Mining tourist imagery to construct destination image position model

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Abstract

This study presents a position model for evaluating the image of tourists a destination. The evaluation is based on secondary data from 1999 through 2004, using a database composed of 20,023 respondents. Data are analyzed using the K-Means data mining method. Analytical results indicate that the destination image position (DIP) model is established, and four groups of visitor are identified. This study provides valuable information for tourism planners and marketing professionals attempting to develop offers that are well adapted to the needs of their target markets.
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Keywords: Data mining; Destination image; Positioning; Formosa

1. Introduction

Marketing of tourist destinations has recently become a very interesting field of research (Castro, Armario, & Ruiz, 2007; Enright & Newton, 2004; Hosany, Ekinci, & Uysal, 2006; Pike, 2002). In particular, the image of a destination has become a very important issue in the marketing research in the tourism industry, since many countries use promotion and global marketing to support their image and to compete with other destinations. Such research is increasingly important because the image of a destination is an essential factor in influencing tourist satisfaction and choices (Castro et al., 2007; Han, 1990; Joppe, Martin, & Waalen, 2001).

However, image is difficult to determine, because it is highly subjective, including both cognitive (beliefs) and affective aspects (feelings) (Baloglu & Brinberg, 1997; Castro et al., 2007; Mackay & Fesenmaier, 2000). Hence, statistical analysis is needed to help firms to identify the most important factors influencing tourists' perception, especially for devising marketing strategies. Pike (2002) reviewed of studies on destination image from 1973–2000 shows that the most popular data anal-

ysis techniques in analyzing the destination image are factor analysis (Coshall, 2000; Leisen, 2001;), t-testing (Chaudhary, 2000), perceptual mapping (Kim, 1998), analysis of means (Baloglu & Brinberg, 1997; Enright & Newton, 2004; Joppe et al., 2001), cluster analysis (Leisen, 2001) and importance performance analysis (Chaudhary, 2000; Chen, 2001; Enright & Newton, 2004; Joppe et al., 2001). Canonical correlation analysis has also recently been applied in destination image research (Hosany et al., 2006). Previous research has largely concerned the image perception and attitudes of repeat tourists.

Information technology provides many useful tools for customers and firms in handling their decision problems (Lin & Hong, 2008). Methods that combine expert systems with knowledge management have recently been presented (Holden, 2004; Li, 2005; Liu & Ong, 2008; Wang & Hong, 2006). Knowledge management depends on many databases being available for testing and verification. Additionally, compares various conventional data analysis techniques, clearly revealing that knowledge management yield the most useful analytical results in made practical strategy.

Researchers have traditionally applied statistical surveys to examine customer behavior. Data mining has recently been widely adopted to predict customer behavior (Giudici

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& Passerone, 2002; Lin & Hong, 2008; Song, Kim, & Kim, 2001). Data mining is one of the most popular methods for identifying potential customer knowledge in business databases to improve decision-making in a firm, by automatically or semi-automatically mining and analyzing large amounts of data in a business database, and discovering potential significant underlying patterns and rules in the data (Hsu & Chen, 2007; Liao, Hsieh, & Huang, 2008; Lin & Hong, 2008; Wang & Hong, 2006). K-means is widely used to analyze market segmentation and positioning (Kim & Ahn, 2008). Data mining is undoubtedly an effective way of discovering the image of a destination for marketing.

Data mining is very effective for determining destination image marketing strategies. Previous studies have applied data mining in tourism marketing research, but none have considered destination image. Therefore, this study has two principal aims: (1) to adopt data mining to build a position model for assessing a destination image and (2) to improve understanding of a destination's ability to satisfy, provide value and influence tourists to visit the destination again. The authors hope that the information provided in this study will help tourism planners and marketing professionals to develop offers that fit the requirements of their target markets. Moreover, the proposed technique could also prove useful in marketing various tourist destinations.

2. Destination image position (DIP) model

Individuals associate images with specific places. A destination image is defined in terms of the sensual, aesthetic and emotional dimensions of space, and is often based on contradictory emotions (González, 2005). The sense of place is created through experience in the spatial setting. Abstract space, which lacks significance other than strangeness, becomes a concrete place filled with meaning through human experience (Tuan, 1977). Increasingly, the abstract becomes particular; the amorphous becomes concrete; contingencies become commitments, and movement becomes pause. A destination image is generally in terms of three sets of criteria, based on (1) regulatory framework, (2) business environment & infrastructure and (3) human, cultural and natural resources. The first of these categories denotes elements that are policy-related and generally under the control of the government; the second category represents elements of the business environment and the economic infrastructure of, and the third category indicates the human and cultural elements of a destination's resources (The World Economic Forum, 2007).

The image of a destination brand can be defined as the perceptions of a place as reflected by the associations held in a tourist's memory (Cai, 2002). Anderson's (1983) psychological theory of adaptive control of thought to describe that a person's knowledge structure or memory as "a simple network in which all elements or units are nodes, and the connections among them are links". The nodes denote various pieces of information stored in mem-

ory, and links represent the strength of associations between them. An information node, which can be verbal, visual or abstract, is activated in working memory when a stimulus is present in an external environment (such as a word pronounced or picture presented), or when an internal production occurs (such as when the picture is encoded and interpreted).

Fig. 1 shows the proposed framework for integrating the internal and external factors identified in previous literature. A two-dimensional destination image position (DIP) model is presented, in which one dimension denotes the internal driving forces, namely place formation processes, and the other dimension represents the external driving forces, namely the destination image evaluation. The DIP model can scale these factors to compare empirical application or static scales for a set of similar destinations by the K-Means method. The positioning process also involves a segmentation process, enabling the targeting of a destination to the visitors who are most likely to appreciate it (Mykletun, Crotts, & Mykletun, 2001). Therefore, this model provides a new method of categorizing destination image positions, based on the appeal of a destination to its visitors.

3. Method

3.1. Data collection

This study used secondary data accumulated from Taiwan Tourism Bureau Ministry of Transportation and Communication, ROC. (The Tourism Bureau, M.O.T.C.) *Visitors Expenditure and Trends in Taiwan Survey Report*, which is a yearly statistical report of the Tourism Bureau, M.O.T.C., based on responses from overseas tourists. This work analyses is conduct with data that covered a period from 2000 through 2005. The total number of observations in the sample was 20,023.

