

# The Study of Tourists' Behavior in Water Usage in Hotel Business: Case Study of Phuket Province, Thailand

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**Abstract**—Tourism is very important to the economy of many countries due to the large contribution in the areas of employment and income generation. However, the rapid growth of tourism can also be considered as one of the major uses of water user, and therefore also have a significant and detrimental impact on the environment. Guest behavior in water usage can be used to manage water in hotels for sustainable water resources management. This research presents a study of hotel guest water usage behavior at two hotels, namely Hotel A (located in Kathu district) and Hotel B (located in Muang district) in Phuket Province, Thailand, as case studies. Primary and secondary data were collected from the hotel manager through interview and questionnaires. The water flow rate was measured in-situ from each water supply device in the standard room type at each hotel, including hand washing faucets, bathroom faucets, shower and toilet flush. For the interview, the majority of respondents ( $n = 204$  for Hotel A and  $n = 244$  for Hotel B) were aged between 21 years and 30 years (53% for Hotel A and 65% for Hotel B) and the majority were foreign (78% in Hotel A, and 92% in Hotel B) from American, France and Austria for purposes of tourism (63% in Hotel A, and 55% in Hotel B). The data showed that water consumption ranged from 188 litres to 507 liters, and 383 litres to 415 litres per overnight guest in Hotel A and Hotel B ( $n = 244$ ), respectively. These figures exceed the water efficiency benchmark set for Tropical regions by the International Tourism Partnership (ITP). It is recommended that guest water saving initiatives should be implemented at hotels. Moreover, the results showed that guests have high satisfaction for the hotels, the front office service reveal the top rates of average score of 4.35 in Hotel A and 4.20 in Hotel B, respectively, while the luxury decoration and room cleanliness exhibited the second satisfaction scored by the guests in Hotel A and B, respectively. On the basis of this information, the findings can be very useful to improve customer service satisfaction and pay attention to this particular aspect for better hotel management.

**Keywords**—Hotel, tourism, Phuket, water usage.

## I. INTRODUCTION

**T**OURISM has become a major contributor in terms of income generation for the economies of many developing countries. The highest growth rates in tourism are attributed to the Asian tourism industry, including Thailand [1]. According to a report by the World Travel & Tourism Council, the total

contribution of travel and tourism to gross domestic product (GDP) in Thailand is raised by 0.1% in 2014 from the 2.4 trillion Baht recorded in 2013 [2]. Phuket has been Thailand's most popular island as a tourism hub of the region and is located in Southern part of the country. Thailand receives a large number of visitors, with more than 11 million people in 2014 [3], generating revenue for the tourism sector of approximately 259,250 million Baht. Phuket is divided into three administrative districts: namely, Muang, Thalang, and Kathu districts. At present, there are 752 hotels in Phuket (with the total number of 46,007 rooms) as 45% in Kathu district, 42% in Muang district and 12.6% in Thalang district, respectively [4]. Based on data from the AQUASTAT, a global information system on water and agricultural which disseminates information on water resources and water uses [5], Thailand tourism activities need daily six to eight times more water than local communities [2]. Tourism business is often located in areas of water shortage such as island or coastal areas [6]. The rapid growth in tourism can be considered to be one of a major water user and has a significant detrimental impact on the environment, especially on the availability of quality water supplies. The higher in hotel numbers contributed to the rise in water demand for hotel business. Despite this, the sustainability of the tourist destination is dependent upon an adequate water supply [7]. Regarding to a lot of rainfall, Phuket experiences water shortages as most of the water is in private hands and not in governmental distribution. The water demand in Phuket has been increasing in accordance with the higher number of hotel businesses and the shortage of fresh water can be considered to be one of the biggest problems. The need for water demand in Phuket has increased with the average of 2% per year in according to economic growth of the tourism [8]. The excessive water demand from tourism puts a serious strain on water resources, especially during the peak tourist season in Phuket (November to April) with a high volume of water usage of 395,545.5 m<sup>3</sup> per day [8]. Therefore, water resource management has become a key issue for the tourism and hotel industry.

