox"/> Friends
	<input type="checkbox"/>	<input type="checkbox"/> Spouse	<input type="checkbox"/> Other (specified)	
Couple				
8. Number of visits including this trip	<input type="checkbox"/> First time	<input type="checkbox"/> 2-3 times	<input type="checkbox"/> 4-5 times	<input type="checkbox"/> > 5 times
9. Travel arrangement	<input type="checkbox"/> Self-organized	<input type="checkbox"/> Tour-organized		

Part 2: Phuket Characteristics

Please tick (✓) only one response for each item that best matches your perception about Phuket.

What do you think about Phuket? Phuket has..... (Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5)	Score Rating				
	1	2	3	4	5
ENVIRONMENTAL IMPACT OF TOURISM DEVELOPMENT					
Congestion and overcrowding					
Heavy, urban type arrangement (construction and expansion of hotels, shops etc.)					
Air and noise pollution due to lots of vehicles					
Traffic congestion					
Large quantities of waste products					
Poor waste management (e.g., waste separation, waste sorting)					
Degradation of natural landscape/scenery due to inadequate waste disposal					
Aesthetic appeal losing due to improper management of waste					
Changes in animal behavior (due to, for example, feeding animals)					
Disturbance of wildlife (e.g., loss of forest wealth, effect on plant life)					
Biodiversity destruction					
Increased garbage along the coast / beaches					
Sea water pollution					
Destruction of coral reef					
Loss of marine ecosystem and biodiversity					
Health risks (water, soil, air, human, wildlife, plant)					

Suggestion

Have a safe trip and Wish to see you again in Phuket

Appendix II

Factors analysis of environmental impacts of tourism

R-Studio

R script survey

<pre>#install.packages("psych") library(psych) #install.packages("GPArotation") library(GPArotation) library(MASS) setwd("D:/6.THESIS/EVI")</pre>	<pre>sva <- read.table("data.txt",h=T,as.is=T,sep="\t") str(sva) summary(sva) # check any mistyping (a Likert scale: min=1,max=5) and NAs # Number of country of origin = 50 = 49 + 1 (nsp: not specified) unique(sva\$nationD)</pre>
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Grouping Country of origin

<pre>Australia <- c("Australia") UK <- c("UK") US <- c("US") China <-c("China") Russia <- c("Russia") Asia <- c("HongKong","India","Iran","Japan", "Korea","Malaysia","Myanmar","Pakistan","Philippines","Singapore","Taiwan") SouthernEU <- c("Italy","Portugal","Serbia","Slovenia","Spain") WesternEU <- c("Austria","France","German","Netherland","Switzerland") Canada <- c("Canada") NewZealand <- c("NewZealand") SouthAfrica <- c("SouthAfrica","Swaziland") MiddleEast <- c("Egypt","Jordan","SaudiArabia","Dubai") SouthAmerica <- c("Argentina","Brazil") nsp <- c("nsp")</pre>

```

unique(sv$povD)
Vff <- c("VisitFriendFamily")
Business <- c("Business")
Education <- c("Education")
Hspa <- c("Health/Spa")
Sport <- c("Sports(event/activity)")
Shopping <- c("Shopping")

Spirit <- c("SpiritualTourism")
Holiday <- c("Holiday")
Mice <- c("MICE")
other.pov.1 <-
c("Tourism","Travel","Vacation")
other.pov.2 <- c("MuayThai")
other.pov.3 <- c("Wedding")

# Combine respondents according to Social/Economics similarity of their country of origin
Other <- c(MiddleEast, SouthAfrica, SouthAmerica) # MiddleEast
EU <- c(NorthernEU, EasternEU, SouthernEU, WesternEU)

# Count number of tourists from each continent: e.g., Western European Tourists for
margin.table(table(subset(sva, nationD %in% WesternEU, select=nationD)))
margin.table(table(subset(sva, nationD %in% EU, select=nationD)))