Destination image and personal statistics were based on data filed by the Tourism Bureau, M.O.T.C. Statistics Executive Information System. The data were collected from two international airports. This study summarizes destination image, satisfaction, travel trends and personal details of visitors filed with the Tourism Bureau, M.O.T.C. in writing, by questionnaire in person. The following ten destination image variables are adopted: environmental sanitation, public security, recreational facilities, traffic, price, food & beverages, history & culture, friendliness of people, climate and scenery & landscape. The respondents were asked to state the extent of their agreement to these image items on a three-point scale.

3.2. Data analysis

Fig. 2 illustrates the stages of data analysis. A two-stage method was used to build the DIP model. In the first stage, Clementine K-Means was applied to mine the destination
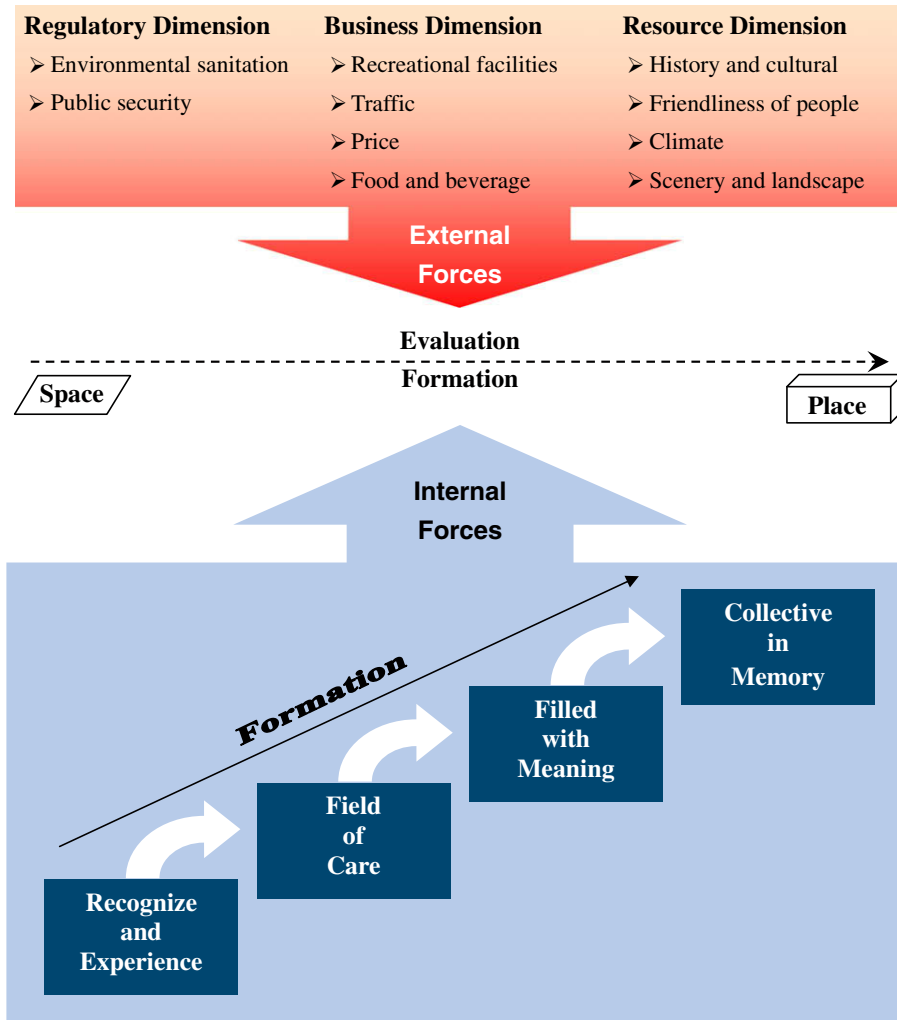
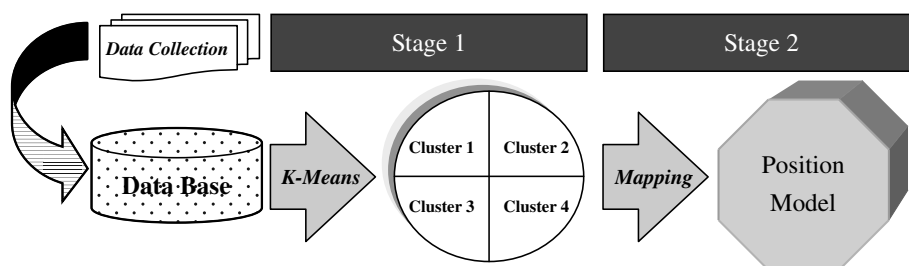Fig. 1. Research model of destination imaging.

Fig. 2. The system of data analysis stages.

images of international visitors. Cluster K-Means is optimized for speed, and is suitable for very large social surveys. Moreover, K-Means can handle different types of variables, especially those that occur in survey questionnaires and database records. It is developed specifically for use in market segmentation, and offers several unique features. Clustering is one of the most popular data mining methods. The goal of clustering is to identify distinct clusters in a dataset. The second stage adopts the analysis result of first stage to build and construct the DIP model.

3.3. Sample distribution

The total number of observations in the sample, as shown in Table 1, was 20,023. The samples mainly comprised Japan (39.4%) and American (12.3%) visitors, with

Table 1
Sample distribution

Items	n	%	Items	n	%
Nationality			*Occupation*		
Japan	7895	39.4	Legislators and managers	4,951	25.5
Singapore	370	1.8	Professionals	5,183	26.7
Korea	981	4.9	Technicians and assistant	1,676	8.6
Malaysia	141	0.7	Clerks	3,559	18.3
Indonesia	97	0.5	Service workers and shop/market salesman	872	4.5
Other areas of Asia	1074	5.4	Agricultural, husbandry, forestry and fishing workers	155	0.8
America	2470	12.3	Production, plant/ machine operators and labors	249	1.3
Canada	517	2.6	Housewife	913	4.7
England	996	5.0	Students	1,446	7.4
France	471	2.4	Retired	411	2.1
Germany	945	4.7	Total	19,415	100.0
Other areas of Europe	1375	6.9			
New Zealand and Australia	653	3.3			
Others country	360	1.8			
overseas Chinese	1676	8.4			
Total	20,021	100.0			
Income (US$/per year)			*Age*		
Under 10,000	1856	10.4	Under 19	246	1.2
10,000–14,999	970	5.5	20–29	5,432	27.1
15,000–29,999	1997	11.2	30–39	5,786	28.9
30,000–39,999	2891	16.3	40–49	4,347	21.7
40,000–69,999	4808	27.1	50–59	3,125	15.6
70,000–99,999	2997	16.9	60 and Over	1,087	5.4
Over 100,000	2251	12.7	Total	20,023	100.0
Total	17,770	100.0			
Education			*Gender*		
Primary school	131	0.7	Male	14,845	74.1
Junior high school	3,160	16.1	Female	5,178	25.9
College and upward	16,359	83.3	Total	20,023	100.0
Total	19,650	100.0			