A number of international researches on hotel water consumption have been focused on water consumption among different regions [9], [10]. The studies revealed that a difference in water usage exists between regions and also within region [10], and that total water consumption varies from hotel to hotel. The main areas of water use in the hotels include the guest rooms, amenities, kitchens, restaurants,

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laundries, gardens and swimming pools [10], [11]. Guest rooms are therefore considered to be target for directed water conservation measures [11]. Therefore, in order to prevent water scarcity and protect water resources from overuse, a study on water consumption in hotel business should be carried out. The existing literatures on water usage in hotel business have focused on the broader aspects of especially direct water use, water-saving initiatives and water practices by the hotels. However, studies of the water usage per guest night stay and guest behavior on water usage are limited. Therefore, this paper presents a study of the water consumption and guest behavior in water usage of two hotels, namely Hotel A and Hotel B at Phuket Province, in Southern Thailand as case studies. Hotel A is a four-star hotel located at Karon Beach, Muang district, Phuket, Thailand that offers 134 rooms and Hotel B is located in Patong Beach, Kathu district, Phuket, Thailand with 350 guest rooms. The objective of this study is to determine guest behavior on water usage at the two hotels in Phuket Province, Thailand as a case study. In this study, primary and secondary data on water usage were collected from the hotel interview and the guest interview via questionnaire. On the basis of this information, guest water usage can be used as the key indicator to investigate aspects of water management to protect water resources and to ensure sustainable development.

## II. METHODOLOGY

### A. Target Population

This research was quantitative study where the secondary data on the water consumption of the hotels is collected from the hotel manager and/or hotel operator and includes water consumption usage, number of rooms, room night sold monthly, occupancy rates, and number of pools, etc. In addition, the behavior of guests on water usage during their stay was evaluated by means of a walk-in survey to a particular group of guests who visit or use the hotel services.

In this study, there are two selected hotels, namely Hotel A and Hotel B. Hotels A is a four-star hotel located at Karon sub-district, Muang District, Phuket, Thailand offers 134 rooms and classified as a large hotel with facilities which include a fitness studio, laundry service, five outdoor swimming pools, game room, restaurant, and meeting room. Hotel B is a four-star hotel located in famous Patong Beach, Kathu sub-district, Kathu district, Phuket, with 350 guest rooms occupied with a variety of international restaurants, a swimming pool and spa.

The number of population used in this study was calculated according to Taro Yamene at 95% confidence level, as in [12], of the following equation;  $n = N/(1+Ne^2)$ . Where:  $n$  is the sample size,  $N$  is the population size (according to tourist number in Phuket), and  $e$  is the level of precision ( $p < 0.05$ ).

### B. Instrument Design

Questionnaire was used as the research instrument and designed to collect data on the amount of water usage in the hotels and from hotel guest rooms (liters per guest night stay).

For the hotel manager, the questions contained the general information about the hotel, water consumption in the hotel, occupancy and more. As for the guest, the questionnaire was developed and divided into 3 parts as closed-ended question, checklist, and five point Likert scale. The example of the questions on the questionnaire is shown in Table I.

TABLE I  
 THE EXAMPLES OF THE QUESTION IN THE QUESTIONNAIRE

Questionnaire	Information	Evaluation method
Part 1: Demographic information	Age, sex, marital status, occupation, purpose and duration of traveling, and etc.	Checklist
Part 2: Guest behavior in water usage from hotel guest room	Duration and frequency of guest to use water or spend during staying in the room.	Questions
Part 3: Factors affecting customer satisfaction	Cleanliness, safety, price promotions, greatness, the distance from the hotel and etc.	Likert rating scale

The water consumption per room night (liters per guest night stay) represents how much water is required for one guest for one night stay period. The water flow rate (liters per minute) was measured in-situ in the standard room type from every water supply device within the guest room included guest bathroom showers, hand washing faucets, bathroom faucets, and toilet flush with the container. Measurements were taken five times for taking the average. The average duration usage and frequency of usage were obtained by the questionnaire. The water consumption in the guest room (liters per guest night stay) was then evaluated by the summation of all water consumption from all water supply devices as multiply the average water flow rate (liters per minute) with average water duration usage and frequency of using the equipment per day.

