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Strategies for Inbound Tourism Recovery from a Catastrophe: The Case of Severe Acute Respiratory Syndrome in Taiwan

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ABSTRACT

The outbreak of Severe Acute Respiratory Syndrome (SARS) was the most catastrophic disaster in Taiwan's recent past. The aim of this study is to assist the development of recovery strategies for future events by mapping the revitalization of Taiwan tourism after the SARS impact. Fuzzy AHP (Analytic Hierarchy Process) method was applied to determine the weighting of various evaluation criteria for developing tourism recovery strategies obtained by consultation with a range of domain experts. The results indicate that highest priority should be given to development and upgrading of domestic tourism attractions and the least to establishing task forces for revitalization of the tourism industry. Conclusions are drawn concerning appropriate strategies for government officials in the event of future disasters.

Keywords: Disaster, Recovery, Revitalization, Tourism

INTRODUCTION

Tourism is a global industry undergoing rapid expansion. It is also the largest industry and generator of jobs in the world. Numbers of international arrivals demonstrate growth from only 25 million tourists in 1950 to a record setting 808 million in 2005 (WTO, 2006). For many countries, tourist expenditure has become an important source of business activity, income, employment, balance of payments, and foreign currency earnings. In Taiwan, tourism has played a significant role in enhancing the island's international exposure. In view of this trend, a state policy "Challenge 2008: Plan for Multiplying Tourism" was issued by the Executive Yuan, the highest administrative body in Taiwan, to promote the island's tourism industry.

The goal of this policy was to have 5 million visitors by 2008. However, just as Taiwan's government was to initiate promotional campaigns for tourism, the Severe Acute Respiratory Syndrome (SARS) outbreak struck a severe blow to the industry at the beginning of 2003. This outbreak particularly affected the Asia-Pacific countries of China, Hong Kong, Taiwan, and Singapore. In particular, SARS dealt a severe blow to Taiwan's tourism industry, with the worst impact on inbound tourism. Since the tourism industry is highly susceptible to negative occurrences, the number of tourist arrivals fell significantly during the SARS outbreak, reaching a level the island had never before witnessed.

The aim of this study is to develop recovery strategies for future such events by mapping the revitalization of Taiwan's tourism after the SARS devastation. A fuzzy decision-making theory method with Analytic Hierarchy Process (AHP) was applied to determine the weighting of various evaluation criteria for tourism recovery strategies. As the evaluation is the result of different evaluators' views of linguistic variables, fuzzy AHP method can re-enforce the comprehensiveness and integrity of the analysis.

This study has three objectives:

1. Providing effective proposals for stimulating the tourism industry during the post-SARS era by interviewing industry professionals, authorities and scholars.
2. Establishing crisis indicators, implementation plans and feasible control mechanisms for reference.
3. Providing marketing strategies to Taiwan officials to improve their disaster mitigation efforts, and helping them develop appropriate strategies in the event of future disasters.

The next section provides a description of how international tourism was affected by the SARS illness, followed by an outline of the concept of Fuzzy AHP and how it is employed in this research. Next, the empirical results of the analysis are described and the final section presents the conclusions of the study.

BACKGROUND

From the end of 2002 onwards, SARS spread rapidly through the medium of international travel to more than 26 countries on five continents. The World Health Organization (WHO) issued travel warnings based on the magnitude of the outbreaks in the regions, including both the number of existing cases and the number of new cases daily. The spread of the epidemic led to WHO designating Taiwan an affected area on March 15, 2003. Taipei, the capital of Taiwan, was placed on the WHO travel advisory list on May 8, and travel warnings were extended to the entire island on May 21. This was the most stringent world-wide travel advisory issued by the WHO.

In response to the SARS outbreak, the Taiwan government decided to implement certain travel-related procedures such as the screening of travelers for fever and providing international travelers with health information. Comprehensive measures for controlling and treating SARS were built into Taiwan's already strong medical system. WHO lifted Taiwan from its SARS travel advisory list on June 17, 2003 and removed it from the list of areas with recent local transmission on July 5.

