Analysis of the island tourism environment based on tourists' perception—A case study of Koh Lan, Thailand

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ABSTRACT

Island tourism is an important part of marine tourism and has developed into an important part of international tourism consumption. The island tourism environment is the foundation for the sustainable development of island tourism. This paper takes Koh Lan as the research area to conduct a questionnaire survey among international tourists to understand their perception of the tourism environment of the island based on descriptive analysis and cross-analysis. The results show that tourists in the tourism environment of the island have obvious behavioral characteristics. 66.7% of the tourists are interested in the island through friends and networks; 76.9% of them travel together with their families and friends more than once; more than 56% of them stay for one day causing the low willingness of these tourists; the homestay is the favorite accommodation option for those who choose to stay; 51.5% of tourists choose to eat at the hotel, and 92.7% of visitors spend less than US $500; 24.2% of the time is used to visit Tawaen Beach, which is the most popular tourist attraction on the island; visitors of different ages and genders have different preferences when choosing travel activities; beach leisure is a favorite activity for tourists. The study evaluates tourists' satisfaction with the tourism environment of the island. More than 90% of the tourists expressed satisfaction with the experience of visiting the island. This evaluation reflects the deficiencies and directions for improvement of the tourism environment of the island and provides inspiration for the development of international island tourism.

1. Introduction

With the development of the economy, people's income level has been continuously improved, and their goals have developed from meeting the needs of food and clothing to higher needs for a comfortable life. People increasingly choose leisure tourism to improve their quality of life. In recent years, island tourism has developed rapidly and has become one of the most popular types of tourism. Island tourism has a strong competitive advantage. There are 31 countries and regions in the world in which tourism accounts for more than 20% of GDP, among which 27 are island countries and regions (Kerr, 2005). The healthy development of island tourism is extremely important for these countries and regions. Some small islands have developed into important tourist destinations (Povilanskas et al., 2016). Thailand has abundant island tourism resources, and its island tourism industry has gradually developed into an important part of its tourism industry. Koh Lan has

become an important destination for the development of island tourism among the islands of Thailand by virtue of its excellent tourism environment. The island has the characteristics of independence, a fragile ecosystem, and limited land resources (Chen, 2012). With the development of tourism on the island, the number of tourists is increasing, and the supporting facilities usually cannot meet the need. The problems of decreased biodiversity of the island and quality of the tourism environment have become increasingly prominent (Theppitak, 2018). The rational use of island resources and the optimization of the island tourism environment are of great significance to the island's protection and management.

Tourists are among the main players in island tourism and are important objects of the island tourism environment (Peng et al., 2012). Generally speaking, the island tourism environment includes the natural environment, the humanistic environment and the economic environment. And Koh Lan tourism environment can also be considered from

these aspects. As far as Koh Lan is concerned, its tourists' perception refers to their subjective feelings about food, housing, transport, traveling, shopping and entertainment in the process of tourism. These subjective feelings directly affect tourists' evaluation of and satisfaction with the tourism environment and subsequently affect their tourism decisions. With reference to Liang's and Gao's models on the role of tourists and the tourism environment (Liang and Gao, 2010), combined with the actual situation of Koh Lan tourism environment, this paper establishes the Koh Lan tourist-tourism environment model based on relevant concepts (Fig. 1).

Based on Urry's theory of tourists' gaze, the reason why people leave their daily life and workplaces to travel in relatively unfamiliar places is to obtain pleasure, nostalgia, stimulation, and other experiences by "gaze" at the things that are significantly different from their secular life. Therefore, tourism gaze and aesthetic appeal are featured by the motivation of the opposite direction of daily life (Larsen et al., 2007; Urry, 1990, 2002).

For people living in the middle and high latitudes, especially in the inland areas, Koh Lan Island is a distant and exotic destination. Through videos, photos, books and other media as well as the experience exchange of their relatives and friends, this island of Thailand provides a variety of unique cognitive symbols, such as tropical vegetation, sand beaches, Southeast Asian foods and the cultural elements of the Hinayana Buddhism and relevant heritages, which are of great differences with visitors' daily life. With the process of tourists' on-the-spot experience and gaze, the cognitive symbols become concrete and systematic. Consequently, their aesthetic appeals are satisfied or modified.

Tourists' perception can be used as an important reference for the management and operation of tourism destinations and is one of the evaluation criteria for the development of tourism destinations (Agapito et al., 2014). Research on tourists' perceptions of the tourism environment began in the late 1980s and early 1990s, and its research areas, methods and purposes were characterized by diversification. The research areas of scholars in this field are mainly concentrated in two aspects. The first involves the countries and regions where the tourism industry is developed and the tourism environment is susceptible to changes, an issue that has been widely addressed by scholars (Spanou et al., 2012; Moyle et al., 2013; Ramdas and Mohamed, 2014). The second area involves various tourist attractions, including natural scenic spots (Deng et al., 2014), historical scenic spots (Bai et al., 2016), characteristic folk culture scenic spots (Jiao, 2013; Zheng, 2014; Wang and Lu, 2016) and theme parks (Zhao et al., 2018; He et al., 2018). In terms of research methods, the data collection methods adopted by scholars mainly include questionnaire surveys (Bertan and AltiNtas, 2013; Kraftchick et al., 2014; Yin and Luo, 2018) and interviews (Tiberghien et al., 2016). The data analysis methods adopted include

structural equation modeling (Eid and Elgohary, 2015), cluster analysis (Brida et al., 2010) and importance-performance analysis (IPA) (Prayag and Brittnacher, 2014; Teng et al., 2018). Currently, the development of research methods on tourists' perceptions has become more mature. The research objectives of scholars are mainly to investigate the impact of climate change on tourism development (Tervokankare et al., 2013), the perceptions of tourists regarding the safety of tourism destinations (Rittichainuwat, 2013), management methods (Pan, 2015), and culture. Research also analyzes tourism products and the service quality of tourist attractions in tourist destinations to propose corresponding strategies (Liu et al., 2015; Du and Peng, 2018) and examines the differences in tourists' perceptions of the tourism environment under different conditions. The paper takes Koh Lan as research area and the island's tourists as the research object to analyze tourists' perception of the tourism environment to explore the attractiveness of the island's tourism and tourists' satisfaction. It also summarizes the inadequacies and experience of tourism on the island and provides implications for the development of international island tourism.

2. Background of the research site

Koh Lan, which is approximately 4.65 km long from north to south and 2.15 km wide from east to west, is in the east of the Gulf of Thailand (Fig. 2). It covers an area of 4.7 square kilometers and is the largest island outside of Pattaya City. It is affiliated with Chonburi Province and is known for its rich coral resources. The island is rich in marine entertainment, including beach leisure, sea parachuting banana boating and diving. In addition, there are currently two terminals on the island, Na Baan Pier and Tawaen Coast Pier, which provide round-trip shipping services for tourists throughout the day. In recent years, tourism on the island has developed rapidly, with an average daily tourist arrival of 7000–10,000 passengers and a daily income of 149,600 US dollars. The number of Koh Lan tourists fluctuated significantly after 2012. In 2015, the number of tourists reached 5.5 million. However, the number of visitors in Koh Lan continued to decline after 2015 (Fig. 3). This change in the number of tourists may be affected by unexpected factors and changes in the quality of the island's tourism environment. Therefore, the decline in the number of tourists also reflects the importance of this survey.

