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Full Length Research Paper

How to develop Taiwan's tourism nation brand

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Globalization and the intensification of economic competition are increasing demand for nation brands. Tourism has a significant association with nation brand for the rapidly growing tourism industry in the future. A good nation brand will help a country's economic growth by promoting the tourism industry. In this study, Decision Making Trial and Evaluation Laboratory (DEMATEL) and Maximum Mean De-Entropy (MMDE) are adopted to analyze the factors of tourism as they relate to branding Taiwan. The results show that the 'festival' is the most important fact for Taiwan nation brand in perspective of tourism.

Key words: Nation brand, tourism, decision making trial and evaluation laboratory (DEMATEL), maximum mean de-entropy (MMDE), Taiwan.

INTRODUCTION

The rapid advance of globalization requires that every country, rich or poor, must compete with others for its share of the world's consumers, tourists, investors, students, entrepreneurs, international sporting and cultural events; and for the attention and respect of the international media, other governments, and the people of other countries (Anholt, 2007). Regardless of the opinion of country governments; they had better get used to the concept of branding the nation (Olins, 2002), because, if a country does not brand well, then they will lose the opportunity to increase their global market share. Government decision makers should develop the strategy of a distinctive country image. Nation branding allows national governments to better manage and control the image that they project to the world. Reviewing the Taiwan advertising campaign in western business publications, we can find the evolution of Taiwan's image. In the 1990s, the advertisements focused on the country's industrial prowess and competent company producers which try to promote a positive country-of-origin image for Taiwan. In the early 2000s, advertising not only continued with past themes, but also emphasized the beauty of Taiwan (Amine and Chao, 2004). In tandem with the tremendous diversification of Taiwan's economy from one that was industrially oriented to one that is leisure and entertainment oriented; Taiwan's government has committed to make tourism development a major policy (Hsu et al., 2009).

The latest AD by Taiwan's Government Information Office highlights the vitality of country and shows the famous attractions in Taiwan. The management of a national image changes from industrial production to the tourism industry. Obviously, Taiwan is rebranding its image toward tourism. Tourism includes many factors and the interactions of factors are complicated, so Decision Making Trial and Evaluation Laboratory (DEMATEL) is a comprehensive method for building, and analyzing a structural model involved causal relationships between complex factors (Zhou et al., 2006). This study about developing Taiwan's tourism nation brand falls into the category of Multiple Criteria Decision Making (MCDM), and DEMATEL is frequently used in the application researches of MCDM (Chen et al., 2011; Tsai et al., 2010). The purpose of this paper is to find the strategy of branding Taiwan from the perspective of tourism. The study will also examine the interactions of tourism criterion and the priority of criterion. According to analytic results, a strategy for branding Taiwan will be recommended.

LITERATURE REVIEW

Nation brand

Nation brand focuses on applying branding and marketing

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communications techniques to promote a nation's image (Fan,2006).Nation brand is using the tools of branding to confirm or change the behavior, attitudes, identity or image of a country in a positive way (Gudjonsson, 2005).

In the later 1990s, the term 'nation branding' began to appear in literature. In 1997, marketing guru, Kotler, and his colleagues, published a book entitled The Marketing of Nations, an early attempt at treating national economic and foreign policy within a marketing strategy framework (Kotler et al., 1997). And then in 2003, Anholt published Brand New Justice, a book which, although not clearly identified in the title, did introduce the idea of nations and countries as 'brands' (Anholt, 2003).

Nation branding is a relatively new field, but the studies of the effect of country image on product purchase decisions have existed for several decades (Papadopoulos and Heslop, 2002; Shimp et al., 1993). Despite the recent surge in interest among both academics and practitioners and growing publications, research on nation branding is still at the initial stages (Fan, 2006).

Nation branding is quite different from traditional branding because there is no single product or service for sale, no simple promotional purpose, rather, the desire to make people see the country in a different light (Anholt, 2008). Nation branding is said not to be centered on a particular product that can be promoted to the customer, rather, nation branding concerns a country's overall image including historical, political, economic and cultural aspects (Quelch and Jocz, 2004; Fan, 2006).

Other authors have discussed different aspects of nation branding (Brymer, 2003; Roberts, 2004; Kyriacou and Cromwell, 2004; Papadopoulos and Heslop; 2002, Fan, 2006). Like Anholt, he developed the concepts of the nation brand in the late 1990s to measure a country from six dimensions, and these areas make the 'Nation Brand Hexagon' including tourism, exports, governance, investment and immigration, culture and heritage and people (Anholt, 2005).Yet, Fan proposed that nation brand provides no tangible product or service; instead, it represents and includes a wide variety of factors and associations which includes place-geography, natural resources, tourist attractions, people-race, ethnic groups, history, culture, language, political and economic systems, social institutions, infrastructure, famous people, and picture or image (Fan, 2006).

In order to manage image campaigns effectively, a long-term nation-brand planning and strategy should be in place, and should have such marketing concepts as continuity, simplicity, coherence and convincing truths about a country integrated in it (Park, 2009; Anholt, 2003, 2005). The field of nation-branding suggests that advertising campaigns are just one element of the overall strategy, at best, and produce a short-term effect (Dinnie, 2008). The nation brand must be simple. If a country disseminates too many images of itself, it will lead to confusion. Since most countries have not worked out any strategy, they often disseminate any image that seems vaguely positive. In this case, there are no priorities and everything ends up being promoted. The result is most of confusion (Gertner and Kotler, 2004).

Taiwan brand

The latest "The Anholt-GfK Roper Nation Brands IndexSM 2009 Report" reflecting 2008 data, shows a strong association between the strength of a country's overall brand and its economic status. The highest ranked countries are high income OECD members, most Asian countries, South Korea, Thailand, Taiwan, and Malaysia, are ranked very tightly. According to the report of 2009, Taiwan ranked 34th overall, demonstrating that Taiwan has a weak reputation (GfK Roper Public Affairs and Media, 2009). The rankings of Taiwan through "the Anholt-GfK Roper Nation Brands IndexSM 2009 Report" on all six hexagon dimension in 2008 and 2009 are as shown in Table 1.

