Managing Logistic Systems for the Creation of Sustainable, Eco-Friendly Tourism on Koh Lan Coral Island

Taweesak Theppitak

Faculty of Logistics, Burapha University, Thailand

E-mail : taweesak99@hotmail.com

Abstract

Nowadays, tourism has become a significant industry in Thailand's economy. Tourism generates high revenues, as compared to the revenues from exporting. But, the real value of those revenues must be weighed against other factors.

Koh Lan is a beautiful example of Thai tourism today. It is an island just out from the beaches of Pattaya City, in Chonburi province. Koh Lan has become an important tourist destination. However, ever-increasing tourism has created problems there related to the sufficiency of its infrastructure systems and facilities. These problems include growing demand on natural resources and an escalation of environmental pollutants. Further, these problems are pointing to an urgent lack of effective logistical planning and management.

This study applied principles of logistics management to the tourism industry under the hypothesis that moving tourists from Pattaya to Koh Lan more efficiently and effectively, including providing an effective transport networking system, would increase and support tourism on Koh Lan. A demand forecast for tourism into the next decade was statistically calculated in order to provide recommendations for the improvement of infrastructure systems and facilities.

An objective of this study was to examine an appropriate demand forecast model for tourism on Koh Lan. The data from this examination could be used for planning and developing infrastructure systems and facilities, including strategies for transport networks and logistics systems to support the future growth of tourists into the next decade. Data was collected from secondary and primary sources, e.g. questionnaire, observation and in-depth interview. The sampling included tourists, entrepreneurs and governmental agencies. The questionnaire was distributed to 270 potential participants, with 245 questionnaires being returned, for a 90.74 % return rate. Validity and reliability were examined using statistical methods and experts.

The result showed that a time series would be an appropriate model for a demand forecast. It found that tourism to Koh Lan would double in the next decade. This result should be used for designing transport and logistics systems from Pattaya City to Koh Lan. Today, more than 1,500 trips a day by ferry and speed-boats are used for tourist travel from Pattaya City to Koh Lan.

This study showed that effectively designed infrastructure systems and facilities are required to support sustainable tourism on Koh Lan. Further, this study learned that new and fantastic tourist facilities

would be increasingly built on the island, underscoring the need for an appropriate plan for managing environmental pollution.

Finally, this study pointed out that a reverse logistics system for garbage management would need to be effectively utilized. Rapidly increasing garbage is a problematic issue for logistics related to a sustainable, green, eco-friendly environment. This study concluded that strategic and integrated logistical management is necessary, with participation from all stakeholders.

Keywords: Tourism, Logistics, strategy, demand forecasting, Island, Thailand

1. Introduction

Nowadays, tourism has become a significant industry to Thailand's economy. It generates high revenues as compared with the revenues from exporting, but the value of those revenues must be weighed against other factors.

Koh Lan coral island (commonly known as Koh Lan) is an important and popular tourist destination, just out from the beaches of Pattaya City, in Chonburi province. However, ever-increasing tourism has created problems in Koh Lan related to the sufficiency of its infrastructure systems and facilities. These problems include growing demand on natural resources and an escalation of environmental pollutants. Further, these problems are pointing to a lack of effective logistical planning and management.

This study applies principles of logistics management to the tourism industry under the hypothesis that moving tourists from Pattaya to Koh Lan more efficiently and effectively, including providing an effective transport networking system, would increase and support the tourism on Koh Lan. A demand forecast (for tourism into the next decade) was statistically calculated in order to provide recommendations for the improvement of infrastructure systems and facilities. The use of logistics in the tourism industry is currently recognized as a strategic tool for enhancing tourist satisfaction in relation to lower travel costs, one-stop services, other conveniences and safety. However, the research study (Briguglio, L. 1995; Bryden,J.1973) shows that tourist destinations, especially islands, typically fail to understand how to apply a logistics concepts as well as how to put logistics strategies into action.

The objective of this study is to examine an appropriate demand forecast model for tourism on Koh Lan. The data from this examination was used for planning and developing infrastructure systems and facilities, including strategies for transport networking and logistics systems to support the future growth of tourists into the next decade.

This study also examines other logistical issues, for example applying logistics to existing and future tourist facilities, and using a reverse logistics system for garbage management.