Following the disastrous SARS epidemic, Taiwan's tourist-related organizations were in the difficult position of decreased visitation and revenues. The disaster caused by the SARS epidemic called for reactions that extended beyond textbook marketing responses. Government policies were needed to play a vital role during the post-SARS period; to listen to tourism industry professionals, and assist the tourism industry in coping with its difficulties.

METHODOLOGY

The strategies for responding to the SARS impact on Taiwan's tourism involved many complex aspects and can be viewed as a multi-criteria decision-making problem. Therefore, systematic measurement is adopted to simplify and incorporate correlative criteria for analysis of issues and strategy making. Since the analytic hierarchy process (AHP) method systematizes complicated problems, is relatively easy to operate, and can integrate most expert and evaluator opinion, this study adopted AHP for the evaluation of weightings.

AHP was first developed by Thomas L. Saaty in 1980 (Saaty, 1980), and has now been applied in many diverse areas of social management science. Since the 1990's, tourism scholars have also applied AHP to tourism planning, evaluation, and decision making (Ryan, 1991; Moutinho & Curry, 1994; Isareli et al., 1998; Tzeng et al., 2002).

The method deconstructs complicated problems from upper hierarchies to lower ones. Furthermore, it also systematizes problems by utilizing a subsystem perspective that can be easily comprehended and evaluated. Finally, it determines the priorities of the elements at each level of the decision hierarchy and synthesizes these priorities to determine the overall priorities of the decision alternatives.

Basic Concept of Fuzzy AHP

In conventional AHP, pairwise comparisons for each level with respect to the goal are conducted using a nine-point scale. Though the purpose of AHP is to capture an expert's knowledge, conventional AHP still cannot reflect human thinking style. In particular, with different decision-making problems of diverse intensity, the results can be misleading if the fuzziness (uncertainty) of decisions are not taken into account such as, 'very cold', 'fairly tall', 'probably correct' (Buchanan & Shortliffe, 1984; Leung & Lam, 1988). Moreover, it is also recognized that human assessment of qualitative attributes is always subjective and thus imprecise. Buckley (1985) first explored fuzzy weights and fuzzy utility with the AHP technique and extended it by the geometric mean method to derive fuzzy weights. According to Saaty (1980), if $A=[a_{ij}]_{m\times m}$ is a positive reciprocal matrix, then the geometric mean of each row r_i can be calculated as $r_i=\left(\prod_{j=1}^{m} a_{ij}\right)^{1/m}$. At this point, Saaty described $\lambda_{\max}$ as the largest eigenvalue of A ($C.I.=(\lambda_{\max}-m)/(m-1)$) and the weights w_i are the components of the normalized eigenvector corresponding to $\lambda_{\max}$, where $w_i=r_i/(r_1+\cdots+r_m)$. Buckley also considered a fuzzy positive reciprocal matrix $\tilde{A}=[\tilde{a}_{ij}]$, and extended the geometric mean technique to describe the fuzzy geometric mean of each row $\tilde{r}_i$ and fuzzy weight $\tilde{w}_i$ corresponding to each criterion by the following equations:

$$\tilde{r}_i=(\tilde{a}_{i1}\otimes\cdots\otimes\tilde{a}_{im})^{1/m};\ \ \tilde{w}_i=\tilde{r}_i\otimes(\tilde{r}_1\oplus\cdots\oplus\tilde{r}_m)^{-1}. \qquad (1)$$

Nowadays, fuzzy set theory has been widely applied to different areas of management science, such as decision making (Kahraman et al., 2004; Dimova et al., 2006), service quality evaluation (Tsaur et al., 2002; Kuo et al., 1999) and tourist risk evaluation (Tsaur et al., 1997). However, it has not been adopted in developing tourism recovery strategies after disasters. Here, fuzzy AHP is used to evaluate strategies to invigorate Taiwan's inbound tourism after a negative impact.