Tourism

Tourism has experienced continuing growth and diversification to become one of the largest and fastest growing economic sectors in the world. Over the past six decades, tourism has grown from 25 million in 1950, to 277 million in 1980, to 438 million in 1990, to 684 million in 2000, and reaching 922 million in 2008, hence, international tourist arrivals have continued to grow. The overall export income generated by international tourism including passenger transport reached US$ 1.1 trillion in 2008, or US$ 3 billion a day. Tourism exports account for as much as 30% of the world's exports of commercial services and 6% of overall exports of goods and services. Globally, as an export category, tourism ranks fourth after fuels, chemicals and automotive products. For many developing countries, it is one of the main income sources and the number one on export category, creating much needed employment and opportunities for development. Although the evolution of tourism over recent years has been somewhat irregular, international tourist arrivals showed an average annual growth of 4.3% between 1995 and 2008. For the moment, the World Tourism Organization (UNWTO) has maintained its long-term forecast and international arrivals are expected to reach nearly 1.6 billion by the year 2020 (UNWTO, 2009). The importance of this industry directly results from the fact that it serves as a major source for generating revenues, employment, private sector growth, and infrastructure development for many countries (Gee, 1999). Through these benefits, tourism development not only stimulates the growth of the industry, but also lead overall economic growth (Lee and Chang, 2008).

Tourism is not only an aggregate of commercial

Table 1. The ranking of Taiwan's all six hexagon dimensions in 2008 and 2009.

Year	overall	export	Governance	Culture	People	Tourism	Immigration/Investment
2009	34	24	32	42	34	39	29
2008	35	25	31	43	33	41	32

Source: GfK Roper Public Affairs and Media (2009).The Anholt-GfK Roper Nation Brands IndexSM 2009 Report. New York: GfK Roper Public Affairs and Media.

activities, but also an ideological framing of history, nature and tradition (MacCannell, 1992). According to "the Anholt-GfK Roper Nation Brands Index^{SM} 2009 Report", there are four questions which measure several concepts that indicate the strength of a country's brand as a tourist destination: (1) would you like to visit the country if money were no object? (2) Is the country rich in natural beauty? (3) Is the country rich in historic buildings and monuments? (4) Does the country have a vibrant city life and urban attractions? Without considering the practical restraints of distance and cost, vacationers look for a destination with the three most important qualities. The natural beauty of a country can refer attractive beaches, pristine wilderness, serene farmland, natural wonders, or any variety of landscapes that make a location desirable. The ancient ruins, architectural assets, and historic landmarks that make certain countries prime tourism locales are included in the historic buildings and monuments concept. The fourth question assesses the contribution of a nation's cities to its tourism image. Yet, Taiwan Tourism Bureau, responsible for the administration of international tourism policy making, the execution and development, focused on festivals, shopping, tastes and attractions including coast, land and culture (GfK Roper Public Affairs and Media, 2009).

Taiwan tourism

According to Taiwan's Tourism Bureau; Taiwan began to develop tourism in 1956; the tourists visiting Taiwan were primarily Americans during the initial phases; then in 1964 with the opening of Japan nationals' overseas travel, there were a large number of Japanese tourists visiting Taiwan. Before 1967, the main source of tourists was from the U.S. market; but in 1967, Japanese tourists for the first time surpassed the United States and Japan has been Taiwan's main tourist source. Over the late 1970s to the early 1990s, Taiwan faced a world economic crises and upheaval in international political events, the growth of Taiwan's tourism development was impeded. In order to attract more foreign tourists traveling to Taiwan, the Ministry of Foreign Affairs began coordinating the implementation of visa-free measures in 1995.

In 1971, Rostow published his book entitled 'The Stages of Economic Growth' which first mentioned the five stages of economic growth as traditional society, preconditions for change, take-off, drive to maturity and mass consumption. Taiwan had risen up the last stage, mass consumption, economic drive towards mass consumption, consumer business now dominate and service industries have also become increasingly important. Into the 21st century, Taiwan has gradually shifted the development of the economy from the manufacturing industry to services such as the tourism industry and developed a long-term work plan. The 'Doubling Tourist Arrivals Plan' began in 2002 with the objective of trying to double the number of tourist arrivals to 2 million, and raise the total number of visitor arrivals to at least 5 million by 2008. This can be achieved by making an all-out effort to harness its driving power, and combining the forces of all related government agency, carrying out improvements to Taiwan's tourism environment, to raise the industry up to international standards.

The Development Vision for 2015 which began in 2007 involves the Three-Year Sprint Program (2007 to 2009), using "Beautiful Taiwan," "Unique Taiwan," "Friendly Taiwan," "Quality Taiwan" and "Marketing Taiwan", aims to create an attractive, unique, visitor-friendly and high-quality travel environment in Taiwan. Overseas publicity and promotion work is to build the reputation of Taiwan as having a friendly travel environment, develop a diverse variety of Taiwanese travel products, introduce, and attract new sources of visitors. The latest "Project Vanguard for Excellence in Tourism" focuses on both quality and quantity to create a strong tourist environment, turning Taiwan into a major tourist destination in Asia, in 2009 the program helped to achieve 4 million visitors to Taiwan. Meanwhile, Taiwan's government set positioning of Taiwan's regional Development: Northern Taiwan-Living Taiwan, Central Taiwan-Enterprising Taiwan, Southern Taiwan-Historical Taiwan, Eastern Taiwan-Leisurely Living Taiwan, Islands-Unique Islands and Taiwan Nationwide-Diversity, to integrate travel resources alluring the attention of the world (Taiwan Tourism Bureau, 2010).