2. Literature review

This study reviews the literature related to the role of tourism (and in particular, eco-friendly tourism) to the economic growth of Thailand. It also considers the adoption of logistics management in the tourism industry, especially island tourism. Two relevant sources (Acharya, A. 1995; Briguglio, L. 1995; Bryden, J. 1973) point out that logistics management contributes to the success of sustainable tourism development. These sources also review definitions of logistics and logistics management as they pertain to sustainable development of tourism.

It is important to understand a clear and concise concept of logistics from a tourism perspective. Logistics is mostly understood in term of business industries, with only a few research studies done exclusively in relation to tourism (Briguglio, L., R. Butler, D. Harrison and W. L. Filko eds. 1996). People typically relate logistics to transportation or warehousing, particularly connecting it to aspects of material goods or information flow (Butler, R. W. 1980; Theppitak, 2006). As such, logistics is understood as a service-oriented process related to movement of physical and information flow. To apply logistics to tourism, people, or tourists, shall be considered as physical flow from one point to another, and examined in terms of lower costs, higher safety and more convenience through excellent coordination and collaboration (Bowersox, D.J. & Closs, D.J. 1996).

The literature review points out that before logistical planning for tourism infrastructure and facilities can be achieved, there needs to be an accurate demand forecast developed. Demand forecasting for tourism into the next decade is statistically calculated in order to provide improvement for infrastructure systems and facilities, which can in turn support growth and expansion. It also reveals patterns of tourist behavior and other factors influencing travel decisions, as well as identifies problematic issues with tourist destinations (Butler, R. W. 1980; Conlin, M. and T. Baum, eds. 1995).

The literature (Butler, R. W. 1980) also reveals that there is a relationship between adoption of logistics management in the tourism industry and the success of sustainable tourism development. For instance, logistics management can be used to consider moving people, or tourists, from one point to another point (Theppitak, 2006). Logistics management also provides tools for facilitating how to prepare accommodations, how to build transport networks between and within locations to support sustainable tourism. This study applies a logistical approach to the tourism industry under the hypothesis that moving tourists from Pattaya to Koh Lan more efficiently and effectively, including providing an effective transport networking system, would increase and support the tourism on Koh Lan. Tourism is qualitatively different from the other domains within the Cultural Sector, as it cannot be readily classified as a sector in the traditional sense, i.e. as measured by either particular markets or industrial outputs. Therefore, it is better understood as a demand-driven, consumer-defined activity.

When considering the factors affecting logistics management adoption and implementation in tourism, particularly, tourism on islands, the literature points out the major factors are economic and political realities (Thor, G.G. 1994). The research (Conlin, M. and T. Baum, 1995) highlights the

relationship between such factors and the adoption of logistics management, like fluctuating tourist counts and tourist satisfaction.

It concludes there is a literature gap related to the examination of issues related to adoption of logistics management (and its effectiveness) within the tourism industry, and specifically for islands. In particular, there needs to be an examination of the factors contributing to the logistics adoption phase and the factors influencing sustainable tourism development. This study therefore proposes a theoretical framework (Figure 1) derived from a previous study (Theppitak, T. 2006).

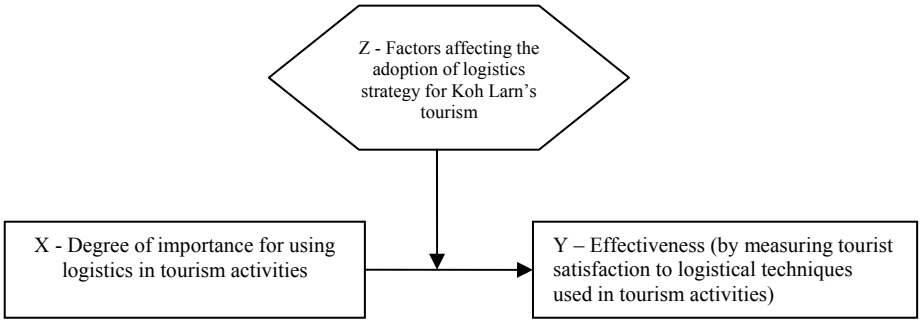

Figure 1 Theoretical Framework of the study

Figure 1 shows the theoretical framework of variables in this study. The literature review revealed that building a sustainable tourism industry, especially tourism on islands, required widely applied logistics concept and strategies. Success of sustainable tourism development requires a high priority of importance on adoption of logistic techniques. The research showed that the more importance placed on the adoption of techniques, the more effectiveness is gained for developing tourism (on an island). A main objective is to find ways to improve tourist satisfaction.