3. Research methods

The paper uses the questionnaire survey method to collect information on the perceptions of tourists regarding the tourism environment of Koh Lan. We set up questions from three aspects of the natural environment, human environment, and economic environment based on
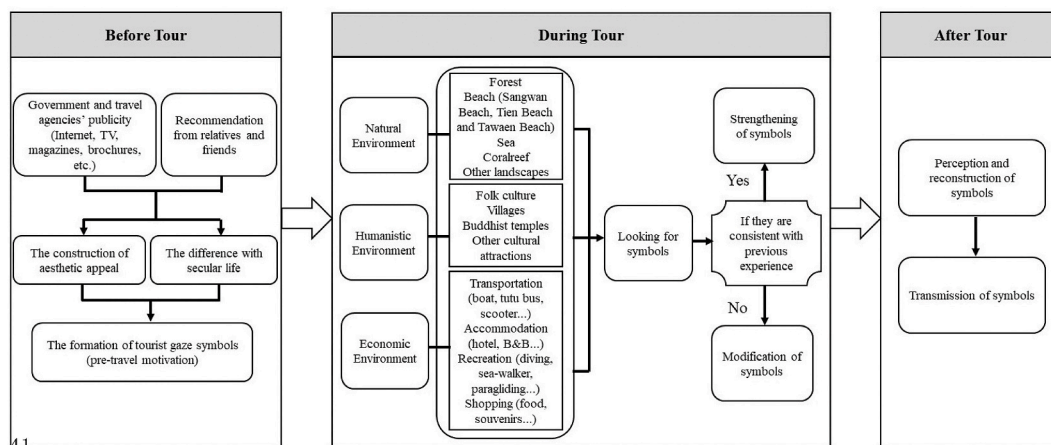

Fig. 1. The environmental perception model of Koh Lan based on the Tourist Gaze Theory.
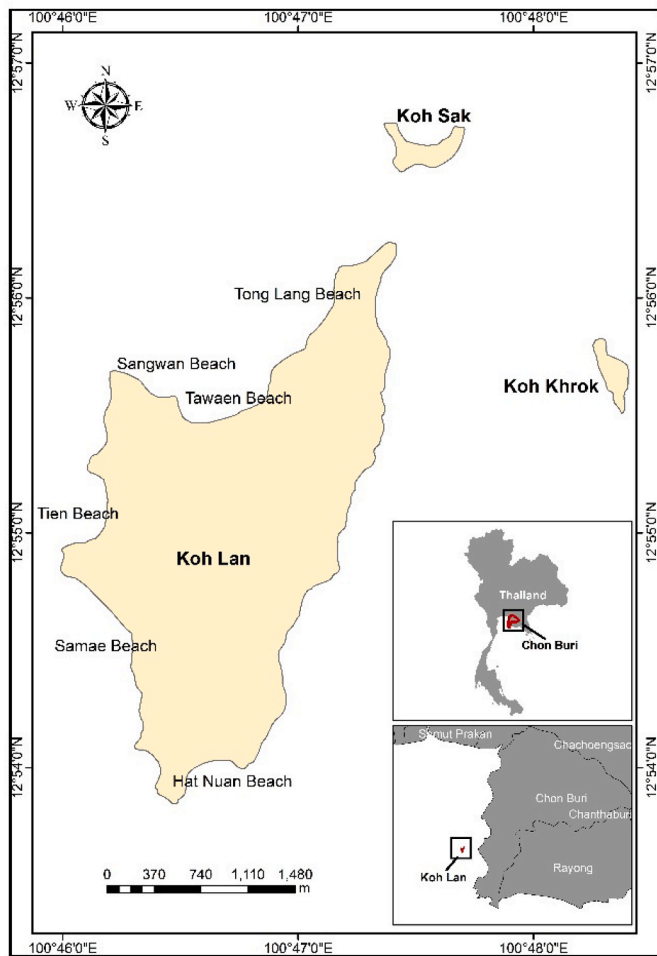
Table 1
Main contents of the questionnaire.

Research project	Main contents
Basic characteristics of the tourist group	Tourists' country, continent, gender, age and status
Behavior characteristics of the tourist group	Ways to obtain tourist information, number of trips, form of travel organization, stay time, willingness to stay, dietary solutions, timetable for tourist attractions
Tourists' satisfaction evaluation	Attractiveness evaluation of tourism activities (diving less than 5 m deep, diving 5–12 m deep, beach leisure, jet gliding, parasailing, banana boat rides, island scenery sightseeing, island culture sightseeing, etc.), artificial environment evaluation, tourism service satisfaction evaluation and improvement (island-land transportation, island roads, scenic spot transportation, catering, hotel accommodation, supporting facilities, attraction services, tourism management, etc.), and overall satisfaction evaluation

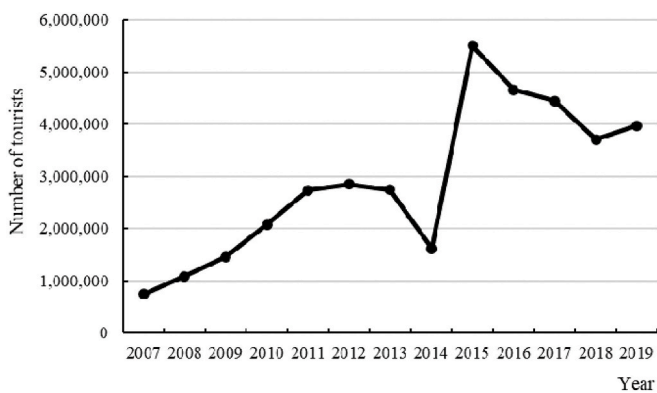**Fig. 2.** The location of Koh Lan.

Fig. 3. Number of tourists to Koh Lan from 2007 to 2019.

the existing literature about the current international island tourism and consumption behavior. Then the scale and the number of questions were revised through the pre-test, and the final form of the questionnaire was determined. The questionnaire consists of three parts: the basic characteristics, behavioral characteristics and satisfaction evaluation of tourists (Table 1). The questionnaire includes questions about the natural, cultural and economic environment of the island in three sections to examine the state of the tourism environment. In the questionnaire analysis process, it is assumed that all the returned questionnaires were based on the tourists' real information and the actual perception feedback to Koh Lan island.

The survey was conducted in Thailand's Koh Lan for 2 days, and 500 questionnaires were distributed at terminals, hotels and beaches. A half-day experimental survey was conducted before the large-scale issuance of the questionnaire. According to the experimental investigation, the questionnaires were sorted, and the order of the questions, the questionnaire layout, and the on-site investigation arrangements were adjusted. We conducted a preliminary analysis of the respondents and re-estimated the response rate and access time. According to the distribution density of tourists and the difference in hotel consumption levels, the survey sites selected were Sangwan Beach Pier, four beach attractions (Taya Beach, Sangwan Beach, Tien Beach and Tawaen Beach), and two hotels with different consumption grades. In these areas, 100 questionnaires were issued at the docks, 100 questionnaires were distributed in each of the two hotels and issued by the hotel, and 50 questionnaires were distributed in each of the four beach spots. Due to the complexity of the local situation, a total of 314 valid questionnaires were collected in this survey, with an effective rate of 62.8%.