```

Extract sub-data: Environment

```

sv <- subset(sva, set %in% c("FUL", "ENV"), select= c(code, sex:infoD, env1:env16))
nvprof <- ncol(subset(sv, select=code:infoD))
nvlike <- ncol(subset(sv, select=c((1+nvprof):ncol(sv))))
summary(sv) # check any mistyping (a Likert scale: min=1, max=5) and NAs
nrow(sv) #403
str(sv)
str(sva)
i <- 0 # convert character to numeric
for (i in c(1:nvlike)) {sv[,nvprof+i] <- as.numeric(sv[,nvprof+i])}
# Order data according to their collection date
sv <- sv[order(sv$code),]
head(sv)

```

A pilot test n = 30

```

# Reliability test: check the internal consistency of the items included for each factor using
Cronbach's alpha
# Cronbach's alpha > 0.8 is good.
sv.pilot <- sv[1:30,c(1:nvlike+nvprof)]
str(sv.pilot)
nrow(sv.pilot[!complete.cases(sv.pilot),]) # Any missing data? = 0 -> OK.
alpha(sv.pilot)
unique(sva$code)
vlike.env <- paste0(c(rep("env",16)),1:16) # Survey data
keep.var <- c("sex","age","mstat","los","trav","numvisit","storg","nationD","povD",
vlike.env[1:16])
sv <- sv[-c(1:30),keep.var]
nrow(sv)

```

Check for any respondents who did not complete the survey

```

nrow(sv[!complete.cases(sv),])
sv[!complete.cases(sv),]
naCase <- rownames(sv[!complete.cases(sv),]) # list of respondents' ID
naCase
length(naCase)
nrow(sv)-length(naCase)
sum(complete.cases(sv))
sv <- sv[complete.cases(sv),]
nrow(sv[!complete.cases(sv),])
nrow(sv)

```

Table 4.1 Demographic characteristics of tourists (n=350)

table(sv\$sex2)	table(sv\$povD2)
round(prop.table(table(sv\$sex2)),3)	round(prop.table(table(sv\$povD2)),3)
table(sv\$age2)	table(sv\$trav2)
round(prop.table(table(sv\$age2)),3)	round(prop.table(table(sv\$trav2)),3)
table(sv\$mstat2)	table(sv\$numvisit2)
round(prop.table(table(sv\$mstat2)),3)	round(prop.table(table(sv\$numvisit3)),3)
table(sv\$nationD2)	table(sv\$numvisit3)
round(prop.table(table(sv\$nationD2)),3)	round(prop.table(table(sv\$numvisit3)),3)
table(sv\$los2)	table(sv\$storg2)
round(prop.table(table(sv\$los2)),3)	round(prop.table(table(sv\$storg2)),3)

Table 4.2 Factor analysis for the environmental impacts of tourism in Phuket Island

```
# Skewness statistics and Kurtosis statistics ["describe()" in Package "psych"]
describe(subset(sv,select = c(env1:env16)))
Step 1: Assumptions for Factor Analysis
#1. Normality (see above: Skewness and Kurtosis statistics/ PFA does not assume multivariate
normality but the maximum likelihood estimate does.)
#2. Linear relations
cor(fac1) #calculate the correlation matrix
#3. Factorability: a degree of collinearity among the variables [KMO, Bartlett test of
sphericity]
# the Bartlett test of sphericity
# Null Hypothesis: A correlation matrix of the data is an identity matrix. (there are no
relationships between the variables.)
# the identity matrix of size n is the n * n square matrix with ones on the main diagonal and
zeros elsewhere.
# Bartlett's test approximates a chi-squared distribution.
```

Very small values of significance (below 0.05) indicate the data is appropriate for factor analysis.

Reference: Bartlett, M. S. (1954). A note on the multiplying factors for various chi square approximations. *Journal of Royal Statistical Society*, 16 (Series B), 296-298.

`cortest.bartlett(fac1)` #`cortest.bartlett` Test whether a matrix is an identity matrix

the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA)

Null hypothesis: a measure of how suited your data is for Factor Analysis

The test measures sampling adequacy for each variable in the model and for the complete model.

The statistic is a measure of the proportion of variance among variables that might be common variance.

That might be indicative of underlying or latent common factors.

The lower the proportion, the more suited your data is to Factor Analysis.