This study examines relationship between variables (*X*, *Y, Z*), defining degree of importance to the adoption of logistics techniques as *an independent variable* (V*ariable X*), and defining the effectiveness of logistical techniques to tourism on the island, in terms of convenience, safety, transport network, infrastructure and facilities on the island, as *a dependent variable* (*Variable Y*).

Furthermore, this study discovered that other influential factors, such as economic and political realities, were significant to the adoption (or non-adoption) of logistic strategies that could develop or enhance tourism on the island. These influential factors are defined in the framework as *an intervening variable,* (Variable Z), which affects both the independent variable (V*ariable X*) and the dependent variable (V*ariable Y)*. It was therefore assumed that the level of such influencing factors would have a direct correlation to the degree of importance placed on the adoption of logistics strategies, as well as to the effectiveness of any logistical technique used on the island.

3. Research methodology

This study initially conducted *a literature review* related to the role and patterns of tourism on islands from a logistics perspective, including the examination of problems and obstacles that occur while traveling on an island. It also explored the use of logistics management in the tourism industry. The objective of this study was to investigate the relationship between variables related to the adoption of logistics management for tourism on an island, as well as the effectiveness of logistics management for building sustainable tourism.

An interview technique was used jointly with questionnaire surveys in order to obtain relevant and in-depth information from tourists on Koh Lan. To obtain the data, the study used a sample of 270 randomly selected tourists, which included both Thai and foreign tourists traveling on Koh Lan. This number of interviews and questionnaires was based on a randomly stratified sampling. The rate of response was very good, with 245 respondents, or 90.74 percent of the total interviews and questionnaires. The data collection period took two months.

3.1 Research Questions

The study explored the number of Koh Lan tourists through the previous ten years to examine appropriate tools for tourist demand forecasting. After forecasting the number of tourists in next decade, the researcher developed logistical models to provide sufficient infrastructure and facilities, including developing transport between mainland and island, as well as within the island. It also examined issues related to reverse logistics for the management of a growing garbage problem on the island. To answer the above issues, the study sought to define the following questions:

1. What is the definition of tourism logistics?
2. How can current tourists' behavior be effectively used to design and develop infrastructure and facilities on Koh Lan in the future?
3. What are factors influencing the design and implementation of logistics management on Koh Lan?
4. What are the predictable efficiencies and effectiveness (of the adoption of logistics management) for the enhancement of sustainable tourism on Koh Lan?

3.2 Research Hypotheses

Based on these research questions, tentative hypotheses were established in order to examine a relationship between the adoption of logistics management and the effectiveness of improving tourism on a specific island. Under intensive literature review, this study found that the more logistics management was adopted within an island, the more its tourism industry grew. This study therefore explored the relationship of the variables under following the hypotheses.

H_1 = There is a correlation between the degree of availability for logistic techniques for tourism, (i.e. transport, infrastructure and facilities), and the effectiveness of such techniques to enhance tourism.

H_2 = There is relationship between factors that influence the adoption of logistics management and the effectiveness of logistics management to enhance tourism.

3.3 Population & Sampling Procedure

Eisenhardt (1989) stated that selection of an appropriate population controlled extraneous variation and helped to define the limits for generalizing the findings. This study used quantitative research by applying inferential statistics, by using a small number of parts of the whole population (a sample) to make inferences, judgments and conclusions about that population (*Zikmund, 1997*).

This study used the number of tourists who traveled to Koh Lan during January through April 2008. 200 questionnaires were randomly distributed for the sampling. After several months, there were 182 questionnaires returned, for a response rate of 91 per cent. This study also interviewed 50 tourists to gain their opinions related to tourism logistics on the island.

3.4 Validity and Reliability

The form of the questionnaire used was perceptual Likert scales (*Rossi et al., 1983*), where targeted samples were asked to rate each item on a five-point scale, ranging from strongly disagree to strongly agree. If a variable was related to a complex concept (*Fowler, 1984*), it was covered using multi-items, with its value corresponding to the mean value of the scales. In determining measurement properties of the constructs used in the statistical analysis, reliability and validity were assessed (*Dick and Hagerty, 1971*), by using respectively Cronbach's alpha and principal component analysis.