4. The survey results and analysis

4.1. Pearson correlation analysis of satisfaction

It can be seen from the table that Number of trips, Stay time, Artificial environmental assessment and Dietary solutions all have significant correlation with Satisfaction evaluation. With the increase in the number of trips to Koh Lan, the satisfaction of tourists has declined. This shows that tourists who have come to Koh Lan many times have become tired of Koh Lan tourism and found some problems in Koh Lan's tourism industry. In addition, the longer the tourists stay on Lan Island, the higher their satisfaction, which shows that tourists have a favorite attitude to the natural landscape or tourism infrastructure of Koh Lan, so they choose to stay for a few more days. The artificial environment is an important part of the island's tourism environment. The more satisfied the tourists are with the artificial environment, the higher the satisfaction with the overall environment of the island's tourism. Tourists who tend to choose hotels to solve their dietary problems are more satisfied with Koh Lan tourism, which reflects that the diets provided by the hotels are more in line with the inner standards of tourists and the necessity to regulate the provision of catering services by roadside stalls (see Table 2).

4.2. Descriptive analysis

4.2.1. Basic characteristics of the tourist group

Regarding countries and continents, a total of 309 tourists were surveyed. These tourists came from 33 countries and regions, which

Table 2
Pearson correlation analysis of satisfaction.

Item	Satisfaction evaluation
Number of trips	−0.185[a] (0.001)
Stay time	−0.152[a] (0.007)
Willingness to stay	−0.027 (0.633)
Status	−0.072 (0.205)
Age	−0.009 (0.879)
Gender	0.006 (0.920)
Travel expenses	0.001 (0.983)
Artificial environmental assessment	0.347[a] (0.000)
Dietary solutions	−0.131[b] (0.020)

P value in brackets.
[a] The correlation is significant at the 0.01 level.
[b] The correlation is significant at the 0.05 level.

indicates the internationalization of tourism on the island. Due to the scattered distribution of countries and regions, the top three countries for the number and proportion of tourists were China, Thailand and Russia. The most tourists came from China, with 97 tourists, accounting for 31.4% of the total. The number of tourists from Thailand was 80, accounting for 25.9% of the total. The number of Russian tourists was 32, accounting for 10.4% of the total. Most of the tourists came from Asia, with a population of 220 with a ratio of 71.2%. The rest of the tourists came from Europe, North America, Australia and Africa, with proportions of 25.6%, 1.9%, 0.7% and 0.7%, respectively. The above data suggest that geographical distance has a certain attraction for tourists when choosing to travel to the island.

In terms of gender, there were slightly more male tourists than female tourists among the 307 visitors surveyed. In terms of age distribution, the 309 tourists surveyed were mainly concentrated in the age ranges of 18–25 and 26–35, accounting for 34.0% and 30.1%, respectively, indicating that most tourists are young people. With regard to the status of tourists, the survey included five categories, namely, single-dependent on parents, single-economic independence, married-childless, married-with minor children, and married-children are independent. Among the 310 tourists surveyed, the single-economic independent type had the highest proportion at 32.6%. The ratio of single-dependent on parents tourists was 21.9%. The married-with minor children, married-childless and married-children are independent groups constituted 18.4%, 13.9% and 13.2%, respectively (see Table 3).

4.2.2. Behavioral characteristics of the tourist group

A total of 312 visitors were surveyed on the ways in which they became interested in tourism in Koh Lan, including introduction by television, the Internet, travel agencies, friends and others. Visitors introduced by friends accounted for 34.6% of the total, 32.1% of tourists became interested in tourism on the island through the Internet, and 22.1% of tourists became interested in tourism through introduction by travel agencies. The proportion of visitors who became interested in learning about the island through television was only 1.3%. Introduction

by friends, networks and travel agencies were the main ways of attracting tourists' interest in the island according to the data.

Among the 310 tourists surveyed, 182 tourists came more than 3 times, with a proportion of 58.7%. Of the remaining visitors, 25.5% (79 tourists) were visiting for the first time, and 15.8% of the tourists were visiting for the second time (49 people). The statistics suggest that the tourist revisit rate is relatively high, which indicates that tourism on the island has a long-lasting appeal and that tourists are attracted to the island for leisure experiences.

There were five forms of tourism organizations in the questionnaire: tour groups, family members, friends, colleagues and others. A total of 312 tourists were surveyed on this issue. Of these tourists, 39.4% were with their families, 37.5% were with friends, and the proportions of tourists who chose tour groups, colleagues and other were 9.3%, 7.1% and 6.7%, respectively. Traveling with family and friends is the main form of tourism organization, indicating that self-help travel dominates the tourism of Koh Lan.

A total of 311 tourists were surveyed on the issue of residence time. Of those surveyed, 56.3% of tourists stayed for only 1 day, 18.7% of tourists stayed for 2 days, 17.0% of tourists stayed for 2–5 days, and 8% of tourists stayed for more than 5 days. According to the willingness of 309 tourists surveyed, the proportion of tourists who indicated that they did not stay on the island was 41.7%; the proportion of tourists who wished to stay at a hotel was 26.2%; the proportion of tourists who stayed at an ordinary hotel was 12.3%; and 19.8% of tourists wanted to stay at star hotels.

With regard to the issue of diet, 51.5% of the 297 tourists surveyed expressed their willingness to eat at the hotel, 36.7% of the respondents chose to eat at roadside stalls, and only 11.8% of tourists chose to address their dietary issues by themselves. Among the 273 tourists surveyed, 131 spent less than US $100, accounting for 48.0% of the total; 44.7% of the tourists spent between $100 and $500; and tourists who spent $500-$1000 and more than $1000 accounted for 2.9% and 4.4% of the total number of tourists, respectively. More than 90% of tourists spent less than $500 on travel, indicating that the cost of traveling is relatively low in Koh Lan. This is an important factor in attracting tourists to the island.

Regarding the timing of tourist attractions, the survey selected eight most popular tourist attractions in Koh Lan, including Tawaen Beach, Sangwan Beach, TongLang Beach, Tien Beach, Samae Beach, Hat Nuan Beach, Khrok Island and Sak Island. According to Fig. 4, the most visited attraction for tourists was Tawaen Beach, which accounted for 24.2% of the time. The main features of Tawaen Beach are a beautiful natural environment, a clean beach, blue water, colorful coral reef resources, and many souvenir shops, which attract masses of tourists. For Samae Beach, Tien Beach, Hat Nuan Beach, Sangwan Beach and TongLang Beach, the time ratios were 15.1%, 12.8%, 12.8%, 10.9%, and 10.6%, respectively. Khrok Island and Sak Island were scheduled for 7.3% and 6.3%, respectively.

Table 3
Basic characteristics of tourist groups surveyed.

Question	Option composition	Number of people	Percentage %	Question	Option composition	Number of people	Percentage %
Country	China	97	31.4	Continent	Asia	220	71.2
	Thailand	80	25.9		Europe	79	25.6
	Russia	32	10.4		North America	6	1.9
	Other	100	32.4		Oceania	2	0.7
Gender	Male	176	57.3		Africa	2	0.7
	Female	131	42.7	Age	Under 18	8	2.6
Status	Single-dependent on parents,	68	21.9		18–25	105	34.0
	Single-economic independence	101	32.6		26–35	93	30.1
	Married-childless	43	13.9		36–45	34	11.0
	Married-with minor children	57	18.4		46–59	46	14.9
	Married-children are independent	41	13.2		Over 60	23	7.4
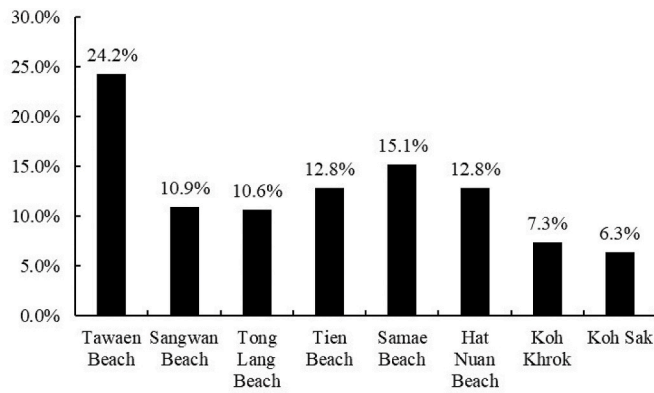
Fig. 4. Schedule of visitor attractions in Koh Lan.