Note: n = 20,023.

relatively few passengers from Malaysia (0.7%) and Indonesia (0.5%) visiting Taiwan among the participants. Approximately 27% of respondents had annual incomes of US$40,000–$69,999; 16.9% earned $70,000–$99,999, and 16.3% earned $30,000–$39,999. Over 80% of respondents had college degrees or above. Over 25% of the respondents were professional, including legislators, administrators, business executives and managers. Moreover, 18% were employed in the service industry, and only 0.8% was agricultural, husbandry, forestry or fishing workers. The majority of respondents were age 30–39 (28.9%) and 20–29

(27.1%). Males constituted 74.1%, while females comprised 25.9%.

4. Results

4.1. DIP Model for the evaluation of Formosa destination image

This DIP model is a multi-dimensional diagram comprising phases supported by the influential factors of destination image. This preliminary model is appropriate for a decision maker or project planner of destination shape, since each of the place planning projects has its own integration methods. The first stage adopts K-Means to cluster the destination images of Taiwan's international visitors. The second stage builds and maps the DIP model based on the analytical result of the first stage.

Fig. 3 shows a conceptual model for evaluating the destination images of Taiwan. The DIP model assumes that people form images of places through the level of internal forces. They are evaluating preference or repulsion by destination image variables. The analysis result is based on the following ten criteria: environmental sanitation (mean = 1.993), public security (mean = 2.356), history & culture (mean = 2.442), scenery & landscape (mean = 2.357), climate (mean = 2.056), friendliness of people (mean = 2.587), recreational facilities (mean = 2.178), price (mean = 2.099), food & beverages (mean = 2.446) and traffic (mean = 1.717). Restated, the most influential external forces are human factors, cultural factors, and natural resources.

Fig. 3 shows the four clusters of destination image perception to mapping onto the DIP model. The results herein are obtained by comparing the factors described in the following section, and should be considered as guides to the perception of Taiwan's destination image.

4.2. Cluster destination image

Table 2 presents the average results of influential factors and the levels of affinity for the destination image of Taiwan. The destination image perceptions for Taiwan are presented in four clusters. These are recognition of local customs, regard for environmental construction, respect for recreational elements and reverence historical humanity, called the "4R segmentation for destination image perception". Each cluster has particular preference or repulsion image factors. Comparing with the position value of 4R groups, the mean preferences for the destination image of Formosa were 2.52, 2.01, 2.05 and 2.38. They are described as follows.

4.2.1. Define cluster 1: recognizing local customs

The "recognizing people custom" group comprises visitors who are interested in the human, cultural, and natural resources dimension factors. Broadly, first cluster contrast with others presents higher satisfaction in various fields. People in cluster 1 are most satisfied with friendliness of
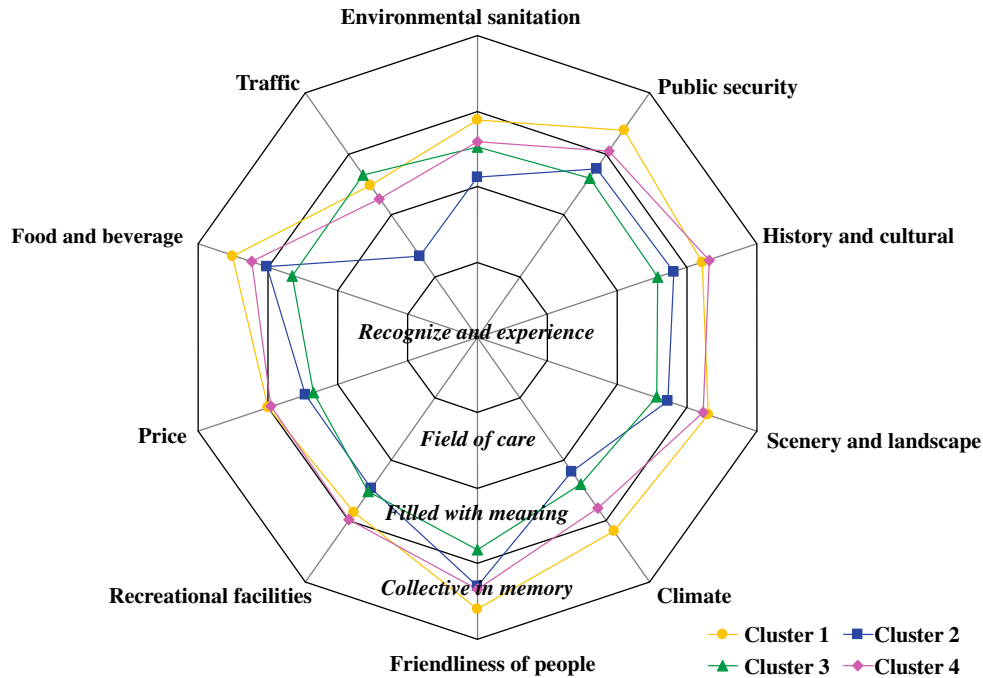
Fig. 3. Position model for the destination image of Formosa.

Table 2
The result of K-Means

Factor	Cluster 1 Recognize people custom (n = 4862) Mean	Cluster 2 Regard environmental construction (n = 6367) Mean	Cluster 3 Respect recreational element (n = 6333) Mean	Cluster 4 Reverence historical humanity (n = 2461) Mean
Environmental sanitation	2.308	1.696	2.019	2.072
Public security	2.714	2.206	2.089	2.440
Recreational facilities	2.292	1.970	2.016	2.388
Traffic	2.001	1.068	2.129	1.818
Price	2.403	1.973	1.875	2.356
Food and beverage	2.804	2.416	2.115	2.593
History and cultural	2.567	2.251	2.068	2.661
Friendliness of people	2.882	2.636	2.255	2.674
Climate	2.534	1.749	1.924	2.235
Scenery and landscape	2.651	2.185	2.055	2.579
Level of affinity	2.516	2.015	2.055	2.382

Note: n = 20,023.

people (mean = 2.882) and food & beverages (mean = 2.804). Clearly, the people in this group tend to be satisfied with the human, cultural and natural resources dimension factors. Therefore, this cluster is called the "recognizing local customs" group.