The designed of the questionnaire was based on literature review and interviews from a panel of experts in tourism industry. The reliability analysis of scale for this research instrument yielded favorable results. The construct exhibited a high degree of reliability in terms of its coefficient alpha. The alpha value for the overall questionnaire was *0.92*. Sources in the literature (*Nunnally and Bernstein (1995); Anderson and Gerbing (1988))* recommended that a value of reliability at 0.70 was acceptable, however, those over 0.80 are considered good (*Sekaran, 2000*).

Validity was also considered, relating to the content, criterion and construct (*Zikmund, 1997*). Content validity could not be determined statistically, but only by the experts and by referring to the literature. The researcher examined over 40 works published over years related to tourism logistics management. Criterion validity is concerned with the predictive nature of the research instrument to obtain the objective (e.g. the existence of logistics and supply chain strategies). Construct validity is

measured as to whether a variable was an appropriate operational definition of the construct or not (*Pearson, 1901*).

3.5 Data Collection

This study collected data in *two* following dimensions: first, a *literature review* was conducted in various fields related to tourism logistics management. Secondly, *survey method* was used to examine the relationships between variables and to answer research questions. Before designing and developing the questionnaire, the researcher interviewed experts, including the director and officers of Koh Lan. Tourists and entrepreneurs of Koh Lan were also included to gain more insights and understanding about the realities of the island.

The questionnaire was conducted in Thai and English languages. First, pre-testing was carried out with thirty-six tourists. This testing measured Cronbach's alpha (α) at 0.92. There were some minor changes required to items of questionnaires, e.g. some ambiguous wording, shortening for long sentences, etc. Three weeks later, the second pre-testing was conducted at thirty-five companies from within the Koh Lan population, with Cronbach's α equaling 0.925. These results revealed that the research instrument had a highly acceptable degree of reliability.

The questionnaire was then used for eliciting data from the attitudes and perceptions of tourists on Koh Lan. The questionnaires, applying a five-point Likert-type scale, were randomly distributed to create samplings. In each sampling, the tourist was asked to evaluate and rate on a five-point Likert-type scale the degree of relative importance given to logistics activities and tourism effectiveness, ranging from 1 = strongly disagree, to 3 = Neutral, to 5 = strongly agree.

In order to collect data with a sufficiently high response rate from respondents, the following research strategies were accomplished using a face-to-face interview style: Data was collected through channels, and included a response rate for each distributed channel obtained (Table 1); 270 questionnaires were distributed in two major groups, 200 Thai tourists and 70 foreign tourists. 245 questionnaires were completed and returned by respondents, for a 90.74 percent rate of return.

3.6 Data Processing

After questionnaires were returned, they were classified by their sources, including coding and editing to make ready for data entry (*Zikmund, 1997*). The SPSS for Window version 10.0.5 was used to analyse the data.

4. Finding results

After conducting surveys with tourists in Koh Lan over several months, it was found that most of these tourists well supported the rationale of this survey. The survey covers demographical data related to attitudes and behaviors of tourists when visiting Koh Lan, including examining hypotheses. Implications related to transport systems, logistics infrastructure and facilities were discussed.

Table 4.1 Gender of targeted tourists

Gender	Percent
Male	56.8
Female	43.2
Total	100.0

Table 4.1 shows the gender of respondents. Male tourists made up the greatest number of respondents in the sample at 56.8 percent, followed by female tourists at 43.2 percent. The study represented real information for tourism on Koh Lan and showed that the male tourists became a major target.

Table 4.2 Age of targeted tourists

Age (years)	Percent
13 – 20	25.2
21 – 28	38.7
29 - 36	12.6
37 – 44	9.9
45 – 52	6.3
Over 52	7.2
Total	100.0

Table 4.3 represents the age of targeted tourists visiting the island. The result showed that 63.9 percent were between the ages of 13 to 28 years. Most of them, or 38.9 percent, had an age between 21 and 28 years. Secondly, 25.2 percent had an age between 13 and 20 years. The figure shows that the major targeted groups of tourists on Koh Lan are now adolescent and young adults.