Fig. 6. Degree of satisfaction and improvement in Koh Lan.
(1-island-land transportation, 2- island roads, 3-scenic spots' transportation, 4-catering, 5-hotel accommodation, 6-supporting facilities, 7-attractions services, 8-tourism management, 9- others)

4.2.3. Tourists' satisfaction evaluation

A total of 309 visitors were surveyed on the issue of the most important activities that attracted to the island. Due to the scattered selection of tourists, the simple calculation of the proportion of tourists cannot reflect the attractiveness of various tourism activities. Thus, the number of tourism activities selected by tourists was the total, and the proportion of various tourism activities was calculated separately. The results are shown in Fig. 5. Beach leisure activities have become the most attractive projects for tourists, with a proportion of 32.6%, which is due to the quality of beaches and the marine water quality on the island, which give the island great appeal. The attraction of diving (less than 5 m in depth) and island scenic spots for tourists was 13.4% and 12.1%, respectively. The appeal of the rest of the tourism activities was below 10%.

According to the survey results with regard to the aspects "what you think is satisfactory" and "what you think needs improvement", a four-quadrant map of improvement-satisfaction is constructed with satisfaction as the abscissa and improvement as the ordinate (Fig. 6). Catering and hotel accommodations are in the first quadrant, indicating that visitors are "satisfied with high-high improvement" in these areas. This shows that tourists have a "tough love" perception of the catering service and hotel accommodations on the island. Visitors believe that catering and hotel accommodations can be further enhanced to achieve a more satisfactory level of visitors' perceptions. The "supporting facilities" are located in the second quadrant, which shows tourists' perception of "low satisfaction and high improvement", indicating that the level of supporting facilities on the island is low and does not meet the expectations of tourists. Tourists have a strong desire to improve the facilities of the island and their service level. "Tourism management" is located in the third quadrant, indicating that tourists have "low satisfaction-low improvement" with regard to tourism management.
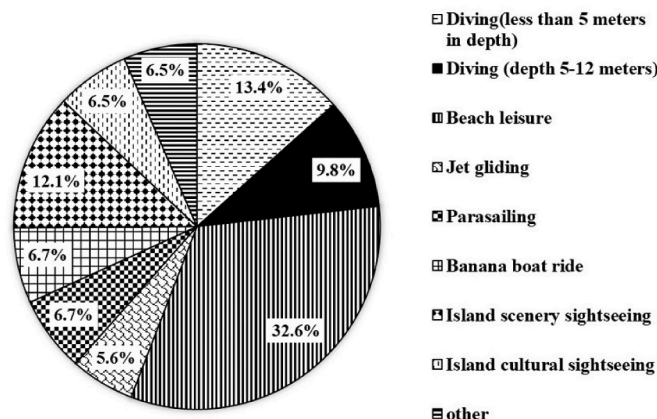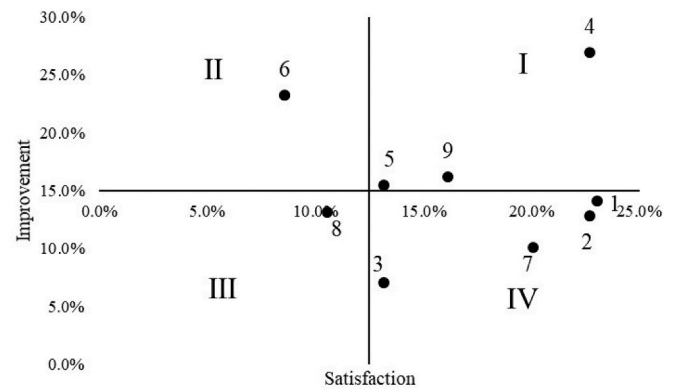
This situation may be due to the influence of "tough love". Visitors focus on the catering service and hotel accommodations when they choose the areas that need improvement. Although tourists are less satisfied with tourism management, they believe that the aspects that are more closely related to eating and living should continue to improve, resulting in a lower level of tourism management improvement. Island-land transportation, island roads, scenic spot transportation and scenic spot service are in the fourth quadrant, indicating that visitors are in a state of "high satisfaction – low improvement" with regard to these aspects. This means that the island is affirmed by tourists in terms of transportation and scenic spot service.

The artificial environment refers to the environmental elements formed by human activities. Among the 306 visitors surveyed, 32.7% of the visitors said that the artificial environment of the island was "very good but not distinctive", 27.5% of the tourists thought that the artificial environment was "pleasing and local", 26.8% of the visitors said "it is passable", and 13.0% of tourists thought that it was "very general", as shown in Table 4. From the evaluation of the artificial environment of the island by the interviewed visitors, it can be seen that the artificial environment is generally considered to lack features, although most tourists are satisfied with it. Some tourists believe that the artificial environment of the island is at a general level and does not meet their expectations. This shows that the artificial environment needs further optimization, strengthened innovation and a focus on characteristic construction.

Among the 301 tourists surveyed on their overall satisfaction of tourism, more than 90% of the tourists expressed that they were "satisfied" or "very satisfied" with the tourism of Koh Lan; of these, 54.5% were "satisfied" and 41.9% were "very satisfied". Only 3.7% of tourists stated that they were "unsatisfied" or "very dissatisfied" with the island tourism. Tourists are generally satisfied with the tourism of Koh Lan, and more than half of the tourists were "satisfied". The proportion of tourists who said that they were "very satisfied" was lower than the proportion of tourists who expressed "satisfaction". There is still room for improvement in the quality of tourism services on the island, and it has not yet reached the level of "very satisfactory" for most tourists (see Table 5).

5. Cross-analysis

5.1. Tourist status and travel expenses

There is a difference in the amount of money spent by different types of visitors (Fig. 7). In the questionnaires for the single-dependent on parents, single-economic independence, married-childless, married-with minor children and married-children are independent groups, the

Fig. 5. Evaluation of tourism activities in Koh Lan.

Table 4
Behavioral characteristics of tourists surveyed.

	Option composition	Number of people	Percentage %		Option composition	Number of people	Percentage %
Ways to obtain tourist information	Television	4	1.3	Form of travel organization	Tour group	29	9.3
	Internet	100	32.1		Families	123	39.4
	Travel agency	69	22.1		Colleagues	22	7.1
	Introduced by friend	108	34.6		Friends	117	37.5
	Other	31	9.9		Other	21	6.7
Number of trips	Three times or more	182	58.7	Dietary solutions	Bring food by themselves	35	11.8
	Twice	49	15.8		Roadside stalls	109	36.7
	Once	79	25.5		Hotels	153	51.5
Stay time	1 day	175	56.3		No stay	129	41.7
	2 days	58	18.7	Willingness to stay	Home stay hotels	81	26.2
	3–5 days	53	17.0		Ordinary hotels	38	12.3
	More than 5 days	25	8.0		Star hotels	61	19.8
Travel expenses (US dollars)	Under 100	131	48.0				
	101–500	122	44.7				
	501–1000	8	2.9				
	Over 1000	12	4.4				

Table 5
Evaluation of the artificial environment and overall satisfaction of Koh Lan.

