應用 TRIZ 發展以消費者角度為基礎之觀光醫療產業策略－以日本消費者為例

To Develop the Strategies of the Medical Tourism Industry in Taiwan by Using GRA and TRIZ: the Japanese Consumer Viewpoint

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摘　要：為追求醫療與觀光產業升級許多國家已著手規劃觀光醫療服務，因而各國對於觀光醫療也逐漸重視，因此，我國在觀光醫療的推廣也需邁向國際化的腳步，所以為全面性推動觀光醫療產業，本文將採消費者決策程序並融入劇場理論來做為設計問卷的基礎，以台灣主要觀光客源國日本為實證對象，利用灰關聯作為分析問卷的工具，藉此找出在推廣觀光醫療時的關鍵成功因素，以及針對分析結果找出在推動觀光醫療時，將造成推動不易的問題利用 TRIZ 理論來研擬出 15 項策略，藉此有助於觀光醫療在未來規劃之參考依據。

關鍵字：觀光醫療；消費者決策程序；劇場理論；灰關聯分析；TRIZ

Abstract: In order to improve Medical Tourism industry, many countries have

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been working on services in Medical Tourism. Since other countries have already highly developed Medical Tourism market, Taiwan should promote its Medical Tourism internationally as well. To create an overall promotion strategy for Medical Tourism industry in Taiwan, this study uses Consumer Decision Process and Dramaturgical Theory to design a questionnaire. The Japanese tourists, as the main source of foreign tourism in Taiwan, are the empirical object of this study. By using Grey Relational Analysis as the tool to analyze the data collected through the questionnaire, we determine the key factors that can make the promotion of Medical Tourism successful. As a result, we define problems that may occur in promoting Medical Tourism and then apply the TRIZ theory to develop 15 strategies to solve them. The contribution of our study is a reference for managers on planning Medical Tourism promotion.

Keywords: Medical Tourism; Consumer Decision-Making Process,; Dramaturgical Theory; Grey Relational Analysis;TRIZ.

1. Introduction

Healthcare demand has been increasing rapidly for three reasons: aging population, popularization of health care, and rising medical expenses in western countries. Since we are living in a global village, more, and more people in the developed countries, such as USA and UK turn to developing countries like India, Malaysia, and Thailand for high quality medical treatment at lower prices, rather than staying on public waiting lists for expensive medical treatment in their own countries (Connell, 2006).

According to the British statistics, in 2006 around 250 000 of British people travelled abroad for medical treatment; it is estimated that by 2010 the number will be 50% higher than in 2006. Furthermore, Bloomberg Businessweek estimates that 500 000 of Americans are travelling abroad to receive medical treatment. During the treatment period, they also travel around for touristic purposes. Medical Tourism in Asian countries is getting popular because the price is 30 to 80% lower than of the medical treatment in the US.

Most researches with the Medical Tourism focus study its development;

however, seldom customer perspective is considered. Our research is designed for understanding the customers point of view by using Consumer Decision Process (CDP). In the questionnaire that we have created, we use Dramaturgical Theory to demonstrate our points. Taking The Japanese consumer as an example, we use Grey Relational Analysis (GRA) to determine the Key Success Factor (KSF) of Medical Tourism in Taiwan. In conclusion, we utilize TRIZ to draft a plan of Medical Tourism for Taiwan in the future.

2. Literature Review

In this section, we review literature about Medical Tourism, Consumer Decision Process, Dramaturgical Theory and Grey Relational Analysis in order to further understand current conditions of Medical Tourism.

2.1. Medical Tourism

Medical Tourism, according to the definition of World Tourism Organization (ECCP, 2005), is separated into medical attendance, therapy and recovery, including screening health, plastic surgery, SPA, and other treatments in hospitals. Amit Sen Gupta (2004) considers that taking treatment in public or private health system (e.g. hospitals, clinics) or public and private services (e.g. government facilities, hotels) is Medical Tourism. Some researchers use also the term Health Tourism (e.g., García-Altés, 2005).