Table 4.3 Nationality of targeted tourists

Nationality	Percent
Asian	86.2
European	11.3
American	1.3
Australian	1.3
Total	100.0

Table 4.3 shows the nationality of tourists. The survey revealed that most tourists came from Asian countries, 86.2 percent. Of this number, 68.2 percent were Thai tourists, with the remainder coming from other Asian countries (e.g. China, Taiwan, and South Korea) at 18 percent collectively. The result also showed a smaller percentage of tourists coming from western countries, especially European tourists. This result reflected that Thai tourists currently make up the major tourist group.

Table 4.4 Marriage status of targeted tourists

Status	Percent
Single	68.5
Married	27.9
Divorced	3.6
Total	100.0

Table 4.4 shows marriage status of tourists. The result revealed the major tourist group, at 68.5 percent, was of single status. Only 27.9 percent of surveyed tourists were married. The result indicates that infrastructure and facilities on Koh Lan should be considered accordingly, to support relevant activities, behaviors and lifestyles.

Table 4.5 Educational level of respondents

Educational Level	Percent
Secondary	7.2
High School	9.9
Continuing Ed	20.7
Bachelor	46.5
Post-graduate	12.6
Total	100.0

Table 4.5 shows educational level of tourists. The result reveals that most of tourists or 87.4 percent have educational level lower than a bachelor's degree, and 12.6 of them were at postgraduate level. The results point to relevant expectation levels regarding lifestyles, traveling activities, facilities and infrastructure on Koh Lan.

Table 4.6 Occupations of respondents

Occupation	Percent
Private employee	47.7
Student	30.6
Farmer	9.9
Unemployment	6.3
General employment	5.4
Total	100.0

Table 4.6 shows the occupations of tourists visiting on Koh Lan. The result revealed that major tourist groups were private employees (47.7 percent) and students (30.6 percent), for a combined total of 78.3 percent. This information points to a corresponding approach to infrastructure and facilities, which should be prepared and developed on Koh Lan to facilitate these targeted groups.

Table 4.7 Average income of respondents

Income	Percent
Lower 5,000	20.7
5,001 – 10,000	23.4
10,001 – 15,000	12.6
15,001 – 20,000	7.2
20,001 – 25,000	3.6
Higher 30,000	9.0
Total	100.0

Table 4.7 represents the average incomes of tourists. The study revealed that average income of most tourist groups, or 63.9 percent, was lower than 20,000 baht. The greatest number, or 23.4 percent, had income between 5,000-10,000 baht. This income data should facilitate researchers to design and develop proper infrastructure and facilities on Koh Lan, consistent with targeted tourists' income.

Table 4.8 Frequency of travel to Koh Lan per tourist (excluding current trip)

Frequency of Travel to Koh Lan (x times)	Percent
1	22.4
2 - 3	44.8
4 - 5	19.0
More than 5	13.8
Total	100.0

Table 4.8 reveals the frequency of travel to Koh Lan per tourist (excluding their current trip at the time of the questionnaire). The result showed that most tourists, or 44.8 percent, had traveled to Koh Lan several times. Only 22.4 percent of them had traveled there only one time. This frequency of tourism to Koh Lan reflects an overall perception of satisfaction for tourists in Koh Lan.

Table 4.9 Traveling period to Koh Lan

Period of Traveling	Percent
January – March	13.6
April – June	16.9
July – September	1.7
October – December	67.8
Total	100.0

Table 4.9 shows traveling period to Koh Lan. The corresponding question asked which month of the year tourists most liked to travel to Koh Lan. The result revealed that most tourists, or 67.8 percent, visited between October-December. This period defines a peak seasonal period of tourism.

Table 4.10 Traveling behavior of tourists

Nature of Travel	Percent
Come alone	6.3
Come with friends	71.2
Come with family	19.8
Come with tour/training/seminar	2.7
Total	100.0

Table 4.10 reveals traveling behavior of tourists. The survey indicated that the greatest percentage of tourists, or 71.2 percent, came with their friends. Only 19.8 percent came with family. This information will help facilitate relevant designs and patterns of transport, as well as for infrastructure and facilities to support sustainable tourism on the island.

Table 4.11 Number of people per tourist group

Number in group	Percent
1-5	58.6
6-10	22.5
11-15	16.2
16-20	0.9
More than 20	1.8
Total	100.0

Table 4.11 reveals the number of people per tourist group. The greatest number of tourists or 58.6 percent identified that their group had one to five tourists. Next, 22.5 percent of them identified six to ten tourists per group. This information points to how building infrastructure and facilities should be built consistent with targeted tourist groups.