A total of 4,395,004 visitors arrived in Taiwan in 2009, more than 14% from 2008, but the number of foreign visitors decreased by 6.5%. With the exception of Hong Kong /Singapore/ Malaysia and Macao, and the Mainland China market, other markets have been in a downward trend. Estimating visitor arrivals in the future, the Mainland China market is the fastest growing area. To

Table 2. Visitor arrivals from tourist markets.

Country/region	2008	2009	2010(f)	2011(f)	2012(f)
Japan	1,086,691	1,000,661	1,100,000	1,200,000	1,260,000
Korea	252,266	167,641	240,000	270,000	290,000
Mainland china	329,204	972,123	1,000,000	1,200,000	1,500,000
HK/Singapore/ Malaysia	979,899	1,080,316	1,020,000	1,100,000	1,180,000
Europe/America/Aust./NZ	656,666	631,486	640,000	690,000	720,000
Others	540,461	542,777	500,000	540,000	550,000
Total	3,845,187	4,395,004	4,500,000	5,000,000	5,500,000

Source: Taiwan tourism bureau.

attract more tourists from other regions, Taiwan's tourism image needs to be strengthened (Table 2).

METHODOLOGY OF EVALUATION

DEMATEL

The DEMATEL method is an analytic technique of relationship structure, which can find the critical aspect/criteria of the structure of systems. It was developed to solve problems. The steps of the DEMATEL method are described as follows (Lin and Tzeng, 2009; Wu et al., 2010):

Step1. Calculate the original average matrix

All experts were asked to indicate the influence that they believe each aspect exerts on each of the others according to an integer scale ranging from 0,1,2,3 and 4, which respectively represents no influence, low influence, modest influence, high influence, and extreme strong influence. The notation of z_{ij} indicates the degree to which the experts believe factor i affects factor j, and when $i = j$, the value of z_{ij} are set to 0. The Arithmetic average method is used to incorporate all opinions of experts, then, we can get the original average matrix Z:

$$Z=\begin{bmatrix} 0 & \cdots & z_{1j} & \cdots & z_{1n} \\ \vdots & & \vdots & & \vdots \\ z_{i1} & \cdots & 0 & \cdots & z_{in} \\ \vdots & & \vdots & & \vdots \\ z_{n1} & \cdots & z_{nj} & \cdots & 0 \end{bmatrix}$$

Step 2. Calculate the normalized initial direct-relation matrix

Calculating the sum of rows and columns separately, the maximum value S is obtained (Equation 1), then dividing Z by S, provides the normalized initial direct-relation matrix A (Equation 2). Each value in matrix A is between 0 and 1:

$$S=\max\left(\max_{1\le i\le n}\sum_{j=1}^{n} z_{ij}, \max_{1\le j\le n}\sum_{i=1}^{n} z_{ij}\right); \; i,j=1,2,3,\ldots,n \quad (1)$$

$$A = Z / S \quad (2)$$

Step 3. Calculate the full relation matrix

The full relation matrix is the sum effects of direct and indirect, the full relation matrix, T, can be obtained by Equations (3) and (4):

$$T=\sum_{1}^{\infty} A^{n} \quad (3)$$

$$T = A+A^2+A^3+A^4+A^5+\ldots+A^{\infty} = A / (I - A) = A(I-A)^{-1} \quad (4)$$

Where: I is the n×n identity matrix

Step 4. Calculate prominence and relevance

Let t_{ij} (i,j=1,2,….,n) as the elements of T, the sums of all columns and rows are D_i and R_j, respectively.

$D_i=\sum_{i=1}^{n} t_{ij} (i=1,2,\ldots,n)$
$R_j=\sum_{j=1}^{n} t_{ij} (j=1,2,\ldots,n)$

D_i represents the sum by taking element i as the cause to influence other elements, R_j represents the sum by taking element j as the result being influenced by other elements. (D+R) is called prominence, which indicates the element's degree of influence and being influenced. (D-R) is called relation. If it is positive, the element tends to fall under the result category. If it is negative, the element tends to fall under the causal category.

MMDE

DEMATEL is a comprehensive method for building and analyzing a structural model involving causal relationships between complicated factors (Wu, 2008), and results in a visual impact-relations map showing the dispatch and receiver effects. In order to manage a complex system effectively, the less important relations should be ignored, or the strategy is difficult to execute. Therefore, finding the appropriate threshold for selecting the more important factors of the program to develop plans is extremely important. In data mining, application of rough set theory, the new information is formed based on a given data. To obtain new knowledge from a given data, we need to measure the uncertainty between the predicting message and the given data.

Information entropy was developed by Shannon (1948), in which the physical entropy used in thermodynamics is more or less closely related to the concept of information as used in communication theory. Therefore, he defined information entropy to measure uncertainty (Jiang et al., 2010). According to tradition, the

threshold value can be set by the decision maker or through discussions with experts to filter out the negligible effects of the impact-relations map, but there is a challenge in finding a unique threshold. It can be difficult to achieve a consensus. Li and Tzeng (2009) proposed the maximum mean de-entropy (MMDE) algorithm, based on the approach of entropy and furthermore, defined two additional information measures: de-entropy and mean de-entropy to find a threshold value for delineating the impact-relations map.

The definitions and steps of the MMDE method (Li and Tzeng, 2009) are thus described.