Fuzzy Number Operations

Fuzzy number $\tilde{A}$ is of a fuzzy set, and its membership functions are $u_{\tilde{A}}(x): R \rightarrow [0,1]$, in which

1. $u_{\tilde{A}}(x)$ is a continuous mapping from R to the closed interval [0,1],
2. $u_{\tilde{A}}(x)$ is of a convex fuzzy subset, and
3. $u_{\tilde{A}}(x)$ is the normality of a fuzzy subset, which means that there exists a number x_0 that makes $u_{\tilde{A}}(X_0) = 1$.

This function of a triangular fuzzy number (TFN) is illustrated in Figure 1.

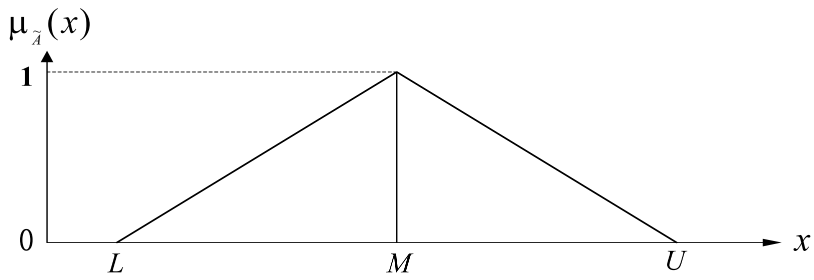

Figure 1 The Membership Function of TFN

A fuzzy number $\tilde{A}$ on R is a TFN if its membership function $\mu_{\tilde{A}}(x)$: $R \rightarrow [0,1]$ is equal to:

$$\mu_{\tilde{A}}(x)=\begin{cases}(x-L)/(M-L) & L \le x \le M \\ (U-x)/(U-M) & M \le x \le U \\ 0 & \text{otherwise}\end{cases} \tag{2}$$

where L and U stand for the lower and upper bounds of the fuzzy number $\tilde{A}$, respectively, and M stands for the model value. According to the nature of TFN and the extension principle put forward by Zadeh (1965), who first proposed the fuzzy set theory, the algebraic calculation of the triangular fuzzy number $\tilde{A}_1 = (L_1, M_1, U_1)$ and $\tilde{A}_2 = (L_2, M_2, U_2)$ can be presented as shown in equations (3) to (8):

Addition of a fuzzy number $\oplus$

$$\tilde{A}_1 \oplus \tilde{A}_2 = (L_1, M_1, U_1) \oplus (L_2, M_2, U_2) = (L_1 + L_2, M_1 + M_2, U_1 + U_2) \tag{3}$$

Multiplication of a fuzzy number $\otimes$

a. $\tilde{A}_1 \otimes \tilde{A}_2 = (L_1, M_1, U_1) \otimes (L_2, M_2, U_2) = (L_1 L_2, M_1 M_2, U_1 U_2)$ *for* $L_1 \ge 0, L_2 \ge 0$ (4)

b. Any real number k,

$$K \otimes \tilde{A}_1 = (K, K, K) \otimes (L_1, M_1, U_1) = (KL_1, KM_1, KU_1) \quad (5)$$

Subtraction of a fuzzy number ⊖

$$\tilde{A}_1 \ominus \tilde{A}_2 = (L_1, M_1, U_1) \ominus (L_2, M_2, U_2) = (L_1 - U_2, M_1 - M_2, U_1 - L_2) \quad (6)$$

Division of a fuzzy number ∅

$$\tilde{A}_1 \varnothing \tilde{A}_2 = (L_1, M_1, U_1) \varnothing (L_2, M_2, U_2) = (L_1/U_2, M_1/M_2, U_1/L_2) \quad (7)$$

Fuzzy inverse

$$\tilde{A}_1^{-1} = (L_1, M_1, U_1)^{-1} = (1/U_1, 1/M_1, 1/L_1) \quad (8)$$

Linguistic Variables

In order to take the imprecision of human qualitative assessments into consideration, the triangular fuzzy numbers are defined with the corresponding membership functions as shown in Figure 2.