### C. Data Collection and Analysis

The survey was carried out between October to November 2015 by face-to face interview with the tourists. In this study, the standard room type was selected and used for the calculation of the water consumption based on the highest proportion among different room types in the hotels. For guest satisfaction, the scoring of the questionnaire was analyzed using the five-point rating of Likert scale. The interpretation of the score was described in [12]; where the mean score is interpreted as the follow: 4.21-5.00 means very satisfied, 3.41-4.20 means satisfied, 2.61-3.40 means general, 1.81-2.60 means dissatisfied, 1.00-1.80 means strongly dissatisfied. The validity of a questionnaire was checked prior the survey to analyze the data. Descriptive, t-test, and Pearson's correlation analysis were used for data analysis by software package SPSS version 17.0.

## III. RESULTS AND DISCUSSION

The respondent answers were analyzed in three aspects as guest demographic information, guest behavior in water usage from hotel guest room, and guest satisfaction. The details are as the following;

### A. Demographic Information

Totally, there were 400 interviewed respondents from the two hotels, Hotel A (n = 204) and Hotel B (n = 244). The majority of the respondent's age was between 21 years and 30 years old for both hotels (53% in Hotel A and 65% in Hotel B) and more than half were men (51% in Hotel A, and 69% in Hotel B). Most of the respondents were foreigners (78% in Hotel A, and 92% in Hotel B) and the majority was American, French and Austrian. The number of guest per room for both hotels was mainly two people with the purpose of staying for travelling (63% in Hotel A, and 55% in Hotel B). For the duration of stay, both hotels had a night stay of more than four nights. The majority of the respondents considered booking through the hotel website (39% in Hotel A and 29% in Hotel B). From the data, it can be seen that most of the respondents travelled for the leisure and this might affect the use of the water consumption during their stay.

### B. Guest Behavior in Water Usage from Hotel Guest Room

According to the data, water flow rates of the water supply devices in Hotel B included hand washing faucets, bathroom faucets, shower, and toilet flush were 9, 14, 6, and 7 (liters per minute), respectively; while hotel A has a flow rate of 8, 24, 14, and 8 (liters per minute), respectively.

It was reported that the standard shower flow should be between 15 liters to 25 liters per minute, and the toilet flush should not exceed 5.5 liters per flush and faucets should have a maximum flow of 6 liters per minute or 4 liters per minute in hand washing sinks of public bathrooms [13]. It can be seen that Hotel B has higher water flow rates (liters per min.) in all water supply devices than Hotel A and the recommendation. This could result in the higher water consumption of the hotel. Regarding of the class of hotels, it is commonly believed that luxury hotels are more water-intensive [10].

The water usage in the guest room was calculated through the water flow rate (liters per minute) for all the water supply devices in the hotel guest room (Table II) multiplied by duration of usage and the frequency (Table III). According to the survey, showering was the most common form of bathing of the respondents for both hotels (n = 144 Hotel A, n = 188 Hotel B), with the duration of usage approximately 16 min. and 13 min., and the average frequency of use was two and three time a day for Hotel A and B, respectively (Table II).

The differences in durations given and the variances in race, education level, gender, employment status, and income were found to not significantly affect the duration of the showers or baths ( $p > 0.05$ ). The results from various demographic groups resulting from 9,386 persons residing in the 48 contiguous United States revealed that the overall frequency of shower use for the surveyed population was 0.98 showers per person per day, and the duration was 6.8 minutes that the water usage are lower than the results observed in this study [14]. It is obvious that a guest staying at the hotel is likely to use more water than they would at home [7]. In addition, the respondents of Hotel B used the hand-washing faucets (water tap) (frequency = 8), and toilet flush (frequency = 5) more often than Hotel A (frequency = 5 and 4, respectively). For

Hotel B, on average, the shower consumes the most water (67.5%), whereas the water usage from the hand washing faucets and toilet flush consume less water (26.9% and 5.6%, respectively). Alternatively, the water consumption from the hotel guest room of the respondents in Hotel A showed that the hand-washing faucets consumed the most water (55.9%), as compared to the use of other water supply devices probably due to the high water in-flow rate and the frequency of use.