4.2.2. Define cluster 2: regard environmental construction

Visitors in this group emphasize the policy factors generally under the control of the government elements. Visitors in this second cluster have the lower satisfaction as opposed to others, most notably among traffic (mean = 1.068) and environmental sanitation (mean = 1.696) factors. Namely, cluster 2 visitors regard regulatory framework (policy rules and regulations, environmental regulation, safety and security, and health and hygiene) as more important than either the business environment and infrastructure or factors relating to human, cultural and natural resources. In summary, people in this group are unhappy with elements that are policy-related and generally under the control of the government. Therefore, this cluster is named the "regard environmental construction group".

4.2.3. Define cluster 3: respect recreational element

Visitors in the respect recreational element group favor the business environment and infrastructure attractions. The third cluster has a lower overall satisfaction in terms of food and beverage (mean = 1.875) than other clusters. Additionally, such visitors have low satisfaction with the recreational facilities (mean = 2.016), environmental sanitation (mean = 2.019) and scenery and landscape (mean = 2.055) factors, suggesting that visitors in cluster 3 respect the business environment and infrastructure. Thus, members of this group respect the business environment and the economic infrastructure. Hence, this cluster is called the "respect recreational element group".

4.2.4. Define cluster 4: reverence for historical humanity

The reverence historical humanity group comprises visitors who are interested in the history and cultural resources

Table 3
The 4R destination image perception cluster descriptions

Variable	Cluster 1 recognize people custom		Cluster 2 regard environmental construction		Cluster 3 respect recreational element		Cluster 4 reverence historical humanity	
	n	%	n	%	n	%	n	%
Nationality								
Japan	2334	27.9	1632	37.2	2616	85.9	1313	31.2
Singapore	175	2.1	117	2.7	15	0.5	63	1.5
Korea	550	6.6	242	5.5	50	1.6	139	3.3
Malaysia	61	0.7	43	1.0	8	0.3	29	0.7
Indonesia	46	0.5	24	0.5	5	0.2	22	0.5
Other areas of Asia	528	6.3	94	2.1	38	1.2	414	9.8
America	1347	16.1	474	10.8	79	2.6	570	13.6
Canada	258	3.1	152	3.5	28	0.9	79	1.9
England	493	5.9	177	4.0	23	0.8	303	7.2
France	251	3.0	68	1.5	4	0.1	148	3.5
Germany	556	6.6	115	2.6	23	0.8	251	6.0
Other areas of Europe	723	8.6	167	3.8	29	1.0	456	10.8
New Zealand and Australia	343	4.1	127	2.9	25	0.8	158	3.8
Others country	162	1.9	63	1.4	27	0.9	108	2.6
overseas Chinese	549	6.6	898	20.4	76	2.5	153	3.6
Total	8376	100.0	4393	100.0	3046	100.0	4206	100.0
Occupation								
Legislators and managers	0	0.0	446	10.6	303	10.3	4202	99.9
Professionals	4050	50.3	873	20.8	260	8.8	0	0.0
Technicians and assistant	1315	16.3	197	4.7	164	5.6	0	0.0
Clerks	1394	17.3	841	20.0	1324	44.9	0	0.0
Service and salesman	356	4.4	345	8.2	171	5.8	0	0.0
Forestry and fishing, etc. workers	95	1.2	19	0.5	41	1.4	0	0.0
Production, operators and labors	185	2.3	17	0.4	46	1.6	1	0.0
Housewife	12	0.1	698	16.6	203	6.9	0	0.0
Students	479	5.9	692	16.5	275	9.3	0	0.0
Retired	168	2.1	77	1.8	163	5.5	3	0.1
Total	8054	100.0	4205	100.0	2950	100.0	4206	100.0
Income (US$/per year)								
Under 9999	537	6.8	917	22.8	365	12.8	37	0.9
10,000–14,999	346	4.4	445	11.1	98	3.4	81	2.0
15,000–29,999	894	11.3	648	16.1	268	9.4	187	4.7
30,000–39,999	1499	19.0	637	15.9	441	15.5	314	7.9
40,000–69,999	2403	30.5	569	14.2	825	29.0	1011	25.4
70,000–99,999	1293	16.4	229	5.7	387	13.6	1088	27.3
Over 100,000	691	8.8	112	2.8	237	8.3	1211	30.4
Total	7890	100.0	4014	100.0	2842	100.0	3980	100.0
Education								
Primary school	43	0.5	54	1.3	17	0.6	17	0.4
Junior high school	972	11.8	1061	24.7	785	26.5	342	8.2
College and upward	7217	87.7	3179	74.0	2159	72.9	3804	91.4
Total	8232	100.0	4294	100.0	2961	100.0	4163	100.0
Gender								
Male	8377	100.0	0	0.0	2275	74.7	4193	99.7
Female	0	0.0	4393	100.0	771	25.3	14	0.3
Total	8377	100	4393	100	3046	100	4207	100
Age								
Under 19	75	0.9	132	3.0	35	1.1	4	0.1
20–29	2383	28.4	1799	41.0	913	30.0	337	8.0
30–39	2850	34.0	1127	25.7	709	23.3	1100	26.1
40–49	1790	21.4	701	16.0	445	14.6	1411	33.5
50–59	940	11.2	487	11.1	586	19.2	1112	26.4
60 and over	339	4.0	147	3.3	358	11.8	243	5.8
Total	8377	100.0	4393	100.0	3046	100.0	4207	100.0
Purpose								
Tourism	1467	17.9	2487	58.1	1830	60.9	687	16.4
Business	5712	69.6	785	18.3	844	28.1	3256	77.7

Table 3 (*continued*)

Variable	Cluster 1 recognize people custom		Cluster 2 regard environmental construction		Cluster 3 respect recreational element		Cluster 4 reverence historical humanity	
	n	%	*n*	%	*n*	%	*n*	%
Visit relatives and friends	529	6.4	433	10.1	139	4.6	182	4.3
Conference	334	4.1	388	9.1	175	5.8	57	1.4
Studies or education	169	2.1	186	4.3	18	0.6	6	0.1
Total	8211	100.0	4279	100.0	3006	100.0	4188	100.0
Travel style								
TS1	469	5.6	799	18.2	569	18.7	346	8.2
TS2	480	5.7	926	21.1	654	21.5	252	6.0
TS3	964	11.5	431	9.8	375	12.3	467	11.1
TS4	65	0.8	32	0.7	25	0.8	26	0.6
TS5	6398	76.4	2204	50.2	1423	46.7	3115	74.1
Total	8376	100.0	4392	100.0	3046	100.0	4206	100.0