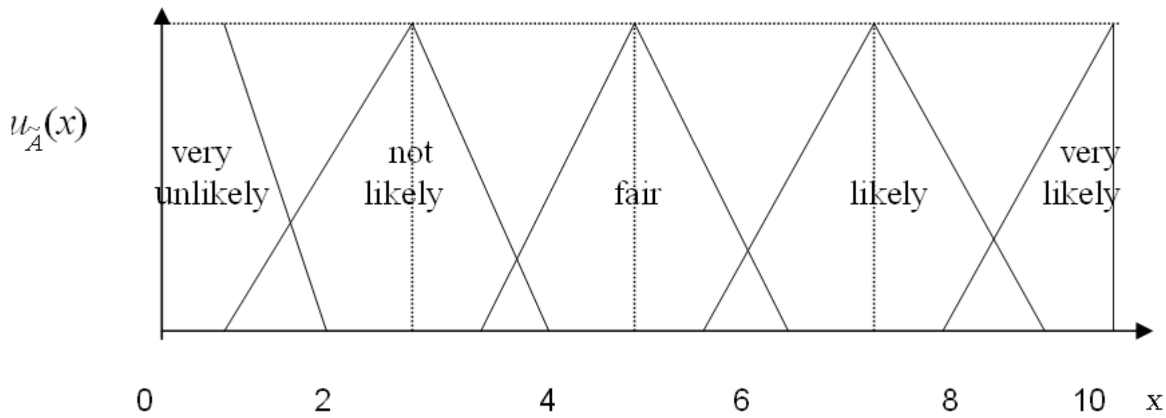

Figure 2 The Membership Function of the Five Levels of Linguistic Variables

Take E_{ij}^k the fuzzy value of evaluator *k* towards alternative strategy *i* under criterion *j*, and all of the evaluation criteria will be indicated by set *S*, that is,

$$E_{ij}^k = \left(LE_{ij}^k, ME_{ij}^k, UE_{ij}^k\right), j \in S \quad (9)$$

Since every respondent perceives differently toward every criterion, we have taken the notion of average value in order to integrate the fuzzy judgment values of *m* evaluators, that is,

$$E_{ij} = \frac{1}{m} \otimes \left(E_{ij}^1 \oplus E_{ij}^2 \oplus, \ldots, \oplus E_{ij}^m\right) \quad (10)$$

E_{ij} as a fuzzy number can be represented by triangular membership function as follows:

$$E_{ij} = (LE_{ij}, ME_{ij}, UE_{ij}) \quad (11)$$

with LE_{ij} being the lower bound, ME_{ij} being the mean, and UE_{ij} being the upper bound, Buckley (1985) stated that the three end points can be calculated by the method proposed as:

$$LE_{ij} = \left(\sum_{k=1}^{m} LE_{ij}^{k} \right) / m \quad (12)$$

$$ME_{ij} = \left(\sum_{k=1}^{m} ME_{ij}^{k} \right) / m \quad (13)$$

$$UE_{ij} = \left(\sum_{k=1}^{m} UE_{ij}^{k} \right) / m \quad (14)$$

Because the result of synthesized judgment is a fuzzy number, we therefore have to adopt defuzzification to convert the fuzzy number into crisp real numbers. The procedure of defuzzification is to locate the Best Nonfuzzy Performance (BNP) value and use this value to order performance numbers.

$$BNP_i = \frac{[(UR_i - LR_i) + (MR_i - LR_i)]}{3} + LR_i, \forall i \quad (15)$$

Since conventional AHP seems inadequate to determine the weighting of strategies to respond to the SARS outbreak, fuzzy AHP was developed in this study to solve the hierarchical fuzzy problems and to make the results more objective. To apply fuzzy AHP in prioritizing strategies in this study, all strategies have to be structured into various hierarchical levels. This study uses the three-level hierarchy for strategies based on the hierarchical structures of AHP. The first hierarchy is the goal level, with strategies for inbound tourism recovery as its ultimate objective; the second hierarchy is the objective level, with its four evaluation aspects; the third hierarchy is the attribute level, with its fifteen evaluation criteria.