Table 4.12 Pattern of vehicle transport to Pattaya City (for tourism to Koh Lan)

Vehicle (from Pattaya City to Koh Lan)	Percent
Bus	30.6
Personal car	33.3
Tourist bus	17.1
Motorcycle	1.8
Other	17.1
Total	100.0

Table 4.12 shows the pattern of vehicle transport to Pattaya City for purpose of tourism in Koh Lan. The survey showed that most of the tourists, or 33.3 percent, traveled to Pattaya City by personal car, 30.6 percent of them visited by bus, and 17.1 percent by tourist bus, respectively.

Table 4.13 Pattern of overnight stays in Koh Lan

Overnight Stay on Koh Lan	Percent
Yes	13.0
No	87.0
Total	100.0

Table 4.13 indicates the pattern of overnight stays in Koh Lan. The survey showed that most of the tourists, or 87.0 percent, did not stay overnight. The tourists pointed out that proper infrastructure and facilities for overnight stays in Koh Lan were unavailable and/or inconvenient. Only 13 percent of surveyed tourists indicated that they stayed overnight in Koh Lan, typically for a long weekend or special holiday.

Table 4.15 Type of Accommodations

Type of accomodation	Percent
Hotel	25.8
Resort	58.1
Private Residence	16.1
Total	100.0

Table 4.15 shows the types of accommodation on Koh Lan. The greatest number of tourists, or 58.1 percent, chose to stay at resorts. Next, 25.8 percent of them chose a hotel, and 16.1 percent stayed at private residents. This information reveals tourists' expectations regarding the pattern of accommodations on Koh Lan.

Table 4.16 summary relationship between variables

Type of variable		Sig.	P-Value
Independent	Dependent		
X	Y	0.022	0.826
Z	X	0.000	0.804
Z	Y	0.001	-0.624

After testing the hypotheses, the results show significant relationships between the tested variables. It found that there is a strong relationship between the use of logistics management for

tourism (X) and building tourist satisfaction in terms of lower costs, safety, comfort and convenience (Y). Further, it also found that there is a strong relationship between the factors affecting the adoption of logistics strategies in terms of economic conditions and political situations (Z), and the level of importance placed on using logistics management (X). Importantly, these factors are shown to have a negative relationship to the increase of tourist satisfaction.

5. Research discussion and Implication

The study results revealed interesting implications for the future development of transport systems, logistics infrastructure and facilities on Koh Lan. The study initially examined the definition and role of logistics in the context of tourism. The major components of a logistics system were discussed. It studied how tourists' travel behaviors can be utilized to design and develop transport, infrastructure and facilities on Koh Lan. It also identified how other influencing factors affect the design and implementation of logistics management on Koh Lan, which, in turn, affects sustainable tourism there.

5.1 What is the definition of tourism logistics?

The findings revealed relevant patterns and trends of tourism on Koh Lan. The results identified that the direction for development of tourism on Koh Lan are unclear and uncertain. There needs to be an application of logistics principles to create and develop sustainable tourism. The key question is what is a relevant definition of logistics in the context of tourism? Theppitak (2005) states in a definition that logistics is "the process of planning, organizing and controlling the flow of materials and services from origin to the end point to satisfy all stakeholders." Therefore, logistics in the context of tourism would be defined as "the management of the flow of materials (including tourists, capitals, technology) and information." In this definition, people are being considered as "goods," being moved from point to point. Transport system(s), between mainland and the island, as well as within the island, would need to be designed to support the move of tourists in terms of lower costs, safety, comfort and convenience.

To support and foster more and better tourism on the island, infrastructure (e.g. electricity, water and telephone) must be readily available. Also, future tourist facilities (for all travel activities and including currently undeveloped areas) must be well planned and organized. These facilities should include hotels and other accommodations. If tourists are the goods, then hotels and resorts can be considered as warehouses or distribution centers. Proper demand forecasts of tourist behaviors and lifestyles are critical. In-depth and accurate logistics is the only proper way to prepare for future tourist accommodations, facilities and traveling activities.

Tourism logistics also includes reverse logistics activities. Reverse logistics can be defined as the management of the flow of materials or information back to a desired point. This methodology covers the management of garbage, or unusable materials, by tourists. Normally, there are many

methods to manage garbage, with different costs occurring, including non-monetary costs like pollution. This study can also be used logistically to incentive and support sustainable, more eco-friendly tourism on Koh Lan.

