PROFILE BASED PERSONALIZED TOURIST TRIP RECOMMENDATION MODEL

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ชัชวัล วงศ์วัฒนกิจ : แบบจำลองแนะนำเส้นทางท่องเที่ยวส่วนบุคคลตามฐานโครงร่างทางสังคม (PROFILE BASED PERSONALIZED TOURIST TRIP RECOMMENDATION MODEL) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร. มาโนช โลหเตปานนท์, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ. ดร. พงศา พรชัยวิเศษกุล, 102 หน้า.

วัตถุประสงค์ของการศึกษาครั้งนี้คือ เพื่อพัฒนาแบบจำลองแนะนำเส้นทางท่องเที่ยวส่วนบุคคลที่เหมาะสมตามฐานโครงร่างทางสังคม ในจังหวัดภูเก็ต ประเทศไทย โดยเก็บรวบรวมข้อมูลด้วยแบบสอบถาม และสุ่มตัวอย่างด้วยวิธีแบบโควต้าจำนวน 1,221 ตัวอย่าง โดยคำนวณจากสัดส่วนจำนวนนักท่องเที่ยวหลักที่มาเยือนจังหวัดภูเก็ต ทั้งนี้แบบสอบถามแบ่งเป็น 3 ส่วน ได้แก่ ข้อมูลทั่วไป ข้อมูลความพึงพอใจต่อสถานที่ท่องเที่ยว และข้อมูลส่วนบุคคล ทั้งนี้ใช้วิธีการวิเคราะห์ความแปรปรวนแบบทางเดียว (one-way ANOVA) เพื่อ (1) หาความสัมพันธ์ระหว่างคุณลักษณะของนักท่องเที่ยวที่มีผลต่อความพึงพอใจในแหล่งท่องเที่ยวประเภทชายหาด และแหล่งท่องเที่ยวเชิงวัฒนธรรม ซึ่งมีจำนวน 11 แห่ง และ (2) หาความสัมพันธ์ระหว่างลักษณะการเดินทางที่มีผลต่อความพึงพอใจในสถานที่ท่องเที่ยว หลังจากนั้นเลือกปัจจัยที่มีผลต่อระดับความพึงพอใจในสถานที่ท่องเที่ยวดังกล่าวสูงสุด 3 อันดับแรก มาคำนวณหาค่าเฉลี่ยเพื่อเลือกสถานที่ท่องเที่ยวที่นักท่องเที่ยวพึงพอใจสูงสุดตามลำดับ โดยใช้การวิเคราะห์ความแปรปรวนแบบสามทาง (Three-way ANOVA) จากนั้นนำผลลัพธ์ที่ได้ไปใช้จัดกำหนดการท่องเที่ยวส่วนบุคคล

ผลการศึกษาการวิเคราะห์ความแปรปรวนแบบทางเดียวพบว่า (1) เชื้อชาติ ระดับการศึกษา ระดับรายได้ และการมาท่องเที่ยวภูเก็ตครั้งแรกหรือไม่ มีผลต่อความพึงพอใจของนักท่องเที่ยวอย่างมีนัยสำคัญ (2) นักท่องเที่ยวชาวไทยมีค่าความพึงพอใจต่อสถานที่ท่องเที่ยวประเภทชายหาดน้อยกว่านักท่องเที่ยวชาวจีนอย่างมีนัยสำคัญ (3) นักท่องเที่ยวต่างชาติมีความพึงพอใจต่อการท่องเที่ยวชายหาดไม่แตกต่างกัน แต่มีความพึงพอใจต่อแหล่งท่องเที่ยวเชิงวัฒนธรรมแตกต่างกันอย่างมีนัยสำคัญ (4) นักท่องเที่ยวที่มีการศึกษาต่ำกว่าปริญญาตรี และสูงกว่าปริญญาตรี มีความพึงพอใจต่อแหล่งท่องเที่ยวประเภทชายหาดและแหล่งท่องเที่ยวเชิงวัฒนธรรมแตกต่างกันอย่างมีนัยสำคัญ

ผลการศึกษาการวิเคราะห์ความแปรปรวนแบบสามทางพบว่า ค่าเฉลี่ยความพึงพอใจที่ได้สามารถนำไปเป็นตัวแทนของกลุ่ม เพื่อใช้สร้างแบบจำลองแนะนำเส้นทางท่องเที่ยวรายบุคคล ตามความพึงพอใจของนักท่องเที่ยวได้ โดยแบบจำลองนี้กำหนดให้นักท่องเที่ยวใส่ข้อมูลส่วนบุคคล และระยะเวลาในการท่องเที่ยวแต่ละวัน เพื่อนำไปจัดกำหนดการเดินทางที่คาดว่านักท่องเที่ยวจะพึงพอใจสูงสุด โดยแบบจำลองนี้ได้นำไปให้นักท่องเที่ยว 15 คน ประกอบไปด้วยนักท่องเที่ยวชาวจีน ไทย ออสเตรเลีย และ ฟินแลนด์ ประเมินค่าความพึงพอใจของเส้นทางที่จัดให้ พบว่าคะแนนความพึงพอใจของเส้นทางที่จัดให้ได้ค่าเฉลี่ย 4.06 จากคะแนนเต็ม 5 ทั้งนี้แบบจำลองนี้สามารถนำไปใช้เป็นเครื่องมือสนับสนุนการตัดสินใจในการวางแผนเส้นทางการท่องเที่ยวส่วนบุคคลตามฐานโครงร่างทางสังคมของจังหวัดภูเก็ตได้

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CHATCHAWAN WONGWATTANAKIT: PROFILE BASED PERSONALIZED TOURIST TRIP RECOMMENDATION MODEL. ADVISOR: ASST. PROF. MANOJ LOHATEPANONT, Sc.D., CO-ADVISOR: ASSOC. PROF. PONGSA PORNCHAIWISESKUL, Ph.D., 102 pp.

This study was developed to optimize the personalized tourist trip recommendation model in Phuket, Thailand. Phuket has consistently been a top ranked tourist destination, with 12.5 million tourists generating USD 9.04 million revenue in 2015. In order to develop the personalized tourist model, a socio-demographic study of destination satisfaction was established by administration of a survey on July 14-18, 2016 to 1,221 visitors in the departure hall of Phuket International Airport.The study utilized the survey data by quota sampling from the proportion of the top 4 nationalities visiting Phuket. Analysis of Variance (ANOVA) was employed to examine which socio-demographic factors were statistically significant. Finally, this study carried out a three-way ANOVA to obtain the mean satisfaction from the interaction between the 3 most influential variables and each destination.

The findings from one-way ANOVA showed (1)Nationality, Education Income, and first time visitor or not were associated with differences in the level of tourist satisfaction, (2)Thai tourist satisfied coastal attractions less than Chinese significantly, (3)there are no different satisfaction among international tourists for coastal destinations but significantly differed for cultural attractions, (4)tourist with no university degree statistically satisfied coastal and cultural destination different from tourist with post graduate degree.

The value of mean satisfaction from three-way ANOVA is used in this model to create recommendation trip based on their profile based.The objective function was to maximize tourist satisfaction.The constraints were the number of attraction/trip, spending time/day, and starting time of the day. The model was validated by 15 tourists from Thai, China, Australia, and Finland.The satisfaction rating scores was 4.06 out of 5.The model will be an initial tool to guide tourists in order to plan or make travel decisions prior to the trip. However once the model is further developed, it will be a comprehensive aspect of tourism management to be utilized by tourism decision makers and businesses to comprehensively manage and market to specific tourist segments.

Field of Study: Logistics Management Student's Signature .....

Academic Year: 2016 Advisor's Signature .....

Co-Advisor's Signature .....

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LIST OF ABBREVIATIONS

Abbreviations

ANOVA	Analysis of Variance
SAT	Satisfaction
NAT	Nationality
EDU	Education
INC	Income
CHN	Chinese
AUS	Australian
NZL	New Zealander
THA	Thai
OAS	Other Asian
OEU	Other European
OTH	Others
P-K-B	Patong-Kamala Beach
K-K-B	Kata-Karon Beach
N-N-B	Naiyang-Naithorn Beach
S-B-B	Surin-Bangtao Beach
P-T-C	Phuket Old Town (Cultural Attraction)
B-T-C	Buddhist Temples (Cultural Attraction)
C-T-C	Chinese Temples (Cultural Attraction)
M-S-C	Museums (Cultural Attraction)
P-C-C	Promthep Cape (Cultural Attraction)
K-V-C	Kata-Karon Viewpoint (Cultural Attraction)

CHAPTER I

INTRODUCTION

1.1 Background

Growth in the tourism industry in Thailand has rapidly increased and continues to rise every year. According to data tabulated by the Ministry of Tourism and Sports, Thailand has welcomed a total of 9.51 million, 11.52 million, 15.94 million and 29.92 million visitors as of the year 2000, 2005, 2010 and 2015 respectively (Tourism, 2016). Meanwhile the revenue from tourists has dramatically increased since 2005 from USD 17,122.88 million (34.62 THB = 1 USD as of April 30, 2017) to USD 42,089.83 million, which is about 2.5 times within five years. More than 50% of total tourists came for Coastal Tourism, which is the major tourist's target for all ages and 30% of all tourists coming to Thailand visit Phuket ("Tourism Economic Review" 2015).

Phuket is Thailand's largest island, which is a well-known tourist destination and has been placed in 3rd place for the "Top Ten Holiday Destinations" listings of 2016 in SmartTravelAsia.com. Phuket is also ranked as "Top 10 Island – World," "Top 25 Beaches – World" by Travelers' Choice 2016 from TripAdvisor (Tripadvisor, 2016b). Phuket is one of the most developed and popular beach destinations in Asia. Phuket is not only an international magnet for beach lovers, but also for both Thai and foreigners, who enthusiastically submerge themselves in the culture, traditions, heritage, local event, manmade attractions, entertainment and variety of activities. Phuket has been a destination for a substantial number of tourists. International tourist arrivals to Phuket has continued to increase from 2.4 million in 2009 to 9.4 million in 2015, while the revenue increased nearly 3 times from USD 2,925.65 million to USD 7,872.10 million(Tourism, 2016). Tourism is seen as a prosperity engine and has increased steadily in the last five years. The number of international

tourist arrivals is directly related to tourism revenue growth rates (BUNNAG, 2014). Phuket is easily accessible by land, sea and air. Phuket International Airport is the third busiest airport in Thailand and has accommodated 46,132 aircraft movements in 2010 and 82,000 movements in 2015 (AOT, 2016). Phuket is a base for luxury yacht charters, with various activities to explore around the Island ("Tourism Economic Review," 2015). The ratio of revenue between international tourists and Thai tourists is estimated 85:15. The tourism sector is one of the most significant economic sectors in Phuket, and should be constantly monitored and analysed to insure success moving forward into the future.

Tourism and transportation are inexorably linked. Without transport there is by definition, no tourism (Seekings, 2007). Transport accounts for a part of tourism business, without it there is no tourism business. Thus the future of transport is very important not only to tourism but also the economy of a given society. To put it simply, transportation connects and associates for the whole tourism and supply chain. The tourism industry is often defined as the sectored system of innovation and production. This sectored system in tourism is extremely complex; changes in external forces can redefine the products and players involved in a tourism based economic sector. The evolvement and progress of information technology is having a tremendous impact in the tourism business (Aldebert, Dang, & Longhi, 2011). Tourists nowadays have been researching and reviewing options online in order to get information before making any decision. The use of the internet has increased at a phenomenal rate in recent years. Technology has a great advantage and plays an important role because it allows tourism industries to provide useful information about locations, activities and transportation. Allowing tourists to analyse and support their decision making process prior to the trip. The technological transformations have influenced tourists' preferences and behaviours concerning vacation time. One result is the abandoning of pre-organized tourist packages offered by tourism intermediaries

in flavour of other more personalized options(Hyde & Lawson, 2003). In many studies, tourists were not treated as a homogenous group. They were clustered around motivational factors and different aspects of the destinations resulting in socio-demographic and psychographic variables (Đurđica PEROVIĆ, 2012). A tourist, visitor or traveller is defined as someone who moves between different geographic locations, for any purpose, less than a year, and outside his/her usual environment. Therefore, having a tool that will aid or guide a traveller based on their preferences would be of substantial benefit to most tourists by reducing their decision time, and optimizing the overall trip satisfaction.

This study and experiment is to create the recommended personalized travel route optimization model for Phuket bound tourists based on a tourist's profile and preferences by using an advanced statistical technique to examine the effects and interactions relating the tourist's socio-demographics and trip characteristics. The objective function of these models will maximize tourist satisfaction by considering the traveling time available and the number of total visits. Finally, the recommended tourist attractions and route will be arranged and displayed.

1.2 Research Objectives

The objectives of this research are to examine the effects of socio-demographic factors and trip characteristics that influence tourist satisfaction on both coastal and cultural destinations in Phuket, Thailand. In addition, outline and develop the optimal model for a recommended personalized tourist trip.

1.3 Scope of the study

This exploratory research focuses on the major groups of tourists who come to visit Phuket, Thailand. This study is divided in two phases as shown in figure 1.1. The first one is to study the tourists by using socio-demographics, trip

characteristics, and experience concerning destinations during their trips. The results from the first phase will be used to develop a framework for the second phase in order to optimize the personalized tourist trip model, which is a goal of the research.

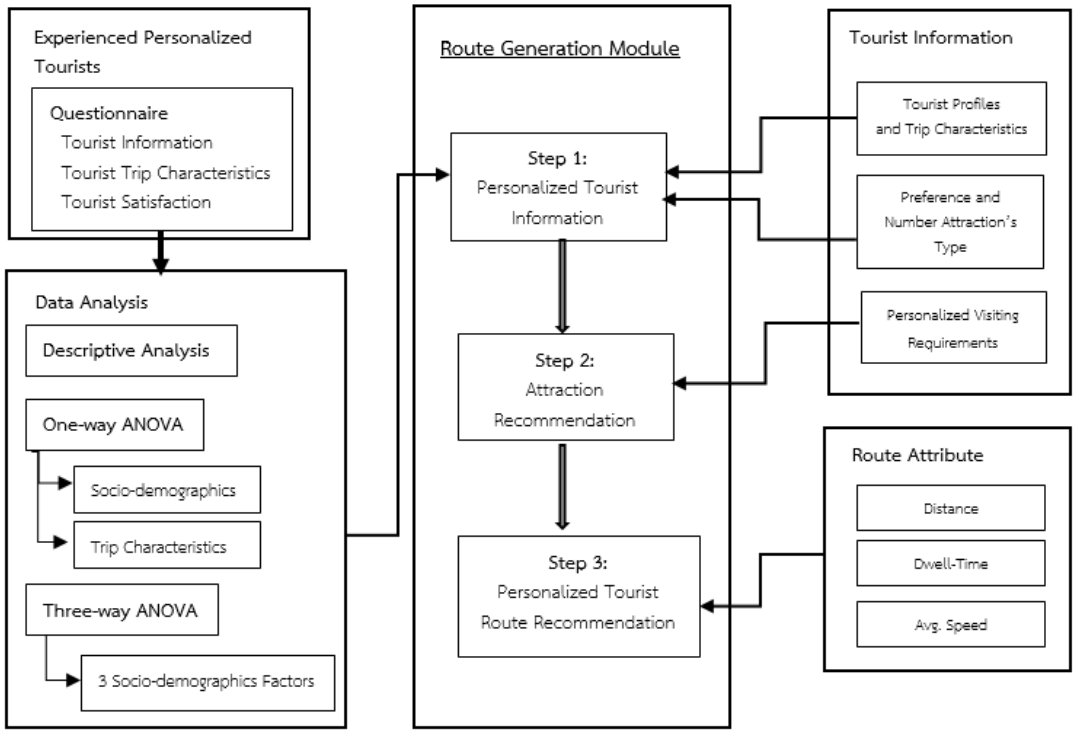

Figure 1 Scope of the Study

1.4 Expected contribution

This study applies analysis of variance to identify what type of socio-demographics and trip characteristics are involved that will influence destination satisfaction. The study can be used to help local government and businesses to comprehensively manage their destinations appropriately as well as market to specific tourist segments. The model developed during this study can serve as a guideline for visitors to effectively plan trips to Phuket, optimizing their time and money to create a custom schedule to enjoy the area, based on the input of the individual's preferences, budget and available time. The results should aid all aspects of the

tourism supply chain in order to manage the right product, in the right market, at the right time which are all parts of a three step plan for sustainable business (Scardigli, 2015). Once adopted and properly utilized the optimization model could boost the tourism sector of Phuket's economy by providing a method for tourists to plan and execute the best possible vacation.

CHAPTER II

LITERATURE REVIEW

2.1 Tourist Satisfaction

Tourism is a complex system. Tourist satisfaction and performance of one sector have significant implications on another. Consumer satisfaction is one of the most heavily researched constructs in tourism research. Satisfaction is the consumer's fulfillment response, the degree to which the level of fulfillment is pleasant or unpleasant (Oliver, 1997)Market segmentation is one of the most widely used methods to gain understanding of the market structure in tourist markets, which are fundamental to the successful operation of the tourism industry: (1) different people have different needs and (2) if tourists are satisfied with their experience they will return (Dolnicar & Le, 2008) Within the discipline of tourism research, satisfaction has been defined as an outcome of a tourist's experience in a destination compared against their expectations about the visit, resulting in positive behavioral intentions such as return, repurchase, purchase recommendation, and becoming loyal customers (Pizam, Neumann, & Reichel, 1978). Chon (1989) proposes satisfaction as a goodness of-fit function between tourists' expectations about a destination and the perceived evaluation of the visiting experience.

According to the United Nations World Tourism Organization (UNWTO, 1985) customer satisfaction is a psychological concept based on a pleasurable feeling of well-being which arises when one's expectations about a destination interact with the experience at the destination area. Johnson, Nader, and Fornell (1996) describe two basic conceptualizations of satisfaction, transaction-specific and cumulative. Transaction-specific satisfaction is a customer's transient evaluation of a particular product or service experience, while cumulative satisfaction describes the total

consumption experience of a product to date. Jang and Feng (2007) found a significant association between stated overall satisfaction and the intention to revisit a destination within the next 12 months.

In general, previous studies have suggested that destination image is a direct antecedent to satisfaction. An approach that tends to consider image as a concept formed by the consumer's reasoned and emotional interpretation. Cognitive evaluations are referring to the individual's own knowledge and beliefs about the object while affective appraisals are relating to an individual's feelings towards the object (Stern & Krakover, 1993). The cognitive image has a direct influence on the affective image and confirms the formation process of the destination image. Both cognitive and affective evaluations had positive influences on the overall satisfaction, achieving a consensus that a more favorable destination image is likely to lead to a higher level of tourist satisfaction, and in turn, satisfaction predicted tourist loyalty (Baloglu & McCleary, 1999; Chiu, Zeng, & Cheng, 2016; Prayag, 2009; Stern & Krakover, 1993; Tasci & Gartner, 2007)

2.2 Socio-demographics

Many studies examined the internal cognitive characteristics of tourists by asking: "What makes tourists satisfied?" or "What important constructs should be considered when analyzing tourist satisfaction?" or "How does tourist satisfaction materialize?" or "How destination image affects behavioral intentions?" In addition, traveler choice of attractions or activities while at a destination is determined by differences in the characteristics of the destinations visited, and the travel elements that can be purchased prior to departure, as well as the characteristics of travelers to those destinations. The literature often portrays the potential distance between expectations and experience, customer loyalty and customer satisfaction, tourists'

perceptions and satisfaction toward destination as result of customer's evaluation of products and services (Prebensen, 2004). However, most of the existing research has mainly paid attention to the influence of cognitive image on satisfaction, but overlooked a more comprehensive effect of tourist characteristics on destination satisfaction. Subsequently, the following question of interest is "What socio-demographic characteristics influence the level of tourist's satisfaction?" One must investigate the distinct influences of tourist profiles on satisfaction level.

A review of previous studies reveals the existence of a set of factors that influence image formation which, following the model proposed by Stern and Krakover (1993) and Asuncion Beerli and Martín (2004), involve both information obtained from different sources and characteristics of the individual. Information sources are the forces which influence the forming of perceptions and evaluations. They refer to the amount and diverse nature of information sources to which individuals are exposed, including destination information acquired as a result of having visited the place; for instance, the number of visits and their duration, first-timers and repeaters, the number of previous visits, and the degree of involvement with the place for pre-visit and post-visit. Personal factors refer to internal determinants, in other words, the socio-demographic characteristics of the individuals (gender, age, level of education, family lifecycle, social class, place of residence, etc.), as well as those of a psychological nature (motivations, values, personality, lifestyle, etc.) (Asunciòn Beerli & Martín, 2004)

Clearly, socio-demographics are a major factor affecting a tourist's experience in any given destination. One proposed research model adopted four socio-demographic characteristics (gender, age, level of education and income) significantly affecting a tourist's choice of sports tourism related travel either locally within Slovenia or to a foreign country (Slak Valek, Shaw, & Bednarik, 2014). Baloglu and McCleary

(1999) found that an individual's age influenced the perceived image of various tourist destinations. The visitor's age also affected the perception of tourist resorts and the image of some places in Australia differently (Walmsley & Young, 1998). Likewise, tourists' gender significantly influenced the perceived image according to the studies by MacKay and Fesenmaier (1997) and Chen and Kerstetter (1999). Most of the decision process models for destination choice. Um and Crompton (1990) and Woodside and Lysonski (1989) showed that personal characteristics, such as gender, age, occupation, education and, social class, were internal inputs that influenced the perceptions of places. A number of empirical works have attempted to identify differences in the perceived image depending on socio-demographic characteristics. Baloglu and McCleary (1999); Calantone, Di Benedetto, Hakam, and Bojanic (1989); Stern and Krakover (1993) and Walmsley and Young (1998) found some differences in the perceived image depending on gender, age, level of education, occupation, income, marital status, and country of origin. Most of the empirical work has attempted to analyze the differences in destination images arising from cultural factors focusing on the tourists' geographical origin. One aspect of tourist satisfaction scholars agree on is that the diversity of tourists' perceptions of satisfaction with a destination or tourism service is based on their countries of origin (Kozak, 2001; Richardson & Crompton, 1988).