Note 1: TS1 = individual package tour Individual package tour; TS2 = group package tour; TS3 = booking tickets and accommodations through travel agencies; TS4 = self-arranged tour, with activities arranged by a local travel agency; TS5 = self-arranged tour, without activities by a local travel agency.
Note 2: n = 20,023.
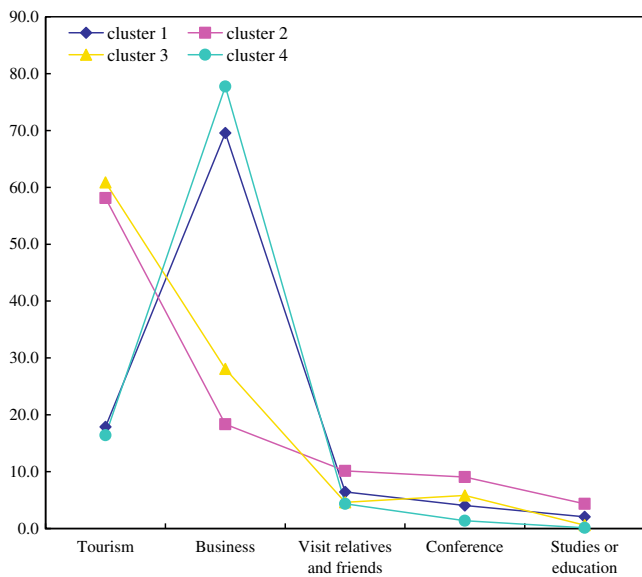
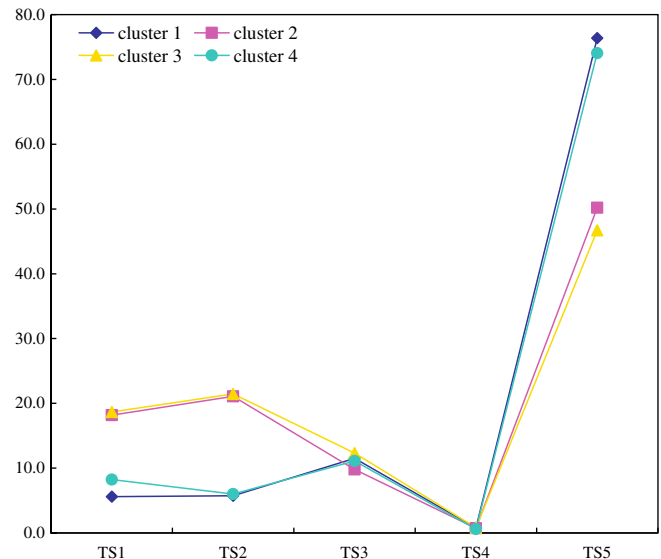Fig. 4. Travel purpose of 4R clusters.

Fig. 5. Travel style of 4R clusters. Note: TS1 = individual package tour; TS2 = group package tour; TS3 = booking tickets and accommodations through travel agencies; TS4 = self-arranged tour, with activities arranged by a local travel agency; TS5 = self-arranged tour, without activities by a local travel agency.

of a destination. The fourth cluster was more content than other clusters with historic and cultural (mean = 2.661) factors. Visitors in cluster 4 showed strong satisfaction with friendliness of people (mean = 2.674), food and beverages (mean = 2.593 and scenery & landscape (mean = 2.579) factors. In other words, they are interested in history and cultural resources. Accordingly, members of this group member prefer the human and cultural elements of Taiwan's resources. Therefore, this cluster is named the "reverence historical humanity group".

4.3. Demographic profile of 4R clusters for image segments

To distinguish tourist data according to the clustering results, a Clementine Relationship Matrix was adopted to

examine and describe the relationships with the 4R cluster groups and personal responses. The results of the four clusters are given below.

Table 3 shows the demographic segmentation results. The largest proportion of visitors in all clusters came from Japan. The proportion of visitors from Japan was highest in cluster 3 has, at 85.9%. Almost 100% of tourists in cluster 4 were legislators and managers. Visitors in cluster 4 had the highest average incomes. The largest proportion tourists with high education levels were found in Clusters 1 (87.7%) and 4 (91.4%). Gender makes significant contributions to the explained variance in these 4R clusters.
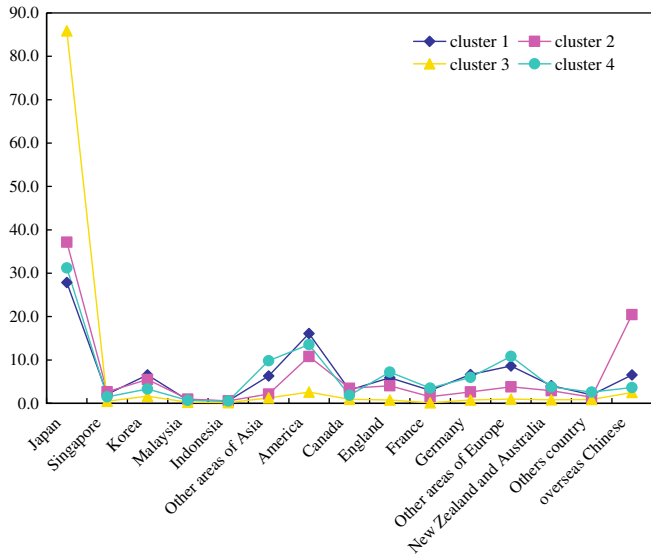
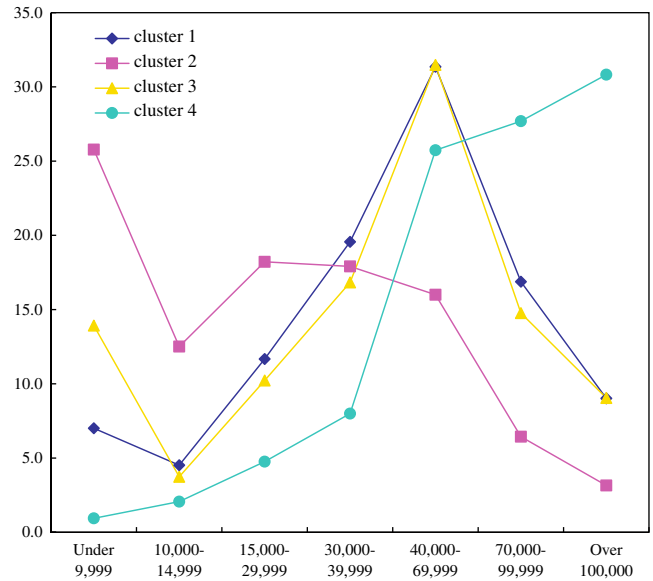Fig. 6. Nationality of 4R clusters.