We divided medical treatment into five categories: critical care, chronic disease treatment, health care, health preserving and plastic surgery by medical institutions. In tourism, traveling, food and beverage industry, accommodations, entertainment and traffic system are all included. Furthermore, indoor activities such as hot springs, local cuisine and shopping, outdoor activities such as mountain climbing, hiking, snorkeling, whitewater rafting and are all involved in Medical Tourism. For Medical Tourism, the schedule of the trip can be arranged based on customer individual needs, and surely the medical treatment is the main focus while arranging the schedule of a trip.

Experts made comments on Medical Tourism. Bies and Zacharia (2007)

defined that Medical Tourism is an outsourcing service, composed of medical services and expensive surgeries. But countries such as India and Thailand can provide this type of medical care in lower cost than most of the developed countries. Another definition, from vertical integration point of view, illustrates medical service as integrator of tourism and medical service according to supply and demand (Lu and Wang, 2007). Lunt and Carrerab (2010) mentioned that customers could make different choices for Medical Tourism services if the information was easily accessible by media. Customers in different ages or of different social statuses would make their choices differently.

In sum, we define Medical Tourism as a medical treatment combined with sightseeing activities. Taiwan Medical Tourism can provide lower cost on medical treatment for the Westerners, sparing a lot of time that otherwise would be wasted in the long waiting lists. Examples would be dentistry and double eyelid surgery. With Medical Tourism, medical treatment can be a pleasant activity for customers.

Medical Tourism is growing in importance all around the world, including Thailand, Malaysia and other Asian countries, Costa Rica, Argentina and other Latin American countries, Dubai, Israel and other middle-east countries, Hungary and other eastern European countries, Australia and South Africa. Among these countries, Asian countries such as India, Thailand, Malaysia and Singapore are making great effort to develop this industry (García-Altés, 2005, Connell, 2006). It can observed that South-East Asian countries hold majority in developing Medical Tourism industry. Taiwan, as one of them, has to develop its own strategy on Medical Tourism in the future by learning from other South-Eastern Asian neighbor countries.

In Taiwan, the projects of Medical Tourism were derived by the Science and Technology Advisory Group of Executive Yuan in 2003. These projects included telehealth, international Medical Tourism, and health insurance and hospital authority (http://www.program.com.tw/info/info_003.htm, accessed 30/3/08). The Taiwanese High Technology industry is world-famous, therefore, Wuang (2007) proposed that we should combine our superior health care system with experience in health insurance. Also, Taiwan should combine exquisite service with Medical Tourism to make the medical service more international,
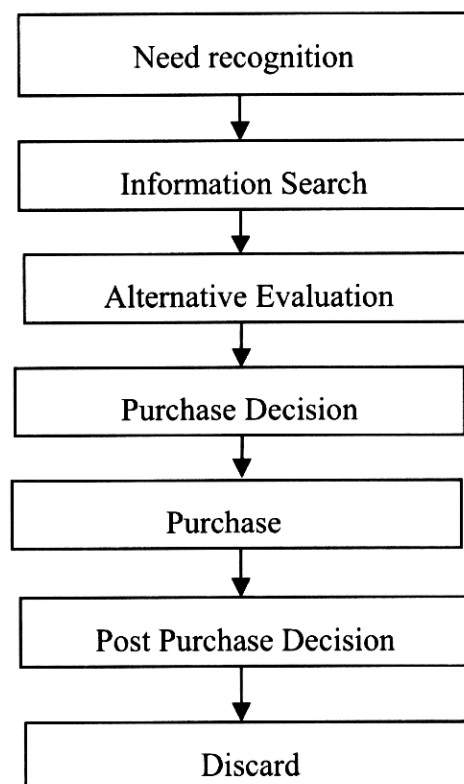
making Taiwan a famous location for medical services.