Harasarn and Chancharat (2014) examined the relationship between income and tourism demand in the short run and long run regarding annual data from 1981 to 2012 for five countries who visited Thailand. The results indicated that there was a long-run relationship between tourists' arrivals and income. The income of tourists was a positive factor in increasing tourism and affected tourism demand because the level of income affects tourist expenditure. The level of income of the population from the origin countries is an important factor when describing tourism

demands of foreign tourists (Harasarn & Chancharat, 2014; Salleh, Siong-Hook, Ramachandran, Shuib, & Noor, 2008).

In order to better understand the relationship between tourist satisfaction toward beach destinations and tourist socio-demographics, the given survey classified the determinants of destination satisfaction across five levels: very satisfied, moderately satisfied, neutral, slightly dissatisfied, and very dissatisfied. This paper proposes a tourist's destination satisfaction is considered cumulative satisfaction. Overall satisfaction was highly related to visitor experience and expectations, and had a direct influence on repurchase intentions. Meanwhile, whenever overall satisfaction was high, transaction-specific satisfaction had little impact on repurchase intentions (Jones & Suh, 2000).

Such an approach provides some protection as destinations and tourism providers no longer compete with the entire global tourism market but compete only with destination providers who cater for the same target segment. In this study, we will classify the sample group of tourists by their nationalities, age, gender, education, and income, isolating specific socio-demographic variables that affect the tourist's satisfaction. We will also determine the travel-related variables (information sources) to gain a better understanding of the correlation between destination and satisfaction. Phuket has yet to benefit from a socio-demographic study of tourist satisfaction with Phuket's many popular beach destinations. The findings of this study can provide valuable insight and direction to establish positioning plans where government and businesses want to invest, manage, and market for tourism industry in Phuket.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describes an overview of research design of the main study of the thesis. The first step in this approach was to conduct a literature review regarding the appropriate effectiveness indicators to be utilized, the schemes to quantify them for modelling purposes, and the type of data that were used. The passage provides futher explaination of the study area, proposed data collection methods and data analysis. The following procedure was to study the socio-demographic factors and trip characteristics that influence the tourist's satisfaction by destination. Finally, the most important factors that affect tourist satisfaction were selected and used for tourist route optimization model.

3.1 Study Area

The area of this study will focus on Phuket, Thailand. Phuket lies off the west coast of southern Thailand in the Andaman Sea, approximately 890km from Bangkok. It is Thailand's largest island at 550sq km, roughly the same size as Singapore, and is surrounded by many smaller islands that add a further 70 sq. km to its total land area. Phuket is quite hilly. About 70 percent of Phuket is mountainous; a Western range runs from North to South from which smaller branches derive. There are a few peaks above 500 meters, the highest peak is Mai Tao Sip Song at 529 meters, which lies within the boundaries of Tumbon Patong, Kathu District. The remaining 30 percent of the island, mainly in the Centre and South, is formed by low plains. Year-round temperatures on Phuket vary between 21-34 °C. The northeast monsoon season, roughly November till April, brings consistent sunny weather, cool breezes and low humidity, with moderate seas. The island faces the annual Southwest monsoon, whose waves sweep in from the Andaman Sea from May to October, seeing the rainiest and

most unpredictable weather along with frequent swells off the Indian Ocean. It is called “Low Season” or “Green Season” for the tourism industry. Geography and weather have created two very different sides to Phuket. The east coast is comprised of limestone shoals with only a few sandy beaches but more culture and local communities down this side of the island. The most beautiful beaches are found on the West coast, separated by rocky coves and headlands. The classic beauty of these West coast beaches attracts the large number of visitors. There were 4.31 million international tourists in 2010, a number that doubled in 2015, while the revenue increased nearly 3 times from 101,286 million to 272,532 million baht for the last 5 years.

The rising visitor influx is a result of the increasing popularity of Phuket as a coastal destination, the expanding range of air travel connections and active marketing campaigns by Thailand targeting affluent visitors. Therefore, these following beaches; (1) Patong-Kamala beach, (2) Kata-Karon beach, (3) Nai Yang-Nai Thon beach, (4) Mai Khow beach, (5) Surin-Bangtao beach, on the West coast of Phuket were used in this study to rate the degree of tourist satisfaction.

Phuket is not famous only for beaches but also attract visitors from around the world for cultural and historical tourism. Phuket has a long and colourful history. A migration and established trade route from western India aided in developing the major resupply ports between Europe and Asia. In addition, the migration from western India brought Dravidians to Malaya peninsula (The west of mainland Malaysia and the southern part of Thailand). The current population are descendants from the Chinese who migrated to the Island for Tin mine industry, western Indians who were fishermen, Europeans and local Thai who were Buddhist. Due to the wide variety of nationalities that helped to develop Phuket throughout history, bringing with them, the culture and religion, the island has many historical temples and landmarks.

However, for the purpose of this study, we selected the most well-known cultural and historical tourist attractions which are (1) The big Buddha and Chalong-Temple, (2) Chinese Temple, (3) Phuket Old Town historic site, (4) Big Buddha- Chalong temple (Buddhist temples), (5) Museum and (6) Kata-Karon View Point. The purpose of designing an attractions matrix was to include a wide range of attractions that are generally believed to stimulate tourist visitations.

The publicity and media exposure has steadily increased the number of international visitors to Phuket. The ratio of revenue between international tourists and Thai tourists is estimated 85:15. Thus, the tourism sector is one of the most significant economic sectors in Phuket.

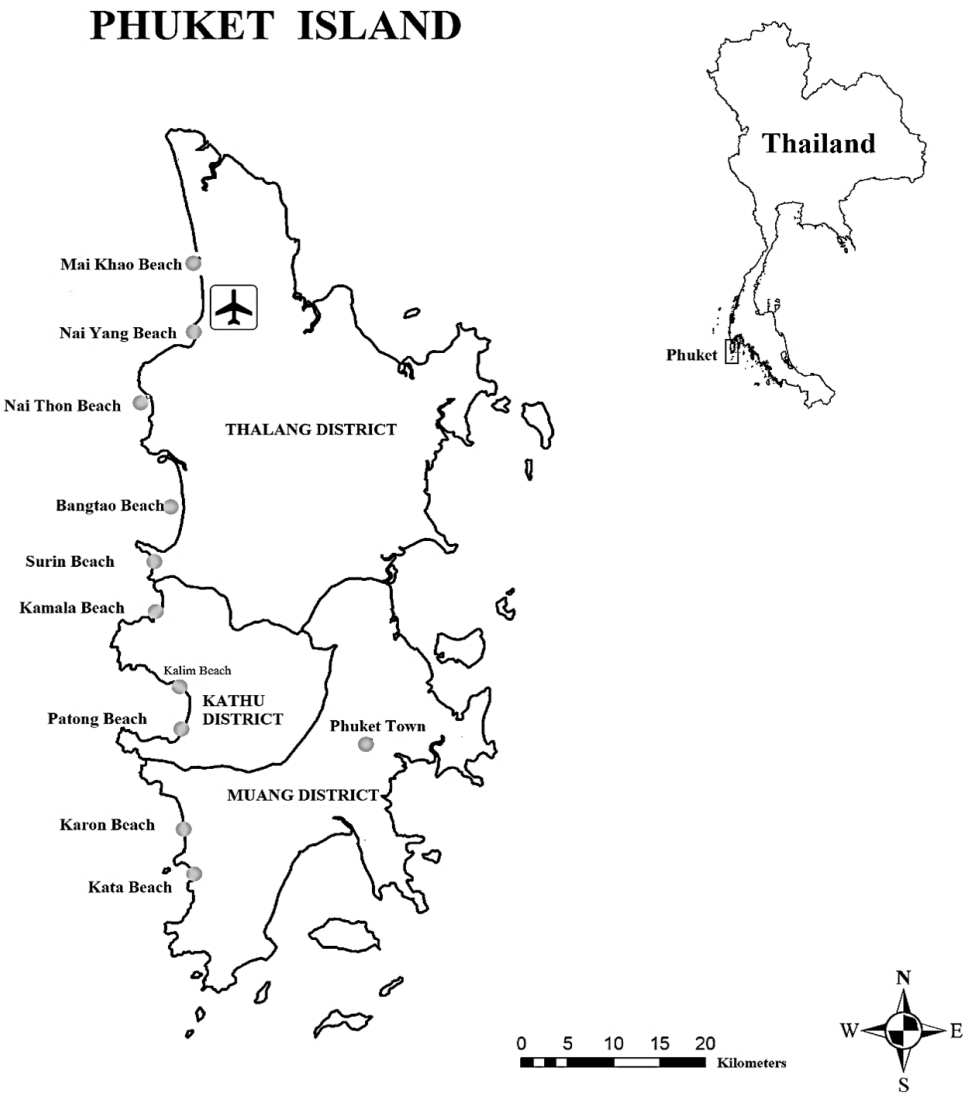

Figure 2 Phuket Map

Source: by Author

3.2 Research Design

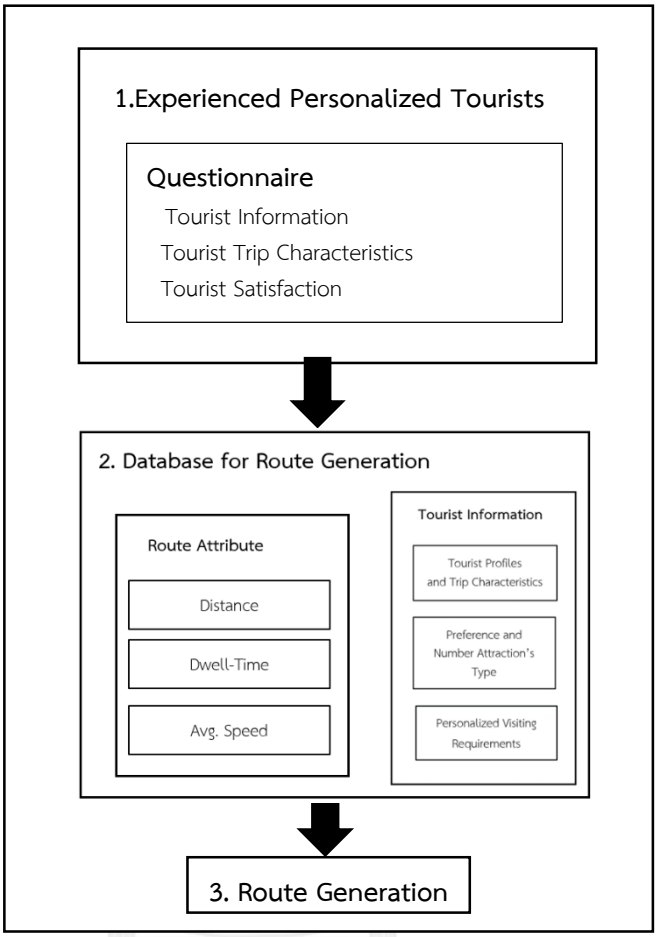

Figure 3 Research Design Flow

3.2.1 Experienced Personalized Tourists

The main objective for seeking experienced personalized tourists was to examine the effects of socio-demographic variables and trip characteristics on destination satisfaction with attractions in Phuket by launching questionnaires. The participants were tourists who stayed at least one night and travelled in Phuket. The ideal candidates would be tourists who came to visit Phuket based on Tourism (2016), including Thai tourists. The attractions in this study were 11 places classified into cultural and coastal tourist destinations. This phase will use Analysis of variance (One-way ANOVA) in order to determine whether there were any statistically significant

differences between the means of independent tourist groups. The one-way ANOVA compares the means between the groups that we were interested in and determines whether any of those means were statistically significantly different from each other. As a consequence, it would provide the most socio-demographic and trip characteristic variables for the model.

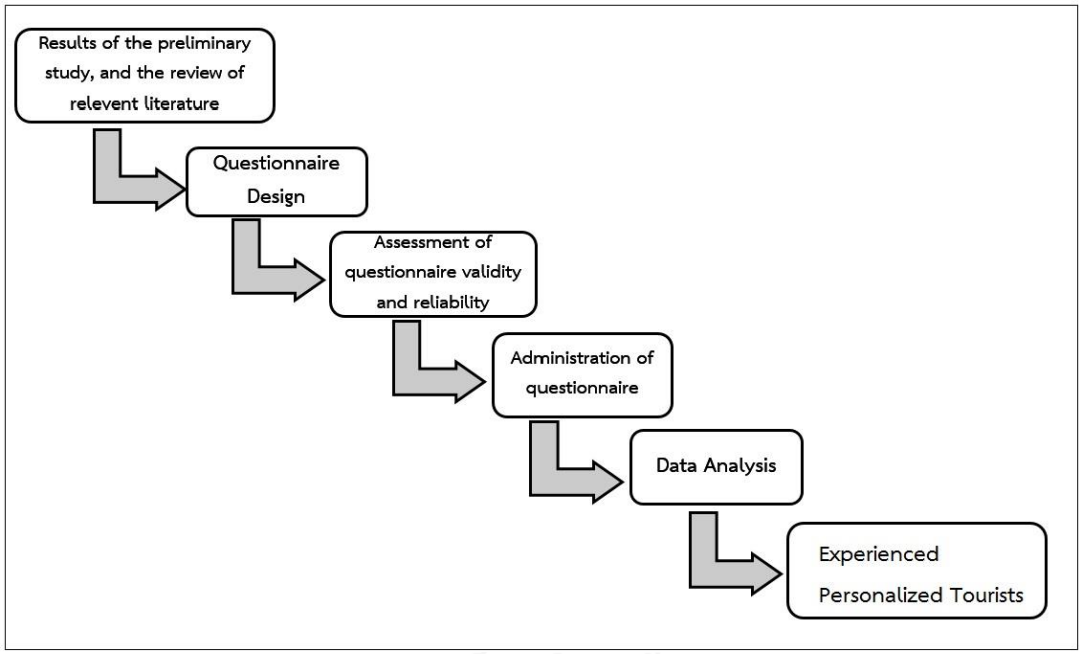

Figure 4 Research Design for Experienced Personalized Tourists

Questionnaire Design

This part focuses on planning in measurement development and questionnaire design. It will start with the population of this study who are tourists. They must visit and stay in Phuket at least one night as the definition by World Tourism Organization (UNWTO). Figure 4 depicts how the questionnaire is constructed.

The first step in questionnaire design is to operationalise the variables involved in the study to make them measurable as well as develop an appropriate scaling to measure these variables. These variables are a respondent's socio-demographics and satisfaction by destination. These variables are derived from the

results of the preliminary study, and the review of relevent literature pertaining to the measurement of the particular constructs as suggested by Asunciòn Beerli and Martín (2004), Đurđica PEROVIĆ (2012), Reid, Hurst, and Anderson (2013), Thongmala Phosikham (2015). In addition to these variables, the trip characteristics that the respondents experience during the trips on activities, attractions, as well as other factors such as: average dwell-time, first timer or repeat visitor, travel party, and length of stay are also included in a questionnaire in order to find out whether they are influential in the level of satisfaction.

The questionnaire consisted of 3 parts; (1) General information, (2) Expectation and Satisfaction with Phuket (3) Personal Information. A combination of structured techniques was used in order to capture various aspects of the respondents' satisfactions with destinations. The respondents were asked to rate their satisfaction with the tourist attractions with the overall travelling experience on a 5-point Likert scale (1 = very dissatisfy and 5= very satisfy) adopted from previous literature.

1) Sampling Plan

Sampling is the process of selecting the right number of participants to be involved in a study and it is essential for all studies that aim to produce results that are generalizable to the whole population (Intan Salwani, Marthandan, Daud Norzaidi, & Choy Chong, 2009). This study aims to determine the satisfaction of multiple groups, the target respondents are the majority of tourists that follow with the main statistical data from the Ministry of Tourism and Sports (2016). Therefore, quota sampling is applied to this study. The technique allows the researcher to sample a subgroup that is of great interest to the study. The first step to create a quota sample is choosing the relevant group and divide the population accordingly, followed by calculating a quota for each stratum. According to the statistics of tourist arrivals to Phuket (Tourism, 2016) a total of 8.45 million tourists visited Phuket in 2014, and international tourists accounted for 71.7% of the total arrivals. Among the international arrivals, Phuket

tourism is dominated by three markets including Chinese (30.32%), Russian (17.80%), and Australian (8.03%) (Immigration Bureau, Police Department, 2015).

Table 1 Tourist Arrivals to Phuket in 2014

Types of tourists	No. of arrivals	Percentage (%)
Thai	2,390,950	28.29
International	6,061,259	71.71
Total	**8,452,209**	**100.00**

Source: Department of Tourism, Ministry of Tourism and Sports (2015)

When taking these figures into consideration, the sampling this study adopted is quota sampling with the main criteria being the country of origin following the statistics by Department of Tourism, Ministry of Tourism and Sports (2015).

Robert V. Krejcie (1970) have produced a table for determining sample size. Table 2 is shown based on the formula, if one wished to know the sample size required to be representative of the opinions 8.45 million tourists, then one enters the table 2 at N is equal to 100,000 the sample size in this example is 384 tourists.

Table 2 Table for Determining Sample Size by Robert V. Krejcie (1970).

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note. *N* is population size. *S* is sample size.

Robert V. Krejcie (1970) states that, using this calculation, as the population increases the sample size increases at a diminishing rate (plateau) and remains, eventually constant at slightly more than 380 cases. There is little to be gained to warrant the expense and energy to sample beyond about 380 cases (Hill, 1998). So does the “The Survey Research Handbook” by Pamela L. and Alreck which provides similar evidence (Alreck & Settle, 1994). Moreover, Herbert F. Weisberg and Bowen (1977) dedicated to survey research, provide a table of maximum sampling

error related to sample size for simple randomly selected samples (Table3). Regarding an error level of 10% in your survey, the sample of 100 is acceptable but for a sample size of 1000, the error level will be around 3.2%.

Table 3 Maximum Sampling Error for Samples of Varying Sizes

Sample Size	% Error
2,000	2.2
1,500	2.6
1,000	3.2
750	3.6
700	3.8
600	4.1
500	4.5
400	5.0
300	5.8
200	7.2
100	10.3

The sample size is determined by following the guidelines by Krejcie and Morgan (1970) with a total of 8.45 million tourists, a minimum sample size is 384 tourists. However, in order to obtain more reliable results, the sample size of the study will be adjusted to 1,200 tourists and the error rate is less than 2.6%. In addition, Roscoe Hill (1998) suggested that the sample size larger than 30 and less than 500 is appropriate for most studies and it is necessary that each sub-group of the sample should be more than 30.

A quota of each group was calculated based on the tourist arrivals to Phuket by the Ministry of Sports and Tourism (2015). Table 4 showed the total number of questionnaires to be collected.

Table 4 The Total Number of Questionnaires

Types of tourists	Origin	%	Unadjusted sample size	Adjusted sample size	The total number of respondents
Domestic	Thai	28.29	339.48	340	202
International	Chinese	30.32	260.68	265	292
	Russian	17.8	153.17	155	204
	Australian	8.03	69.10	70	158
	Others	43.85	377.34	370	365
	Total	**100**	**1,200**	**1,200**	**1,221**

The total participants were classified in 7 groups as shown in Table 5. Each sub-group had a sample size more than 30 which was appropriate for most studies as suggested by many previous studies.

Table 5 The Total Number of Tourist's Participant by Nationality

Tourist's Nationality	Number of Respondents
Chinese (CHN)	292
Russian (RAS)	204
Australian and New Zealander (AUS&NZL)	158
Thai (THA)	202
Other European (OEU)	154
Other Asian (OAS)	143
Others (OTH)	68
Total	**1,221**

2) Reliability and Validation

As part of the process of assessing the questionnaire's validity and reliability, a test run was conducted to test the internal consistency of questionnaire

items. The first draft of the survey instrument was distributed at the departure hall of Phuket International Airport to 30 randomly selected visitors who stayed and travelled in Phuket. Based on the results of the pilot test, the questionnaire was reviewed by experts in various tourism disciplines before administering it to respondents. The questionnaire was available in 4 languages: Thai, English, Chinese and Russian. Back-translation was used to ensure the consistency of the Chinese and Russian version.

3) Administration of questionnaire

At the process of questionnaire administration, in order to gain access, the potential respondents, it was planned to distribute at the departure hall of Phuket International Airport during 14-18 July 2016. Because it is assumed that this is the final stage of the tourist trip. The rationale for targeting the right groups, trained research assistants are instructed to ask a screening question to the respondents: "Did you stay in Phuket more than one day?" to ensure they were actual tourists, then proceeded to the next question. Otherwise, they would approach the next available person.

3.2.2 Database for Route Generation

This part was consisted of two parts. The first one was the route attributes which were the information about distance, average speed, and dwell-time by destination's type. The second part was input from tourists. There was tourist's profile, attraction's preference, and traveling time per day.