RESULTS

In consideration of the time constraints, limited budgets and difficulties in approaching specialists, this research is based on Hakim's suggestions (1987) concerning procedures. First, we defined criteria for hierarchy strategies through brainstorming as well as through a series of pretests with domain experts: 4 senior government officers and 2 senior practitioners (one for travel agencies and one for the airline industry). After this, 18 questionnaires were distributed, 17 of which were collected, giving a collection ratio of 94%. Fifteen questionnaires were collected by face-to-face interviews and the remaining three through telephone or e-mail delivery due to distance restraints or requests from the interviewees. The experts included two tourism-related professors, three government officials, and ten experienced practitioners (three each for the airline industry, travel agencies and the hotel industry, and one for a consultant firm). The results from the questionnaires were entered into Excel 2000 in sequence to derive the weightings and then the various weight alternatives were evaluated. The outcomes were then prioritized by weight, and the expert opinions were combined to form the "Strategies for inbound tourism response to the SARS outbreak in Taiwan". Each weighting mode derived from this research was consistent as all CI's (Consistency Indicators) and CR's (Consistency Rates) were below 0.1. Figure 3 and Table 1 were generated during the course of this analysis.

According to the findings, "develop and upgrade domestic tourism attractions" was ranked as the most important of the fifteen criteria. It was unanimously agreed that the first priority for the government is to consolidate tourism resources, fully upgrade infrastructure, and encourage the participation of private investment. These will help to create a friendly and diversified world-class travel environment.

The criterion "finance working capital for enterprises" was ranked as second in importance. Unlike the devastating September 21 earthquake and September 11 terrorist attack, the SARS outbreak was unprecedented. Nearly all inbound, outbound and domestic travel was halted. Therefore, the travel industry expects the government to expedite loan financing and simplify application processes so that the industry can obtain financial aid in a timely fashion.

"Establish a task force for the revitalization of the tourism industry" that would combine resources from government, the tourism industry and relevant tourism groups, to clarify misconceptions was considered the least important factor. Specialists believed that this requires a long-term process before results occur, therefore, it was placed last in priority.

"Attend large scale international traveling exhibitions" was ranked second from the last. Because it has already been practiced for years with positive results, this strategy is not critical after a SARS-like event, although some specialists suggested promoting Taiwan's friendly travel environment, safety precaution measurements, new tourist attractions, new traveling kits and bonus schemes when attending exhibitions.

CONCLUSIONS

In this study, a fuzzy AHP approach for determining the weighting of strategies for inbound tourism recovery in response to the SARS outbreak in Taiwan was employed. Triangular fuzzy numbers were introduced into conventional AHP in order to improve the imprecise ranking of strategies render results more objective and practical. The result of the study is that fifteen selected strategies were ranked according to expert evaluation. The outcome of this research can serve as a reference to government authorities for policy adjustment and possible strategies to revitalize the tourism industry. It can also be utilized by the tourism industry for more efficient management after future disasters.

Certain limitations of this study should be noted and serve as a guide for future research. The basic assumption of AHP is independence of hierarchy and criteria. However, correlations do exist among some criteria. It is suggested this issue be tackled in subsequent studies. Also, the selection of sampling affects the final results for criteria, weighting and measurement. The interviewees could be more diversified if the sample size were enlarged. For instance, specialists could be included from the transportation, food and beverage, and recreational industries.

This study also provides a hierarchy of strategies for tourism recovery in order to minimize losses. Moreover, it will help marketers to draw some practical conclusions for promoting tourism in Taiwan in the event of future mishaps because through the development of tourism recovery strategies, negative impacts can be minimized (Barton, 1994; Sellnow & Sarabakhsh, 1999; Anderson, 2006). Further, steps toward developing a systematic crisis-management program in the tourism industry should be done for every destination. Measures and policies of diversification may reduce the overall risk involved to the industry (Stafford, Yu & Kobina Armoo, 2002; Ritchie, 2004; Anderson, 2006).