TABLE II  
 GUEST BEHAVIOR IN WATER USAGE AT HOTEL A'S GUEST ROOM AND HOTEL B'S GUEST ROOM

Water supply devices	Hotel A (n = 204)			Hotel B (n = 244)		
	Mean ± SD	Min	Max	Mean ± SD	Min	Max
1.1 Shower	188	-	-	144	-	-
1.2 Bath tub & Jacuzzi	16	-	-	100	-	-
Frequency	3±0.98	1	5	2±0.66	1	4
Duration (min.)	13±8.2	3	40	16±10.4	2	50
2. Hand washing Faucets	8±4.6	2	20	5±3.8	1	15
Duration (min.)	3±1.83	1	10	4±2.5	1	10
3. Toilet flush	5±1.79	2	10	4±2.2	1	15
Duration (min.)	-	-	-	-	-	-

TABLE III  
 THE WATER EFFICIENCY BENCHMARK FOR GUEST ROOMS BY THE ITP [15]

Weather	Water use rating (liters per guest per night)		
	Good	Fair	Poor
Temperate	250	250-300	> 300
Mediterranean	270	270-320	> 320
Tropical	300	300-350	> 350

The data from the calculation showed that the water consumption per guest for Hotel A (n = 204) ranged from 188 liters to 507 liters per overnight guest and 383 liters to 415 liters per overnight guest for Hotel B (n = 244), respectively. The water efficiency benchmark for guest rooms set by the ITP based on the weather of the hotel region [15] was used in this study to compare the guest water consumption and is shown in Table III. As seen in Table III, the water consumption in guest rooms for Hotel A and Hotel B were poor (> 350 liters per guest per night) based on an average number of occupants (total n = 448) in comparison with the benchmark. As in [11], the best average water consumption for hotels was reported to be 227 (kL per bed) and the worst is 435 (kL per bed). The high water consumption of the two hotels during the observation period was probably due to the purpose of the guest visit for travelling and leisure which might influence the high water consumption behavior. Tourists usually consume more water when they are on holiday than when they are at home [5]. However, it has been reported that average water use per guest night by hotels in Asian countries was about 677 liters per guest per night stay, while Australia/New Zealand's water use is about 313 liters [16]. The guest night water use in Australia and New Zealand were found to be related to guest nights, the percentage of the toilets installed whether low/dual flush, the price per night, the number of hotel rooms [16]. In the case of Spain, water usage



was estimated around 440 liters per guest per night [5]. In addition, hotel water consumption in Phuket was also studied by other researchers and showed that the water consumption per guest in the two studied hotels (large size) operated by chain system were 525 and 605 liters per person per night stay, respectively [17]. The period taking the survey in this study was during the low-season (October-December) and this might cause the lower in water consumption as compared to other studies that taken the survey from the high season (March-May).

In this study, it was found that the water consumption in guest room was related to the guest behavior. Correlation analysis showed that the time of tap and shower usage are significantly correlated ( $r = 0.476^{**}$ ), meaning that guests who use more water are likely to use more water in all water supply devices. In addition, the data showed that the frequency of shower use was negatively correlated with the duration of use ( $r = -0.332^*$ ). This revealed that the more often guests shower, the less showering time they used. Moreover, the monthly water consumption of the two hotels during October-November of the 2014 and 2015 was also compared with the information obtained from the questionnaires. The results indicated that there is a correlation in the water use in hotel guest rooms from the water bills and from the questionnaire ( $r = 0.763^*$ ). This can be referred to the degree of reliability of the information obtained. From the data obtained, it can be seen that water-use efficiency through installing water saving devices should be implemented for water conservation purposes. Tourists are resistant towards behavioral change related to environmental issues whilst on holiday [9]. Further research then will determine the environmentally friendly behavior of guests towards more water saving behavior.

### C. Factors Affecting Customer Satisfaction

The satisfaction of guests while staying in the two hotels was assessed through the rating scale. Fig. 1 presents the factors in guest satisfaction of the hotels and shows that most guests had high level of satisfaction in the hotels (rating scale  $> 3.80$ ). When respondents were asked to evaluate guest satisfaction, the top rates were the front office service (overall average score of 4.35 Hotel A and 4.20 Hotel B, respectively) implied the most satisfaction and the most important first impression for guests on arrival at the property. Luxurious decor and room cleanliness exhibited the second satisfaction scored by guests for Hotel A and B, respectively. In addition, good location for the accommodation (overall average score of 3.96) and hotel cleanliness (overall average score of 3.96) showed the lowest rating of the respondents of Hotel A and Hotel B, respectively; however, this still showed a “good” satisfaction level for the respondents.