5.2 How can tourists' behavior be effectively used to design and develop infrastructure and facilities on Koh Lan?

Table 5.1 Expectations & perceptions of transport system patterns between Pattaya and Koh Lan

Issues	Importance Level	Satisfaction Level	GAP
1. Frequency of speed boats between Pattaya and Koh Lan	3.81	3.64	0.17
2. Service Fee of speed boats between Pattaya and Koh Lan	3.79	3.36	0.43
3. Safety of speed boats between Pattaya and Koh Lan	3.88	3.51	0.37
4. Rules of Conduct for speed boats between Pattaya and Koh Lan	3.77	3.52	0.25
5. Convenience of speed boats between Pattaya and Koh Lan	3.78	3.53	0.25
6. Service Fee of ferry between Pattaya and Koh Lan	3.90	3.75	0.15
7. Safety of Ferry between Pattaya and Koh Lan	3.95	3.71	0.24
8. Rules of Conduct for ferry between Pattaya and Koh Lan	3.77	3.63	0.14
9. Service quality of the above factors for traveling to Koh Lan	4.07	3.86	0.21

Table 5.1 represents levels of importance and satisfaction with various transport systems between Pattaya City and Koh Lan (an eight kilometer distance). The result reveals tourists' satisfaction and expectations with these transport systems. Normally, tourists have two choices of transport to the island: ferry or speed boat. The result showed that tourists have intermediate expectation levels of service quality (e.g. convenience, safety and fee) for speed boats and ferries. After actually traveling to Koh Lan, they had satisfactory levels lower than their expectation levels. With speed boat services, fees and safety were the main sources of dissatisfaction. For ferry boat services, convenience and safety were the main sources of dissatisfaction.

Table 5.2 Importance and satisfaction levels with accommodation on Koh Lan

Issues	Importance Level	Satisfaction Level	GAP
1. Comfort and convenience of accommodation	3.87	3.57	0.3
2. Cleanliness of accommodation	4.07	3.64	0.43
3. Rental fees and costs of accommodation	3.86	3.50	0.36
4. Safety and security of accommodation	4.20	3.61	0.59
5. Beauty and atmosphere of accommodation	4.09	3.87	0.22
6. Convenience of transport to accommodation	3.98	3.56	0.42
7. Time duration of stay in accommodation	3.73	3.60	0.13
8. Other services or facilities in accommodation (i.e. breakfast, swimming pool)	3.77	3.39	0.38
9. Expectation and satisfaction level for accommodation in total	3.94	3.68	0.26

Table 5.2 represents tourists' levels of importance of and satisfaction with accommodations on Koh Lan. The result revealed that tourists had high expectation levels for accommodations and related services, especially in regards to safety and security, cleanliness, and the atmosphere of an accommodation. The survey found that beautiful atmosphere and cleanliness were factors with which tourists were most satisfied. However, other factors, like more facilities and services, as well as fees, were issues of dissatisfaction. In conclusion, tourists had high expectation levels for services related to accommodations on the island, and are satisfied with these services to an intermediate level.

Table 5.3 Expectations and perceptions of travel destinations on Koh Lan

Issues	Importance level	Satisfaction level	GAP
1. Number of travel destinations on Koh Lan	3.80	3.69	0.11
2. Variety of activities at travel destinations on Koh Lan	3.70	3.58	0.12
3. Beauty and atmosphere of travel destinations	4.08	3.92	0.16
4. Ease and comfort in accessing travel destinations	3.95	3.60	0.35
5. Cleanliness and sanitation of travel destinations	4.05	3.55	0.50
6. Safety and security of travel destinations	4.01	3.62	0.39
7. Natural environment and local culture	3.89	3.73	0.16
8. Total importance and satisfaction levels for travel destinations	3.94	3.74	0.20

Table 5.3 represents the levels of importance and satisfaction tourists have for travel destinations within Koh Lan. Surveyed tourists revealed they had high expectation for travel destinations in respect to beauty and atmosphere, cleanliness and safety, and that they were satisfied with these aspects of the island. However, they indicated some dissatisfaction with cleanliness and sanitary system, as well as some concern for the safety of security systems used at some travel destinations.