	Option composition	Number of people	Percentage %		Option composition	Number of people	Percentage %
Artificial environmental assessment	Pleasing and local	84	27.5	Evaluation of overall satisfaction	Very satisfied	126	41.9
	Very good but not distinctive	100	32.7		Satisfied	164	54.5
	Passable	82	26.8		Unsatisfactory	8	2.7
	Very general	40	13.0		Very dissatisfied	3	1.0

tourists' travel expenses were mainly below US $500, and the proportions were 94.7%, 92.1%, 89.1%, 82.4% and 84.2%, respectively. It is obvious that the range of tourism expenditure is shifting to more than $500 with the evolution of tourists' status. Among the groups of tourists who were married-with minor children and married-children are independent, tourists who spent more than $500 on tourism accounted for 17.6% and 15.8%, respectively, of the total number of visitors. The correlation analysis suggested that the tourism cost and tourists' status are significantly positively correlated at the significance level of 0.05, and the correlation coefficient is 0.133. According to the above analysis, the amount of tourism spending should increase correspondingly with the evolution of the state of tourists because tourists in different states

differ in terms of income status and life pressures. In general, the higher the degree of evolution of tourists, the stronger their spending power.

5.2. Age and gender characteristics of tourism activity selection

According to the selection of tourism activities by tourists of different ages (Fig. 8), different tourism activities have different appeals to tourists of different ages. Visitors under the age of 18 tend to dive less than 5 m deep and dive 5–12 m deep, with a level of attraction of 23.1% and 30.7%, respectively. Beach leisure activities are more attractive to tourists over the age of 18, and the proportion of tourists of all ages for these activities reached more than 30%. Beach leisure activities have
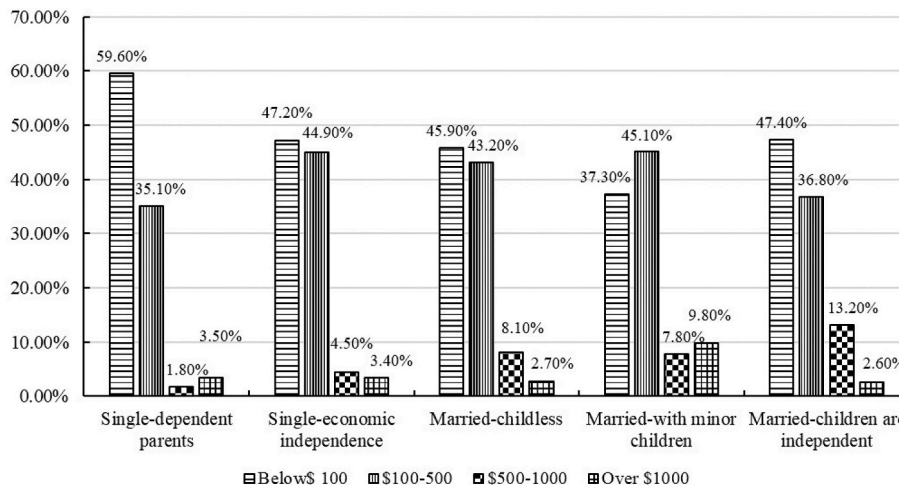

Fig. 7. Comparison of tourism spending conditions for different states of tourists.

become the favorite tourist activities for tourists over 18 years old. In addition, visitors aged 18–25 and 36–45 have a greater interest in island scenery sightseeing and diving less than 5 m in depth, with a level of attraction of more than 10%. Diving less than 5 m in depth and diving 5–12 m in depth attracted 14.2% and 12.1% of visitors aged 26–35, respectively. Tourists aged 46–59 are more interested in diving less than 5 m in depth, island scenery sightseeing and parasailing. Tourists over the age of 60 tend to enjoy scenic island tours and island cultural tours. The above analysis suggests that beach leisure has become a popular tourist activity for tourists of all ages. Diving less than 5 m in depth and island scenic sightseeing activities are also popular among tourists. The age characteristics of tourists are obvious in the choice of tourism activities. Young tourists under the age of 35 tend to dive 5–12 m deep, parasail and perform other exciting tourism activities. Middle-aged and older tourists over 35 years old tend to enjoy activities that are less stimulating, such as scenic tourism, cultural sightseeing and diving less than 5 m in depth.

As shown in Fig. 9, male tourists and female tourists have different preferences for tourism activities. Beach leisure activities are enjoyed by 53.4% of male tourists and 45.8% of female tourists, and the rest of the tourism activities are less than 25%. Furthermore, 22.2% of male tourists and 14.5% of female tourists believe that island scenery sightseeing is attractive, and diving less than 5 m in depth attracts 20.5% of male tourists and 20.6% of female tourists. Tourist activities that show different preferences for male and female tourists include banana boat rides, island scenic tours, and jet gliding. Male tourists are more interested in beach leisure, banana boating, island scenery sightseeing, jet gliding and diving 5–12 m than female tourists, while female tourists are more interested in island cultural tourism than male tourists.