Fig. 8. Income of 4R clusters.

Furthermore, the age distributions in each cluster are different. The average age of tourist is oldest in cluster 4. The purpose of most passengers in Clusters 2 (58.1%) and 3 (60.9%) was tourism, where are that of most passengers in Clusters 1 (69.6%) and 4 (77.7%) was business. Finally, the type of trip arrangements was different in each cluster. Most visitors for tourism preferred individual or group package tours. Moreover, most participants preferred TS5 (self-arranged tour, with activities arranged by a local travel agency) over TS4 (self-arranged tour, without activities by a local travel agency).

Nationality, occupation, income, education, gender, age, purpose of visit and travel style each contributed to the explained variance in these 4R clusters. Analytical results indicate that demographic variables can effectively distinguish variations in the tourist market. Figs. 4–11 show the percentage preference ratings by personal variable in terms of purpose of travel, style of travel, nationality, occupation, income, education, gender and age. The characteristics of each segment are described as follows.

4.3.1. Targeting the recognize people custom group

Figs. 4–11 illustrate the features of segment 1 "Recognize People Custom" Group relative to other groups. Segment 1 shows that passengers in this group have "purpose of travel for business", "style of travel prefer TS5
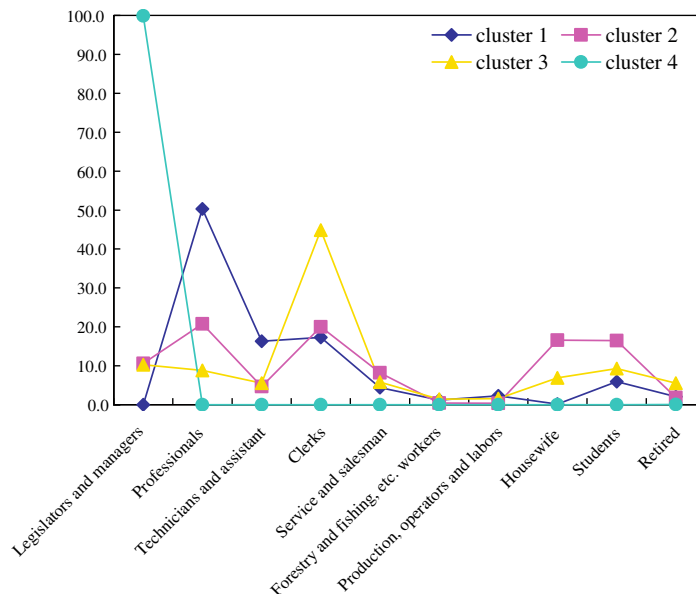

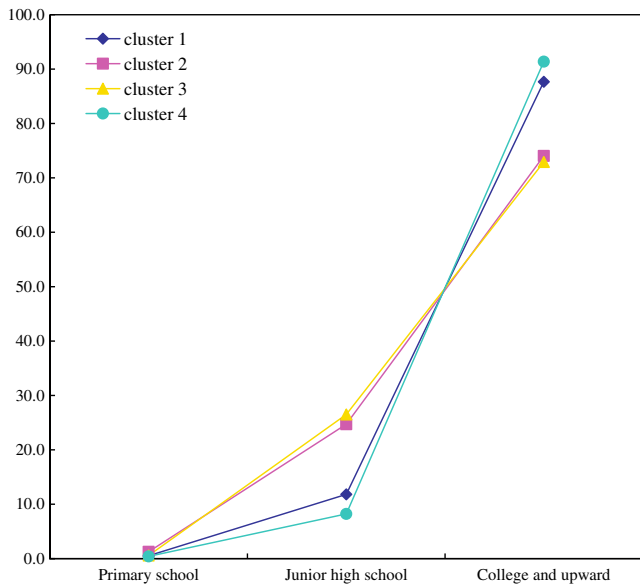Fig. 7. Occupation of 4R clusters.

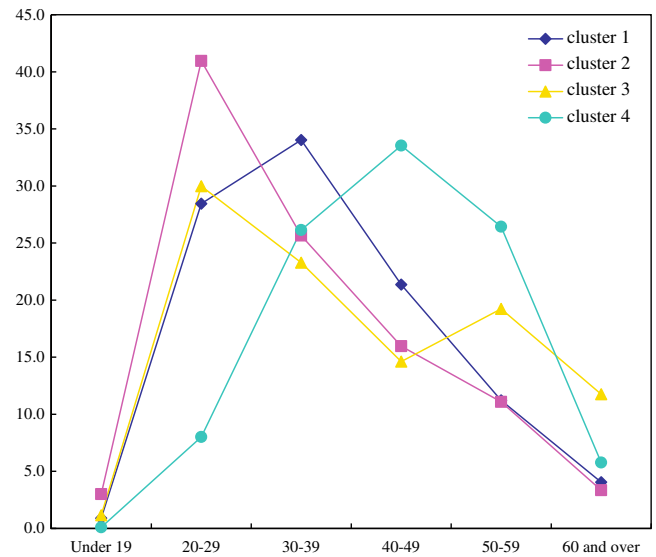Fig. 9. Education of 4R clusters.

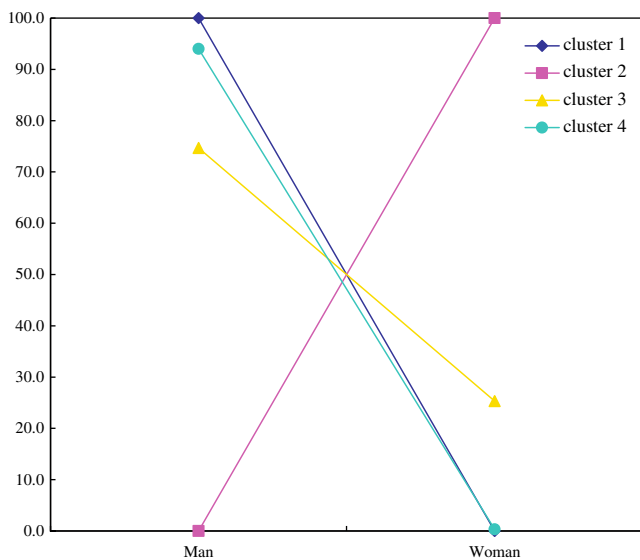Fig. 11. Age of 4R clusters.