2.2. Consumer Decision Process (CDP)

Consumer Decision Process (CDP) is a decision-making process conducted by the consumers before a purchase (Mowen, 1988). When consumers purchase products or services, their decision may be affected by situations, such as searching for the products or services that can satisfy their needs. So, when consumers first identify a certain, they start searching for information and evaluate alternatives to choose the best option for purchase to fulfill the need, and make an evaluation of the process afterwards (Blackwell *et al.*, 2006).

The idea of CDP, shown in Figure 1, was presented by Blackwell, Miniard, and Engel (2006). We use the theory as a framework for designing the questionnaire used in our study.

Figure 1
Consumer Decision Process

Need recognition

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Information Search

↓

Alternative Evaluation

↓

Purchase Decision

↓

Purchase

↓

Post Purchase Decision

↓

Discard

Source: Blackwell, Miniard and Engel (2006)

At the first phase, needs are triggered by internal and external stimuli. Then, to meet their needs, consumers actively search for information about the way to fulfill them. After the search, they evaluate accordingly to their sense of value, lifestyle, and living condition to decide whether they will make the purchase or not. During the purchase, consumers are going to decide where to purchase first; their attitude could be affected by media, salespeople or exhibition of the product. After the purchase, post-purchase decisions are made. Delighted consumers are satisfied with those products that meet their needs. On the contrary, people who feel unsatisfied with the products, will dispose, recycle or resale their products.

Gurley *et al.* (2005) suggested managers can apply CDP to motivate consumers during making their decisions. In business management, managers can distribute resources effectively to promote products in the market. To know more about relation between CDP and Medical Tourism, we will conduct further exploration through CDP model application in this study.

3. Research Methodology

3.1. Dramaturgical Theory

Dramaturgical Theory is a theory that presents the interactions of entire society in dramaturgical way (Goffman, 1959). Grove and Fisk (1983) applied Dramaturgical Theory in their research in service industry. He developed the Dramaturgical Theory for service marketing. It is the interaction in "Performance" between Personal Front ("Actor" in Dramaturgical Theory), and Customers ("Audience" in Dramaturgical Theory) in the same environment ("Setting" in Dramaturgical Theory).

We can tell that interaction between different elements in Dramaturgical Theory from customer viewpoint is important. Solomon *et al.* (1985) uses similar approach, as in Figure 2, as well. In the next section, we combine Dramaturgical Theory with the first phase ("Need Recognition") from CDP to present its major effects on Medical Tourism from customers' perspective.

Figure 2

Dramaturgical Theory
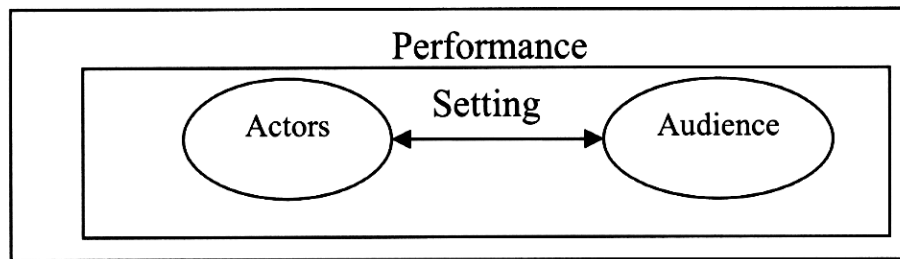
Source: Grove *et al.* (1992)

3.2. Grey Relational Analysis

Grey Relational Analysis (GRA) is an analysis of the correlation between different discrete sequences within the Grey System Theory (Wu *et al.*, 1996; Zhang and Li, 2006; Kunga, and Wen, 2007; Zhai, Khoo, and Zhong, 2009; Tseng, 2010). In the research, we use GRA to find out the Key Success Factors that affect the behavior of The Japanese consumers in Medical Tourism services. Because Medical Tourism is not widespread in Taiwan yet, consumers in Taiwan are not familiar with its services. Relevant statistics and information are limited. Because of the lack of statistics, we cannot present a particular distribution pattern as we usually do in mathematical statistics. However, using GRA, statistics with non-typical distribution pattern is allowed (Wu *et al.*, 1996 ; Zhang and Li, 2006; Lin, Lu, and Lewis, 2007; Zhai, Khoo, and Zhong, 2009; Tseng, 2010). Therefore, we use GRA as a tool to identify critical factors that influence the way how The Japanese consumers participate in Medical Tourism in Taiwan.