3.2.3 Route Generation

This part was to formulate the model. The objective function was to maximize tourist satisfaction and trip characteristic scores. The constraints were the number of visits for attraction's type, and the spending time per day. The route generation would recommend the tourist's attraction from the highest rank to the lowest one. This part required the tourist's decision whether they want to go as the

model recommended or not, otherwise they can reselect the places again. Finally, the model would arrange the personalized itinerary.

3.3 Research Analysis

3.3.1 Descriptive Analysis

Descriptive statistics describe and understand the features of a specific data set, by giving short summaries about the sample and measures of the data. Descriptive statistics are used to compute the summary of a given data set, which can be a representation of the entire population or a sample of it. Descriptive statistics measures the central tendency include the mean, median and mode, while measures of variability include the frequency, standard deviation or variance, the minimum and maximum variables, and the kurtosis and skewness.

3.3.2 Inferential Statistics for Comparing Means

Inferential statistics are techniques that allow researchers to use samples to make generalizations about the populations from which the samples were drawn. It is, therefore, important that the sample accurately represents the population. The process of achieving this is called sampling. Inferential statistics arise out of the fact that sampling naturally incurs sampling error and thus a sample is not expected to perfectly represent the population. The methods of inferential statistics are (1) the estimation of parameter(s) and (2) testing of statistical hypotheses.

(1) Analysis of Variance (ANOVA)

Analysis of Variance (ANOVA) is a parametric statistical technique used to compare datasets. It is similar in application to techniques such as t-test and z-test, in that it is used to compare means and the relative variance between them. However, analysis of variance (ANOVA) is best applied where more than 2 populations or samples

are meant to be compared. Analysis of variance (ANOVA) has three types; One-way analysis, Two-way analysis, and K-way analysis. However, this study will use One-way and Three-way ANOVA.

(2) One Way ANOVA (One-way ANOVA)

The One-way Analysis of Variance (ANOVA) is a procedure for testing the hypothesis that K population means are equal, where K > 2. The One-way ANOVA compares the means of the samples or groups in order to make inferences about the population means. The One-way ANOVA is also called a single factor analysis of variance because there is only one independent variable or factor. The independent variable has nominal levels or a few ordered levels.

2.1) The variables in the One-way ANOVA

In an ANOVA, there are two kinds of variables: independent and dependent. The independent variable is controlled or manipulated by the researcher. It is a categorical variable used to form the groupings of observations. In this study, the independent variables will be the tourist and trip characteristics. Even though, in the One-way ANOVA, only one independent variable is considered, but there are two or more levels of the independent variables.

The dependent variable is defined as the variable that is, or is presumed to be, the result of manipulating the independent variable. In the One-way ANOVA, there is only one dependent variable – and hypotheses are formulated about the means of the groups on that dependent variable. The dependent variable differentiates individuals on some quantitative (continuous) dimension. The ANOVA F test evaluates whether the group means on the dependent variable differ significantly from each other. That is, an overall analysis-of-variance test is conducted to assess

whether means on a dependent variable are significantly different among the groups. In this study will record the mean of satisfaction by destination.

2.2) Models in the One-way ANOVA

In an ANOVA, there are two specific types of models that describe how we choose the levels of our independent variable. We can obtain the levels of the treatment (independent) variable in at least two different ways: We could, and most often do, deliberately select them or we could sample them at random. The way in which the levels are derived has important implications for the generalization we might draw from our study. For a one-way analysis of variance, the distinction is not particularly critical, but it can become quite important when working with more complex designs such as the factorial analysis of variance. If the levels of an independent variable (factor) were selected by the researcher because they were of particular interest and/or were all possible levels, it is a fixed-model (fixed-factor or effect). In other words, the levels did not constitute random samples from some larger population of levels. The treatment levels are deliberately selected and will remain constant from one replication to another. Generalization of such a model can be made only to the levels tested. In this study, a fixed-model that will specify the particular factors shown in Table 6.

2.3) Hypothesis for the One-way ANOVA

The null hypothesis (H_0) tested in the One-way ANOVA is that the population means from which the K samples are selected are equal. Or that each of the group means is equal.

$$H_0 : \mu_1 = \mu_3 = \ldots = \mu_k$$

Where k is the number of different independent groups

The alternative hypothesis (H_a) is that at least one group mean significantly differs from the other group means.

$$H_a: \mu_i \neq \mu_k \text{ ;}$$

For at least one $i \neq k$ where i and k simply indicate unique group

2.4) Assumption Analysis of Variance

(1) The observations are random and independent samples from the populations. This is commonly referred to as the ***assumption of independence***. The null hypothesis actually says that the samples come from populations that have the same mean. The samples must be random and independent if they are to be representative of the populations. The value of one observation is not related to any other observation. In other words, one person's score should not provide any clue as to how any of the other people should score. That is, one event does not depend on another.

(2) The distributions of the populations from which the samples are selected are normal. This is commonly referred to as the ***assumption of normality***. This assumption implies that the dependent variable is normally distributed (a theoretical requirement of the underlying distribution, the F distribution) in each of the groups.

(3) The variances of the distributions in the populations are equal. This is commonly referred to as the ***assumption of homogeneity of variance***.

This study will use One-way analysis to compare whether or not the mean satisfaction output of (1) seven groups of tourists by nationality, (2) two gender groups, (3) four age groups, (4) three education levels, (5) two income levels, (6) two groups between first time visitor and repeat visitor, (7) four groups of travel party, and

(8) two groups of the length of stay, are significantly different at each destination among groups.

Table 6 Variables for One-way ANOVA Test

Independent Variables		**Dependent Variables**
Type	**Factors**	**Satisfaction Scores by Destination**
Socio-demographic Factors	Nationality Age Gender Education Income	Patong-Kamala beach Kata-Karon beach Naiyang-Naithon beach Kata-Karon Viewpoint Maikhow beach Surin-BangTao beach Phuket Old Town Big buddha-Chalong Temple Promthep Cape Museum Chinese Temple
Trip Characteristics	1st time visitors Travel Party Length of Stay	

The results from one-way ANOVA will be able to determine the factors that have a difference in means. However, it won't pinpoint the pairs of means that are different. This post-hoc test will identify the pairs of means (from at least three) that differ. The multiple-comparison post-hoc correction is used to perform many independent or dependent statistical tests at the same time. The post-hoc Least Significant Difference (LSD) test is applied in this study that if an omnibus test is conducted and is significant, the null hypothesis is incorrect. The finding will reveal the mean difference among them. The mean value could indicate the higher or lesser mean between groups for those dependent variables.

(3) Three Way ANOVA (3-Way ANOVA)

Three-way analysis is used to determine if there is an interaction effect between three independent variables on a dependent variable. The main effects are retrieved from one-way ANOVA. Basically, a three-way interaction means that one, or more, two-way interactions differ across the levels of a third variable. A three-way ANOVA will be used in the following number of situations.

The effect of three different types of socio-demographic characteristics for satisfying tourist destinations. The study is focused on the effect of tourist and trip characteristics. What type of tourists' profile and trip characteristics associate with tourist's satisfaction? What factors might cause the difference of satisfaction scores among groups?

3.1 The variables in the Three-way ANOVA

(1) Independence Variables: A variable that is controlled or manipulated by the researcher. A categorical variable used to form the groupings of observations. A Three-way ANOVA always involves three independent variables. Each independent variable, or factor, is made up of, or defined by, two or more elements called levels. When looked at simultaneously, the levels of the first, second, and third factor create the conditions of the study to be compared.

(2) Dependent Variables: The variable is presumed to be, the result (outcome) of the manipulation of the independent variable(s). In the Three-way (three-factor) ANOVA, there are three independent variables (factors) and a single dependent variable.

Table 7 Variables for Three-way ANOVA Test

Independent Variables (3 Factors)			**Dependent Variables**
Nationality	Age	Gender	Patong-Kamala beach
		Income	Kata-Karon beach
	Gender	Income	Naiyang-Naithon beach
		Income	Maikhow beach
	Education	Age	Surin-BangTao beach
		Income	Phuket Old Town
			Promthep Cape
			Museum
			Big buddha-Chalong Temple
			Chinese Temple
			Kata-Karon Viewpoint

(3) Models in Three-Way ANOVA

In three-way ANOVA, there are 3 independent variables. These three variables are obtained from one-way ANOVA which are statistically significant with destinations. However, in this study nationality has been selected as a fixed factor while the other two factors could be shown in Table 7.

(4) Hypothesis for the Three-way ANOVA

H_0: $\mu_1 = \mu_2 = \ldots = \mu_k$

That is, there is no difference among them.

H_a: $\mu_i \neq \mu_k$

That is, at least one pair means differs.

The findings from one-way ANOVA will be the initial step of selecting the most influential factors for the model. The interaction effect of the 3 factors from three-way ANOVA will be the database that represents specific groups for developing the personalized tourist model.

3.4 Personalized Tourist Model

3.4.1 Input Data for Personalized Tourist Model

This section consisted of average dwell time (hrs/visit) that was retrieved from descriptive analysis (Table 8), the table of mean satisfaction scores of tourist profile and trip characteristics from Three-way ANOVA, the distance between destinations, and the average speed.

Table 8 Average Dwell Time by Attraction's Type

Average Dwell Time by Type of Destination (hours/visit)
Beach
Cultural, Historical and Art Attractions
Phuket Downtown
Temples
Museum

Table 9 The Mean Satisfaction Scores from Three-way ANOVA Test

Independent Variables	**Dependent Variables (Satisfaction scores by destinations**										
The Interaction between nationality and the 2 variables	P-K-B	K-K-B	N-N-B	MK-B	S-B-B	P-T-C	B-T-C	M-S-C	C-T-C	P-C-C	K-V-C
3 variables of Trip Characteristic	P-K-B	K-K-B	N-N-B	MK-B	S-B-B	P-T-C	B-T-C	M-S-C	C-T-C	P-C-C	K-V-C

3.4.2 Formulation

Set:

S : Set of Tourist Profile's Satisfaction Scores

T : Set of Trip Characteristic's Satisfaction Scores

L : Set of Location

L_1 : Set of coastal tourist location

L_2 : Set of culture tourist location

C_1 : Set of selected location preference for coastal tourism

C_2 : Set of selected location preference for cultural tourism

Parameters:

S_l : Tourist Profile's Satisfaction scores by destination l on specific of country, and the two variables that were the most influencing factors.

T_l : Trip Characteristics Satisfaction scores by destination l on specifics of trip characteristic factors.

Variables:

$x_l \in (0,1)$ $x_l = 1$, if the tourist profile with the specific nationality, education, and income selects to visit location l otherwise is equal to zero.

Formulation:

$$Max\ z = \sum_{l \in L} (S_l x_l + T_l x_l) \quad (1)$$

Subject to:

$$\sum_{l \in L_1} X_l \leq C_1 \qquad \forall_l \in L_1 \quad (2)$$

$$\sum_{l \in L_2} X_l \leq C_2 \qquad \forall_l \in L_2 \quad (3)$$

$$\sum_{l \in 1}^{L} X_l \leq 11 \qquad \forall_l \in L \quad (4)$$

$$X_l \in \{0,1\} \qquad \forall_l \in L \quad (5)$$

The objective function (1) is to maximize two terms of 1) mean tourist satisfaction from the interaction of 3 variables and 2) mean of 3 variables of tourist trip characteristics.

The constraint (2) is the tourist's preference number of Coastal tourist attractions which will not be greater than 5.

The constraint (3) is the tourist's preference number of Culture tourist attractions which will not be greater than 6.

The constraint (4) is the total number of both Coastal and Culture tourist attractions which will not be greater or equal to 11.

Regarding this stage, there were the most important factors from socio-demographics and trip characteristics

CHAPTER IV

DATA ANALYSIS AND RESULT DISCUSSION

Data analysis is presented in great detail including data preparation, descriptive statistics, one way analysis of variance (One-way-ANOVA) and three way analysis of variance (Three-way-ANOVA).

4.1 Data Preparation

4.1.1 Normality Test

In this study, we will use Skewness and Kurtosis along with the Q-Q plot as a graphical method of accessing normality (See appendix B). From both Skewness and Kurtosis, and graphical Q-Q plot of satisfaction scores of all destination satisfactions in this study indicated that the distribution is normal (See appendix B).

4.1.2 Homogeneity of Variance Test

(1) Levene's Test (Levene Test)

Levene's test is used to test the assumption of homogeneity of variance. It tests the assumption that each group (category) of one or more categorical independent variables has the same variance on an interval dependent. The Levene test is robust in the face of departures from normality and is more robust in the face of non-normality than more traditional tests like Bartlet's test. This test should not be significant to meet the assumption of equality of variances.

The Levene test is defined as:

H_0: $\sigma_1^2 = \ldots = \sigma_k^2$

H_a: $\sigma_i^2 \neq \sigma_j^2$ for at least one pair $i \neq j$

For the nationality variable, Table 10 showed the *F* value for Levene's test at Patong-Kamala beach was 4.744 and 4.621 with a Sig. (*p*) value of 0.030 and 0.032. Because the Sig. value was less than our alpha 0.05 ($p < 0.05$), we rejected the null hypothesis (no difference) for the assumption of homogeneity of variance and conclude that there was a significant difference between the two group's variances at Patong-Kamala beach and Kata-Karon beach. Thus, the assumption of homogeneity of variance were not met for those two destinations while the rest met the assumption of homogeneity of variance.

Table 10 Test Homogeneity of Variances: Nationality

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	4.744	1	933	0.030*
Kata-Karon	4.621	1	761	0.032*
Naiyang_Naithorn	1.185	1	410	0.277
Mikhow	1.617	1	365	0.204
Surin-Bangtao	2.313	1	370	0.129
Phuket Old Town	0.056	1	545	0.813
Big Buddha or Chalong temple	0.068	1	575	0.794
Museums	0.027	1	356	0.869
Chinese temples	0.831	1	361	0.363
Promthep Cape	2.483	1	409	0.116
Kata-Karon Viewpoint	0.027	1	504	0.870

*Significant $p < 0.05$

For the age variable, the Sig. value for all destinations were greater than our alpha 0.05 ($p < 0.05$), we retained the null hypothesis (no difference) for the assumption of homogeneity of variance and concluded that there was not significant difference between the two group's variances for all nationalities at all destinations. That was, the assumption of homogeneity of variance was met as shown in Table 11.

Table 11 Test Homogeneity of Variances: Age

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	0.084	3	931	0.969
Kata-Karon	0.927	3	759	0.427
Naiyang_Naithorn	0.058	3	408	0.982
Mikhow	0.278	3	363	0.841
Surin-Bangtao	1.723	3	368	0.162
Phuket Old Town	0.308	3	543	0.820
Big Buddha or Chalong temple	0.373	3	573	0.772
Museums	0.844	3	354	0.471
Chinese temples	0.556	3	359	0.644
Promthep Cape	0.649	3	407	0.584
Kata-Karon Viewpoint	1.723	3	502	0.161

Table 12 Test Homogeneity of Variances: Gender

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	2.402	1	932	0.122
Kata-Karon	0.509	1	761	0.476
Naiyang_Naithorn	0.073	1	410	0.788
Mikhow	0.333	1	365	0.564
Surin-Bangtao	0.557	1	370	0.456
Phuket Old Town	6.563	1	544	0.011*
Big Buddha or Chalong temple	1.787	1	574	0.182
Museums	0.498	1	356	0.481
Chinese temples	0.324	1	361	0.569
Promthep Cape	0.103	1	409	0.748
Kata-Karon Viewpoint	0.066	1	503	0.798

*Significant p < 0.05

For the gender variable, the *F* value for Levene's test at Phuket Old Town was 6.563 with a Sig. (*p*) value of 0.011 (see Table 13). Because the Sig. value was less than our alpha 0.05 ($p < 0.05$), we rejected the null hypothesis (no difference)

for the assumption of homogeneity of variance and concluded that there was a significant difference between the two group's variances at Phuket Old Town. That was, the assumption of homogeneity of variance was not met while the rest met the assumption of homogeneity of variance as showed in Table 12.

Table 13 Test Homogeneity of Variances: Level of Education

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	1.934	2	928	0.145
Kata-Karon	0.378	2	755	0.686
Naiyang_Naithorn	0.351	2	406	0.704
Mikhow	0.391	2	362	0.676
Surin-Bangtao	0.513	2	367	0.599
Phuket Old Town	0.249	2	542	0.779
Big Buddha or Chalong temple	0.093	2	571	0.911
Museums	0.370	2	352	0.691
Chinese temples	1.085	2	358	0.339
Promthep Cape	2.298	2	406	0.102
Kata-Karon Viewpoint	0.347	2	500	0.707

The education variable was showed in table 13, the Sig. value for all destinations were greater than our alpha 0.05 ($p < 0.05$), we retained the null hypothesis (no difference) for the assumption of homogeneity of variance and concluded that there was not a significant difference between the two group's variances for all education groups at all destinations. That was, the assumption of homogeneity of variance was met.

For the income variable, the Sig. value for all destinations were greater than our alpha 0.05 ($p < 0.05$), we retained the null hypothesis (no difference) for the assumption of homogeneity of variance and concluded that there was not a significant difference between the two group's variances for all income groups at all destinations. That was, the assumption of homogeneity of variance was met as showed in Table 14.

Table 14 Test Homogeneity of Variances: Income Level

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	3.699	1	924	0.055
Kata-Karon	0.587	1	750	0.444
Naiyang_Naithorn	0.124	1	408	.0725
Mikhow	0.508	1	362	0.477
Surin-Bangtao	1.477	1	366	0.225
Phuket Old Town	0.315	1	539	0.575
Big Buddha or Chalong temple	1.427	1	568	0.233
Museums	0.089	1	351	0.766
Chinese temples	0.015	1	356	0.903
Promthep Cape	1.268	1	405	0.261
Kata-Karon Viewpoint	2.642	1	500	0.105

Table 15 Test Homogeneity of Variances: Length of Stay

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	5.222	1	932	.023*
Kata-Karon	3.173	1	759	0.075
Naiyang_Naithorn	2.134	1	409	0.145
Mikhow	1.093	1	364	0.297
Surin-Bangtao	5.937	1	369	0.015*
Phuket Old Town	0.160	1	543	0.689
Big Buddha or Chalong temple	0.064	1	573	0.800
Museums	4.065	1	354	0.045*
Chinese temples	0.013	1	360	0.909
Promthep Cape	0.058	1	408	0.811
Kata-Karon Viewpoint	0.049	1	503	0.824

*Significant $p < 0.05$

For the number length of stay variable as shown in Table 15, the *F* value for Levene's test at Patong-Kamala beach, Surin-Bangtao beach and Museum were 5.222, 5.937, and 4.065 with a Sig. (*p*) value of 0.023, 0.015 and 0.045 respectively.

Because the Sig. value of those 3 destinations were less than our alpha 0.05 ($p < 0.05$), we rejected the null hypothesis (no difference) for the assumption of homogeneity of variance and concluded that there was a significant difference between the two group's variances at Patong-Kamala beach, Surin-Bangtao beach and Museum. That was, the assumption of homogeneity of variance was not met while the rest met the assumption of homogeneity of variance.

Table 16 Test Homogeneity of Variances: Travel Party

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	.437	1	336	.509
Kata-Karon	.773	1	248	.380
Naiyang_Naithorn	.031	1	140	.860
Mikhow	.309	1	136	.579
Surin-Bangtao	.004	1	132	.949
Phuket Old Town	.328	1	192	.568
Big Buddha or Chalong temple	3.129	1	205	.078
Museums	1.164	1	134	.283
Chinese temples	1.260	1	130	.264
Promthep Cape	1.818	1	169	.179
Kata-Karon Viewpoint	.523	1	179	.471

For the travel party variable, the Sig. value for all destinations were greater than our alpha 0.05 ($p < 0.05$), we retained the null hypothesis (no difference) for the assumption of homogeneity of variance and concluded that there was not significant difference between the two group's variances for all travel party at all destinations. That was, the assumption of homogeneity of variance was met.

For the first time or repeat visitor variable, the *F* value for Levene's test at Patong-Kamala beach, Naiyang-Naithorn beach, and Mikhow beach were 6.765,

5.469, 4.576 with a Sig. (*p*) value of 0.009, 0.020, and 0.033. Because the Sig. value was less than our alpha 0.05 ($p < 0.05$), we reject the null hypothesis (no difference) for the assumption of homogeneity of variance and concluded that there was a significant difference between the two group's variances at Patong-Kamala beach, Naiyang-Naithorn beach, and Mikhao beach. That was, the assumption of homogeneity of variance was not met while the rest of the destinations met the assumption of homogeneity of variance (See Table 17).

Table 17 Test of Homogeneity of Variances First Time Visitor or Not

Satisfaction by destination	Levene Statistic	df1	df2	Sig.
Patong-Kamala Beach	6.765	1	933	.009*
Kata-Karon	2.353	1	761	.125
Naiyang_Naithorn	5.469	1	410	.020*
Mikhow	4.576	1	365	.033*
Surin-Bangtao	.009	1	370	.925
Phuket Old Town	3.303	1	545	.070
Big Buddha or Chalong temple	.979	1	575	.323
Museums	2.827	1	356	.094
Chinese temples	.314	1	361	.576
Promthep Cape	.000	1	409	.997
Kata-Karon Viewpoint	.361	1	504	.548

*Significant p < 0.05

(2) Brown & Forsythe's test

The Brown-Forsythe Test is for testing the assumption of equal variances in ANOVA. It is a modification of the Levene Test and tests for the equality of group means. It is more robust that the Levene's test when groups are unequal in size and the absolute deviation scores are highly skewed, causing a violation of normality assumption and the assumption of equal variances. Both the Levene and B-

F tests transform dependent variables for use in an ANOVA test. The only difference between the two tests is in how those transformed variables are constructed. The Levene test uses deviations from group means, which usually results in a highly-skewed set of data; violating the assumption of normality. The Brown-Forsythe test attempts to correct for this skewness by using deviations from group medians.