Fig. 10. Gender of 4R clusters.

Fig. 12. Sun Moon Lake image.

(self-arranged tour, without activities by a local travel agency)", "American", "professionals, technicians and assistant", "middle and high income about US$30,000–$100,000 per year", "college and upward", "man" and "middle-aged person aged 30–39" in their demographic profile variables.

4.3.2. Targeting the regard environmental construction group

Segment 2 in Figs. 4–11 (shows OR illustrates OR depicts OR displays OR presents) the features of segment 2 "Regard Environmental Construction Group" compared with other groups. The typical profile of passengers in segment 2 is as follows: "purpose of travel for tourism", "style of travel are TS1 (individual package tour) and TS2 (group

package tour) relatively higher than other segments", "overseas Chinese", "housewives and students", "annual income is low about US$10,000–$30,000", "junior high school", "woman" and "young people under 19 and around 20–29".

4.3.3. Targeting the respect recreational element group

Segment 3 in Figs. 4–11 shows the features of "Respect Recreational Element Group" contrast with other groups. The typical profile of passengers in this segment is "purpose of travel for tourism", "style of travel are TS1 (individual package tour), TS2 (group package tour), and TS3 (booking tickets and accommodations through travel agencies) relatively higher than other groups", "overwhelming majority is Japanese", "clerks", "middle and low income about US$30,000–$70,000 per year", "junior high school", "make", "young people aged 20–29 second only to segment 2" and "elderly tourists 60 and older".

4.3.4. Targeting the reverence historical humanity group

Segment 4 in Figs. 4–11 shows the features of the "Reverence Historical Humanity Group". The typical profile of respondents in segment 4 is as follows: "purpose of travel for business", "style of travel prefer TS5 (self-arranged tour, without activities by a local travel agency)", "an above average proportion of the respondents reside in other areas of Asia, England and other areas of Europe than other groups", "nearly all legislators and mangers", "high income about US$40,000–$100,000 per year", "college and upward", "man" and "people in middle age about 40–59".

4.4. Empirical application

This study adopted the Sun Moon Lake of the famous destination of Taiwan for the DIP model empirical application examples. The DIP model and 4R segmentation for destination image perception are applied as follows:

Step 1: Build and Identify the well regarded resources of the destination, and map them onto the DIP model.
Step 2: Look for clusters in the DIP model.
Step 3: Carry on contrasting and comparing the demographic profile based on the segment result of this research.
Step 4: Segment the target consumer through the characteristic of cluster, then draft the marketing strategy of attractive and customization in view of the above.

4.4.1. Destination: Sun Moon Lake

4.4.1.1. Step 1: Identify the destination. Fig. 12 presents the imagery of the Sun Moon Lake, which is located in the middle of Taiwan at an elevation of 748 m above sea level, is the only large natural lake in Taiwan. The southern part of Kuang–Hua Island is shaped like a new moon, and the northern part is shaped like a sun; hence the name Sun Moon Lake. The Sun Moon Lake is a immense stretch of deep blue-green water, which looked like in earlier times when it was a shallow marsh covered with vibrant green water plants. The natural forests bordering these roads are good places for bird watching. Moreover, other activities available around the Sun Moon lake include rowing, taking cruise ship, walking nature trails and riding bicycle activities to encircle the. The first known tribe to live in the Sun Moon Lake region was the Shao Clan. The Harvest Festival, Sowing Festival and the special handicraft fair held every year, as well as their articles has helped to preserve the particular culture of the Sun Moon Lake region. The clustered village of Thao indigenous people are attractive and unique features.

4.4.1.2. Step 2: Match the cluster. Step 1 was performed to identify the Sun Moon Lake's advantages and weakness. Local culture is strong in this area. Clearly, visitors in cluster 1, the recognize people custom group, are most likely to

Table 4
The empirical application for Sun Moon Lake

Factors	Advantage	Target	Characteristic	Marketing strategy
Environmental sanitation	◎	Recognize people custom group	Prefer human, cultural, and natural resource. Japanese, American and European. High education, middle range income, man and middle-aged.Tend to self-arranged tour, without activities by a local travel agency	Intensify promotional media, such as website, magazine and guidebook. Design a simple and short-term trip Make partnership with business hotels or airline companies
Public security	◎			
Recreational facilities	⊙			
Traffic	◎			
Price	◎			
Food and beverage	⊙			
History and cultural	⊙			
Friendliness of people	○			
Climate	⊙			
Scenery and landscape	⊙			

Note: ⊙ = advantage images; ○ = adequate images; ◎ = weakness images.

prefer this region, since they are interested in the human, cultural and natural resources.

4.4.1.3. Step 3: Analyze the demographic profile. As explained in step 2, Sun Moon Lake was paired with the recognize people custom group, and then the target customer characteristics were analyzed. The respondents in cluster 1 are geographically diverse. An above average proportion of the respondents reside in Japan, America and Europe. The cluster members are mainly professionals, high education, middle range income, male and middle-aged. An above average proportion of the cluster members are the 30–39 year age bracket. The main purpose for travel is business. Furthermore, the members tend to do self-arranged tours, without activities by a local travel agency.

4.4.1.4. Step 4: Devise marketing strategies. Table 4 shows that the Sun Moon Lake suits individuals who wish to experience a destination's history, cultural, local customs and practices and meet local residents. Regard America, Europe and Japan as and promote the country mainly. Furthermore, segment 1 members prefer self-arranged tours, so planner/operator should intensify promotional media, such as websites, magazines and guidebook, in order to increase opportunity touching the target market. Moreover, business travelers generally stay for a short time at their destination. The tourism proprietor can design a simple and short-term trip, and than form partnerships with business hotels or airline companies to increase visibility and chance of being chosen by potential customers.

5. Conclusions

The DIP model provides a highly effective evaluation tool for planners, managers and government officials to help make decision for marketing strategies, particularly for segmenting and positioning. The model can be applied ideally to posit all types of destination (e.g. a theme park, city or county) onto this model. The main contributions of this study are the use of *k*-means to construct the 4R evaluation model, and the evaluation of the insightful patterns of destination image by combining destination image factors and place formation theories. This study explores the destination's internal and external formation on the levels of DIP evaluation. Various strategic and evaluative position models have been developed in order to attach those strategically in regard to destination image theories, and previous research has identified many criteria for destination image evaluation.