4. Questionnaire Design and Sampling Methods

To conclude, we used CDP and Dramaturgical Theory to systematize our research. Then, we used questionnaires and GRA to identify the Key Success Factor in Medical Tourism in Taiwan, and applied TRIZ theory to our conclusions in order to find the solution to the problems in Medical Tourism.

4.1. Questionnaire Design

The questionnaire was designed based on the CDP theory proposed by Blackwell, Miniard and Engel (2006). Meanwhile, we combined it with Dramaturgical Theory (Grove *et al.*,(1992) to understand the interactions among the four elements - setting, actors, audience and performance - during the first CDP stage ("needs recognition"). Concerning that the Medical Tourism emphasizes human interactions, Dramaturgical Theory is to explain the interactions between purchase process and service. In this case, everyone in the service has to play their part to make the process work smoothly and to make their customers satisfied. Figure 3 is the theoretical framework of the consumer questionnaire used in this study, and it consists of seven steps. The items developed in the questionnaire are shown in Appendix A.
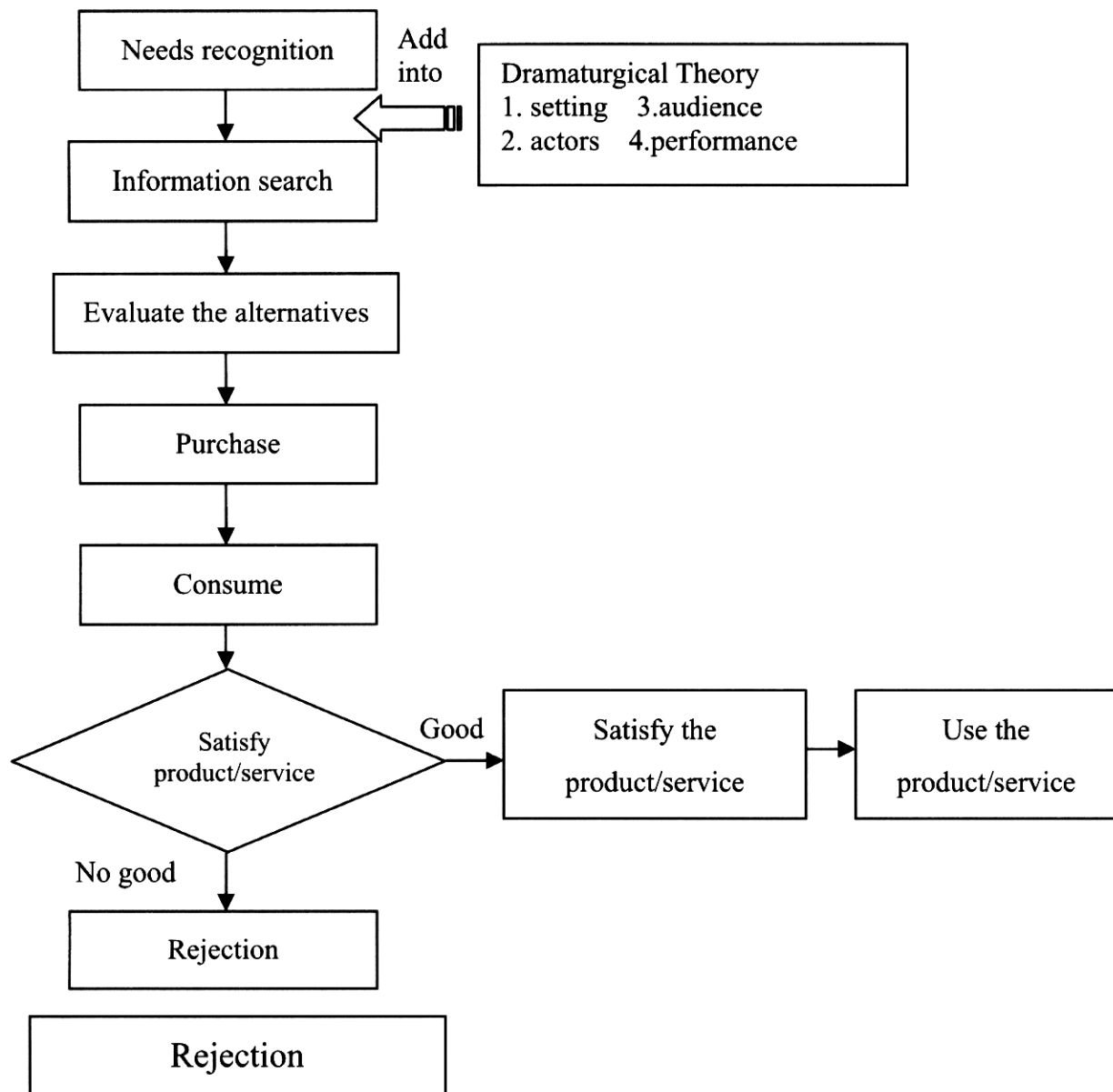
4.2. Sampling