Definition of the MMDE method

Definition of H(X): The information entropy of a discrete random variable *X,* that can take the range of possible values $\{x_1,\ldots,x_n\}$, p_i is the probability of X_i, defined as Equations (5) and (6) (Manish and Majumde, 2009):

$$H(p_1, p_2, \cdots, p_n) = -\sum p_i \lg p_i \tag{5}$$

$H(p_1, p_2, \cdots, p_n)$ is the level of entropy, subject to constraints:

$$\sum_{i=1}^{n} p_i = 1; \quad p_i \lg p_i = 0 \quad if \quad p_i = 0 \tag{6}$$

If the same distribution is assigned to the p_i and the entropy value is maximum, it is denoted as *H*. Another measure for the decreased level of entropy- de-entropy defined as Equation (7):

$$H\left(\frac{1}{n}, \frac{1}{n}, \cdots, \frac{1}{n}\right) = -\sum_{1}^{n}\left(\frac{1}{n}\lg\frac{1}{n}\right) = \lg n \tag{7}$$

Definition of H^D: For a given finite discrete scheme of *X*, the de-entropy of *X* is denoted as H^D and defined as Equation (8):

$$H_n{}^D = H\left(\frac{1}{n}, \frac{1}{n}, \cdots, \frac{1}{n}\right) - H(p_1, p_2, \cdots, p_n) \tag{8}$$

As was mentioned previously, when the probability of all elements are equal, the *H* is maximum. It is easy to find the value of H^D is equal to or larger than 0. The H^D can explain a lot of useful information derived from a specific data set, which reduces the "uncertainty" of information.

Definition of dispatch-node and receive-node: The (*i, j*) element of the matrix *T* is denoted as t_{ij} and directly affects the relationship from factor x_i to factor x_j. For each t_{ij}, the factor x_i is defined as a dispatch-node and factor x_j is defined as a receive-node with respect to t_{ij}.

By Definition of H^D, an *nxn* full relation matrix *T* can be considered as a collection (set *T*) with n^2 pair ordered elements. Each subset of the set *T* can be divided into two sets: an ordered dispatch-node set and an ordered receive-node set. For an ordered dispatch-node set (or an ordered receive-node set), we can count the frequency of the different elements of the set. If the finite cardinality of an order dispatch-node set (or an ordered receive-node set) is *m* and the frequency of element x_i is *k*, we assign the corresponding probability of x_i as Equation (9):

$$p_i = \frac{k}{\mathrm{m}} \tag{9}$$

Notation of C(X) and N(X): In this paper, *C(X)* denotes the cardinal number of an ordered set *X* and *N(X)* denotes the cardinal number of different elements in set *X*. For example, if *X* = {3, 4, 4, 3 },C(X) = 4 and *N(X)* = 2.

The steps of the MMDE method

Step1. Transforming the full relation matrix: Transforming the *n×n* total relation matrix *T* into an ordered set *T*, $\{t_{11},t_{12},\ldots,t_{21},t_{22},\ldots,t_{nn}\}$, rearranging the element order in set T from large to small, and transforming to a corresponding ordered triplets *(tij, xi, xj)* set denotes *T**. Each element of set T, t_{ij}, can also be seen as an ordered triplet (t_{ij}, x_i, x_j) as (influence value, dispatch-node, receive-node).

Step 2. Finding the dispatch-node: Take the second element as the dispatch-node, from the ordered triplets of the set *T**, then obtain a new ordered dispatch-node set, T^{Di}.

Step 3. Calculating the mean de-entropy: Take the first t elements of T^{Di} as a new set T_t^{Di}, assign the probability of different elements, and then calculate the H^D of the set T_t^{Di}, H_t^{Di}; The mean de-entropy is calculated by Equation (10):

$$MDE_t{}^{Di} = \frac{H_t{}^{Di}}{N\left(T_t{}^{Di}\right)} \tag{10}$$

At first, the t is set as 1, then of value of t is determined by raising the value from 1 to $C(T^{Di})$ in increments of 1. Why $MDE_t{}^{Di} = \frac{H_t{}^{Di}}{N\left(T_t{}^{Di}\right)}$ is used as "mean de-entropy" rather than $MDE_t{}^{Di} = \frac{H_t{}^{Di}}{C\left(T_t{}^{Di}\right)}$ must be clarified.

No matter how many times a dispatch-node repeats in a set T_t^{Di}, this dispatch-node will be displayed only once in the impact-relations map if we use this T_t^{Di} to draw the impact-relations map. The H_t^{Di} is the de-entropy of $N(T_t^{Di})$ dispatch-nodes in the impact relations map, not $C(T_t^{Di})$ dispatch-nodes. In this step, we can get $C(T_t^{Di})$ mean de-entropy values.

Step 4. Finding the maximum mean de-entropy: In $C(T_t^{Di})$ mean de-entropy values, choosing the maximum mean de-entropy and its corresponding T_t^{Di} . This dispatch-node set, with the maximum mean de-entropy, is denoted as $T_{max}{}^{Di}$. The elements of $T_{max}{}^{Di}$ are the "more important" factors to provide more information about influence dispatching for a decision maker than other factors.

Step 5. Finding the receive-node and calculating the maximum mean de-entropy: Similar to Steps 2 to 4, an ordered receive-node set T^{Re} and a maximum mean de-entropy receive-node set $T_{max}{}^{Re}$ can be decided. The elements of $T_{max}{}^{Re}$ provide information on which are easily influenced.

Step 6. Obtaining the threshold value: Taking the first u elements in *T** as the subset, T^{Th}, which includes all elements of $T_{max}{}^{Di}$ in the

Table 3. Criteria of developing Taiwan's tourism nation brand.