Table 5.4 Expectations and perceptions of transport (and related logistics) in Koh Lan

Issues	Importance level	Satisfaction level	GAP
1. Comfort and availability of transport to Koh Lan	3.82	3.69	0.13
2. Comfort and availability of transport in Koh Lan	3.83	3.51	0.32
3. Safety for transport system to Koh Lan	3.95	3.61	0.34
4. Costs and expenses of traveling to Koh Lan	3.90	3.54	0.36
5. Costs and expenses of traveling in Koh Lan	3.86	3.40	0.46
6. Volume of vehicles (cars, motorbikes) in Koh Lan	3.83	3.49	0.34
7. Total importance and satisfaction levels for transport	3.87	3.66	0.21

Table 5.4 represents the levels of importance and satisfaction tourists place on transport (and related logistics) while visiting Koh Lan. This study asked the tourists to rate the transport systems from Pattaya City to Koh Lan, as well as the transport systems within Koh Lan, in various relevant areas. Most of the tourists indicated high expectations related to safety and the expense of transportation. The study also found that they were mostly satisfied with the availability and comfort of transport systems to Koh Lan. However, they were somewhat dissatisfied with the safety of transport systems to Koh Lan.

When considering the transport system within Koh Lan, tourists had high expectations for price standardization, as well as for comfort and availability of transport. But, they were dissatisfied to actually find a lack of price standardization of transport within Koh Lan.

Table 5.5 Expectations and perceptions of infrastructure and facilities in Koh Lan

Issues	Importance level	Satisfaction level	GAP
1. Infrastructure in Koh Lan (e.g. electricity, water, telephone)	3.90	3.52	0.38
2. Problem solving when infrastructure systems beak down	3.83	3.56	0.27
3. Costs and fees for services of infrastructure	3.91	3.32	0.59
4. Total expectation and satisfaction level for infrastructure and facilities	3.90	3.56	0.34

Table 5.5 represents the levels of importance and satisfaction tourists placed on infrastructure and relevant facilities in Koh Lan**.** When considering (in term of logistics) the infrastructure required for supporting tourism on the island, it included electricity, water, and telephone systems. Survey results revealed that most of the tourists (more than 75 percent) did not stay overnight in Koh Lan, but rather returned to stay overnight in Pattaya City. They had high expectations for the costs and availability of tourism infrastructure in Koh Lan. But, they were dissatisfied with the actual fees charged for services and the availability of infrastructure.

In summary, the *main research finding* reveals that:

- Placing a high level of importance for using logistics management with tourism (X) has a strong positive relationship to building and enhancing tourist satisfaction (Y).
- Influencing factors (Z; economic, social, and political) have a correlating relationship to the use of logistics management (X).
- Influencing factors (Z) also affect the travel behavior of tourists and tourist satisfaction (Y).
- Finally, the study reveals that influencing factors (Z) can strongly affect the effective degree of adoption and implementation of logistics management (X). Effectively, these factors are uncontrollable variables for the tourism industry.

6. Conclusion

The results show that using a logistics concept for management of tourism, especially on an island, would increase effective, sustainable, eco-friendly tourism. A demand forecast of tourism for the next ten years must be considered to effectively design and develop smooth flow patterns for future tourists, along with providing sufficient and appropriate infrastructure and facilities. This study points out that a seasonal time series would be an appropriate model of demand forecasting. It revealed that in the next decade,

tourism in Koh Lan would increase to twice its current level. This result must be taken into consideration for designing transport (and related logistics systems) from Pattaya City to Koh Lan.

Today, more than 1,500 trips a day, by ferry and speed-boats, are used in travel to Koh Lan. Effective design for future infrastructure systems and facilities must support sustainable tourism in Koh Lan. Likewise, development plans for new travel destinations must include an appropriate plan for managing environmental pollution. Finally, garbage management could be effectively planned using a reverse logistics system, as rapidly increasing garbage has become a problematic issue related to the logistics of maintaining a green, eco-friendly environment.

This study provides valuable information for stakeholders, especially top management of Pattaya City and the Tourism Authority of Thailand, as to the planning and development of infrastructures and facilities for islands, and specifically Koh Lan. Logistically planned transport management can facilitate growing tourist travel to and from Koh Lan, providing hotel, resort and residential-accommodation owners with consistently increasing demand, while also preventing the unrestrained destruction of natural resources and environments on the island. This study leads to the conclusion that strategic and integrated logistics management is required, with active participation from all relevant stakeholders.

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