Table 18 Summary of Levene's Test and Brown& Forsythe's Test by Socio-Demographics

Dependent Variables	Homogeneity	Nationality		Age		Gender		Education		Income	
	Test	Statistic	Sig.	Statistic	Sig.	Statistic	Sig.	Statistic	Sig.	Statistic	Sig.
Satisfaction of Patong-Kamala Beach	Levene	4.744	0.03*	0.084	0.969	2.402	0.122	1.934	0.145	3.699	0.055
	Brown-Forsythe	17.93	**0.000***	0.346	0.792	5.027	0.025*	3.663	0.026*	1.549	0.214
Satisfaction of Kata-Karon	Levene	4.621	0.032*	0.927	0.427	0.509	0.476	0.378	0.686	0.587	0.444
	Brown-Forsythe	17.43	0.000*	1.161	0.324	3.225	0.073	0.575	0.563	5.922	0.015*
Satisfaction of Naiyang_Naithorn	Levene	1.185	0.277	0.058	0.982	0.073	0.788	0.351	0.704	0.124	0.725
	Brown-Forsythe	11.974	0.001*	0.209	0.89	0.226	0.634	1.278	0.28	0.098	0.754
Satisfaction of Mikhow	Levene	1.617	0.204	0.278	0.841	0.333	0.564	0.391	0.676	0.508	0.477
	Brown-Forsythe	9.559	0.002*	0.257	0.857	0.077	0.782	0.266	0.766	0.061	0.805
Satisfaction of Surin-Bangtao	Levene	2.313	0.129	1.723	0.162	0.557	0.456	0.513	0.599	1.477	0.225
	Brown-Forsythe	18.472	0.000*	0.177	0.912	0.161	0.688	2.109	0.124	0.011	0.917
Satisafaction of Phuket Old Town	Levene	0.056	0.813	0.308	0.82	6.563	0.011*	0.249	0.779	0.315	0.575
	Brown-Forsythe	9.127	0.003*	0.679	0.565	2.937	0.087	0.737	0.479	4.803	0.029*
Satisfaction of Big Buddha or Chalong temple	Levene	0.068	0.794	0.373	0.772	1.787	0.182	0.093	0.911	1.427	0.233
	Brown-Forsythe	1.702	0.194	0.363	0.78	1.777	0.183	1.526	0.219	1.144	0.285
Satisfaction of Musuems	Levene	0.027	0.869	0.844	0.471	0.498	0.481	0.37	0.691	0.089	0.766
	Brown-Forsythe	1.625	0.204	0.701	0.552	0.145	0.703	1.817	0.165	0.002	0.968
Satisfaction of Chinese temples	Levene	0.831	0.363	0.556	0.644	0.324	0.569	1.085	0.339	0.015	0.903
	Brown-Forsythe	2.956	0.087	0.165	0.92	1.31	0.253	6.3	0.002*	0.605	0.437
Satisfaction of Promthep Cape	Levene	2.483	0.116	0.649	0.584	0.103	0.748	2.298	0.102	1.268	0.261
	Brown-Forsythe	0.848	0.358	1.024	0.382	2.01	0.157	0.538	0.585	0.503	0.479
Satisfaction of Kata-Karon Viewpoint	Levene	0.027	0.87	1.723	0.161	0.066	0.798	0.347	0.707	2.642	0.105
	Brown-Forsythe	0	0.991	1.714	0.163	1.37	0.242	0.937	0.393	0.575	0.449

*Significant $p < 0.05$

Table 18 depicted the Brown& Forsythe's Test with socio-Demographics as following. Nationality was used to predict the level of satisfaction for all destinations. The Brown & Forsyth test was significant for the group of nationality at

Patong-Kamala beach, Kata-Karon beach, Naiyang-Naithon beach, Maikhow beach, Surin-Bangtao beach, and Phuket Old Town. Thus, the groups of nationality was not equal variances for those 6 destinations.

Age was used to predict the level of satisfaction at 11 destinations, as the B-F test was non-significant, indicating Age did not predict the satisfaction scores for all these destinations.

Education was used to predict the level of satisfaction for all destinations. The Brown & Forsyth test is significant for the group of education at Patong-Kamala beach and Chinese temples. Thus, the groups of education was not equal variances at Patong-Kamal beach and Chinese temples while the rest of destinations had equal variances.

Income was used to predict the level of satisfaction for all destinations. The Brown & Forsyth test was significant for the group of income at Kata-Karon beach and Phuket Old Town. Thus, the groups of income did not have equal variances at Kata-Karon beach and Phuket Old Town while the rest of destinations had equal variances.

Table 19 illustrated the Levene test and Brown& Forsythe's Test with Tourist's trip characteristics as follows: The length of stay was used to predict the level of satisfaction at 11 destinations, as the B-F test was non-significant, indicating the number of stays does not predict the satisfaction scores for all these destinations. Even though some destinations were statistically significant by Levene test but in this study, we will use B-F test. Because it is a robust for the Equality of Variances. Travel party was used to predict the level of satisfaction at 11 destinations, as the B-F test was non-significant, indicating travel party did not predict the satisfaction scores for all these destinations.

Table 19 Summary of Levene's Test and Brown& Forsythe's Test for Trip Characteristics

Dependent Variables	Homogeneity	First time/Repeat Visitor		Travel Party		Length of Stay	
	Test	Statistic	Sig.	Statistic	Sig.	Statistic	Sig.
Satisfaction of Patong-Kamala Beach	Levene	6.765	0.009*	0.437	0.509	5.222	0.023*
	Brown-Forsythe	0.006	0.937	1.03	0.311	2.268	0.132
Satisfaction of Kata-Karon	Levene	2.353	0.125	0.773	0.38	3.173	0.075
	Brown-Forsythe	9.292	0.002*	2.32	0.129	0.371	0.543
Satisfaction of Naiyang_Naithorn	Levene	5.469	0.02*	0.031	0.86	2.134	0.145
	Brown-Forsythe	7.105	0.008*	0.608	0.437	0.067	0.795
Satisfaction of Mikhow	Levene	4.576	0.033*	0.309	0.579	1.093	0.297
	Brown-Forsythe	4.319	0.038*	1.11	0.294	0.068	0.795
Satisfaction of Surin-Bangtao	Levene	0.009	0.925	0.004	0.949	5.937	0.015*
	Brown-Forsythe	10.522	0.001*	1.192	0.277	1.946	0.164
Satisafaction of Phuket Old Town	Levene	3.303	0.07	0.328	0.568	0.16	0.689
	Brown-Forsythe	0.131	0.718	1.171	0.281	0.06	0.807
Satisfaction of Big Buddha or Chalong temple	Levene	0.979	0.323	3.129	0.078	0.064	0.8
	Brown-Forsythe	1.115	0.291	1.163	0.282	3.489	0.063
Satisfaction of Musuems	Levene	2.827	0.094	1.164	0.283	4.065	0.045*
	Brown-Forsythe	4.515	0.034*	2.527	0.114	0	0.984
Satisfaction of Chinese temples	Levene	0.314	0.576	1.26	0.264	0.013	0.909
	Brown-Forsythe	6.348	0.012*	0.355	0.552	2.679	0.103
Satisfaction of Promthep Cape	Levene	0	0.997	1.818	0.179	0.058	0.811
	Brown-Forsythe	3.085	0.08*	1.185	0.278	0.002	0.968
Satisfaction of Kata-Karon Viewpoint	Levene	0.361	0.548	0.523	0.471	0.049	0.824
	Brown-Forsythe	7.491	0.006*	0.44	0.508	0.246	0.62

*Significant $p < 0.05$

Finally, first time visitor or repeat visitor was used to predict the level of satisfaction for all destinations. The Brown & Forsyth test was significant for the group of first time or repeat visitors at Kata-Karon beach, Naiyang-Naithon beach, Maikhow beach, Surin-Bangtao beach, Museums, Chinese temples, and Kata-Karon Viewpoint. Thus, the groups of being first time visitor or not was not equal variances for those 7 destinations while the rest had equal variances.

In this experimental context, finding different variances would be as important as finding different means. If the variances were different, then the populations were different. Thus, one can conclude that there are no equality of group means for Nationality, Gender, Education, Income and first time visit or not.

4.2 Descriptive Analysis

Descriptive statistics were to be analysed which included frequency, median and mean values. Descriptive statistics were calculated for the participants as shown in table 20.

The total participants were 56% female and 44% male. Domestic tourists were 17% while foreigners were 83%. The average age of all participants were in the range of 25-34 years old. The main purpose of traveling to Phuket were 88% for holiday and 66% were first time visitors. The majority of tourists who came to visit Phuket travelled with family, spouse, friends and others for 32%, 28%, 23% and 17% respectively. The average of income range was between USD2,000/month-USD3,000/month. The tourists with university degree, no university degree and post graduate degree were 45%, 35%, and 20% respectively. The mode of total stay were 4 days and the average length of stay were 7.6 days. The most time spent on the beach was 4.5 hours while dwell time for the cultural attractions like Phuket Old Town was 3 hours.

Table 20 Profile of respondents

Gender		**Income level**(USD/month)	
Male	44%	Income<1,000	30%
Female	56%	1,000≤ income< 2,000	24%
		2,000≤ income< 4,000	23%
		Income ≥ 4,000	23%
Age		**Education level**	
18-24	20%	Up to secondary school	12%
25-34	39%	Diploma	23%
35-44	21%	Bachelor degree	45%
45-54	10%	Master degree	18%
55-64	8%	Doctoral degree	2%
Over 65	2%		
Origin		**First Time Visit**	66%
Thai	17%	**Non First Time Visit**	34%
Foreigners	83%	**Travel Purpose**	
Group		Holiday	88%
Mainland China	24%	Others	12%
Australia & New Zealand	13%	**Total Stay**	
Russia	17%	Mean	7.6 days
Thai	16%	Mode	4 days
Other Asian	12%	**Activities**	
Other Europe	13%	On the beach	
Others	5%	Mean	4.5 hours/time
Travel Party		Mode	2 hours/time
Alone	8%	Sunbathing	
With spouse	28%	Mean	2.8 hours/time
With family/relative members	32%	Mode	2 hours/time
With friends	23%	Scuba Diving	
With business associates	5%	Mean	0.89 hours/time
With tour group	4%	Mode	2 hours/time

The average overall of tourist satisfaction scores and average scores by nationality was shown in Table 21. The results found most tourists rated their satisfaction level above 4 out of 5 with all destinations in Phuket. For the specific groups of tourists, Russian had satisfaction levels towards all destinations similar to Thai. Australian and New Zealander rated the satisfaction level for all destinations in Phuket higher than the other nationalities and all places had scores higher than the

overall average. It was interesting that all major tourist groups were highly satisfied with cultural attractions such as Buddhist temples, Chinese temples, Kata-Karon viewpoint, and Promthep Cape. Kata-Karon viewpoint and Promthep cape are similar in terms of geography. However, Promthep is well-known for seeing the sunset while Kata-Karon viewpoint is well-known for seeing the famous beaches from an elevated viewpoint. Chinese and Buddhist temples were rated higher than the overall satisfaction score as well. Because much of Phuket's culture comes from the ethnic Thai people and Chinese who played an important role in forming the traditions of Phuket. Therefore, it is a mixed culture that represents heritage through Thai and Chinese temples. Chinese temples are very important for local people especially during the Vegetable Festival, an old traditional festival lasting for ten days. The temples are very attractive and well maintained. It was not surprising that tourists from around the world highly satisfied. When focused on coastal destinations, most tourists except Thai were satisfied with Kata-Karon beach the most, followed by Naiyang-Naithon beach and Maikhow beach. But the most famous Patong-Kamala beach had the lowest satisfaction scores. Moreover, most tourists who rated Maikhow and Naiyang-Naithon beaches quite high, could prefer to visit the less crowded beaches and more natural settings, provided by the fact that part of Maikhow and Naiyang-Naithon beaches are in the Sirinat National Park.

Table 21 Average Destination Tourist Satisfaction by Nationality

Destination	Overall	Chinese	Australian/ NewZealander	Russian	Thai	Other Asian	Other European
Patong-Kamala beach	4.00	4.13	4.03	3.98	3.86	4.09	3.94
Kata-Karon beach	4.26	4.35	4.36	4.26	4.06	4.32	4.17
Naiyang-Naithon	4.14	4.08	4.32	4.09	4.03	4.25	4.27
Mai Khow beach	4.11	4.17	4.24	3.94	3.82	4.34	4.27
Surin-Bangtao	4.03	4.11	4.14	3.92	3.81	4.36	4.00
Phuket Old Town	4.15	4.07	4.37	4.21	4.06	4.26	4.09
Buddhist temple	4.22	4.28	4.37	4.31	4.31	4.22	4.32
Museums	4.10	4.09	4.26	4.19	4.11	4.19	4.14
Chinese temple	4.03	4.12	4.22	4.10	4.06	4.04	3.91
Promthep Cape	4.22	4.16	4.30	4.31	4.29	4.33	4.18
Kata-Karon View Point	4.23	4.25	4.33	4.43	4.23	4.22	4.14

Table 22 showed the average spending time per visit at each destination. This study asked tourists to give the approximate time that they spend in each destination such as going to beaches, visiting temples, visiting cultural sites, etc. The destinations were categorised to the type of Beach, Historical sites, Downtown, Temples, and Museums.

Table 22 Average Dwell-time By Attraction's Type

Destination	Average Dwell Time
Beach	4.5 hours/visit
Cultural, Historical and Art Attractions	1.3 hours/visit
Phuket Downtown	3.1 hours/visit
Temples	0.74 hours/visit
Museum	2.4 hours/visit

The table shows tourists spent the longest time on the beach, Phuket downtown, museums, cultural or historical sites, and temples 4.5, 3.1, 2.4, 1.3, and 0.74 hours/visit respectively.

4.3 Inferential Statistics for Comparing Means

4.3.1 One-way ANOVA

The analysis of variance, one-way ANOVA analysis was carried out to determine which socio-demographic characteristic influences the level of tourist satisfaction with destinations in Phuket. It was the step to select the suitable factors for this model. This tool compares the mean output of tourist satisfaction scores whether it is the same or different between groups by nationality, age, education, income, and gender.

In this research, it would compare the mean difference among group of variables with 11 different destination satisfactions. It is possible to have a tiny P value – clear evidence that the population means are different – even if the distributions overlap considerably. Based on literature reviews, these following variables; Nationality, Gender, Age, Education, Income, first time visitor or not, Travel party, and the length of stay were analysed with one-way ANOVA test. Prior to performing the ANOVA test, data must be classified in categories. The average mean was applied as a reference value in order to rearrange the groups. Only Age, Education, Income, Travel party, and the length of stay had been regrouped as shown in Table 23-27.

Table 23 Category of Age Variable

Age	18-24	241	Age	18-24	241
	25-34	476		25-34	476
	35-44	258		35-44	258
	45-54	127		45 and above	246
	55-64	93			
	65 and over	26			
	Total	1221		Total	1221

Table 24 Category of Education Variable

Education	Up to secondary school	142	Education	No University Degree	420
	Diploma	278			
	Bachelor	546		Bachelor	546
	Master	222		Post Graduate Degree	248
	Doctoral	26			
	Total	1214		Total	1214

Table 25 Category of Income Variable

Income (USD/month)	Income<USD1,000	364	Income (USD/month)	Income<USD2,000	657
	USD1,000≤Income<USD2,000	293			
	USD3,000≤Income<USD4,000	263		Income ≥USD2,000	542
	Income ≥4,000	279			

Table 26 Category of Travel Party Variable

Travel Party	Spouse	318	Travel Party	Spouse	318
	Family/Relative	365		Family/Relative	365
	Friends	266		Friends	266
	Business Associates	57		Others	201
	Tour group	50			
	Traveling Alone	94			
	Total	1150		Total	1150

Table27 Category of Length of Stay Variable

Length Stay	1-4 Days		Length Stay	= 4 Days	429
	5-7 Days			> 4 Days	800
	7 Days				
	Total	1219		Total	1219

The table from the ANOVA output, (ANOVA) was the key table because it showed whether the overall F ratio for the ANOVA was significant. The results from one-way ANOVA found the Nationality, Gender, Education and Income were statistically significant. However, for any subgroup that had more than 2 groups, we would not know which specific pairs of means were significantly different, unless we did a post hoc test. The multiple comparison procedures are used to determine which groups are significantly different after obtaining a statistically significant result from an Analysis of Variance.

Table 27 One-way ANOVA Test for Socio-demographic Factors

ONE-WAY ANOVA	Nationality		Age		Gender		Education		Income	
	F.	Sig.	F.	Sig.	F.	Sig.	F.	Sig.	F.	Sig.
SAT. of Patong-Kamala Beach	1.408	0.208	0.793	0.345	4.926	0.027*	3.783	0.023*	1.572	0.21
SAT. of Kata-Karon	2.186	0.042*	0.341	1.119	3.229	0.073	0.59	0.555	5.949	.015*
SAT. of Naiyang_Naithorn	1.212	0.299	0.892	0.206	0.226	0.635	1.273	0.281	0.098	0.754
SAT. of Mikhow	2.621	0.017*	0.855	0.259	0.078	0.781	0.265	0.767	0.06	0.807
SAT. of Surin-Bangtao	2.535	0.020*	0.915	0.173	0.162	0.687	2.137	0.119	0.011	0.916
SAT. of Phuket Old Town	3.286	0.003*	0.565	0.680	2.789	0.095	0.748	0.474	4.909	0.027*
SAT. of Big Buddha/Chalong temple	1.136	0.34	0.774	0.371	1.734	0.188	1.47	0.231	1.102	0.294
SAT. of Musuems	0.609	0.723*	0.562	0.685	0.145	0.703	1.809	0.165	0.002	0.968
SAT. of Chinese temples	1.029	0.406	0.919	0.166	1.331	0.249	6.42	0.002*	0.615	0.433
SAT. of Promthep Cape	0.734	0.622	0.372	1.045	2.027	0.155	0.488	0.614	0.482	0.488
SAT. of Kata-Karon Viewpoint	0.474	0.828	0.16	1.73	1.366	0.243	0.908	0.404	0.549	0.459

*Significant $p < 0.05$

The findings were shown in Table 27. Nationality had significant influence on the overall tourist satisfaction with Kata-Karon beach, Maikhow beach, Surin-Bangtao beach, Phuket Old Town, and Museum. Income was significantly correlated with the tourist satisfaction with Kata-Karon beach and Phuket Old Town. Education had significant influence on tourist satisfaction with Patong-Kamala beach and Chinese temples. Gender was significantly correlated with Patong-Kamala beach. The socio-demographic factors that influenced the level of tourist satisfaction in this study were nationality, education, income, and gender, while age was not statistically significant. These results were consistent with previous studies such as Rittichainuwat, Qu, and Mongkhonvanit (2008); Shamsub and Lebel (2012) who showed that travel motivation differed by tourist demographics, which were gender, age, marital status, region of residence, income level of the country of origin, and education level. However, Đurđica PEROVIĆ (2012) found that country of residence, occupation and wage were associated with the level of tourist's satisfaction but age and gender were not. Moreover, previous research indicated that knowledge could influence attitude, evaluation and consumption behaviours (Cordell, 1997). Knowledge was mostly

categorized as familiarity and expertise and also classified according to its content, nature, complexity, valence and the amount of information stored in the memory (Alba & Hutchinson, 1987). Consumers with a higher level of knowledge can also realize a product or service's benefits better than those with a lower level of knowledge, thus knowledge is also suggested to influence cumulative satisfaction positively. Harasarn and Chancharat (2014) indicated that there was a long-run relationship between tourist arrivals, and economic growth and income.

As a result, this study would select nationality, gender, education, and income for further determining the mean satisfaction from the interaction among these 3 variables by three-way ANOVA test.

To gain a better understanding of some possible types of interaction involving qualitative variables, table 28 displayed the tourist characteristic variables which were first time or repeat visitors, who the tourist travelled with (Travel party), and the number of stays to gain insight into tourists' satisfaction with 11 destinations in Phuket.

The first time or repeat traveller was statistically different in tourist satisfaction while the other two variables were not. The next process would find which destinations had the mean satisfaction different by applying Post Hoc test.

Table 28 One-way ANOVA Test for Trip Characteristic Factors

ONE-WAY ANOVA	Trip Characteristics	1st time or repeat visitor		Travel Party		Length of Stay	
		F	Sig.	F	Sig.	F	Sig.
SAT. of Patong-Kamala Beach	Between Groups	0.006	0.939	0.939	0.421	2.131	0.145
SAT. of Kata-Karon	Between Groups	9.174	0.003*	1.971	0.117	0.344	0.558
SAT. of Naiyang_Naithorn	Between Groups	6.968	0.009*	1.161	0.324	0.065	0.798
SAT. of Mikhow	Between Groups	4.196	0.041	2.058	0.106	0.066	0.797
SAT. of Surin-Bangtao	Between Groups	10.542	0.001*	1.473	0.222	1.851	0.174
SAT. of Phuket Old Town	Between Groups	0.125	0.724	0.817	0.485	0.060	0.806
SAT. of Big Buddha or Chalong temple	Between Groups	1.093	0.296	0.401	0.752	3.685	0.055
SAT. of Musuems	Between Groups	4.435	0.036*	1.652	0.177	0.000	0.985
SAT. of Chinese temples	Between Groups	6.228	0.013*	1.145	0.331	2.660	0.104
SAT. of Promthep Cape	Between Groups	3.098	0.079	0.536	0.658	0.002	0.968
SAT. of Kata-Karon Viewpoint	Between Groups	7.490	0.006*	1.177	0.318	0.249	0.618

*Significant $p < 0.05$

4.3.1 Post Hoc Tests in ANOVA

In the prior section we used ANOVA to compare means from k independent groups. In the case of rejecting the null hypothesis, we would declare that at least one population mean differed but did not specify how so. Post hoc tests are designed for situations in which the researcher has already obtained a significant omnibus F-test with a factor that consists of three or more means and additional exploration of the differences among means is needed to provide specific information on which means are significantly different from each other.