The increase in market-driven competition and adoption of information technology causes tourism market conditions and visitors' needs to change rapidly. Travelers are no longer satisfied with mass tourism producing products anymore, and mass tourism customization becomes an alternative to destinations producing variety a products that are limited in resource and reasonable cost structure. The ability to fulfill diverse tourists' needs is insufficient to catch the new opportunities if destinations cannot sense the changes. A destination's performance on mass tour customization capability and agility all depend on its demarcation capabilities.

This study applies data mining to analyze an enormous data set, and helps define the customization and contribution, thus formulating the DIP model application approach. Segments of target markets are identified for defining marketing strategies. The results indicate the preferences and repulsion imagery features through market segments. The groups with the satisfied imagery are clearly the striking segments. These segments form the most sensitive target markets, as they not only have a preference image but also have the strongest visitation tendencies. Additionally, the demographic characteristics of the segment members can be used to designate promotion media with matching visitor profiles.

The 4R segmentation for destination image perception is clearly an easy and simple way to describe and segment tourist's features. Hence, 4R segmentation considers four classes of tourist in the tourism market. Moreover, a clustered destination image is produced. The clusters are favorable to market segmentation and creating marketing strategies. From a competitive perspective, destination operators/marketers can further enhance their image by directing promotional campaigns towards specific markets, increasing the popularity of a destination over other areas that a traveler might consider when selecting a destination. This investigation demonstrates that the profiles of customers in each segment are important factors in determining destination image. This finding enables decision makers to shape particular images to attract different segments. This approach of targeting the most approachable target markets is likely to enhance the efficiency and effectiveness of the destination's promotional revenue.

Most importantly, this study builds a position model for assessing the image of a destination. This DIP model can help firms to construct sustainable competitive advantage, and to create competitive advantage for an entire area through positioning and segmenting.

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References

Anderson, J. (1983). *The Architecture of Cognition*. Cambridge, MA: Harvard University Press.

Baloglu, S., & Brinberg, D. (1997). Affective images of tourism destination. *Journal of Travel Research, 35*, 11–15.

Cai, L. A. (2002). Cooperative branding for rural destinations. *Annals of Tourism Research, 29*, 720–742.

Castro, C. B., Armario, E. M., & Ruiz, D. M. (2007). The influence of market heterogeneity on the relationship between a destination's image and tourists' future behaviour. *Tourism Management, 28*, 175–187.

Chaudhary, M. (2000). India's image as a tourist destination: A perspective of foreign tourists. *Tourism Management, 21*, 293–297.

Chen, J. S. (2001). A case study of Korean outbound travelers' destination images by using correspondence analysis. *Tourism Management, 22*, 345–350.

Coshall, J. T. (2000). Measurement of tourists' images: The repertory grid approach. *Journal of Travel Research, 39*, 85–89.

Enright, M. J., & Newton, J. (2004). Tourism destination competitiveness: A quantitative approach. *Tourism Management, 25*, 777–788.

Giudici, P., & Passerone, G. (2002). Data mining of association structures to model consumer behavior. *Computational Statistics and Data Analysis, 38*, 533–541.

González, B. M. (2005). Topophilia and Topophobia: The home as an evocative place of contradictory emotions. *Space and Culture, 8*, 193–213.

Han, C. M. (1990). Testing the role of country image in consumer choice behaviour. *European Journal of Marketing, 24*, 24–40.

Holden, N. (2004). Why marketers need a new concept of culture for the global knowledge economy. *International Marketing Review, 21*, 563–572.

Hosany, S., Ekinci, Y., & Uysal, M. (2006). Destination image and destination personality: An application of branding theories to tourism places. *Journal of Business Research, 59*, 638–642.

Hsu, C. C., & Chen, Y. C. (2007). Mining of mixed data with application to catalog marketing. *Expert Systems with Applications, 32*, 12–23.

Joppe, M., Martin, D. W., & Waalen, J. (2001). Toronto's image as a destination: A comparative importance-satisfaction analysis by origin of visitors. *Journal of Travel Research, 39*, 252–260.

Kim, H. B. (1998). Perceived attractiveness of Korean destinations. *Annals of Tourism Research, 25*, 340–361.

Kim, K. J., & Ahn, H. (2008). A recommender system using GA K-Means clustering in an online shopping market. *Expert Systems with Applications, 34*, 1200–1209.

Leisen, B. (2001). Image segmentation: The case of a tourism destination. *Journal of Services Marketing, 15*, 49–66.

Li, S. L. (2005). A web-enabled hybrid approach to strategic marketing planning: Group Delphi plus a web-based expert system. *Expert Systems with Applications, 29*, 393–400.

Liao, S. H., Hsieh, C. L., & Huang, S. P. (2008). Mining product maps for new product development. *Expert Systems with Applications, 34*, 50–62.

Lin, C., & Hong, C. (2008). Using customer knowledge in designing electronic catalog. *Expert Systems with Applications, 34*, 119–127.

Liu, H. H., & Ong, C. S. (2008). Variable selection in clustering for marketing segmentation using genetic algorithms. *Expert Systems with Applications, 34*, 502–510.

MacKay, K. J., & Fesenmaier, D. R. (2000). An exploration of cross-cultural destination image assessment. *Journal of Travel Research, 38*, 417–423.

Mykletun, R. J., Crotts, J. C., & Mykletun, A. (2001). Positioning an island destination in the peripheral area of the Baltics: A flexible approach to market segmentation. *Tourism Management, 22*, 493–500.

Pike, S. (2002). Destination image analysis-a review of 142 papers from 1973 to 2000. *Tourism Management, 23*, 541–549.

Song, H. S., Kim, J. K., & Kim, S. H. (2001). Mining the change of customer behavior in an internet shopping mall. *Expert Systems with Applications, 21*, 157–168.

The World Economic Forum. (2007). *The travel & tourism competitiveness report 2007*. Geneva, Switzerland.

Tuan, Y. F. (1977). *Space and place: The perspective of experience*. London: Edward Arnold.

Wang, H. F., & Hong, W. K. (2006). Managing customer profitability in a competitive market by continuous data mining. *Industrial Marketing Management, 35*, 715–723.