Criteria	Descriptions
Landscapes	Eight national parks offer a variety of distinct topographic landscapes: Taroko National Park, Yushan National Park, Shei-pa National Park, Yangmingshan National Park, Kenting National Park, Kinmen National Park, Dongsha Marine National Park and Taijiang National Park.
Marine recourse	Taiwan has a very rich marine ecology. In the Pacific Ocean on Taiwan's east, groups of dolphins can be seen jumping out of the water. Azure seas and magnificent coral reefs can be found in Kending on the south on end of Taiwan, on Green Island and the islands of the Penghu Archipelago.
Culture	Because of its unique historical and geographical background, Taiwan has a rich and versatile culture composed of elements taken from many different ethnic groups
Festival	The Chinese New Year, Lantern Festival, Religious Activities, Aboriginal Ceremonies, Hakka Culture Activities, Specially Industry Activities
Shopping	Taiwan is littered with large shopping centers and department chain stores. Combining diverse leisure and entertainment facilities, these venues offer designer clothing, lifestyle products, food outlets, bookstores, movie house, wholesale warehouses, amusement centers, and others, providing the ultimate shopping environment
Tastes	Its culinary culture has expanded beyond the traditional Chinese foods. Foreign foods from all over the world have also made their appearance in Taiwan. Taiwan's own native cuisine has also become known around the world.

Table 4. Causal influence level summarized table of criteria.

Criteria	Landscapes	Marine recourse	Culture	Festival	Shopping	Tastes	Σy_i
Landscapes	0	1.4444	3.0000	2.7222	2.3889	2.3333	11.8888
Marine recourse	1.2778	0	2.2778	2.1667	2.1667	1.7778	9.6668
Culture	2.8333	2.1111	0	3.3333	2.6667	2.6111	13.5555
Festival	2.7222	2.0556	3.1111	0	3.3333	3.3333	**14.5555***
Shopping	2.4444	2.1111	2.5556	3.1667	0	3.1111	13.3889
Tastes	2.1111	1.5556	2.4444	2.8889	3.1111	0	12.1111
Σy_j	11.3888	9.2778	13.3889	14.2778	13.6667	13.1666	

Bold value = *S*.

dispatch-node and all elements of T_{max}^{Re} in the receive-node, the minimum influence value in T^{Th} is the threshold value.

CASE APPLICATION

Study framework

The criteria of Taiwan's tourism nation brand consist of landscapes, marine resources, culture, festival, shopping and tastes (Table 3). According to Teng (2002), 5 to 15 experts will be appropriate for group decision making. In order to obtain the relations among criteria, the questionnaire was mailed to 18 experts who have worked in tourism for more than 5 years. Eighteen valid questionnaires have been received, representing a 100% return rate. The eighteen respondents include ten males and eight females, from four university academics, two media workers, seven county and city government tourism officials and five travel agency workers. Therefore, the computation using DEMATEL method is based upon these opinions of the eighteen experts.

Impact assessment of criteria

First, the results from evaluating the relations of these six criteria and counting the average dimensions of the questionnaire from the 18 experts are shown as Table 4. Taking the respective values into the matrix, matrix Z can be constructed.

Calculating the sum of rows and columns separately, 14.5555 is the largest value. After matrix Z is divided by 14.5555, the normalized initial direct-relation matrix, *A* is as follows:

S = max(11.8888, 9.6668, 13.5555, 14.5555, 13.3889, 12.1111, 11.3888, 9.2778, 13.3889, 14.2778, 13.6667, 13.1666) = 14.5555:

By Equations (3) and (4), the full relation matrix *T* can be obtained as:

$$A = Z / S = \begin{bmatrix} 0 & 1.4444 & 3.0000 & 2.7222 & 2.3889 & 2.3333 \\ 1.2778 & 0 & 2.2778 & 2.1667 & 2.1667 & 1.7778 \\ 2.8333 & 2.1111 & 0 & 3.3333 & 2.6667 & 2.6111 \\ 2.7222 & 2.0556 & 3.1111 & 0 & 3.3333 & 3.3333 \\ 2.4444 & 2.1111 & 2.5556 & 3.1667 & 0 & 3.1111 \\ 2.1111 & 1.5556 & 2.4444 & 2.8889 & 3.1111 & 0 \end{bmatrix} /14.5555 = \begin{bmatrix} 0 & 0.0992 & 0.2061 & 0.1870 & 0.1641 & 0.1603 \\ 0.0878 & 0 & 0.1565 & 0.1489 & 0.1489 & 0.1221 \\ 0.1947 & 0.1450 & 0 & 0.2290 & 0.1832 & 0.1794 \\ 0.1870 & 0.1412 & 0.2137 & 0 & 0.2290 & 0.2290 \\ 0.1679 & 0.1450 & 0.1756 & 0.2176 & 0 & 0.2137 \\ 0.1450 & 0.1069 & 0.1679 & 0.1985 & 0.2137 & 0 \end{bmatrix}$$

By Eqs (3) and (4), the full relation matrix *T* can be obtained.

$$T = A / (I\text{-}A) = \begin{bmatrix} 0 & 0.0992 & 0.2061 & 0.1870 & 0.1641 & 0.1603 \\ 0.0878 & 0 & 0.1565 & 0.1489 & 0.1489 & 0.1221 \\ 0.1947 & 0.1450 & 0 & 0.2290 & 0.1832 & 0.1794 \\ 0.1870 & 0.1412 & 0.2137 & 0 & 0.2290 & 0.2290 \\ 0.1679 & 0.1450 & 0.1756 & 0.2176 & 0 & 0.2137 \\ 0.1450 & 0.1069 & 0.1679 & 0.1985 & 0.2137 & 0 \end{bmatrix} /(\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0. & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} -$$

$$\begin{bmatrix} 0 & 0.0992 & 0.2061 & 0.1870 & 0.1641 & 0.1603 \\ 0.0878 & 0 & 0.1565 & 0.1489 & 0.1489 & 0.1221 \\ 0.1947 & 0.1450 & 0 & 0.2290 & 0.1832 & 0.1794 \\ 0.1870 & 0.1412 & 0.2137 & 0 & 0.2290 & 0.2290 \\ 0.1679 & 0.1450 & 0.1756 & 0.2176 & 0 & 0.2137 \\ 0.1450 & 0.1069 & 0.1679 & 0.1985 & 0.2137 & 0 \end{bmatrix})$$

$$= \begin{bmatrix} 0.9042 & 0.8328 & 1.1908 & 1.2408 & 1.1864 & 1.1583 \\ 0.8276 & 0.6138 & 0.9758 & 1.0232 & 0.9925 & 0.9513 \\ 1.1654 & 0.9492 & 1.1323 & 1.3888 & 1.3158 & 1.2845 \\ 1.2210 & 0.9966 & 1.3766 & 1.2764 & 1.4191 & 1.3890 \\ 1.1334 & 0.9393 & 1.2674 & 1.3665 & 1.1480 & 1.2958 \\ 1.0449 & 0.8512 & 1.1792 & 1.2664 & 1.2399 & 1.0380 \end{bmatrix}$$