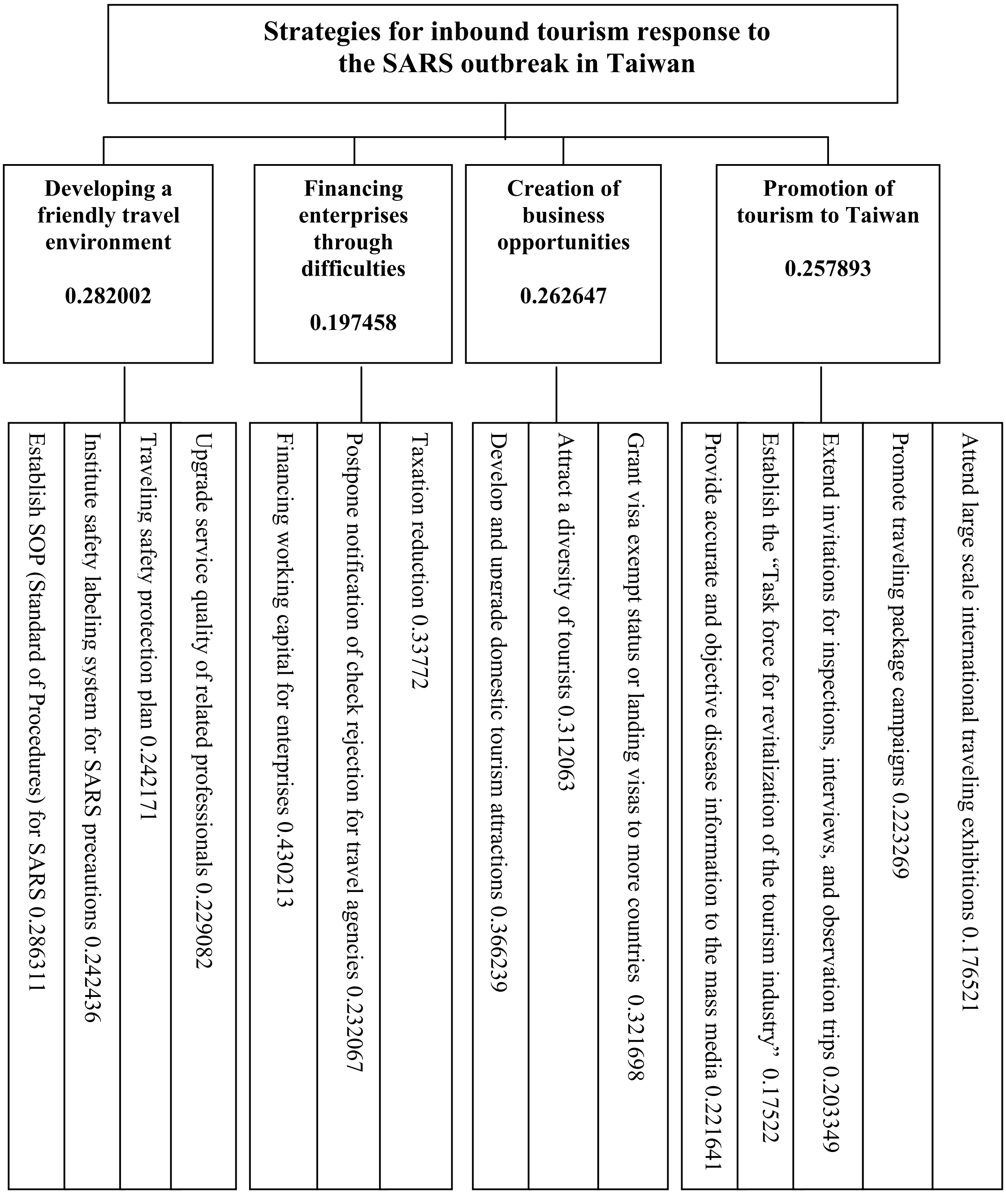

Figure 3 Weighting Structure of Strategy Evaluations

Table 1 Ranking of Strategies

Strategies	All specialists		Cumulative weighting
	Priority	Weighting	
Develop and upgrade domestic tourism attractions	1	0.0962	0.0962
Finance working capital for enterprises	2	0.0849	0.1811
Grant visa exempt status or landing visas to more countries	3	0.0845	0.2656
Attract a diversity of tourists	4	0.0820	0.3476
Establish SOP (Standard of Procedures) for SARS	5	0.0807	0.4283
Institute safety labeling system for SARS precautions	6	0.0684	0.4967
Traveling safety protection plan	7	0.0683	0.5650
Taxation reduction	8	0.0667	0.6317
Upgrade service quality of related professionals	9	0.0646	0.6963
Promote traveling package campaigns	10	0.0576	0.7539
Provide accurate and objective disease information to the mass media	11	0.0572	0.8111
Extend invitations for inspections, interviews, and observation trips	12	0.0524	0.8635
Postpone notification of check rejection for traveling agencies	13	0.0458	0.9093
Attend large scale international traveling exhibitions	14	0.0455	0.9548
Establish a “Task force for revitalization of the tourism industry”	15	0.0452	1.0000
Total weighting		1.0000	

REFERENCES

Anderson, B. A. (2006). Crisis management in the Australian tourism industry: Preparedness, personnel and postscript. Tourism Management, 27(6), 1290-1297.

Barton, L. (1994). Crisis management: Preparing for and managing disasters. Cornell

Hotel and Restaurant Administration Quarterly, 35(2), 59-65.

Buchanan, B.G., & Shortliffe, E.H. (1984). Rule-based expert systems. Addison-Wesley, Reading, MA.

Buckley, J. J. (1985). Fuzzy hierarchical analysis. Fuzzy Sets and Systems, 17(3), 233-247.

Dimova, L., Sevastianov, P., & Sevastianov, D. (2006). MCDM in a fuzzy setting: Investment projects assessment application. International Journal of Production Economics, 100(1), 10-29.

Hakim, C. (1987). Research design: Strategies and choices in the design of social research. Unwin Hyman Ltd., London.