5.3. Residence time and accommodation willingness

Most of the tourists who stayed for one day chose not to stay on the island. Most tourists who chose to stay for one day chose a star hotel, and fewer tourists chose ordinary hotels and home stays as accommodations. Visitors who stayed for 2 days and 3–5 days had a lower proportion of non-residential stays. Most tourists who stayed for 2 days and for 3–5 days chose the home stay hotel as a place to stay, and the proportion of
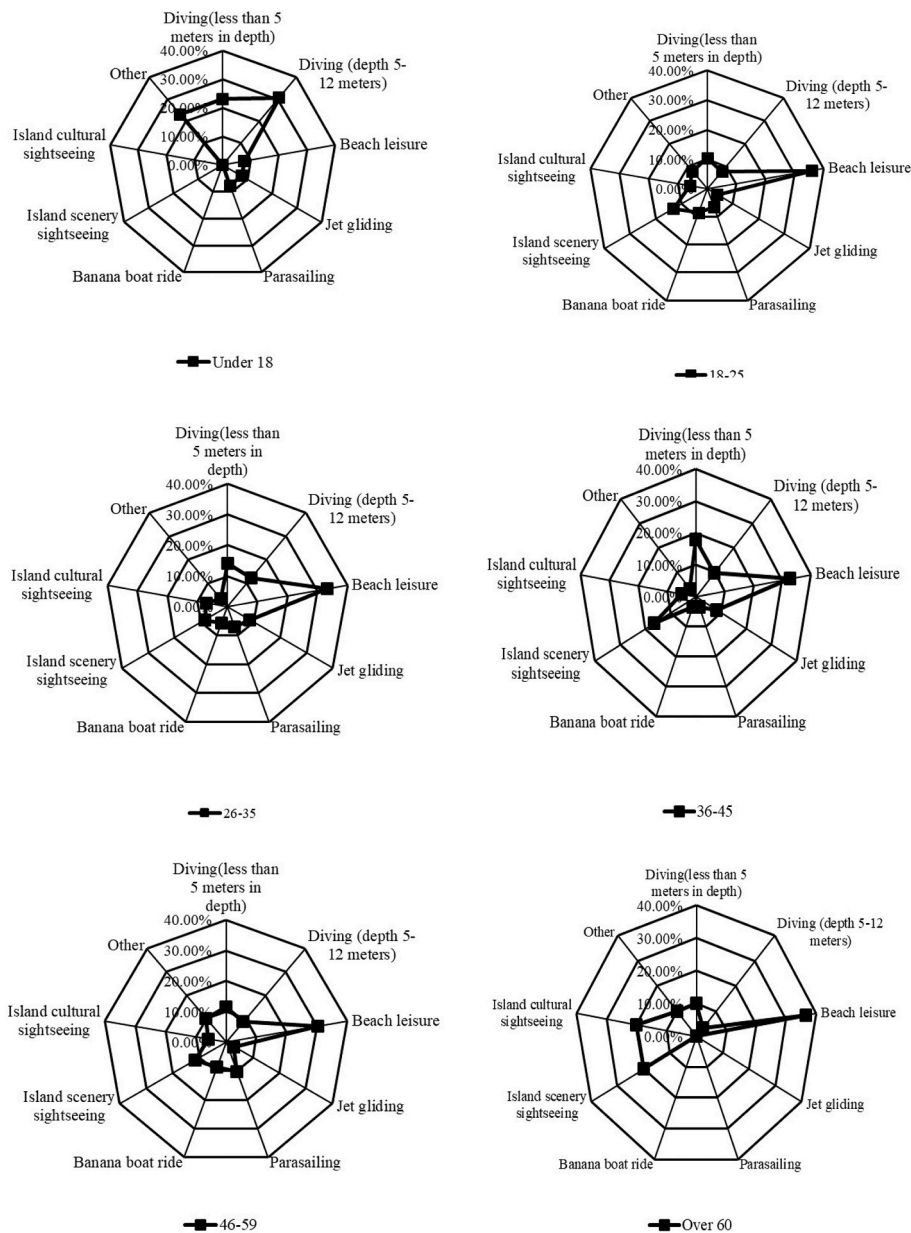
Fig. 8. Preferences of tourists of different ages for tourism activities.
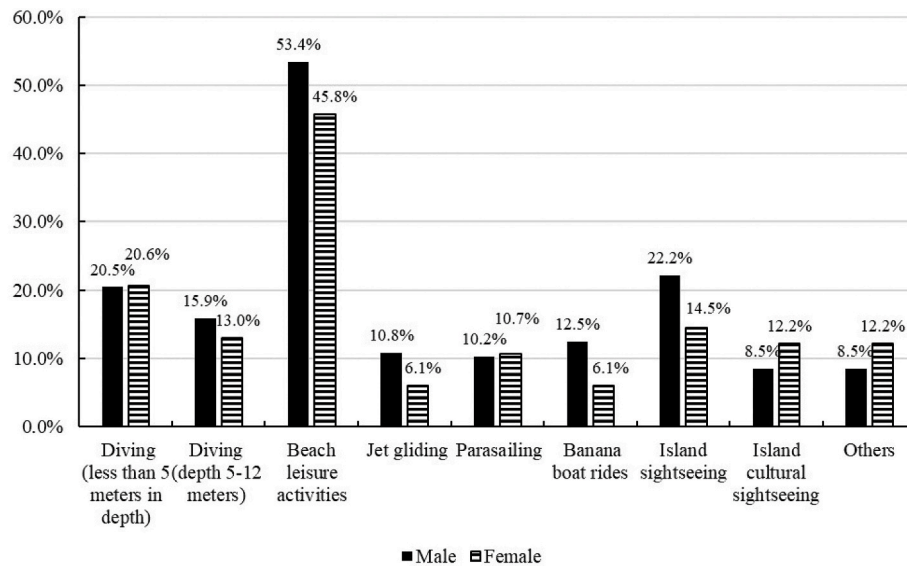
Fig. 9. Preferences of tourists of different genders for tourism activities.

tourists who chose ordinary hotels and star hotels was basically the same. Visitors who stayed for more than 5 days had a higher proportion of home-stay hotels and star hotels, both of which were 36.0%. The home stay facility was the main accommodation choice among tourists who chose to stay. Compared with the standard accommodations, the price of home stay hotels is relatively low, and their island features are obvious. Visitors who stay for one day have a high proportion of non-residence, which is in line with expectations (see Table 6).

5.4. Number of trips and residence time

Most of the tourists who traveled to Koh Lan for the first time and the second time stayed for more than two days, while most of the tourists who visited the island for the third time or more stayed for one day. Furthermore, 48.7% of the tourists who visited the island for the first time chose to stay for 1 day, and tourists who visited for the second time chose to stay for 1 day at a rate of 40.8%. The proportion of tourists who traveled for the third time or more to the island for one day reached 64.1%, and the proportion of tourists staying for more than 2 days is shrinking. The correlation analysis showed a significant correlation between the number of trips and stay time at a significance level of 0.01. The fewer the number of trips, the longer the visitors stayed. As the number of visits to Koh Lan increases, the tourism project becomes more familiar, and tourists' travel preferences gradually form, resulting in saved travel time and reduced stay time. Therefore, it is necessary to offer various tourism activities to extend the stay time of tourists who have visited many times (see Table 7).

6. Conclusion and implications

6.1. Conclusion

A questionnaire survey of visitors to Koh Lan showed that tourists are relatively satisfied with the overall tourism environment. However, it is generally believed that the artificial environment lacks attractive characteristics and that the level of supporting facilities needs to be improved. The tourist groups have obvious characteristics of tourism behavior, reflecting the characteristics of the tourism environment of the island. The specific findings are as follows.

(1) 66.7% of tourists become interested in tourism through friends and networks, and 76.9% of them travel together with their families and friends more than once. (2) The time that tourists stay is short, 56.3% of them stay for one day, resulting in more than 40% of visitors not to stay. 51.5% of tourists are willing to eat at the hotel, and 92.7% of travel cost is usually less than US $500. (3) The time difference between tourists' visits to the scenic spots of Koh Lan is obvious, and 24.2% of the time is used to visit Tawaen Beach, which is the most attractive scenic spot on the island. (4) The age and gender characteristics of tourists are obvious in the selection of their favorite tourism activities. Older tourists and female tourists prefer sightseeing tourism activities, and young tourists and male tourists may be more inclined to relatively stimulating tourism activities. (5) Regardless of the age or gender classification of tourists, beach leisure is the most attractive activity. (6) The home stay hotel is the most popular place to stay among tourists who choose to stay.

6.2. Disadvantages of tourism development in Koh Lan

Based on the above conclusions, shortcomings in the tourism industry of the island can be identified. (1) The homogenization of the construction of the artificial environment does not fully highlight the

Table 6
Visitors' willingness to stay with different stay times.

Stay time	No stay	Home stay hotels	Ordinary hotels	Star hotels	Total number
1 day	68.2%	8.1%	7.5%	16.2%	173
2 days	7.1%	46.4%	23.2%	23.2%	56
3–5 days	3.8%	60.4%	15.1%	20.8%	53
Over 5 days	12.0%	36.0%	16.0%	36.0%	25

Table 7
Visitors' stay time with different travel times.