4.3 Threshold value

Then, following the steps, the results of the threshold value were calculated and are shown below:

Step 1: After transforming the full relation matrix *T*, shown above, the ordered triplets set T^* $\{(t_{ij},x_i,x_j)\}$ was obtained as {(1.4191,4,5), (1.3890,4,6), (1.3888,3,4), (1.3766,4,3), (1.3665,5,4), (1.3158,3,5), (1.2958,5,6), (1.2845,3,6), (1.2764,4,4), (1.2674,5,3), (1.2664,6,4), (1.2408,1,4), (1.2399,6,5), (1.2210,4,1), ... , (0.6138,2,2)}.

$$= \begin{bmatrix} 0.9042 & 0.8328 & 1.1908 & 1.2408 & 1.1864 & 1.1583 \\ 0.8276 & 0.6138 & 0.9758 & 1.0232 & 0.9925 & 0.9513 \\ 1.1654 & 0.9492 & 1.1323 & 1.3888 & 1.3158 & 1.2845 \\ 1.2210 & 0.9966 & 1.3766 & 1.2764 & 1.4191 & 1.3890 \\ 1.1334 & 0.9393 & 1.2674 & 1.3665 & 1.1480 & 1.2958 \\ 1.0449 & 0.8512 & 1.1792 & 1.2664 & 1.2399 & 1.0380 \end{bmatrix}$$

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Step 2: According to the results of Step 1, the ordered dispatch-node set T^{Di} $\{(x_i)\}$ can be calculated as {4,4,3,4,5,3,5,3,…,6,1,2,2}.

Step 3: Based on the set T^{Di}, a collection of sets T_t^{Di}, in which t is from 1 to 36, can be obtained. After all of the H^D values of the sets T_t^{Di} are calculated, a set with 36 mean de-entropy values is created.

Step 3a: T_t^{Di} sets and MDE_t^{Di} values: T_1^{Di} = {4},

Table 5. Matrix for full-relation of the criteria.

Criteria	Landscapes	Marine recourse	Culture	Festival	Shopping	Tastes
Landscapes	0.9042	0.8328	1.1908	1.2408*	1.1864	1.1583
Marine recourse	0.8276	0.6138	0.9758	1.0232	0.9925	0.9513
Culture	1.1654	0.9492	1.1323*	1.3888*	1.3158*	1.2845*
Festival	1.2210*	0.9966	1.3766*	1.2764*	1.4191*	1.3890*
Shopping	1.1334	0.9393	1.2674	1.3665*	1.1480	1.2958*
Tastes	1.0449	0.8512	1.1792	1.2664*	1.2399*	1.0380

Bold values means ≥ the threshold value (1.2210).

$MDE_1^{Di}=0$; $T_2^{Di}=\{4,4\}$, $MDE_2^{Di}=0$; $T_3^{Di}=\{4,4,3\}$, $MDE_3^{Di}=0.0283$; $T_4^{Di}=\{4,4,3,4\}$, $MDE_4^{Di}=0.0654$; $T_5^{Di}=\{4,4,3,4,5\}$, $MDE_5^{Di}=0.0494$; …., $T_{36}^{Di}=\{4,4,3,4,5,3,5,3,\ldots,6,1,2,2\}$, $MDE_{36}^{Di}=0$.

Step 3b: Set of 36 MDE_t^{Di} = {0, 0, 0.0283, 0.0654, 0.0494, 0.0291, 0.0065, 0.0055, 0.0126, 0.0032, 0.0229, 0.0272, 0.0169, 0.023, 0.0124, 0.0089, 0.005, 0.0047, 0.0038, 0.0025, 0.0033, 0.0035, 0.012, 0.0007, 0.0137, 0.0148, 0.0075, 0.0036, 0.0017, 0.0022, 0.0026, 0.0017, 0.017, 0.0016, 0.0004, 0}.

Step 4: From Step 3, the maximum mean de-entropy value is 0.0654 and the corresponding dispatch-node set is $T_{max}^{D\,I}$= {4,4,3,4}={3,4}.

Step 5: Similar to Steps 2 to 4.

Step 5a: the ordered receive-node set $T^{Re}=\{(x_j)\}$ ={5,6,4,3,4,5,6,6,4,3,4,4,5,1,…,2,1,2}

Step 5b: Set of 36 MDE_t^{Re} values: {0, 0, 0, 0, 0.0135, 0.0142, 0.0086, 0.0164, 0.0189, 0.0050, 0.0110, 0.0194, 0.0135, 0.0230, 0.0194, 0.0197, 0.0192, 0.0085, 0.0074, 0.0085, 0.0033, 0.0035, 0.0012, 0.0007, 0.0016, 0.0148, 0.0156, 0.0161, 0.0164, 0.0092, 0.0050, 0.0041, 0.0017, 0.0006, 0.0004, 0}

Step 5c: Maximum MDE_t^{Re} value: 0.2230

Step 5d: Receive-Node set of the maximum MDE_t^{Re} : T_{max}^{Re}={5,6,4,3,4,5,6,6,4,3,4,4,5,1}={1,3,4,5,6}.