KMO returns values between 0 and 1. A rule of thumb for interpreting the statistic:

KMO values between 0.8 and 1 indicate the sampling is adequate. # KMO values less than 0.5 indicate the sampling is not adequate. # Reference: Kaiser, H. 1974. An index of factor simplicity. *Psychometrika* 39:31-36.

`KMO(fac1)`

#4. Sample size

Step 2: How many factors?

1. Eigen values:

Kaiser's criterion: How many factors have eigen-values more than 1?

`eigen(cor(fac1))$values`

Scree-plot: a plot of eigen-values vs the number of factors: Looking for the elbow for the cliff and the scree (constant eigen-values)

`scree(fac1)`

Total variance explained: approximately more than 50% of the variance using the least number of factors

2. Parallel analysis

`fa.parallel(fac1)`

Step 3: Perform a factor analysis

```

fa(r=fac1,nfactors=4,rotate="varimax",n.Obs=nrow(sv),fm = "pa") -> fa1
fa1
# Criteria for selecting items
# 1.Community - indicates the variance in each item explained by the extracted factors;
ideally, above .5 for each item.
fa1$communality # Communality estimates for each item
# 2. Factor loading - indicates how strongly each item loads on each factor; should generally be
above |.5| for each item
round(fa1$loadings[1:ndim1,],3)
fa1$loadings[1:ndim1,] -> ld
# 3. Meaningful and useful contribution to a factor
# 4. Reliability - check the internal consistency of the items included for each factor using
Cronbach's alpha
alpha(fac1) # for all 16 variables
alpha(fac1[,12:16]) # for each factor
alpha(fac1[,9:11])
alpha(fac1[,4:8])
alpha(fac1[,1:3])
# A residual correlation matrix: The closer to the zero the better the model fits to the data.
fa1$residual # values on the main diagonal of a matrix are common variances of that measured
variable on the retaining factors.
describe(fa1$residual)
alpha(fac1)
alpha(fac1[,c("env12","env13","env14","env15","env16")]) # factor1
alpha(fac1[,c("env4","env5","env6","env7","env8")]) # factor2
alpha(fac1[,c("env1","env2","env3")]) # factor3
alpha(fac1[,c("env9","env10","env11")]) # factor4

```

Factor score using the weighted sum scores above a cut-off value

<pre>ldcut <- ld ldcut[-c(12:16),1] <- 0 ldcut[-c(4:8),2] <- 0 # remain max loadings of Xs to the corresponding Factor and replace other loadings with zero ldcut[-c(1:3),3] <- 0 ldcut[-c(9:11),4] <- 0 ldcut as.matrix(fac1) %*% as.matrix(ldcut) -> f # create factors for (i in c(1:ncol(f))) {f[,i] <- f[,i]/sum(ldcut[,i])} # weighted factors to retain a Likert scale: 1-5 cor(f) describe(f) par(mfrow=c(2,3))</pre>	<pre>hist(f[,1]) hist(f[,2]) hist(f[,3]) hist(f[,4]) boxplot(f[,1]) boxplot(f[,2]) boxplot(f[,3]) boxplot(f[,4]) # Add new factors to a dataframe sv\$fc1 <- f[,1] sv\$fc2 <- f[,2] sv\$fc3 <- f[,3] sv\$fc4 <- f[,4] # Add an index for identification points for any outliers or influences sv\$id <- c(1:nrow(sv))</pre>
<pre>ld sv\$fd1 <- (sv\$env12+sv\$env13+sv\$env14+sv\$env15+sv\$env16)/5 all.equal(sv\$fc1,sv\$fd1) sv\$fd2 <- (sv\$env4+sv\$env5+sv\$env6+sv\$env7+sv\$env8)/5 all.equal(sv\$fc2,sv\$fd2) sv\$fd3 <- (sv\$env1+sv\$env2+sv\$env3)/3 all.equal(sv\$fc3,sv\$fd3) sv\$fd4 <- (sv\$env9+sv\$env10+sv\$env11)/3 all.equal(sv\$fc4,sv\$fd4)</pre>	

Table 4.3 One-way ANOVA results on variations of perceptions of environmental impacts with demographic factors and behavioral characteristics factors of visitors to Phuket