This study illustration showed a sample output from Fisher's Least Significant Difference (LSD) post hoc test. It was to explore all possible pair-wise comparisons of means comprising a factor using the equivalent of multiple t-tests. The concern now is how to determine which of the means for the 7 group of Nationalities and 3 level of Education, are significantly different from the others by Least Significant

Difference (LSD) test. Inspection of the source table 29-33 showed that both the main effects and the interaction effect were significant.

Table 29 Different Mean SAT. between Nationality Group with Patong-Kamala beach

Dependent Variable	(I) Nationality	(J) Nationality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SAT. of Patong-Kamala Beach	CHN	AUS&NZL	0.10466	0.11916	0.38	-0.1292	0.3385
		RUS	0.14937	0.10187	0.143	-0.0506	0.3493
		THA	.27736*	0.10544	.009*	0.0704	0.4843
		OAS	0.04421	0.11704	0.706	-0.1855	0.2739
		OEU	0.1887	0.11332	0.096	-0.0337	0.4111
		OTH	0.1827	0.17314	0.292	-0.1571	0.5225

*Significant $p < 0.05$

Table 29 depicted Chinese tourists were satisfied with Patong-Kamala beach higher than Thai significantly.

Table 30 Different Mean SAT. between Nationality Group with Kata-Karon beach

Dependent Variable	(I) Nationality	(J) Nationality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SAT. of Kata-Karon Beach	CHN	AUS&NZL	-0.00905	0.10823	0.933	-0.2215	0.2034
		RUS	0.09485	0.09423	0.314	-0.0901	0.2798
		THA	.29252*	0.09661	.003*	0.1029	0.4822
		OAS	0.03137	0.10863	0.773	-0.1819	0.2446
		OEU	0.18155	0.10746	0.092	-0.0294	0.3925
		OTH	-0.02876	0.15742	0.855	-0.3378	0.2803
	AUS&NZL	CHN	0.00905	0.10823	0.933	-0.2034	0.2215
		RUS	0.1039	0.11294	0.358	-0.1178	0.3256
		THA	.30157*	0.11494	.009*	0.0759	0.5272
		OAS	0.04042	0.12521	0.747	-0.2054	0.2862
		OEU	0.19059	0.12419	0.125	-0.0532	0.4344
		OTH	-0.01972	0.16929	0.907	-0.352	0.3126
	THA	CHN	-.29252*	0.09661	0.003	-0.4822	-0.1029
		AUS&NZL	-.30157*	0.11494	0.009	-0.5272	-0.0759
		RUS	-0.19767	0.10186	0.053	-0.3976	0.0023
		OAS	-.26115*	0.11531	0.024	-0.4875	-0.0348
		OEU	-0.11097	0.1142	0.331	-0.3352	0.1132
		OTH	-.32128*	0.16211	0.048	-0.6395	-0.0031

*Significant $p < 0.05$

Table 30 illustrated these following pairs, Chinese -Thai, Australian/New Zealanders –Thai, Other Asian-Thai, and Others-Thai had a higher mean difference with Kata-Karon beach compared to the other significantly.

Table 31 Different Mean SAT. between Nationality Group with Maikhow beach

Dependent Variable	(I) Nationality	(J) Nationality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
SAT. of Mikhow Beach	CHN	AUS&NZL	-0.0724	0.15778	0.647	-0.3827	0.2379
		RUS	0.23001	0.13805	0.097	-0.0415	0.5015
		THA	.34748*	0.14616	0.018	0.0601	0.6349
		OAS	-0.16838	0.1555	0.28	-0.4742	0.1374
		OEU	-0.10068	0.15898	0.527	-0.4133	0.212
		OTH	0.25538	0.26651	0.339	-0.2687	0.7795
	AUS&NZL	CHN	0.0724	0.15778	0.647	-0.2379	0.3827
		RUS	0.30242	0.16648	0.07	-0.025	0.6298
		THA	.41988*	0.17326	0.016	0.0791	0.7606
		OAS	-0.09598	0.18121	0.597	-0.4523	0.2604
		OEU	-0.02828	0.18421	0.878	-0.3905	0.334
		OTH	0.32778	0.28229	0.246	-0.2274	0.8829
	RUS	CHN	-0.23001	0.13805	0.097	-0.5015	0.0415
		AUS&NZL	-0.30242	0.16648	0.07	-0.6298	0.025
		THA	0.11747	0.15551	0.451	-0.1884	0.4233
		OAS	-.39840*	0.16433	0.016	-0.7216	-0.0752
		OEU	-.33070*	0.16762	0.049	-0.6603	-0.0011
		OTH	0.02536	0.27175	0.926	-0.5091	0.5598
	THA	CHN	-.34748*	0.14616	0.018	-0.6349	-0.0601
		AUS&NZL	-.41988*	0.17326	0.016	-0.7606	-0.0791
		RUS	-0.11747	0.15551	0.451	-0.4233	0.1884
		OAS	-.51586*	0.17119	0.003	-0.8525	-0.1792
		OEU	-.44817*	0.17436	0.011	-0.7911	-0.1053
		OTH	-0.09211	0.27596	0.739	-0.6348	0.4506

*Significant $p < 0.05$

Table 31 depicted the mean satisfaction level with Maikhow beach were significantly different between THAI and all the nationalities, except Others (OTH). The findings found THAI were less satisfied compared to the other groups. Russian had

also less satisfaction compared to Chinese, Australian/New Zealanders, Other Asian, and Other European significantly.

Table 32 Different Mean SAT. between Nationality Group with Surin-Bangtao beach

Dependent Variable	(I) Nationality	(J) Nationality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SAT. of Surin-Bangtao Beach	CHN	AUS&NZL	-0.03759	0.16342	0.818	-0.359	0.2838
		RUS	0.18745	0.13727	0.173	-0.0825	0.4574
		THA	.29492*	0.14696	0.046	0.0059	0.5839
		OAS	-0.25029	0.1596	0.118	-0.5641	0.0636
		OEU	0.10526	0.15842	0.507	-0.2063	0.4168
		OTH	0.48988	0.2608	0.061	-0.023	1.0027
	RUS	CHN	-0.18745	0.13727	0.173	-0.4574	0.0825
		AUS&NZL	-0.22505	0.1708	0.188	-0.5609	0.1108
		THA	0.10746	0.15513	0.489	-0.1976	0.4125
		OAS	-.43775*	0.16715	0.009	-0.7664	-0.109
		OEU	-0.08219	0.16602	0.621	-0.4087	0.2443
		OTH	0.30242	0.26549	0.255	-0.2197	0.8245
	THA	CHN	-.29492*	0.14696	0.046	-0.5839	-0.0059
		AUS&NZL	-0.33251	0.17869	0.064	-0.6839	0.0189
		RUS	-0.10746	0.15513	0.489	-0.4125	0.1976
		OAS	-.54521*	0.1752	0.002	-0.8897	-0.2007
		OEU	-0.18966	0.17412	0.277	-0.5321	0.1528
		OTH	0.19496	0.27063	0.472	-0.3372	0.7272
	OAS	CHN	0.25029	0.1596	0.118	-0.0636	0.5641
		AUS&NZL	0.2127	0.18922	0.262	-0.1594	0.5848
		RUS	.43775*	0.16715	0.009	0.109	0.7664
		THA	.54521*	0.1752	0.002	0.2007	0.8897
		OEU	0.35556	0.18491	0.055	-0.0081	0.7192
		OTH	.74017*	0.2777	0.008	0.1941	1.2863

*Significant $p < 0.05$

Table 32 showed the mean satisfaction level with Surin-Bangtao beach were significantly different between (1) THAI and Chinese and (2) Thai and Other Asian. Thai were less satisfied compared to the two nationalities above. Russian also had less

satisfaction with this beach compared to Other Asian. But Other Asian group were significantly more satisfied with Surin-Bangtao than other groups.

Table 33 Different Mean SAT. between Nationality Group with Phuket Old Town

Dependent Variable	(I) Nationality	(J) Nationality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
SAT. of Phuket Old Town	CHN	AUS&NZL	-.32871*	0.14474	0.024	-0.613	-0.0444
		RUS	0.0152	0.12252	0.901	-0.2255	0.2559
		THA	0.19342	0.13138	0.142	-0.0647	0.4515
		OAS	-0.13526	0.14397	0.348	-0.4181	0.1475
		OEU	.30938*	0.13973	0.027	0.0349	0.5839
		OTH	0.05224	0.21385	0.807	-0.3678	0.4723
	AUS&NZL	CHN	.32871*	0.14474	0.024	0.0444	0.613
		RUS	.34392*	0.15021	0.022	0.0489	0.639
		THA	.52213*	0.15752	0.001	0.2127	0.8315
		OAS	0.19345	0.16816	0.25	-0.1369	0.5238
		OEU	.63810*	0.16454	0	0.3149	0.9613
		OTH	0.38095	0.23083	0.099	-0.0725	0.8344
	RUS	CHN	-0.0152	0.12252	0.901	-0.2559	0.2255
		AUS&NZL	-.34392*	0.15021	0.022	-0.639	-0.0489
		THA	0.17821	0.13738	0.195	-0.0917	0.4481
		OAS	-0.15046	0.14946	0.315	-0.4441	0.1431
		OEU	.29418*	0.14539	0.044	0.0086	0.5798
		OTH	0.03704	0.21759	0.865	-0.3904	0.4645
	THA	CHN	-0.19342	0.13138	0.142	-0.4515	0.0647
		AUS&NZL	-.52213*	0.15752	0.001	-0.8315	-0.2127
		RUS	-0.17821	0.13738	0.195	-0.4481	0.0917
		OAS	-.32868*	0.15681	0.037	-0.6367	-0.0207
		OEU	0.11597	0.15293	0.449	-0.1844	0.4164
		OTH	-0.14118	0.22269	0.526	-0.5786	0.2963
	OAS	CHN	0.13526	0.14397	0.348	-0.1475	0.4181
		AUS&NZL	-0.19345	0.16816	0.25	-0.5238	0.1369
		RUS	0.15046	0.14946	0.315	-0.1431	0.4441
		THA	.32868*	0.15681	0.037	0.0207	0.6367
		OEU	.44464*	0.16386	0.007	0.1228	0.7665
		OTH	0.1875	0.23034	0.416	-0.265	0.64

*Significant $p < 0.05$

Table 34-35 represented the mean different satisfaction with cultural attractions that had mean satisfaction statistical differences among groups of nationality.

The findings found Australian/New Zealander were more satisfied traveling to Museum less than Russian. While Russian had lesser mean satisfaction scores for Chinese temple visits than Australian/New Zealander.

Table 34 Different Mean SAT. between Nationality Group with Museum

Dependent Variable	(I) Nationality	(J) Nationality	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
SAT. of Museum	AUS&NZL	CHN	0.15108	0.15844	0.341	-0.1605	0.4627
		RUS	.37013*	0.17333	0.033	0.0292	0.711
		THA	0.2465	0.18072	0.173	-0.1089	0.6019
		OAS	0.18076	0.18919	0.34	-0.1913	0.5528
		OEU	0.25166	0.19151	0.19	-0.125	0.6283
		OTH	0.42727	0.26378	0.106	-0.0915	0.946
	RUS	CHN	-0.21905	0.1406	0.12	-0.4956	0.0575
		AUS&NZL	-.37013*	0.17333	0.033	-0.711	-0.0292
		THA	-0.12363	0.1653	0.455	-0.4487	0.2015
		OAS	-0.18937	0.17452	0.279	-0.5326	0.1538
		OEU	-0.11847	0.17703	0.504	-0.4666	0.2297
		OTH	0.05714	0.25347	0.822	-0.4413	0.5556
SAT. of Chinese Temples	AUS&NZL	CHN	0.15108	0.15844	0.341	-0.1605	0.4627
		RUS	.37013*	0.17333	0.033	0.0292	0.711
		THA	0.2465	0.18072	0.173	-0.1089	0.6019
		OAS	0.18076	0.18919	0.34	-0.1913	0.5528
		OEU	0.25166	0.19151	0.19	-0.125	0.6283
		OTH	0.42727	0.26378	0.106	-0.0915	0.946
	RUS	CHN	-0.21905	0.1406	0.12	-0.4956	0.0575
		AUS&NZL	-.37013*	0.17333	0.033	-0.711	-0.0292
		THA	-0.12363	0.1653	0.455	-0.4487	0.2015
		OAS	-0.18937	0.17452	0.279	-0.5326	0.1538
		OEU	-0.11847	0.17703	0.504	-0.4666	0.2297
		OTH	0.05714	0.25347	0.822	-0.4413	0.5556

*Significant $p < 0.05$

Table 35 Different Mean SAT. between Education Group with Coastal Destination

Dependent Variable	(I) Education level	(J) Education level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
SAT. of Patong-Kamala Beach	**No University Degree**	Bachelor	.12196	.07437	.101	-.0240	.2679
		Post Graduate	.25682*	.09448	**.007***	.0714	.4422
	Bachelor	No University Degree	-.12196	.07437	.101	-.2679	.0240
		Post Graduate	.13486	.08891	.130	-.0396	.3094
	Post Graduate	No University Degree	-.25682*	.09448	.007*	-.4422	-.0714
		Bachelor	-.13486	.08891	.130	-.3094	.0396
SAT. of Kata-Karon	No University Degree	Bachelor	.00516	.06916	.941	-.1306	.1409
		Post Graduate	.08867	.08875	.318	-.0856	.2629
	Bachelor	No University Degree	-.00516	.06916	.941	-.1409	.1306
		Post Graduate	.08351	.08413	.321	-.0816	.2487
	Post Graduate	No University Degree	-.08867	.08875	.318	-.2629	.0856
		Bachelor	-.08351	.08413	.321	-.2487	.0816
SAT. of Naiyang-Naithorn	No University Degree	Bachelor	.16060	.10063	.111	-.0372	.3584
		Post Graduate	.10268	.13123	.434	-.1553	.3607
	Bachelor	No University Degree	-.16060	.10063	.111	-.3584	.0372
		Post Graduate	-.05792	.11995	.629	-.2937	.1779
	Post Graduate	No University Degree	-.10268	.13123	.434	-.3607	.1553
		Bachelor	.05792	.11995	.629	-.1779	.2937
SAT. of Mikhow	No University Degree	Bachelor	.04208	.10603	.692	-.1664	.2506
		Post Graduate	.10064	.13842	.468	-.1716	.3728
	Bachelor	No University Degree	-.04208	.10603	.692	-.2506	.1664
		Post Graduate	.05856	.12683	.645	-.1909	.3080
	Post Graduate	No University Degree	-.10064	.13842	.468	-.3728	.1716
		Bachelor	-.05856	.12683	.645	-.3080	.1909

*Significant $p < 0.05$

Table 35 depicted the comparison between 3 education levels and demonstrated which groups had different mean satisfaction scores. The results showed two beaches in which Patong-Kamala beach and Surin-Bangtao beach significantly differed in mean satisfaction scores between groups of no university and post graduate

degree. Tourists with a post graduate degree had lower satisfaction scores for both beaches.

Table 36 Different Mean SAT. between Education group with Cultural Destination

Dependent Variable	(I) Education level	(J) Education level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
SAT. of Surin-Bangtao	**No University Degree**	Bachelor	.15179	.10555	**.151**	-.0558	.3593
	Bachelor	**Post Graduate**	.28082*	.14105	**.047***	.0035	.5582
	Bachelor	No University Degree	-.15179	.10555	**.151**	-.3593	.0558
		Post Graduate	.12903	.12983	.321	-.1263	.3843
	Post Graduate	No University Degree	-.28082*	.14105	.047*	-.5582	-.0035
		Bachelor	-.12903	.12983	.321	-.3843	.1263
SAT. of Phuket Old Town	No University Degree	Bachelor	.04299	.09515	.652	-.1439	.2299
		Post Graduate	.14339	.11853	.227	-.0895	.3762
	Bachelor	No University Degree	-.04299	.09515	.652	-.2299	.1439
		Post Graduate	.10040	.10854	.355	-.1128	.3136
	Post Graduate	No University Degree	-.14339	.11853	.227	-.3762	.0895
		Bachelor	-.10040	.10854	.355	-.3136	.1128
SAT. of Big Buddha or Chalong temple	No University Degree	Bachelor	.12111	.07527	.108	-.0267	.2689
		Post Graduate	.01621	.09864	.870	-.1775	.2100
	Bachelor	No University Degree	-.12111	.07527	.108	-.2689	.0267
		Post Graduate	-.10490	.09461	.268	-.2907	.0809
	Post Graduate	No University Degree	-.01621	.09864	.870	-.2100	.1775
		Bachelor	.10490	.09461	.268	-.0809	.2907
SAT. of Musuems	No University Degree	Bachelor	.17354	.10445	.098	-.0319	.3790
		Post Graduate	.21951	.14122	.121	-.0582	.4973
	Bachelor	No University Degree	-.17354	.10445	.098	-.3790	.0319
		Post Graduate	.04598	.13443	.733	-.2184	.3104
	Post Graduate	No University Degree	-.21951	.14122	.121	-.4973	.0582
		Bachelor	-.04598	.13443	.733	-.3104	.2184

*Significant $p < 0.05$

Table 36 and 37 presented the significant different mean satisfaction scores for cultural attractions in Phuket. Tourists with no university degree were satisfied with Chinese temples significantly greater than tourists with a bachelor or post graduate.

Table 37 Different Mean SAT. between Education Group with Cultural Destinations

Dependent Variable	(I) Education level	(J) Education level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
SAT. of Chinese temples	No University Degree	Bachelor	.27647*	.10330	.008*	.0733	.4796
		Post Graduate	.45857*	.13693	.001*	.1893	.7278
	Bachelor	No University Degree	-.27647*	.10330	.008	-.4796	-.0733
		Post Graduate	.18209	.12790	.155	-.0694	.4336
	Post Graduate	No University Degree	-.45857*	.13693	.001*	-.7278	-.1893
		Bachelor	-.18209	.12790	.155	-.4336	.0694
SAT. of Promthep Cape	No University Degree	Bachelor	-.07575	.10080	.453	-.2739	.1224
		Post Graduate	.02725	.13709	.843	-.2422	.2967
	Bachelor	No University Degree	.07575	.10080	.453	-.1224	.2739
		Post Graduate	.10300	.12491	.410	-.1426	.3486
	Post Graduate	No University Degree	-.02725	.13709	.843	-.2967	.2422
		Bachelor	-.10300	.12491	.410	-.3486	.1426
SAT. of Kata-Karon Viewpoint	No University Degree	Bachelor	.11146	.08439	.187	-.0543	.2773
		Post Graduate	.09412	.11259	.404	-.1271	.3153
	Bachelor	No University Degree	-.11146	.08439	.187	-.2773	.0543
		Post Graduate	-.01734	.10572	.870	-.2251	.1904
	Post Graduate	No University Degree	-.09412	.11259	.404	-.3153	.1271
		Bachelor	.01734	.10572	.870	-.1904	.2251

*Significant $p < 0.05$

Table 38 Summary of LSD Post Hoc Test

Variable	Between Groups	Destination						
		Coastal Attractions				Culture Attractions		
		Patong-Kamala Beach	Kata-Karon Beach	Maikhow Beach	Surin-Bangtao Beach	Phuket Old Town	Museums	Chinese Temple
Nationality	THA - CHN	X	X	X	X			
	THA – AUS&NZL		X	X		X		
	THA - OAS		X	X	X	X		
	THA - OEU			X				
	THA - OTH		X					
	CHN- AUS&NZL					X		
	CHN - OEU					X		
	RUS – AUS& NZL					X	X	X
	RUS - OEU			X				
	RUS - OAS			X	X	X		
	OEU – AUS&NZL					X		
	OAS - OEU					X		
	OAS - OTH				X			
Education	No University& Bachelor Degree							X
	No University& Post Graduate	X			X			X
Income (USD)	<24,000/year& = 24,000/year		X			X		

The summary from multiple comparisons by LSD Post Hoc test (Table 38) found the mean satisfaction was statistically different for 7 out of 11 destinations. The findings found there were no mean differences for these following cultural attractions; Buddhist temples (Big Buddha and Chalong temple), Promthep Cape, and Kata-Karon viewpoint. The mean satisfaction of Thai tourists was statistically different from others mostly for coastal attractions. In the point of view of international tourists which were CHN, AUS&NZL, RUS and OEU, their level of satisfaction towards beach destination were no different but significantly different concerning cultural destinations.

The mean difference between tourists with no university degree were statistically different from tourists with a post graduate degree on Surin-Bangtao beach. Whereas the mean difference between (1) no university and bachelor degree, and (2) bachelor degree and post graduate degree were statistically different with Chinese temples. Finally post hoc test found the mean for income groups statistically differed with Kata-Karon beach and Phuket Old Town.

However, the LCD post hoc test would be able to further measure the different mean value between groups. The sign minus between group (I) and group (J) .