Travel times	1 day	2 days	3–5 days	Over 5 days	Total number
Three times or more	64.1%	14.9%	15.5%	5.5%	181
Twice	40.8%	40.8%	16.3%	2.0%	49
Once	48.7% %	12.8%	20.5%	17.9%	78

characteristics of the island, which makes it easy for tourists to become bored with the tourism environment. (2) Tourists stay for a short period of time on the island, and the length of stay directly affects the improvement of tourism consumption and the development of the local economy. In the tourism activities of the island, there is a lack of activities to attract tourists to extend their stay time. (3) The level of service facilities of the tourism industry does not meet the expectations of tourists and needs to be further improved. (4) Tawaen Beach is visited for the longest time by tourists. In addition to the beautiful natural scenery of Tawaen Beach, the goods and souvenirs are an important reason for tourists to spend more time. Thus, sales outlets need to be optimized to help extend tourists' time and improve efficiency.

6.3. Implications for the development of island tourism

6.3.1. Establishing the concept of ecotourism and strengthening the ecological protection of islands

Koh Lan can attract many tourists to experience various tourism activities, mainly due to high-quality tourism resources, and the protection awareness of the original island's tourism resources and ecosystems that managers have. However, some tourism resources are destroyed in the actual protection process, which leads to the decline of the quality of perception of some tourist (Theppitak, 2010). The high-quality ecological environment provides visitors with a unique sense of enjoyment, which makes Koh Lan's tourism have a higher tourist revisit rate. Therefore, first, countries should develop consciousness of eco-tourism and achieve orderly planning and development in the process of developing island tourism. At the same time, the development of island resources should consider the local geomorphological features and combine the artificial environment with the local natural environment to achieve the ideal state of "liking nature itself", giving visitors a unique experience. This will create a long-lasting appeal. Second, a sustainable island tourism industry foundation and operational system should be established to properly deal with solid waste and domestic sewage generated by tourists during the tourist journey to minimize the possible ecological pollution of islands. Finally, it is necessary to control the development intensity of island resources and to control the approval process of development projects. According to the environmental characteristics of different islands or the characteristics of different locations of the same island, moderate development should be carried out to avoid the destruction of the island ecosystem caused by over-exploitation.

6.3.2. Developing diverse island tourism activities and creating special brand activities

Visitors choose a travel event to experience based on their own preferences. This requires a wealth of tourism activities for visitors to choose. Koh Lan's diverse tourism activities meet the needs of different tourists. Furthermore, the island is known by tourists for diving, water parachutes, banana boats and other tourism activities, which enhances the popularity of island tourism. Diversified tourism activities are a direct way to improve the quality of island tourism. Because of the closed nature of islands, island tourism activities require three-dimensional development based on the three dimensions of island, sea and sky. Island tourism activities can be designed from the perspective of natural scenery. It can be seen that the age and gender characteristics of the Koh Lan tourism project preferences are obvious from the above analysis results, and the spending power of their tourist groups is significantly different. Therefore, it is necessary to consider the age characteristics and spending power of the main tourist groups when designing a tourism activity project. For example, the relevant departments of Koh Lan can carry out the thematic tourism option on the coral reefs, relying on abundant coral reef resources. And the theme of beach parties can be carried out with the high-quality beaches. In addition, tourism activities can be designed using the unique island cultural resources of each country because culture is the most effective

tool to make tourism resources have a long-lasting appeal. It would be helpful to form a brand event with local island characteristics by holding a theme cultural event. It is also possible to carry out theme travel projects in conjunction with traditional Thai festivals. This would not only attract tourists to extend their visit but would also meet the needs of tourists. This would benefit the promotion of excellent traditional culture and the popularity of island tourism.

6.3.3. Strengthening island tourism propaganda through a variety of publicity channels

The development of island tourism needs to be publicized, and high-end island tourism brands can be created through publicity. Propaganda can be understood from the perspectives of tourism operators and tourists. According to the survey data, 32.1% of the interviewed tourists learned travel information through the Internet. The propaganda channels of tourism operators have mainly developed from traditional media, such as newspapers and television, to new Internet media, and tourists indirectly promote island tourism by making recommendations and providing feedback to relatives, friends, and tour groups. With the advent of the Internet era, tourists increasingly rely on the Internet to obtain information on island tourism. Thus, relevant government departments and tourism operators should change their marketing ideas and focus on promoting the tourism brand of the island through networks to stimulate public interest. At the same time, they should continue to increase investment in traditional media to strengthen the promotion of the island tourism image. Cooperation with travel agencies should be extended, and island tourism should be promoted through the portals and brochures of travel agencies. The promotion of island tourism should adhere to the integration of traditional media and emerging media to form a comprehensive tourism promotion network system.

6.3.4. Improving the infrastructure construction of the island and integrating the island's characteristic elements

Currently, the homogeneity of the island tourism infrastructure is a serious problem, which is also reflected in Koh Lan. 32.7% of the respondents believe that the artificial environment of Koh Lan lacks characteristics. Countries with a late start in the development of island tourism have a late-mover advantage in the construction of island tourism infrastructure. Relevant departments should actively improve the island tourism infrastructure and use creative thinking to integrate the island's local cultural elements into the infrastructure construction based on the experience of Koh Lan's tourism infrastructure construction. First, it is necessary to improve the catering service level of scenic spots, create a dining environment with local characteristics, and provide special local foods on the island. Second, relevant departments should actively improve the accommodation conditions of ordinary and star hotels and focus on building island-specific residential houses to attract tourists to stay. At the same time, they should promote management standardization and service standardization to improve the quality of accommodation services. Finally, the transportation infrastructure should be improved, the number of round trips between the islands and land should be increased, and dilapidated vessels should be replaced. It is necessary to optimize the road layout on the island and improve the road safety monitoring system to ensure the safety of tourists based on the distribution rules of tourist attractions.

6.3.5. Reasonable distribution of commodity sales outlets to provide a variety of souvenirs and commodities

Shopping is an important means for tourists to obtain tourism satisfaction and is a major component of island tourism revenue. Most of Koh Lan's tourism revenue comes from tourists buying goods and souvenirs. According to the survey results, 56.3% of the tourists surveyed stayed only one day. And this directly leads to the shortening of shopping time for Koh Lan tourists. Therefore, it is currently the most direct way to increase the revenue of island tourism by rationally planning the