<p><u>Gender</u></p> <pre>sav1 <-aov(fc1~sex2, data = sv) summary(sav1) sav2 <-aov(fc2~sex2, data = sv) summary(sav2) sav3 <-aov(fc3~sex2, data = sv) summary(sav3) sav4 <-aov(fc4~sex2, data = sv) summary(sav4)</pre>	<p><u>Age group</u></p> <pre>sav1 <-aov(fc1~age2, data = sv) summary(sav1) sav2 <-aov(fc2~age2, data = sv) summary(sav2) sav3 <-aov(fc3~age2, data = sv) summary(sav3) sav4 <-aov(fc4~age2, data = sv) summary(sav4) TukeyHSD(sav2) -> tukey tukey plot(tukey)</pre>
<p><u>Purpose of trip</u></p> <pre>sav1 <-aov(fc1~povD2, data = sv) summary(sav1) sav2 <-aov(fc2~povD2, data = sv) summary(sav2) sav3 <-aov(fc3~povD2, data = sv) summary(sav3) sav4 <-aov(fc4~povD2, data = sv) summary(sav4) TukeyHSD(sav2) -> tukey tukey plot(tukey)</pre>	<p><u>Country of origin</u></p> <pre>sav1 <-aov(fc1~nationD2, data = sv) summary(sav1) sav2 <-aov(fc2~nationD2, data = sv) summary(sav2) sav3 <-aov(fc3~nationD2, data = sv) summary(sav3) sav4 <-aov(fc4~nationD2, data = sv) summary(sav4) TukeyHSD(sav1) -> tukey tukey plot(tukey) TukeyHSD(sav2) -> tukey tukey plot(tukey)</pre>

<u>Number of visits</u>	
sav1 <-aov(fc1~numvisit3, data = sv)	plot(tukey)
summary(sav1)	TukeyHSD(sav2) -> tukey
sav2 <-aov(fc2~numvisit3, data = sv)	tukey
summary(sav2)	plot(tukey)
sav3 <-aov(fc3~numvisit3, data = sv)	TukeyHSD(sav3) -> tukey
summary(sav3)	tukey
sav4 <-aov(fc4~numvisit3, data = sv)	plot(tukey)
summary(sav4)	TukeyHSD(sav4) -> tukey
TukeyHSD(sav1) -> tukey	tukey
tukey	plot(tukey)
<u>Length of trip</u>	<u>Travel party</u>
sav1 <-aov(fc1~los2, data = sv)	sav1 <-aov(fc1~trav2, data = sv)
summary(sav1)	summary(sav1)
sav2 <-aov(fc2~los2, data = sv)	sav2 <-aov(fc2~trav2, data = sv)
summary(sav2)	summary(sav2)
sav3 <-aov(fc3~los2, data = sv)	sav3 <-aov(fc3~trav2, data = sv)
summary(sav3)	summary(sav3)
sav4 <-aov(fc4~los2, data = sv)	sav4 <-aov(fc4~trav2, data = sv)
summary(sav4)	summary(sav4)
<u>Marital status</u>	<u>Travel arrangement</u>
sav1 <-aov(fc1~mstat2, data = sv)	sav1 <-aov(fc1~storg2, data = sv)
summary(sav1)	summary(sav1)
sav2 <-aov(fc2~mstat2, data = sv)	sav2 <-aov(fc2~storg2, data = sv)
summary(sav2)	summary(sav2)
sav3 <-aov(fc3~mstat2, data = sv)	sav3 <-aov(fc3~storg2, data = sv)
summary(sav3)	summary(sav3)
sav4 <-aov(fc4~mstat2, data = sv)	sav4 <-aov(fc4~storg2, data = sv)
summary(sav4)	summary(sav4)

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Jaruwan M, Sangdao W (2016). "Factors Influencing Perceptions of Tourists on Safety and Security in Phuket, Thailand." *International Conference on Applied Statistics 2016, July 13-15, 2016, Phuket, Thailand.*

Jaruwan M, Sangdao W (2017). "Tourists' Perceptions on Safety and Security: a Case Study of Phuket Island of Thailand." *Proceedings 2nd ISI Regional Statistics Conference, 20-24 March 2017, Indonesia (Session CPS34).*

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