According to the data, other than the satisfaction for the front office service, the survey revealed that the respondents (mostly aged between 21 years and 30 years) were very satisfied with the luxury decor (2<sup>nd</sup> ranking), room cleanliness (3<sup>rd</sup> ranking for Hotel A and 2<sup>nd</sup> for Hotel B) and general service standard (3<sup>rd</sup> ranking for Hotel B) (Fig. 1). However, other studies showed that within the same age group, the observed respondents considered the attractive nature or surrounding landscape and the safety security system as the top important characteristic of the property [18]. This finding can be very useful for the hotel operator and/or manager to improve the customer service satisfaction and for hotel management to handle the environmental aspects.

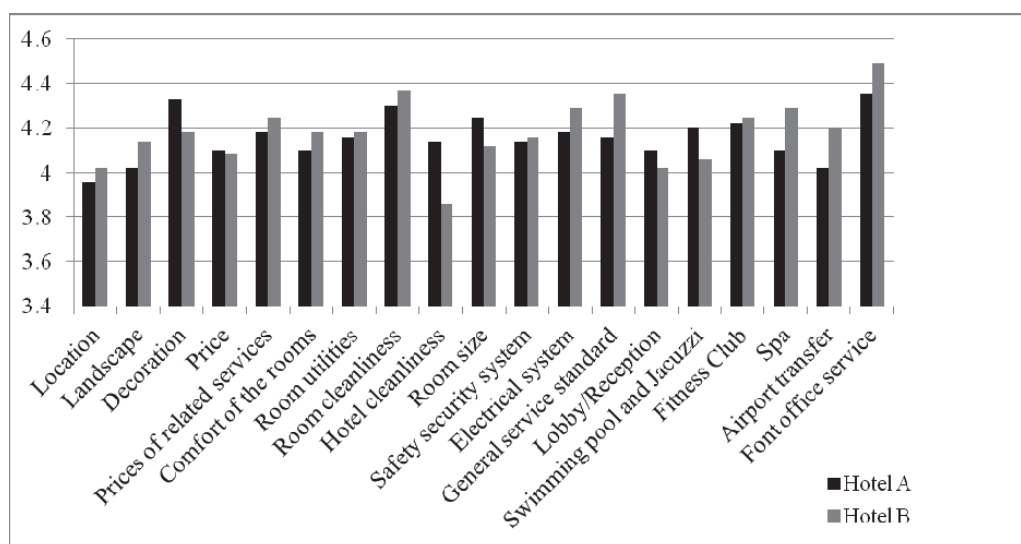


Fig. 1 Factors Affecting Customer Satisfaction

### IV. CONCLUSION

Guest water usage in the hotel guest rooms can be used as the key indicator to investigate water equity, water availability, and result in sustainable water resources

management. Guest behavior in water usage of the two hotels, namely Hotel A and Hotel B at Phuket Province, of Southern Thailand as case studies was studied and showed that the water consumption in guest room for Hotel A (188-507 liters

per overnight guest) and Hotel B (383 to 415 liters per overnight guest) were poor ( $> 350$  liters per guest per night) that based on an average number of respondents (total  $n = 448$ ) in comparison with the benchmark by ITP.

The water consumption in guest rooms was related to guest behavior as the correlation analysis showed that the time of tap and shower use are significantly correlated ( $r = 0.476^{**}$ ), meaning that guest who use more water are likely to use more water in all water supply devices.

From the data obtained, it can be seen that water-use efficiency through installing water saving devices should be implemented for water conservation purposes due to guest behavioral change related to environmental issues whilst on holiday can be difficult. Various supplementary initiatives and recommendations should be implemented in the hotels. However, guest water saving initiatives in hotels have not been studied in this research but could be further conducted in the future. This research will therefore provide a picture of guest behavior on water usage to improve water resource management via water saving initiatives.