sales outlets of goods and optimizing the layout of outlets to extend the stay time of tourists. The major tourist attractions have large numbers of tourists in the process of organizing island tourism, which is suitable for setting up sales points for goods and souvenirs. According to the flow of tourists in major tourist attractions, sales outlets should be established to provide commodities and souvenirs with the characteristics of the attractions. Product sales outlets should be properly distributed on both sides of the main roads on the island. Their design should highlight the local cultural characteristics of the island and promote the added value and level of souvenirs to stimulate the identity and consumption desire of the tourists. Special souvenirs and merchandise are purchased by tourists and brought back to their original place of residence, which can help to create indirect publicity.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Agapito, D., Mendes, J., Valle, P., 2014. Exploring the conceptualization of the sensory dimension of tourist experiences. J. Destin. Market. Manage. 2, 62–73. https://doi.org/10.1016/j.jdmm.2013.03.001.
Bai, D., Ma, Y.F., Liu, J.S., 2016. Evaluation of the tourists' perception to the world heritage tourism destination based on grounded theory. J. Arid Land Resour. Environ. 30, 198–203. https://doi.org/10.13448/j.cnki.jalre.2016.204.
Bertan, S., AltıNtaş, V., 2013. Visitors' perception of a tourism destination: the case of Pamukkale. Tourismos 8, 115–132.
Brida, J.G., Osti, L., Barquet, A., 2010. Segmenting resident perceptions towards tourism - a cluster analysis with a multinomial logit model of a mountain community. Int. J. Tourism Res. 12, 591–602. https://doi.org/10.1002/jtr.778.
Chen, J.H., 2012. Empirical study on the island tourism environment based on tourists' perception——taking Gulangyu and Meizhou Islands on the west side of the straits as cases. J. Fujian Agric. For. Univ. (Nat. Sci. Ed.) 15, 63–67. https://doi.org/10.3969/jissn.1671-6922.2012.02.013.
Deng, Y.R., He, Q.H., Liu, P.L., 2014. Evaluation of low carbon environment education in mountain-type scenic spots based on tourists' perception——taking Nanyue Hengshan as an Example. Human Soc. Sci. 2, 224–228. https://doi.org/10.3969/j.issn.1009-5675.2014.02.057.
Du, J.Y., Peng, H.D., 2018. A study on the influence of tourist destination image on tourist' perception-using Guangzhou Huadu District as an example. Spec. Zone Econ. 7, 103–106.
Eid, R., Elgohary, H., 2015. The role of Islamic religiosity on the relationship between perceived value and tourist satisfaction. Tour. Manag. 46, 477–488. https://doi.org/10.1016/j.tourman.2014.08.003.
He, X.Q., Li, Ch.N., Xu, J.J., 2018. The features of tourists perception of popular science education in Mount Longhu global Geopark. J. Arid Land Resour. Environ. 32, 202–208 https://doi.org/CNKISUN:GHZH.0.2018-08-032.
Jiao, Sh.T., 2013. Research on the evaluation system of the tourist perception of ethnic cultural travel performing arts products based on factor analysis. Hum. Geogr. 28, 150–154.
Kerr, S.A., 2005. What is small island sustainable development about? Ocean Coast Manag. 48, 503–524. https://doi.org/10.1016/j.ocecoaman.2005.03.010.
Kraftchick, J.F., Byrd, E.T., Canziani, B., et al., 2014. Understanding beer tourist motivation. Tour. Manage. Persp. 12, 41–47. https://doi.org/10.1016/j.tmp.2014.07.001.

Larsen, J., Urry, J., Axhausen, K.W., 2007. Networks and tourism: mobile social life. Ann. Tour. Res. 34 (1), 244–262. https://doi.org/10.1016/j.annals.2006.08.002.
Liang, W.B., Gao, X.Q., 2010. The foreign visitors' perception and appraisal to the tourism environment in Guilin. J. NW Univ. 40, 319–322.
Liu, Zh.X., Ma, Y.F., Li, S., Niu, Y.L., Wei, T., 2015. Evaluation on the factors influencing the tourism image of Beijing based on tourists' cognition and perception. J. Arid Land Resour. Environ. 29, 203–208. https://doi.org/10.13448/j.cnki.jalre.2015.106.
Moyle, B.D., Weiler, B., Croy, G., 2013. Visitors' perceptions of tourism impacts. J. Trav. Res. 52, 392–406. https://doi.org/10.1177/0047287512467702.
Pan, F.C., 2015. Practical application of importance-performance analysis in determining critical job satisfaction factors of a tourist hotel. Tourism Manag. 46, 84–91. https://doi.org/10.1016/j.tourman.2014.06.004.
Peng, X., Ye, Ch.F., Yang, J.Y., Yang, J.B., Chen, Sh.B., Wang, N., 2012. Practice and experience of biodiversity conservation of Nanji Islands based on island management. Ocean Dev. Manage. 29, 93–100. https://doi.org/10.3969/j.issn.1005-9857.2012.05.026.
Povilanskas, R., Armaitienè, A., Dyack, B., Jurkus, E., 2016. Islands of prescription and islands of negotiation. J. Destin. Market. Manag. 5, 260–274. https://doi.org/10.1016/j.jdmm.2016.01.004.
Prayag, G., Brittnacher, A., 2014. Environmental impacts of tourism on a French urban coastal destination: perceptions of German and British visitors. Tourism Anal. 19, 461–475. https://doi.org/10.3727/108354214X14090817031116.
Ramdas, M., Mohamed, B., 2014. Visitor perceptions on the impacts of tourism activities, development and infrastructure on the environment of Perhentian Islands. In: International Conference on Tourism Research. EDP Sciences. https://doi.org/10.1051/shsconf/20141201081, 2014.
Rittichainuwat, B.N., 2013. Tourists' and tourism suppliers' perceptions toward crisis management on tsunami. Tourism Manag. 34, 112–121. https://doi.org/10.1016/j.tourman.2012.03.018.
Spanou, S., Tsegenidi, K., Georgiadis, T., 2012. Perception of visitors' environmental impacts of ecotourism: a case study in the Valley of Butterflies protected area, Rhodes Island, Greece. Int. J. Environ. Res. 6, 245–258.
Teng, Y., Wang, X.Ch, Pan, X.X., 2018. A study on IPA analysis of Yangzhou food landscape based on tourists'perception. J. Res. Diet. Sci. Culture 35, 60–64 https://doi.org/CNKI:SUN:YZPX.0.2018-03-014.
Tervokankare, K., Hall, C.M., Saarinen, J., 2013. Christmas tourists' perceptions to climate change in Rovaniemi, Finland. Tourism Geogr. 15, 292–317. https://doi.org/10.1080/14616688.2012.726265.
Theppitak, T., 2018. Managing tourism logistics with sustainable development of eco-tourism. Int. J. Adv. Sci. Res. Dev. 5, 1–11.
Theppitak, T., 2010. Applying logistics management to Koh lan coral island to enhance sustainable nature-based tourism. Univ. Thai Chamber Commer. J. 30 (4).
Tiberghien, G., Bremner, H., Milne, S., 2016. Performance and visitors' perception of authenticity in eco-cultural tourism. Tourism Geogr. 19, 287–300. https://doi.org/10.1080/14616688.2017.1285958.
Urry, J., 1990. The Tourist Gaze: Leisure and Travel in Contemporary Society. Sites of Memory, Sites of Mourning: the Great War in European Cultural History.
Urry, J., 2002. The Tourist Gaze: Leisure and Travel in Contemporary Societies, second ed. Sage, London – Thousand Oaks – New Delhi.
Wang, Zh.F., Lu, M.S., 2016. Analysis of tourist market structure, tourist behavior and perception in ethnic areas——a case study of Xiangxi Prefecture. J. Southwest Univ. Natl. (Humanities Soc. Sci.) 37, 148–153. https://doi.org/10.3969/j.issn.1004-3926.2016.12.025.
Yin, Zh.X., Luo, W.B., 2018. Empirical analysis of the relationship among tourists' urban perception of nontourism aspects, tourist satisfaction and loyalty: taking Changsha as an example. Econ. Geogr. 38, 212–217. https://doi.org/10.15957/j.cnki.jjdl.2018.01.02.
Zhao, L., Wu, W.Zh., Li, J., Wu, Y., 2018. The formation mechanism of tourist loyalty in ecotourism scenic spots from the perspective of tourist perceived value: evidence from Xixi National Wetland Park. Acta Ecol. Sin. 19, 1–12. https://doi.org/10.5846/stxb201707291366.
Zheng, Ch.X., 2014. Study on enhancing tourists' experience quality of cultural tourism products from perception: the case of Gongfu Tea cultural tourism of south Fujian. J. Heinan Univ. (Nat. Sci.) 44, 683–692. https://doi.org/10.3969/j.issn.1003-4978.2014.06.011.