Step 6: According to the results of Steps 4 and 5, the elements {3,4} are the dispatch-nodes and the elements {1,3,4,5,6} are the receive-nodes in the impact-relations map.

Step 6a: T_{max}^{Di} = {(1.4191,4,5), (1.3890,4,6), (1.3888,3,4), (1.3766,4,3) } (The nodes in box is the needed dispatch-nodes shown at first time in the ordered set)

Step 6b: T_{max}^{Re} = {(1.4191,4,5), (1.3890,4,6), (1.3888,3,4), (1.3766,4,3), (1.3665,5,4), (1.3158,3,5), (1.2958,5,6), (1.2845,3,6), (1.2764,4,4), (1.2674,5,3), (1.2664,6,4), (1.2408,1,4), (1.2399,6,5), (1.2210,4,1)} (The nodes in box is the needed receive-nodes shown at first time in the ordered set)

Step 6c: T^{Th} = {(1.4191,4,5), (1.3890,4,6), (1.3888,3,4), (1.3766,4,3), (1.3665,5,4), (1.3158,3,5), (1.2958,5,6), (1.2845,3,6), (1.2764,4,4), (1.2674,5,3), (1.2664,6,4), (1.2408,1,4), (1.2399,6,5), (1.2210,4,1)} (T^{Th} = T_{max}^{Di} ∪ T_{max}^{Re})

Step 6d: Threshold Value = 1.2210 (The minimum influence value in T^{Th} is the threshold value.)

The prominence and relevance

Based on the DEMATEL steps and MMDE steps shown earlier, the results were used to create the impact-relations map deriving by mapping a dataset of (*D+R, D-R*). These are shown in Table 5 for criteria. And the impact-relations maps of the DEMATEL method are presented in Figure 1.

From Table 6, the importance criteria are festival, shopping, culture and tastes. Festival is the criterion with the highest value of 15.2408. The *D-R* values of landscapes, marine recourse, festival and cultural are positive and show that they are net causes. The *D-R* values of tastes and shopping are negative show that they are the causes affected by others. According to the values of (*D+R*) and (*D-R*) in Table 6, we created a criteria XY scatter with the coordinates of each criterion, based on the horizontal axis (*D+R*) and the vertical axis (*D-R*), shown as in Figure 1. In this study, we have a total of 6 criteria. Taking (*D+R*) and (*D-R*) together into consideration, festival is the most important factor.

Conclusion

In order to place in the global market, economic prosperity, countries muster their efforts to obtain a better Nation Brand, of which Taiwan is no exception. According

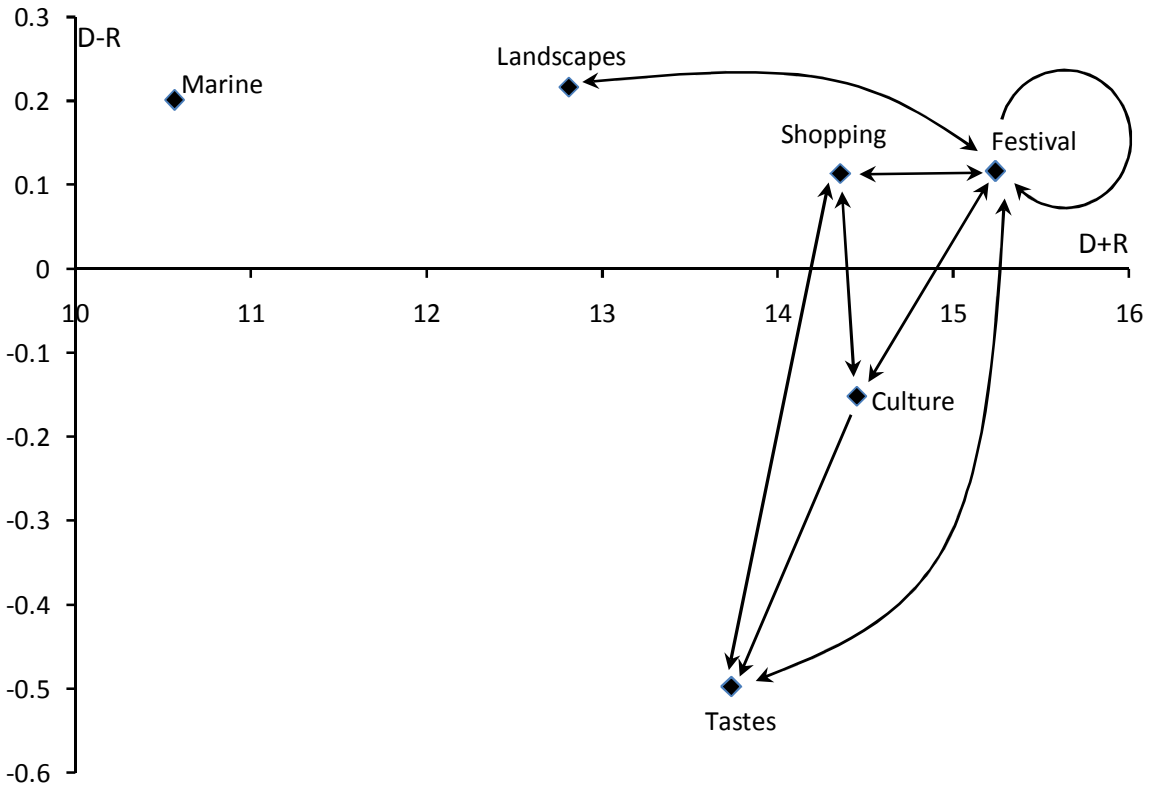

Figure 1. The digraph showing causal relations among these criteria.