Israeli, A.A., Mehrez, A., Bochen, D., & Hakim, D. (1998). Justification of global positioning systems purchase using the analytic hierarchical process – The case of the Israeli defense force. Technovation, 18(6-7), 409-424.

Kahrama, C., Cebeci, U., & Ruan. D. (2004). Mult-attribute comparison of catering service companies using fuzzy AHP: The case of Turkey. International Journal of Production Economics, 87(2), 171-184.

Kuo, R. J., Chi, S.C., & Kao, S. S. (1999). A decision support system for locating convenience store through fuzzy AHP. Computers & Industrial Engineering, 37(1-2), 323-326.

Leung, K.S., & Lam, W. (1988). Fuzzy concepts in expert systems. Computer, 21(9), 43-56.

Moutinho, L., & Curry, B. (1994). Modelling site location decisions in tourism. Journal of Travel & Tourism Marketing, 3(2), 35-56.

Ritchie, B.W. (2004). Chaos, crises and disasters: A strategic approach to crisis management in tourism industry. Tourism Management, 25(6), 669-683.

Ryan, C. (1991). Recreational tourism—A social science perspective. London: Routledge.

Saaty, T.L. (1980). The analytic hierarchy process: Planning, priority setting. New York: McGraw Hill International Book Co.

Sellnow, T., & Sarabakhsh, M. (1999). Crisis management in the hospitality industry. FIU Hospitality Review, 17(1-2), 53-61.

Stafford, G., Yu, L., & Kobina Armoo, A. (2002). Crisis management and recovery how Washington, D.C., hotels responded to terrorism. The Cornell Hotel and Restaurant Administration Quarterly, 43(5), 27-40.

Tsaur, S.H., Chang, T.Y., & Yen, C.H. (2002). The evaluation of airline service quality by Fuzzy MCDM. Tourism Management, 23(2), 107-115.

Tsaur, S.H., Tzeng, G.H., & Wang, K.C. (1997). Evaluating tourist risks from Fuzzy perspectives. Annals of Tourism Research, 24(4), 796-812.

Tzeng, G.H., Teng, M.H., Chen, J.J., & Opricovic, S. (2002). Multicriteria selection for a restaurant location in Taipei. International Journal of Hospitality Management, 21(2), 171-187.

World Tourism Organization (WTO) (2006). UNWTO world tourism barometer. Retrieved March 10, 2006 from: http://www.unwto.org/facts/menu.html

Zadeh, L.A. (1965). Fuzzy sets. Information and Control, 8(3), 338-353.