Table 39 Summary Comparison Mean Satisfaction Scores between Thai and Others

Nationality (I)	Nationality (J)	Mean Difference (I - J)						
		Coastal Attraction				Cultural Attraction		
		Patong-Kamala Beach	Kata-Karon Beach	MaiKhow Beach	Surin-Bangtao Beach	Phuket Old Town	Museums	Chinese Temple
Thai	Chinese	-0.27736	-0.29252	-0.34748	-0.29492			
Thai	Australian/New Zealander		-0.30157	-0.41988		-0.52213		
Thai	Other Asian		-0.26115	-0.51586	-0.54521	-0.32868		
Thai	Other Europe		-0.11097	-0.44817				
Thai	Others		-0.32126					

The results from Table 39 found Thai had less satisfaction levels towards beach destinations compared to international tourists significantly. Thai also rated less satisfaction for Phuket Old Town than Other European and Others.

The results from Table 40 found there were no significant difference in mean satisfaction among international tourists for coastal attractions, except Russian were less satisfied for Maikhow beach and Surin-Bangtao beach compared to Other European and Others. Tourists from Australia/New Zealand were significantly more satisfied with cultural destinations such as Phuket Old Town, Chinese temples, and Museums when compared to the Russian group.

Table 40 Summary Comparison Mean Satisfaction Scores between International Tourists

Nationality (I)	Nationality (J)	Mean Difference (I - J)						
		Cultural Attraction				Cultural Attraction		
		Patong-Kamala Beach	Kata-Karon Beach	MaiKhow Beach	Surin-Bangtao Beach	Phuket Old Town	Museums	Chinese Temple
Chinese	Australian/New Zealander					-0.32871		
Chinese	Other Europe					0.30938		
Russian	Australian/New Zealander					-0.34392	-0.37013	-0.37013
Russian	Other Europe			-0.3307				
Russian	Other Asian			-0.3984	-0.43775	-0.15046		

4.3.3 Three-way ANOVA

The 3-way ANOVA was used to simultaneously examine more categorical independent variables, which were useful to compare the effect of multiple level of three factors. Based on the results from One-way ANOVA, these following factors would be used to process the three-way ANOVA. There was age, gender, education, and income for the part of socio-demographics as shown in table 35. The remaining variable was first time visitor or not left for trip characteristics analysis therefore it was not necessary to perform a three-way ANOVA. There were only three factors that would be form the object of study. The most three influential factors would be selected to proceed in 3-way ANOVA analysis in order to examine the interaction between them.

Table 41 demonstrated the most three influential variables were either (1) Nationality, Education, and Gender or (2) Nationality, Education, and Income. Based on many previous studies about socio-demographics affecting satisfaction found gender was not statistically significant (Đurđica PEROVIĆ, 2012; Slak Valek et al., 2014; Thongmala Phosikham, 2015; Yusuf Dündar, 2015).

Thus, in this study gender would be dropped out and the three variables would be Nationality, Education, and Income.

Table 41 The significant value (p<0.05) of Socio-demographics Variables from 3-way ANOVA

Independent Variables	Nationality					
	Age	Age	Gender	Gender	Income	Income
	Gender	Education	Education	Income	Age	Education
Dependent Variable	**Interaction Between 3 factors (Sig.)**					
SAT. Patong-Kamala beach (1)	0.107	0.438	0.042*	0.058	0.281	0.076
SAT. Kata-Karon beach (2)	0.304	0.217	0.077	0.099	0.476	0.028*
SAT. Naiyang-Naithon beach (3)	0.272	0.386	0.519	0.442	0.537	0.280
SAT. Maikhow beach (4)	0.011*	0.258	0.167	0.032*	0.026*	0.039*
SAT. Surin-BangTao beach (5)	0.075	0.037*	0.116	0.263	0.041*	0.157
SAT. Phuket Old Town (6)	0.038*	0.086	0.011*	0.004*	0.021	0.030*
SAT. Big buddha-Chalong Temple (7)	0.310	0.067	0.576	0.878	0.859	0.166
SAT. Museums (8)	0.760	0.880	0.294	0.571	0.945	0.580
SAT. Chinese Temple (9)	0.174	0.288	0.015*	0.368	0.723	0.062
SAT. Promthep Cape (10)	0.190	0.144	0.208	0.322	0.077	0.308
SAT. Kata-Karon Viewpoint (11)	0.859	0.270	0.588	0.832	0.539	0.544

*Significant p < 0.05

Three-way ANOVA test was performed in order to obtain the mean satisfaction for these 3 interactions of Nationality, Education, and Income categories. The mean satisfaction from trip characteristics would retrieve from one-way ANOVA test on being the first time visitor or not. Thus, the model would consist of 5 Nationalities, 3 Education levels, and 2 Income levels.

However, testing the variability within the groups were quite important to check how much variance within groups. Variances are a measure of dispersion, or how far the data are scattered from the mean. Larger values represent greater dispersion. To put it simply, if the variance within groups are greater than variance between groups, it means that there are highly different within a group.

The analysis of variance partitions the total variability of the data are from the variability of within group, called the within-groups sum of squares (SS_w), and the variability between the groups, called the between-groups sum of squares (SS_B). The estimate based on the within-groups variability is also known as Mean Square Within (MS_w). The estimate based on the between-group variability is called the between-groups variance estimate and also known as Mean Square Between, (MS_B). Mean squares are estimates of variance across groups. Mean squares are used in analysis of variance and are calculated as a sum of squares divided by its appropriate degrees of freedom. Let N equal the total number of samples in a survey, and K the number of groups. F ratio is a ratio of two variances. F ratio is used to determine whether group means are equal or not.

The first term (MS_w) reflects the difference observed among subjects exposed to the same treatment. It is assumed that within-groups variation of a similar magnitude exits in each of the groups. If the means across groups are close together, this number will be small. Therefore, we can attribute variation within a group to random sampling fluctuation that why MS_w is also referred to as "error" (See Table 42).

The second term (MS_B) has to with the difference among group means. The expected group mean of MS_B could vary due to the random selection process in the formation of the groups. If different treatments that have an effect on the dependent variable are applied to the different groups, the difference among the group means should be high.

Table 42 Definition of Mean Square Between Groups and Within Groups

Mean Square Total is an estimate of total variance against the grand mean (mean of all samples)	$\frac{SS_{total}}{N-1}$
Mean Square Between groups compare the means of groups to the grand mean	$MS_B = \frac{SS_B}{K-1}$
Mean Square Within groups calculate the variance within each individual group (error)	$MS_w = \frac{SS_W}{N-K}$
Mean Square Between and Mean Square Within are used to calculate the **F - ratio**	$F = \frac{(MS_B)}{(MS_w)}$

In this study we want the group means from all 5 Nationalities, 3 Education levels, 2 Income levels, and First time visitor or not that would be the representative value for them. Thus, we expect less variance within groups and high variance between groups. The results from the variability test on Nationalities, Education, Income, and First time visitor or not are shown in Table 43.

Table 43 Variability Test for Model Variables

ANOVA		Nationality		Education		Income		1st Time visitor or Not	
		Mean Square	F	Mean Square	F	Mean Square	F	Mean Square	F
SAT. of Patong-Kamala Beach	Between Groups	1.419	1.408	3.805	3.783	1.578	1.572	0.006	0.006
	Within Groups	1.008		1.006		1.004		1.012	
SAT. of Kata-Karon Beach	Between Groups	1.55	2.186	0.423	0.59	4.214	5.949	6.499	9.174
	Within Groups	0.709		0.717		0.708		0.708	
SAT. of Naiyang_ Naithorn Beach	Between Groups	0.946	1.212	0.998	1.273	0.076	0.098	5.378	6.968
	Within Groups	0.781		0.784		0.774		0.772	
SAT. of Mikhow Beach	Between Groups	1.979	2.621	0.207	0.265	0.046	0.06	3.223	4.196
	Within Groups	0.755		0.78		0.764		0.768	
SAT. of Surin-Bangtao Beach	Between Groups	1.972	2.535	1.697	2.137	0.008	0.011	8.192	10.542
	Within Groups	0.778		0.794		0.758		0.777	
SAT. of Phuket Old Town	Between Groups	2.95	3.286	0.69	0.748	4.425	4.909	0.115	0.125
	Within Groups	0.898		0.923		0.901		0.922	
SAT. of Buddhist Temples	Between Groups	0.745	1.136	0.966	1.47	0.716	1.102	0.718	1.093
	Within Groups	0.656		0.657		0.65		0.657	
SAT. of Musuems	Between Groups	0.481	0.609	1.422	1.809	0.001	0.002	3.45	4.435
	Within Groups	0.791		0.786		0.785		0.778	
SAT. of Chinese temples	Between Groups	0.801	1.029	4.863	6.42	0.479	0.615	4.781	6.228
	Within Groups	0.778		0.758		0.779		0.768	
SAT. of Promthep Cape	Between Groups	0.577	0.734	0.385	0.488	0.378	0.482	2.414	3.098
	Within Groups	0.786		0.788		0.784		0.779	
SAT. of Kata-Karon Viewpoint	Between Groups	0.338	0.474	0.645	0.908	0.391	0.549	5.241	7.49
	Within Groups	0.713		0.711		0.711		0.7	

According to Table 43, the mean square within nationality group had less variance compared to the variance between groups except for satisfaction with Museum and Kata-Karon viewpoint. The mean square within education group had higher variance than between groups with Kata-Karon Viewpoint, Mikhow beach, Phuket Old Town, Promthep Cape, and Kata-Karon Viewpoint. But for some destinations such as Patong-Kamala beach, Naiyang-Naithon beach, Surin-Bangtao beach, Museum, Chinese temples F value between groups had 3.783, 1.273, 2.137, 1.470, 1.809, 6.42 times compare to within groups. The mean squared within income group were higher than between groups with Patong-Kamala beach, Kata-Karon beach,

Phuket Old Town, and Buddhist temples. Finally, the mean square within 1st time visitor or not had less variance than between groups for all destinations except Patong-Kamal beach and Phuket Old Town. Moreover, the F value between groups were about 1.1 times up to 10.542.

Thus, there were variability within the groups for some destinations as we mentioned above but for the overall the F value between groups were mostly greater than within groups for all variables. Therefore, in this optimization model, we will use the mean SAT. value from three-way-ANOVA for socio-demographic factors and the mean SAT. value from one-way ANOVA for trip characteristic factor as shown in Table 44 and 45.

Table 44 The Mean SAT. Scores of 3 interactions between Nationality*Education*Income

Independent Variables			Dependent Variables (SAT. scores by destinations)										
NAT.	EDU.	INC. USD/ month	P-K -B	K-K -B	N-N -B	MK -B	S-B -B	P-T-C	B-T-C	M-S-C	C-T-C	P-C-C	K-V-C
CHN (1)	No University	<2,000	4.1429	4.2639	4.0323	4.0000	4.1290	3.8810	4.4194	4.1000	4.1463	4.1176	4.3265
		=2,000	4.1908	4.2095	4.4082	4.2955	4.2326	4.0870	4.3684	4.2045	4.3590	4.2750	4.4500
	Bachelor	<2,000	4.1724	4.3696	4.0952	4.1967	4.0862	4.1772	4.2469	4.0702	3.9833	4.4198	4.3425
		=2,000	3.8636	4.1772	4.0761	4.0921	4.0000	3.9091	4.1942	4.0857	3.9275	4.2078	4.1961
	Post Graduate	<2,000	3.8235	4.6875	4.3333	4.8000	4.2000	3.8333	4.8889	4.6667	5.0000	4.7778	4.8571
		=2,000	3.8632	4.0986	4.1370	4.0270	3.8889	3.7857	4.2500	4.0000	3.6486	4.1250	4.2955
AUS & NZL (2)	No University	<2,000	3.9836	4.2593	4.2308	4.0833	4.0000	4.1563	4.3182	4.2273	4.2273	4.0690	4.3158
		=2,000	4.1908	4.2095	4.4082	4.2955	4.2326	4.0870	4.3684	4.2045	4.3590	4.2750	4.4500
	Bachelor	<2,000	4.0938	4.6957	4.5714	4.5714	4.4286	4.5909	4.7500	4.3846	4.3750	4.7333	4.6364
		=2,000	3.8636	4.1772	4.0761	4.0921	4.0000	3.9091	4.1942	4.0857	3.9275	4.2078	4.1961
	Post Graduate	<2,000	4.0000	4.2500	4.1111	4.1429	4.0000	4.6667	4.2000	3.6000	3.8333	4.2000	4.1429
		=2,000	3.8632	4.0986	4.1370	4.0270	3.8889	3.7857	4.2500	4.0000	3.6486	4.1250	4.2955
RUS (3)	No University	<2,000	4.0000	4.5714	4.1333	4.1429	4.2000	4.2778	4.2500	4.4667	4.0769	4.4615	4.5625
		=2,000	4.1908	4.2095	4.4082	4.2955	4.2326	4.0870	4.3684	4.2045	4.3590	4.2750	4.4500
	Bachelor	<2,000	4.0306	4.2530	3.9773	3.8947	3.8095	3.9655	4.1967	3.8438	3.8286	4.0784	4.2222
		=2,000	3.8636	4.1772	4.0761	4.0921	4.0000	3.9091	4.1942	4.0857	3.9275	4.2078	4.1961
	Post Graduate	<2,000	3.8542	4.0789	4.2632	3.8125	3.8667	4.0000	4.3529	3.9333	3.6429	3.9444	4.1923
		=2,000	3.8632	4.0986	4.1370	4.0270	3.8889	3.7857	4.2500	4.0000	3.6486	4.1250	4.2955
THA (4)	No University	<2,000	4.0586	4.3061	4.1250	4.0625	4.1014	4.0543	4.3571	4.2078	4.1579	4.1579	4.3592
		=2,000	3.9412	3.8684	4.2500	3.8235	3.7647	3.9286	4.1724	4.0000	4.2143	4.0526	4.2727
	Bachelor	<2,000	4.1057	4.3586	4.1074	4.1416	4.0263	4.1572	4.2901	4.0392	3.9910	4.3333	4.3423
		=2,000	3.8684	4.1846	4.0541	3.9643	3.9000	3.8718	4.3333	3.9286	4.0000	4.2500	4.3721
	Post Graduate	<2,000	3.0000	4.5000	4.2258	4.0714	3.9600	4.0000	4.3333	3.9565	5.0000	5.0000	5.0000
		=2,000	3.7586	4.0000	3.5833	3.5000	3.6364	3.7059	4.2000	3.9091	3.5455	4.2000	4.3889
OAS (5)	No University	<2,000	4.0586	4.3061	4.1250	4.0625	4.1014	4.0543	4.3571	4.2078	4.1579	4.1579	4.3592
		=2,000	4.5714	4.6000	4.5556	4.7059	4.7857	4.6111	4.6522	4.4667	4.6000	4.5455	4.5789
	Bachelor	<2,000	4.0586	4.3061	4.2258	4.1416	4.0263	4.1572	4.2901	4.0392	3.9910	4.3333	4.3423
		=2,000	3.8667	4.1739	4.1111	4.1429	4.1250	4.0588	4.1071	4.0455	3.8750	4.2500	4.1379
	Post Graduate	<2,000	3.8395	4.2647	4.2258	4.0714	3.9600	4.0755	4.4107	3.9565	3.9167	4.2424	4.3171
		=2,000	3.8889	4.2143	4.1000	4.1111	4.2857	3.9167	4.5455	4.1250	3.8889	4.1111	4.3750
OEU (6)	No University	<2,000	4.0586	4.3061	4.1250	4.0625	4.1014	4.0543	4.3571	4.2078	4.1579	4.1579	4.3592
		=2,000	4.1111	4.2000	4.3333	4.3750	4.1111	3.8333	4.3158	4.1111	4.4545	4.3750	4.5714
	Bachelor	<2,000	4.1057	4.3586	4.1074	4.1416	4.0263	4.1572	4.2901	4.0392	3.9910	4.3333	4.3423
		=2,000	3.8824	4.1667	4.2273	4.1905	4.0476	3.6897	4.0870	4.3333	4.0000	4.1333	3.9583
	Post Graduate	<2,000	3.8395	4.2647	4.2258	4.0714	3.9600	4.0755	4.4107	3.9565	3.9167	4.2424	4.3171
		=2,000	3.8378	4.1154	4.2941	4.3333	3.8750	3.7391	4.1875	4.0714	3.6000	4.1667	4.2000
OTH (7)	No University	<2,000	4.0586	4.3061	4.1250	4.0625	4.1014	4.0543	4.3571	4.2078	4.1579	4.1579	4.3592
		=2,000	4.4444	4.4286	5.0000	4.5000	4.6667	4.0000	4.4000	4.3333	4.0000	4.5000	4.4000
	Bachelor	<2,000	4.1057	4.3586	4.1074	4.1416	4.0263	4.1572	4.2901	4.0392	3.9910	4.3333	4.3423
		=2,000	3.7273	4.1818	3.5000	4.1667	3.7500	4.2500	4.0000	4.4000	3.5000	4.0000	4.1667
	Post Graduate	<2,000	3.8395	4.2647	4.2258	4.0714	3.9600	4.0755	4.4107	3.9565	3.9167	4.2424	4.3171
		=2,000	4.1818	4.2000	4.6667	5.0000	4.0000	4.0000	3.5000	3.0000	3.5000	3.0000	4.0000

Table 45 The Mean SAT. Scores of Nationality*First Time Visitor

Independent Variables		Dependent Variables (SAT. scores by destinations)										
NAT	Is this your 1st time visitor?	P-K-B	K-K-B	N-N-B	MK-B	S-B-B	P-T-C	B-T-C	M-S-C	C-T-C	P-C-C	K-V-C
CHN	Yes	4.1370	4.4359	4.1724	4.2860	4.2542	4.0723	4.4021	4.1846	4.1765	4.4342	4.4444
	No	4.1231	4.2031	3.9500	4.0000	3.8611	4.0196	4.2679	3.9444	3.8919	4.2449	4.2245
AUS& NZL	Yes	3.9750	4.4000	4.4412	4.2500	4.1724	4.2927	4.4655	4.0833	4.1724	4.3333	4.4490
	No	4.1852	4.2381	4.0625	4.2310	4.0769	4.5455	4.2941	4.3529	4.3333	4.2105	4.3158
RUS	Yes	3.9914	4.3580	4.1304	3.9140	4.0488	4.0500	4.2540	4.0588	3.9167	4.1000	4.3922
	No	3.9688	4.1290	4.0303	3.9710	3.7500	4.0208	4.2642	4.0000	3.7778	4.1395	4.1522
THA	Yes	3.8384	4.0843	4.0769	3.9090	3.9333	3.7917	4.1607	3.9333	4.1212	4.2162	4.5000
	No	3.8833	4.0208	3.9667	3.7080	3.6786	3.9459	4.4167	3.9615	3.7368	4.1600	4.1471
OAS	Yes	4.1304	4.4200	4.4138	4.4670	4.3913	4.3250	4.4615	4.3929	4.1600	4.4444	4.3429
	No	4.0227	4.2000	4.0769	4.1180	4.3182	3.9583	4.2609	3.8824	3.8889	4.0588	4.2857
OEU	Yes	3.9286	4.2889	4.4400	4.3000	4.2105	3.7692	4.3077	4.5882	4.2105	4.3077	4.1429
	No	3.9636	4.0625	4.0870	4.2500	3.8519	3.7097	4.0938	3.8571	3.7727	4.1364	4.2188
OTH	Yes	4.0000	4.3889	4.0000	4.4000	4.0000	3.9286	4.0000	4.4286	3.7778	4.3000	4.5000
	No	3.8750	4.3750	3.5000	3.5710	3.1667	4.1111	4.1111	4.0000	3.8333	3.6667	4.1667

These two Tables above were the input for the optimization model which consisted of two terms from socio-demographics and trip characteristics.

4.4 Personalized Optimization Model and Applications

Set:

S : Set of Tourist Profile's Satisfaction Scores

T : Set of Trip Characteristic's Satisfaction Scores

L : Set of Location

L_1 : Set of coastal tourist location

L_2 : Set of culture tourist location

C_1 : Set of selected location preference for coastal tourism

C_2 : Set of selected location preference for cultural tourism

Parameters:

S_l : Tourist Profile's Satisfaction scores by destination l on specific of Nationality, Education, and Income.

T_l : Trip Characteristic's Satisfaction scores by destination l on specific of Nationality and being either first time visitor or repeat visitor.

Variables:

$x_l \in (0,1)$ $x_l = 1$, if the tourist profile with the specific nationality, education, and income selects to visit location l otherwise is equal to zero.

Formulation

$$Max\ z = \sum_{l \in L} (S_l x_l + T_l x_l) \quad (1)$$

Subject to:

$$\sum_{l \in L_1} X_l \leq C_1 \qquad \forall_l \in L_1 \quad (2)$$

$$\sum_{l \in L_2} X_l \leq C_2 \qquad \forall_l \in L_2 \quad (3)$$

$$\sum_{l \in 1}^{L} X_l \leq 11 \qquad \forall_l \in L \quad (4)$$

$$X_l \in \{0,1\} \qquad \forall_l \in L \quad (5)$$

The objective is to maximize tourist satisfaction by their tourist profile and trip characteristics. The constraints will be the limitation of attraction's type. There are five coastal tourist attractions and six cultural tourist attractions.