Table 6. Causal influence level summarized table of criteria.

criteria	D	R	D + R	D - R
Landscapes	6.5133	6.2965	12.8098	0.2168
Marine recourse	5.3842	5.1829	10.5671	0.2013
Culture	7.2360	7.1221	14.3581	0.1139
Festival	7.6787	7.5621	15.2408	0.1166
Shopping	7.1504	7.3017	14.4521	-0.1513
Tastes	6.6196	7.1169	13.7365	-0.4973

to 50 NBI^{SM} target countries in rank order based on their overall Nation Brands Index® NBI 2009 report: Taiwan was 34th, but only 39th on the tourism index, demonstrating the weakness in Taiwan's brand. Taiwan's government needs to make more effort in branding Taiwan in tourism. This study applies the DEMATEL method to evaluate the importance of criteria and the MMDE method to set an appropriate threshold value for obtaining adequate information to draw the impact-relations map in branding Taiwan in perspectives of tourism for decision-making. The results show that festival, tastes and culture are more important for branding Taiwan with respect to tourism, and festival is the most important factor. Future researchers should explore other parts of the Nation Brands Index® to find other key factors to arise the overall ranking on Nation Brands Index® of Taiwan.

REFERENCES

Amine LS, Chao MCH (2004). Managing country image to long-term advantage: The case of Taiwan and Acer. Place Branding, 1(2): 187-204.

Anholt S (2003). Brand New Justice: The Upside of Global Branding. Butterworth and Heinemann, Oxford, UK.

Anholt S (2005). Editorial. Place Branding, 1(4): 333-346.

Anholt S (2007). Brand Africa: what is competitive identity? Afr. Anal., 2(2): 72-81.

Anholt S (2008). Editorial 'Nation Branding' in Asia. Place Branding and Public Diplomacy, 4: 265-269.

Brymer C (2003). Branding a country, www.pedroguitton.com/phd_knowledge_center/pdf/Country_Branding.pdf
Chen CA, Lee MH, Yang YH (2011). Branding Taiwan for tourism using the DEMATEL and ANP methods. Serv. Ind. J., iFirst, pp. 1-19.
Dinnie K (2008). Nation Branding: Concepts, Issues, Practice. Oxford, UK: Elsevier.
Fan Y (2006). Branding the nation: What is being branded? J.Vacation Mark., 12(1): 5-14.
Gee CY (1999). International tourism: A global perspective. Madrid, Spain: World Tourism Organization.
Gertner D, Kotler P (2004). How can a place correct a negative image? Place Branding. 1(1): 50-57.
GfK Roper Public Affairs and Media (2009). The Anholt-GfK Roper Nation Brands Index^{SM} 2009 Report. New York: GfK Roper Public Affairs & Media.
Gudjonsson H(2005). Nation branding. Place Branding, 1(3): 283-298.
Hsu TK, Tsai YF, Wu HH (2009). The preference analysis for tourist choice of destination: A case study of Taiwan. Tourism Manage., 30: 288-297.
Jiang F, Sui Y, Cao C (2010). An information entropy-based approach to outlier detection in rough sets. Expert Syst. Appl., 37(9): 6338-6344.
Kotler P, Jatusripitak S, Maesincee S (1997). The Marketing of Nations. New York: Free Press.
Kyriacou S, Cromwell T (2004). Branding nations, the concepts and benefits of nation branding. www.eastwestcoms.com.
Lee CC, Chang CP (2008). Tourism development and economic growth: a closer look at panels. Tourism Manage., 29(1): 180-192.
Lin CL, Tzeng GH(2009). A value-created system of science (technology) park by using DEMATEL. Expert Syst. Appl., 36: 9683-9697.
MacCannell D (1992). Empty Meeting Grounds: The Tourist Papers. London: Routledge.
Manish P, Majumde SK (2009). Quality of mixing in a downflow bubble column based on information entropy theory. Chem. Eng. Sci., 64(8): 1798-1805.
Olins W (2002). Henry Stewart Publications 1350-231X. Brand Manage., 9(4/5): 241-248.
Papadopoulos N, Heslop L (2002). Country equity and country branding: Problems and prospects. J. Brand Manage., 9(4/5): 294-314.
Park A (2009). Selling a small state to the world: Lithuania 's struggle in building its national image. Place Branding and Public Diplomacy, 5(1): 67-84.
Quelch J, Jocz K (2004). Opinion Piece: Positioning the nation-state. Place Branding, 1(3): 229-237.
Roberts K (2004). Every world needs an edge. www.nzedge.com.
Rostow W (1971). The stages of economic growth. England: Cambridge University Press, 2nd edition.
Shannon CE (1948). The mathematical theory of communication. Bell Syst. Tech. J., 27(3/4): 373-423.
Shimp TA, Samiee S, Madden TJ (1993). Countries and their products: a cognitive structure perspective. J. Acad. Mark. Sci., 21(4): 323-330.
Taiwan Tourism Bureau (2010). Tourism policy, admin.taiwan.net.tw/English.
Teng JY (2002). Project evaluation: Methods and applications. Keelung: National Taiwan Ocean University.
Tsai WH, Hsu W (2010). A novel hybrid model based on DEMATEL and ANP for selecting cost of quality model development. Total Q. Manage. Bus. Excell., 21(4): 439-456.
UNWTO (2009). Tourism Highlights 2009 Edition. Madrid Spain: UNWTO Publications.
Wu HH, Chen HK, Shieh JI (2010). Evaluating performance criteria of Employment Service Outreach Program personnel by DEMATEL method. Expert Syst. Appl., (37): 5219-5223.
Wu WW (2008). Choosing knowledge management strategies by using a combined ANP and DEMATEL approach. Expert Syst. Appl., (35): 828-835.
Zhou DQ, Zhang L, Li HW (2006). A study of the system's hierarchical structure through integration of DEMATEL and ISM. In Proceedings of the fifth international conference on machine learning and cybernetics. Dalian, pp. 1449- 1453.