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#### REFERENCES

- [1] Kuoni Water Management Manual for Hotels. Thailand: Kuoni. Zurich, Switzerland. 2014. Kuoni Group, Zurich, Switzerland 4-89. [http://www.greenhotelier.org/wp-content/uploads/2015/11/water\\_manual\\_hotels\\_thailand\\_0.pdf](http://www.greenhotelier.org/wp-content/uploads/2015/11/water_manual_hotels_thailand_0.pdf)
- [2] Henry Butcher Malaysia International Asset Consultant. Thailand, "It's Back to Business". <http://www.henrybutcher.com.my/content/thailand-its-back-business>.
- [3] National Statistical Office, Phuket. "Provincial Statistics Report". 2015. [http://phuket.nso.go.th/images/new/interest\\_stat/provincial\\_stat\\_report/2558/14%20tourism\\_2558.pdf](http://phuket.nso.go.th/images/new/interest_stat/provincial_stat_report/2558/14%20tourism_2558.pdf).
- [4] Tourism Investment Geoinformatic system. <http://tourisminvest.tat.or.th>
- [5] S. Beken, "Water Equity-Contrasting tourism water use with hat of the local community". *Water Resources an Industry*, vol. 7-8, pp. 9-22, 2014.
- [6] Unknown author, "A Water Use Model for the tourism industry in the Asia-Pacific Region: The impact of water saving measures on water use". [http://www98.griffith.edu.au/dspace/bitstream/handle/10072/68052/102987\\_1.pdf;jsessionid=BF21FBBC478929E3AB3F4CD2821FEEA2?sequence=1](http://www98.griffith.edu.au/dspace/bitstream/handle/10072/68052/102987_1.pdf;jsessionid=BF21FBBC478929E3AB3F4CD2821FEEA2?sequence=1)
- [7] D. T. Bartolomé and Dolores, T., "Hotel water consumption at a seasonal mass tourist destination. The case of the island of Mallorca". *Journal of Environmental Management*, vol. 92(10), pp. 2568-2579, 2011.
- [8] Unknown author, Provincial Waterworks Authority. <http://en.pwa.co.th/>
- [9] S.J. Page, S. Essex, and S. Causevic, "Tourist attitudes towards water use in the developing world: A comparative analysis. *Tourism Management Perspectives*, vol. 10, pp. 57-67, 2014.
- [10] N. Charara, A. Cashman, R. Bonnell, and Gehr, R. "Water use efficiency in the hotel sector of Barbados". *Journal of Sustainable Tourism*, vol. 19(2), pp. 231-245, 2011.
- [11] SA Water, Government of South Australia, Fact Sheet: Saving Water: Make it Your Business Hotel Water Efficiency from [http://www.sawater.com.au/\\_data/assets/pdf\\_file/0004/6691/Factsheet\\_HotelWaterEfficiency.pdf](http://www.sawater.com.au/_data/assets/pdf_file/0004/6691/Factsheet_HotelWaterEfficiency.pdf)
- [12] G.D. Israel, 1992. "Determining Sample Size. Fact Sheet PEOD-6, a series of the Program Evaluation and Organizational Development,

- Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida". Publication date: November. <http://www.sut.ac.th/im/data/read6.pdf>
- [13] Australian Government. 2014. "Water rating: Water Efficiency Labelling and Standards (WELS) scheme". <http://www.waterrating.gov.au/consumers/water-efficiency>.
- [14] US EPA, Office of Research and Development, 2006. "Quantification of Exposure-Related Water Uses for Various U.S. Subpopulations". Washington, 20460. [http://www.wilkestech.com/205edrb06\\_Final\\_Water\\_Use\\_Report.pdf](http://www.wilkestech.com/205edrb06_Final_Water_Use_Report.pdf)
- [15] F.E. Tang, "A Study of Water Consumption in Two Malaysian Resorts World Academy of Science, Engineering and Technology International". *Journal of Environmental, Chemical, Ecological, Geological and Geophysical Engineering*, vol. 6(8), pp. 506-511, 2012.
- [16] C.J. McLennan, S. Becken, and K. Stinson, "A Water-Use Model For The Tourism Industry In The Asia-Pacific Region: The Impact Of Water-Saving Measures On Water Use". *Journal of Hospitality & Tourism Research*, pp. 1-22, 2014.
- [17] S. Decha. 2013. *Hotel Water Consumption: A Case Study in Phuket Province*. Project ThesisA Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Technology and Environmental Management.
- [18] J. LaMondia, T. Snell, and C.R. Bhat. 2009. *Traveler Behavior and Values Analysis in the Context of Vacation Destination and Travel Mode Choices: A European Union Case Study*. [http://www.caee.utexas.edu/prof/bhat/abstracts/vacation\\_destination\\_15march2010.doc](http://www.caee.utexas.edu/prof/bhat/abstracts/vacation_destination_15march2010.doc)