4.4.1 Database for developing Personalized Tourist Route Optimization

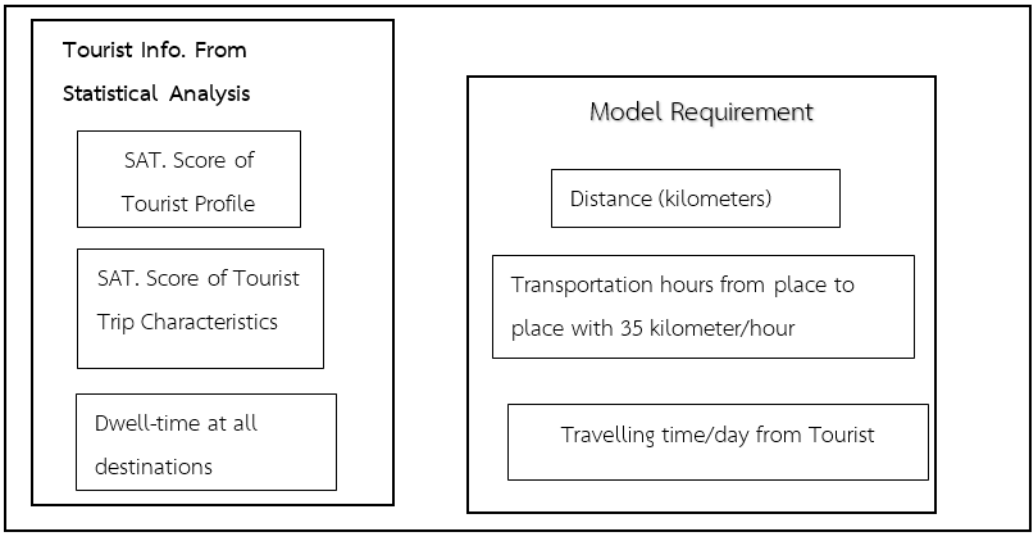

Figure 5 Model Requirement

Figure 5 showed all the data requirements that the model needs in order to develop "Personalized Tourist Route Optimization" There were two parts. The first one is input from data analysis. Those were satisfaction scores from Table 22, 44 and 45. The second part was from the fact such as distance table and Transportation time as showed in Table 46 and 47.

Table 46 Distance from Destination to Destination (Kilometers)

Distance (kilometre)

		Location	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
			P-K-B	K-K-B	N-N-B	MK-B	S-B-B	P-T-C	B-T-C	M-S-C	C-T-C	P-C-C	K-V-C
Location													
S1	P-K-B		0	10	40	41	13	16	19	38	14.1	26	14
S2	K-K-B		10	0	12	49	24	17	10.1	46	16	11	4
S3	N-N-B		40	12	0	54	25.1	32	38	29	33	54	50
S4	MK-B		41	49	54	0	33	35	42	31	37	58	53
S5	S-B-B		13	24	25.1	33	0	26	30	27.1	25	37	27
S6	P-T-C		16	17	32	35	26	0	9.1	30	2	19.1	18
S7	B-T-C		19	10.1	38	42	30	9.1	0	35	9	12	11
S8	M-S-C		38	46	29	31	27.1	30	35	0	14	31	33
S9	C-T-C		14.1	16	33	37	25	2	9	14	0	19	18.1
S10	P-C-C		26	11	54	58	37	19.1	12	31	19	0	7
S11	K-V-C		14	4	50	53	27	18	11	33	18.1	7	0

Table 47 Transportation Time (hour) on speed 35 kilometer/hour

Transport (hour) on speed 35 kilometre/hour

35	km/hr	Location	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
			P-K-B	K-K-B	N-N-B	MK-B	S-B-B	P-T-C	B-T-C	M-S-C	C-T-C	P-C-C	K-V-C
Location													
S1	P-K-B			0.29	1.14	1.17	0.37	0.46	0.54	1.09	0.40	0.74	0.40
S2	K-K-B		0.29		0.34	1.40	0.69	0.49	0.29	1.31	0.46	0.31	0.11
S3	N-N-B		1.14	0.34		1.54	0.72	0.91	1.09	0.83	0.94	1.54	1.43
S4	MK-B		1.17	1.40	1.54		0.94	1.00	1.20	0.89	1.06	1.66	1.51
S5	S-B-B		0.37	0.69	0.72	0.94		0.74	0.86	0.77	0.71	1.06	0.77
S6	P-T-C		0.46	0.49	0.91	1.00	0.74		0.26	0.86	0.06	0.55	0.51
S7	B-T-C		0.54	0.29	1.09	1.20	0.86	0.26		1.00	0.26	0.34	0.31
S8	M-S-C		1.09	1.31	0.83	0.89	0.77	0.86	1.00		0.40	0.89	0.94
S9	C-T-C		0.40	0.46	0.94	1.06	0.71	0.06	0.26	0.40		0.54	0.52
S10	P-C-C		0.74	0.31	1.54	1.66	1.06	0.55	0.34	0.89	0.54		0.20
S11	K-V-C		0.40	0.11	1.43	1.51	0.77	0.51	0.31	0.94	0.52	0.20	

4.4.2 Application Diagram

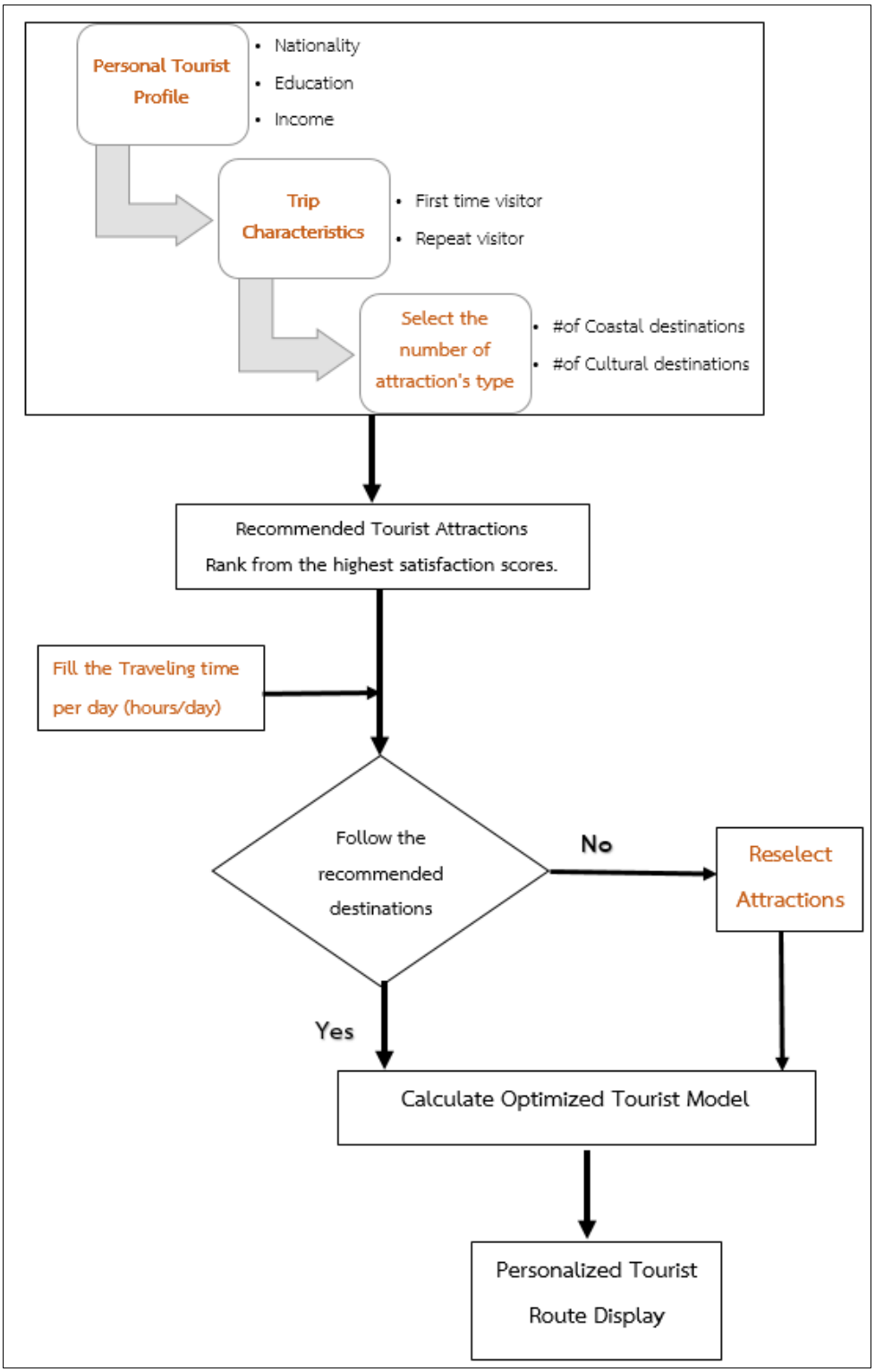

Figure 6 Application Diagram

The application consisted of three parts. The first part asked 6 questions as shown in figure 8.

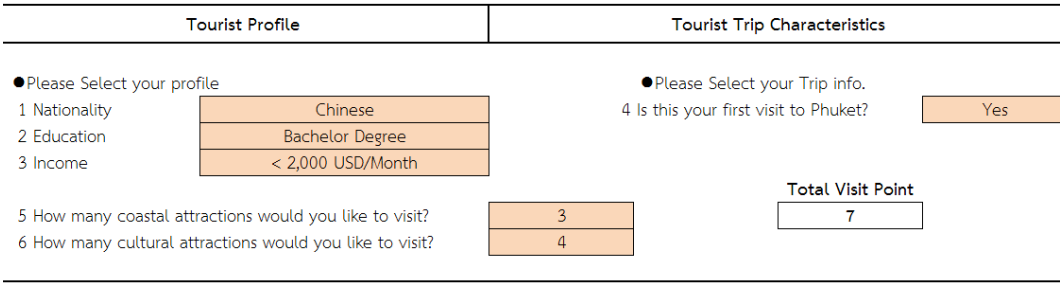

Figure 7 Tourist Profile Selection

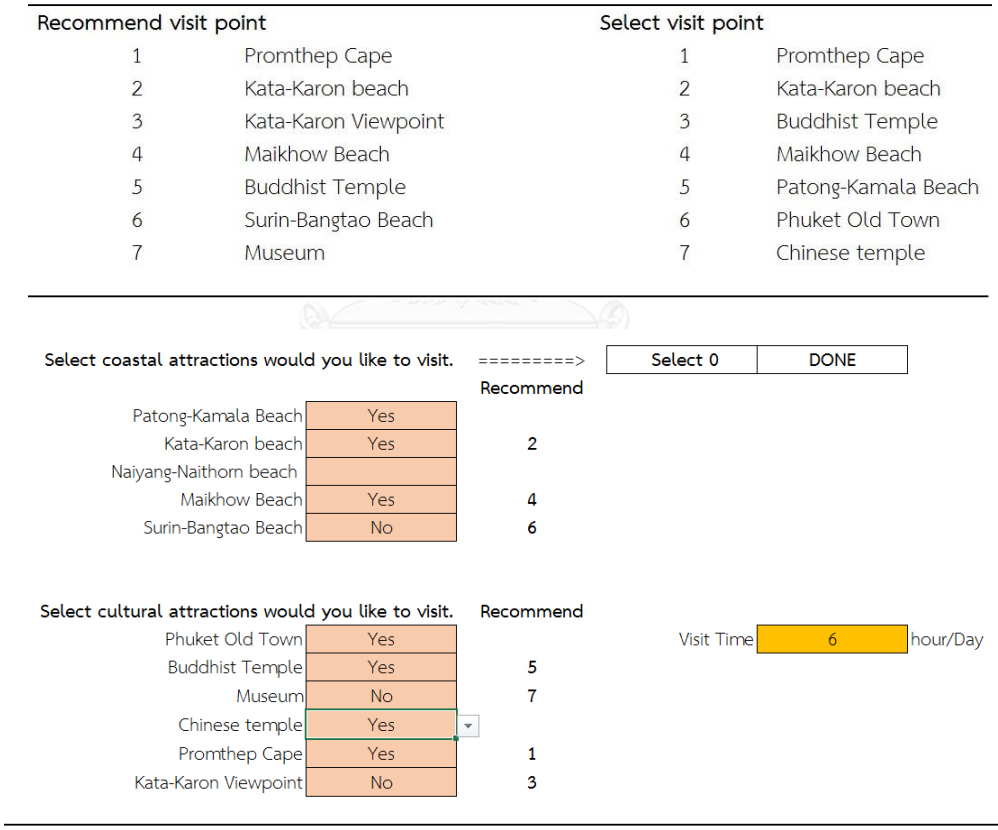

Figure 8 Recommended Destinations

Figure 9 will demonstrate the recommended tourist attractions from the highest scores to the lowest one. Tourist must fill the traveling time/day for this

part. However, in this stage if users don't want to follow the model, they can change the destinations. The new tourist attractions will show next to recommended one.

Finally, the model will generate the personalized tourist trip and be displayed in the third part as the daily recommended trip as shown in figure 10.

Recommend			7 Point	Select			7 Point
DAY1			6 hour/day	DAY1			6 hour/day
START	To			START	To		
8:00	9:18	1	Promthep Cape	8:00	9:18	1	Promthep Cape
9:18	10:48	2	Kata-Karon Viewpoint	9:18	-	2	
10:48	-	3		-	-	3	
-	-	4		-	-	4	
		5				5	
DAY2			6 hour/day	DAY2			6 hour/day
START	To			START	To		
8:00	12:30	1	Kata-Karon beach	8:00	12:30	1	Kata-Karon beach
12:30	13:31	2	Buddhist Temple	12:30	13:31	2	Buddhist Temple
13:31	-	3		13:31	-	3	
-	-	4		-	-	4	
-	-	5		-	-	5	
DAY3			6 hour/day	DAY3			6 hour/day
START	To			START	To		
8:00	12:30	1	Surin-Bangtao Beach	8:00	8:44	1	Chinese temple
12:30	-	2		8:44	12:19	2	Phuket Old Town
-	-	3		12:19	-	3	
-	-	4		-	-	4	
-	-	5		-	-	5	
DAY4			6 hour/day	DAY4			6 hour/day
START	To			START	To		
8:00	10:24	1	Museum	8:00	12:30	1	Patong-Kamala Beach
10:24	-	2		12:30	-	2	
-	-	3		-	-	3	
-	-	4		-	-	4	
-	-	5		-	-	5	
DAY5			6 hour/day	DAY5			6 hour/day
START	To			START	To		
8:00	12:30	1	Maikhow Beach	8:00	12:30	1	Maikhow Beach
12:30	-	2		12:30	-	2	
-	-	3		-	-	3	
-	-	4		-	-	4	
-	-	5		-	-	5	

Figure 9 Personalized Tourist Recommendation Trip

4.4.3 Model's Satisfaction Validation

This model was provided to 2 local travel agents, 3 taxi drivers, and 15 tourists to rate the validity of the trip itinerary and model's satisfaction for tourists. The trips formulated in the model were feasible in respect to time and travel, and associated with the preferences of major tourist groups. For example, Chinese preferred to travel near shopping areas where mostly are located in town. Russians preferred to travel to less crowded beaches.

Tourists were asked to rate the model's satisfaction (1) at the hotel on the check-out date and (2) in the car on the way to drop off at airport. The fifteen tourist's nationalities were Thai, Chinese, Australian, and Finnish. The overall rating scores were 4.06 out of 5.

In summary, this model can arrange a personalized tourist trip based on a given profile and maximize satisfaction. This tool would help tourists to manage and plan their trip effectively that will create potential repeat visitors and generate excellent word of mouth for Phuket.

CHAPTER V

CONCLUSION

The purpose of this research is to develop the optimal model for personalized tourist trip. The personalized tourist route model will use information from tourist profiles and trip characteristics that statistically affect tourist satisfaction. The area of study is five coastal and six culture destinations in Phuket, Thailand.

The following showed how tourists rated their satisfaction levels towards all destinations in Phuket. Tourists from Australian and New Zealanders were satisfied with all destinations higher than the others. Most tourists rated the higher scores to the less crowded and more natural beaches rather than the busy beach like Patong-Kamala. Most tourists were highly satisfied with cultural sites such as Chinese and Buddhist temples.

This research showed how analysis of variance (one-way ANOVA) was applied to examine the socio-demographics, and trip characteristics factors with overall satisfaction. The findings will identify the effect of socio-demographics to focus on distinctiveness of place that satisfy the tourist's profile.

The findings showed there were no significant differences among groups of nationality with most well-known destinations such as Patong-Kamala beach, Kata-Karon Viewpoint, and Promthep Cape. But they were significant different for visiting Museum, Phuket Old Town, and some certain beach like Mikhow beach, and Surin-Bangtao beach. Education was significantly correlated with the tourist satisfaction scores with crowded beaches like Patong-Kamala beach. The trip characteristic factors found the first time or repeat traveler had no difference with Patong-Kamala beach and local culture such as Phuket Old Town, Promthep cape and Thai Temples.

The model of this study aims to maximize tourist satisfaction from the interaction between Nationality, Education, and Income that significantly affects tourist satisfaction. The results reveal first time Chinese tourists who had income less than USD2,000/month, with bachelor degree or under would be satisfied with the cultural or urban destinations. But repeat Chinese tourists would be satisfied more with beaches.

Repeat Australian and New Zealanders tourists who had income less than USD2,000/month, with bachelor degree or under would be highly satisfied with historical sites such as a museum or Chinese and Thai temples.

First time or repeat visitors from Russia who had income less than USD2,000/month, with any degree of education would be satisfied with cultural sites, visiting museums and prefer isolated beaches.

Thai tourists who had income less than USD2,000/month, with bachelor degree or under are highly satisfied with a natural, uncrowded beach and some interest in cultural tourist attractions. Moreover, the model discovered the top 3 destinations that all tourists are highly satisfied with are Kata-Karon beach, Promthep Cape, and Kata-Karon Viewpoint.

In summary, an exploration of tourist socio-demographics is relevant for understanding both the demand and supply side of tourism. The model will be an initial tool to guide tourists in order to plan or make their decision prior to the trip. It will be essential in helping tourism decision makers and businesses to comprehensively manage and market their locations appropriately.

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APPENDICE

Appendix A Questionnaire

Part 1: General Information

1. Approximately, including this trip how many **international** trips in total did you have in the last five years? ……..trip (s)
2. Is this your first visit to Thailand?

   ❑ Yes, this is my first time. ❑ No. Number of time (s)……..
3. Is this your first visit to Phuket?

   ❑ Yes, this is my first time. ❑ No. Number of time (s)……..
4. On this trip, how long did you stay in Phuket? …….. day (s)
5. What is your nationality? .....
6. What was the main purpose of your current visit to Phuket? (Mark all that applies)

   ❑ Holiday/Leisure
   ❑Meeting/Seminar/Business/Professional
   ❑ Visit friends and relatives
   ❑ Pre-wedding/Wedding/Honeymoon
   ❑ Education (Study/Teaching)
   ❑ Health treatment
   ❑ Others (please specify) ……
7. How did you travel to Phuket?

   ❑ By plane
   (Name of airline.....)
   ❑ By own car
   ❑ By bus
   ❑ By cruise/ship
   ❑ Others (please specify.....)
8. How did you arrange your trip to Phuket?

   ❑ Own arrangement
   ❑ Tour Package
   ❑ Others (please specify.....)
9. How did you obtain the information used to plan this trip to Phuket? (Mark all that applies)

   ❑ Family and friends
   ❑ Travel agent
   ❑ Newspapers
   ❑ Television
   ❑ Past experience at Phuket
   ❑ Magazine
   ❑ Facebook
   ❑ Twitter
   ❑ YouTube
   ❑ Instagram
   ❑ Travel blog
   ❑ TripAdvisor
   ❑ On-line travel agent
   (please specify .....)
   ❑ Others
   (please specify .....)
10. With whom are you travelling?

    ❑ Spouse
    ❑ Family/relatives
    ❑ Business associates
    ❑ Friends
    ❑ Tour group
    ❑ Travelling alone (**Go to Question 12**)

11. Altogether, how many adults/or children are in your travel party? (Including yourself)

Number of adults: …… Number of children (aged below 12 years old): ……

12. What types of transportation did you use when you were in Phuket? (Mark all that applies)

- ❑ Car/motorbike rental
- ❑ Public transportation (Tuk Tuk or taxi)
- ❑ Bus provided by tour companies
- ❑ Own vehicle
- ❑ Others (please specify .....)

13. Where did you stay during your visit? (Mark all that applies)

- ❑ Hotel/resort/location ……..……..……..
- ❑ Hostel/serviced apartment (name of the hostel/serviced apartment) ……
- ❑ Staying with friends and relatives
- ❑ Others (please specify) ……..……..

14. What were your highlights of this current visit to Phuket? (Mark all that applies)

- ❑ Tourist attractions (please specify) ……..……..……..
- ❑ Local food and seafood
- ❑ Friendly local people
- ❑ Accommodation
- ❑ Affordability/value for money
- ❑ Heritage/art/culture
- ❑ Outdoor/adventurous/beach activities
- ❑ Sightseeing
- ❑ Spa, wellness and health treatment
- ❑ Shopping
- ❑ Others (please specify) ……

15. Which of the following leisure activities did you do during this trip? If tick, also indicate approximate time you spent in each attraction. (Mark all that applies)

❑	Visiting amusement/theme parks	.....hour(s) per visit
❑	Going to beaches	.....hour(s) per visit
❑	Sunbathing	.....hour(s) per visit
❑	Scuba diving/diving/water sports	.....hour(s) per visit
❑	Dining at local restaurants/Trying local food	.....hour(s) per visit
❑	Elephant trekking	.....hour(s) per visit
❑	Golfing	.....hour(s) per visit
❑	Going on a guided day trip to nearby islands	.....hour(s) per visit
❑	Visiting entertainment/pubs	.....hour(s) per visit

❑	Shopping at department stores	.....hour(s) per visit
❑	Shopping at souvenir shops	.....hour(s) per visit
❑	Sightseeing in Phuket downtown	.....hour(s) per visit
❑	Spa/massage	.....hour(s) per visit
❑	Visiting forest/parks	.....hour(s) per visit
❑	Visiting museums	.....hour(s) per visit
❑	Visiting cultural, historical and art attractions	.....hour(s) per visit
❑	Visiting temples	.....hour(s) per visit
❑	Others (please specify) ……	.....hour(s) per visit

Part 2: Expectation and Satisfaction of Phuket

16. Listed below are the main tourist attractions in Phuket. Rate the level of preference you felt with them before your trip to Phuket, and also indicate your satisfaction about these tourist attractions (The lowest level is 1 while the highest level is 5).

Tourist Attractions	Level of your preference before the trip						Your Satisfaction after the trip					
Patong-Kamala beach	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Kata-Karon beach	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Naiyang-Naithorn beach	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Mikhow beach	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Surin-BangTao beach	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Phuket Old Town	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Big Buddha or Chalong temple	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Museums	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Chinese temples	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Promthep Cape	1	2	3	4	5	N/A	1	2	3	4	5	N/A
Kata-Karon viewpoint	1	2	3	4	5	N/A	1	2	3	4	5	N/A

17. Please indicate the level of agreement concerning the following statements.

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am willing to recommend my family and friends to visit Phuket for their holiday.	1	2	3	4	5
I plan to return to Phuket again in the near future.	1	2	3	4	5
I plan to travel to Thailand again for my next holiday.	1	2	3	4	5
Overall, Phuket offers me everything I want for my holiday.	1	2	3	4	5

Part 3: Personal information

18. Gender
❑ Female ❑ Male

19. Age
❑ 18-24 ❑ 25-34 ❑ 35-44
❑ 45-54 ❑ 55-64 ❑ 65 or above

20. Education level
❑ Up to secondary school
❑ Diploma
❑ Bachelor degree
❑ Master degree
❑ Doctoral degree

21. Occupation
❑ Business owner
❑ Government
❑ Housewife
❑ Managerial/ Administrative
❑ Professional/Technician
❑ Retiree
❑ Self-employed
❑ Student
❑ Others (please specify) ……

22. Marital status
❑ Single
❑ Married
❑ In relationship
❑ Separated
❑ Widowed
❑ Others (please specify) ……

23. Monthly income (USD)
❑ Below 1,000
❑ 1,000-1,999
❑ 2,000-2,999
❑ 3,000-3,999
❑ 4,000-4,999
❑ 5,000-5,999
❑ 6,000-6,999
❑ 7,000 or Higher

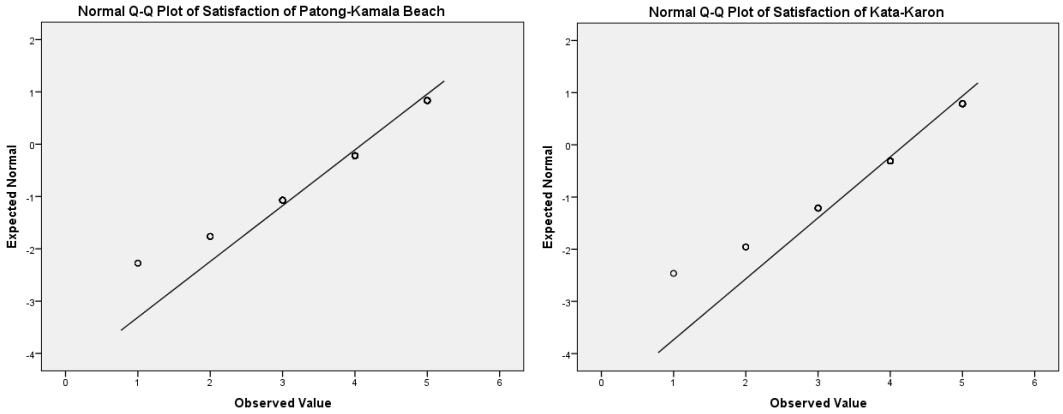
24. Other suggestions/comments

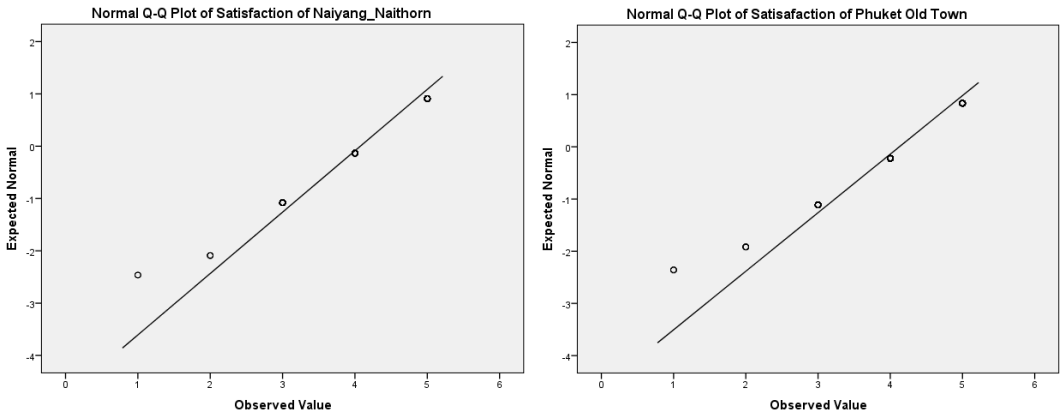
……

☺ **Thank you very much for your kind co-operations**

Appendix B Normality Test by Q-Q Plots

Figure Graph Normal Q-Q Plot of Satisfaction with 11 Attractions





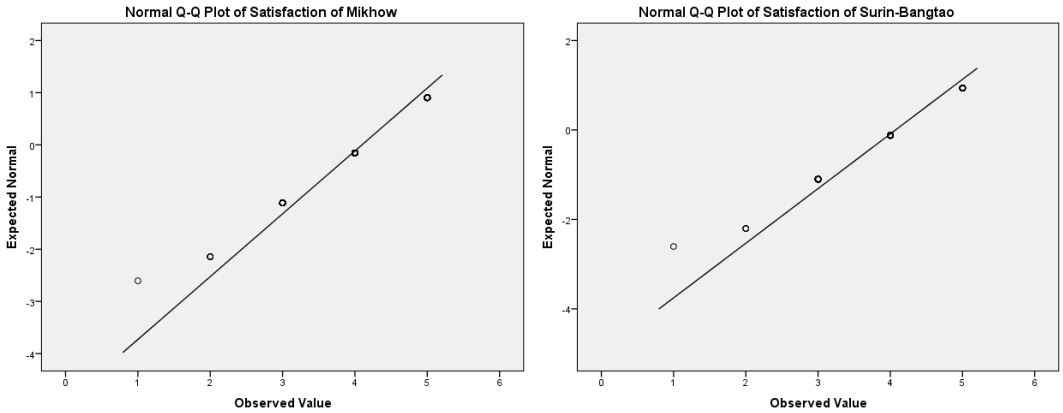
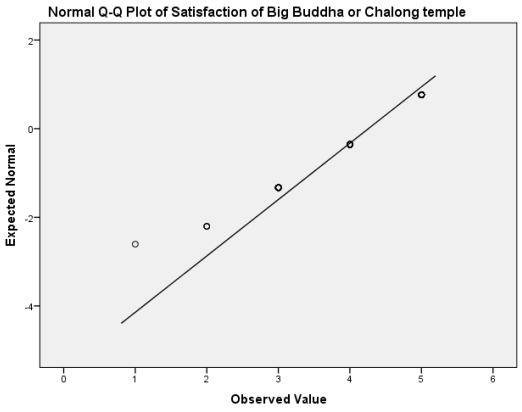
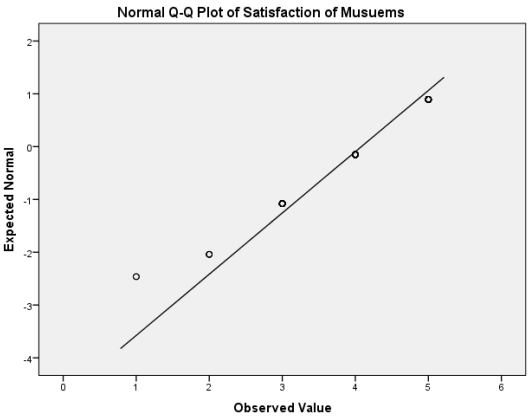
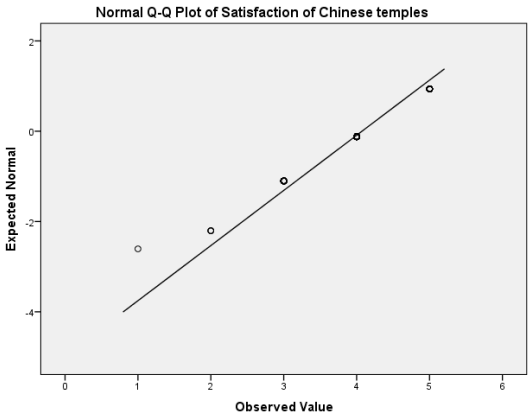
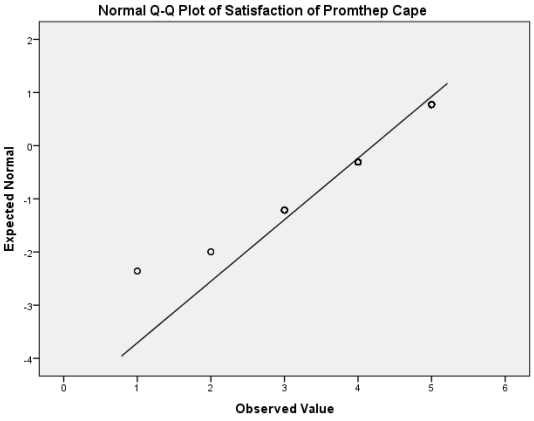


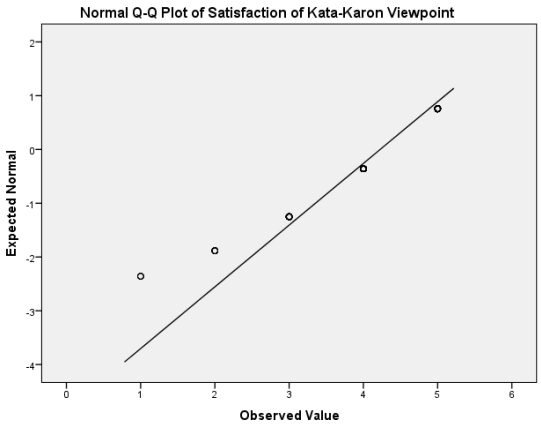
Figure (Continue) Graph Normal Q-Q Plot of Satisfaction with 11 Attractions











Appendix C Normality Test by Skewness and Kurtosis

Test Normality by Skewness and Kurtosis

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Satisfaction of Patong-Kamala Beach	935	4.0064	1.00532	-.963	.080	.568	.160
Satisfaction of Kata-Karon	763	4.2621	.84615	-1.153	.089	1.297	.177
Satisfaction of Naiyang_Naithorn	412	4.1408	.88490	-.956	.120	.796	.240
Satisfaction of Mikhow	367	4.1090	.88033	-.770	.127	.208	.254
Satisfaction of Surin-Bangtao	372	4.0269	.89282	-.670	.126	.035	.252
Satisafaction of Phuket Old Town	547	4.0311	.95931	-.862	.104	.341	.209
Satisfaction of Big Buddha or Chalong temple	577	4.3050	.81043	-1.102	.102	1.045	.203
Satisfaction of Musuems	358	4.1006	.88622	-.805	.129	.406	.257
Satisfaction of Chinese temples	363	4.0165	.88246	-.711	.128	.334	.255
Satisfaction of Promthep Cape	411	4.2506	.88509	-1.212	.120	1.447	.240
Satisfaction of Kata-Karon Viewpoint	506	4.3300	.84183	-1.385	.109	2.112	.217
Nationality	1221	.2391	.42674	1.225	.070	-.501	.140
Gender	1220	1.4426	.49690	.231	.070	-1.950	.140
Age	1221	2.4169	1.02061	.237	.070	-1.063	.140
Education levels	1214	1.8583	.72843	.224	.070	-1.096	.140
Income Levels	1199	1.4520	.49790	.193	.071	-1.966	.141
First time/repeat visitors	1221	1.3423	.47469	.665	.070	-1.560	.140
Length of Stay	1219	1.6497	.48068	-.584	.070	-1.540	.140

Appendix D Variability Test

Table Variability test for Group of Nationality by Destination

ANOVA							
Destination's Type			Sum of Squares	df	Mean Square	F	Sig.
Coastal Destination	Satisfaction of Patong-Kamala Beach	Between Groups	8.515	6	1.419	1.408	0.208
		Within Groups	935.446	928	1.008		
		Total	943.961	934			
	Satisfaction of Kata-Karon	Between Groups	9.302	6	1.55	2.186	0.042
		Within Groups	536.273	756	0.709		
		Total	545.575	762			
	Satisfaction of Naiyang_Naithorn	Between Groups	5.678	6	0.946	1.212	0.299
		Within Groups	316.157	405	0.781		
		Total	321.835	411			
	Satisfaction of Mikhow	Between Groups	11.871	6	1.979	2.621	0.017
		Within Groups	271.769	360	0.755		
		Total	283.64	366			
	Satisfaction of Surin-Bangtao	Between Groups	11.832	6	1.972	2.535	0.02
		Within Groups	283.899	365	0.778		
		Total	295.731	371			
Cultural Destination	Satisafaction of Phuket Old Town	Between Groups	17.701	6	2.95	3.286	0.003
		Within Groups	484.771	540	0.898		
		Total	502.472	546			
	Satisfaction of Big Buddha or Chalong temple	Between Groups	4.471	6	0.745	1.136	0.34
		Within Groups	373.844	570	0.656		
		Total	378.315	576			
	Satisfaction of Musuems	Between Groups	2.888	6	0.481	0.609	0.723
		Within Groups	277.492	351	0.791		
		Total	280.38	357			
	Satisfaction of Chinese temples	Between Groups	4.805	6	0.801	1.029	0.406
		Within Groups	277.095	356	0.778		
		Total	281.901	362			
	Satisfaction of Promthep Cape	Between Groups	3.463	6	0.577	0.734	0.622
		Within Groups	317.724	404	0.786		
		Total	321.187	410			
	Satisfaction of Kata-Karon Viewpoint	Between Groups	2.03	6	0.338	0.474	0.828
		Within Groups	355.854	499	0.713		
		Total	357.883	505			

Table Variability test for Group of Education by Destination

ANOVA							
Destination's Type			Sum of Squares	df	Mean Square	F	Sig.
Coastal Destination	SAT. of Patong-Kamala	Between Groups	7.61	2	3.805	3.783	0.023
		Within Groups	933.381	928	1.006		
		Total	940.99	930			
	SAT. of Kata-Karon	Between Groups	0.846	2	0.423	0.59	0.555
		Within Groups	541.434	755	0.717		
		Total	542.28	757			
	SAT. of Naiyang_Naithorn	Between Groups	1.997	2	0.998	1.273	0.281
		Within Groups	318.336	406	0.784		
		Total	320.333	408			
	SAT. of Mikhow	Between Groups	0.414	2	0.207	0.265	0.767
		Within Groups	282.419	362	0.78		
		Total	282.833	364			
	SAT. of Surin-Bangtao	Between Groups	3.394	2	1.697	2.137	0.119
		Within Groups	291.387	367	0.794		
		Total	294.781	369			
Cultural Destination	Satisafaction of Phuket Old Town	Between Groups	1.38	2	0.69	0.748	0.474
		Within Groups	500.15	542	0.923		
		Total	501.53	544			
	SAT. of Big Buddha or Chalong temple	Between Groups	1.933	2	0.966	1.47	0.231
		Within Groups	375.322	571	0.657		
		Total	377.254	573			
	SAT. of Musuems	Between Groups	2.844	2	1.422	1.809	0.165
		Within Groups	276.705	352	0.786		
		Total	279.549	354			
	SAT. of Chinese temples	Between Groups	9.726	2	4.863	6.42	0.002
		Within Groups	271.205	358	0.758		
		Total	280.931	360			
	SAT. of Promthep Cape	Between Groups	0.769	2	0.385	0.488	0.614
		Within Groups	319.793	406	0.788		
		Total	320.562	408			
	SAT. of Kata-Karon Viewpoint	Between Groups	1.291	2	0.645	0.908	0.404
		Within Groups	355.584	500	0.711		
		Total	356.875	502			

Table **Variability test for Group of Income by Destination**

IANOVA							
Destination's Type			Sum of Squares	df	Mean Square	F	Sig.
Coastal Destination	Satisfaction of Patong-Kamala Beach	Between Groups	1.578	1	1.578	1.572	0.21
		Within Groups	927.291	924	1.004		
		Total	928.869	925			
	Satisfaction of Kata-Karon	Between Groups	4.214	1	4.214	5.949	0.015
		Within Groups	531.253	750	0.708		
		Total	535.467	751			
	Satisfaction of Naiyang_Naithorn	Between Groups	0.076	1	0.076	0.098	0.754
		Within Groups	315.848	408	0.774		
		Total	315.924	409			
	Satisfaction of Mikhow	Between Groups	0.046	1	0.046	0.06	0.807
		Within Groups	276.636	362	0.764		
		Total	276.681	363			
	Satisfaction of Surin-Bangtao	Between Groups	0.008	1	0.008	0.011	0.916
		Within Groups	277.296	366	0.758		
		Total	277.304	367			
Cultural Destination	Satisafaction of Phuket Old Town	Between Groups	4.425	1	4.425	4.909	0.027
		Within Groups	485.907	539	0.901		
		Total	490.333	540			
	Satisfaction of Big Buddha or Chalong temple	Between Groups	0.716	1	0.716	1.102	0.294
		Within Groups	368.941	568	0.65		
		Total	369.656	569			
	Satisfaction of Musuems	Between Groups	0.001	1	0.001	0.002	0.968
		Within Groups	275.529	351	0.785		
		Total	275.53	352			
	Satisfaction of Chinese temples	Between Groups	0.479	1	0.479	0.615	0.433
		Within Groups	277.42	356	0.779		
		Total	277.899	357			
	Satisfaction of Promthep Cape	Between Groups	0.378	1	0.378	0.482	0.488
		Within Groups	317.558	405	0.784		
		Total	317.936	406			
	Satisfaction of Kata-Karon Viewpoint	Between Groups	0.391	1	0.391	0.549	0.459
		Within Groups	355.683	500	0.711		
		Total	356.074	501			

Table Variability test for Group of First time visitor or Not by Destination

ANOVA							
Destination's Type			Sum of Squares	df	Mean Square	F	Sig.
Coastal Destination	SAT. of Patong-Kamala Beach	Between Groups	0.006	1	0.006	0.006	0.939
		Within Groups	943.956	933	1.012		
		Total	943.961	934			
	SAT. of Kata-Karon	Between Groups	6.499	1	6.499	9.174	0.003
		Within Groups	539.077	761	0.708		
		Total	545.575	762			
	SAT. of Naiyang_Naithorn	Between Groups	5.378	1	5.378	6.968	0.009
		Within Groups	316.457	410	0.772		
		Total	321.835	411			
	SAT. of Mikhow	Between Groups	3.223	1	3.223	4.196	0.041
		Within Groups	280.417	365	0.768		
		Total	283.64	366			
	SAT. of Surin-Bangtao	Between Groups	8.192	1	8.192	10.542	0.001
		Within Groups	287.539	370	0.777		
		Total	295.731	371			
Cultural Destination	Satisafaction of Phuket Old Town	Between Groups	0.115	1	0.115	0.125	0.724
		Within Groups	502.356	545	0.922		
		Total	502.472	546			
	SAT. of Big Buddha or Chalong temple	Between Groups	0.718	1	0.718	1.093	0.296
		Within Groups	377.597	575	0.657		
		Total	378.315	576			
	SAT. of Musuems	Between Groups	3.45	1	3.45	4.435	0.036
		Within Groups	276.93	356	0.778		
		Total	280.38	357			
	SAT. of Chinese temples	Between Groups	4.781	1	4.781	6.228	0.013
		Within Groups	277.12	361	0.768		
		Total	281.901	362			
	SAT. of Promthep Cape	Between Groups	2.414	1	2.414	3.098	0.079
		Within Groups	318.773	409	0.779		
		Total	321.187	410			
	SAT. of Kata-Karon Viewpoint	Between Groups	5.241	1	5.241	7.49	0.006
		Within Groups	352.643	504	0.7		
		Total	357.883	505			

VITA

Miss Chatchawan Wongwattanakit was born in Phuket – Thailand. She received her bachelor degree from the Faculty of Engineering in 2001 from Kasetsart University and her master degree of Business Administration in Operations Management from University of Missouri (St. Louis), USA in 2009. She is a Ph.D. Candidate in the Department of Logistics Management (Interdisciplinary program) at Chulalongkorn University. Miss Chatchawan is currently an instructor in the department of Tourism, Faculty of Hospitality and Tourism, Prince of Songkla University (Phuket campus). Her areas of interest are tourism logistics, sustainable tourism, and information technology in transportation.