In our study we have used convenience sampling. The questionnaires were sent out to The Japanese citizens and The Japanese business travelers in Taiwan to get our samples. In total, we sent out 300 questionnaires, and received 225 back, but only 212 of them being valid, including 146 from The Japanese citizens and 66 from The Japanese businessmen in Taiwan. That gives us the response rate of 70.67%.

4.2.1. Distribution in Japan: Cooperate with The Japanese Local Academic Research Team to Distribute the Questionnaires

To make our research credible, we cooperated with professors and researchers of Kobe University, Chuo University, Yamagata University, Rakuno Gakuen University, Wakayama University, Tokyo University of Marine Science and Technology, Agricultural Research Center, and other educational institutions for assistance to distribute questionnaires to enhance the credibility of the questionnaire.

Figure 3

Theoretical Framework of the Questionnaire

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┌─────────────────────┐   Add    ┌──────────────────────────────────┐
│  Needs recognition  │   into   │  Dramaturgical Theory            │
└─────────────────────┘  ◁───◫   │  1. setting    3.audience        │
           │                     │  2. actors     4.performance     │
           ▼                     └──────────────────────────────────┘
┌─────────────────────┐
│  Information search  │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Evaluate the alternatives │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│      Purchase        │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│      Consume         │
└─────────────────────┘
           │
           ▼
        ◇ Satisfy        Good    ┌──────────────────┐        ┌──────────────────┐
       product/service  ───────▶ │  Satisfy the     │ ─────▶ │   Use the        │
                                 │  product/service │        │  product/service │
  No good   │                    └──────────────────┘        └──────────────────┘
            ▼
┌─────────────────────┐
│      Rejection       │
└─────────────────────┘

┌─────────────────────┐
│      Rejection       │
└─────────────────────┘
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4.2.2. Distribution in Taiwan: the Japanese Business Travelers in Taiwan

We focused on over thirty of the Japanese business travelers staying in Taiwan for 1 to 3 years. To distribute our questionnaires among them, we have visited business hotels and The Japanese noodle shops in Taiwan to invite them to fill our questionnaires.

5. Research Analysis

Firstly, we analyzed the Reliability and Validity of our questionnaires, and then we carried the survey to investigate our samples and analyze their characteristics. Afterwards, we used descriptive Statistics Analysis to better understand consumer behavior, and used GRA to determine the Key Success Factor for Medical Tourism industry.

Table 1
Reliability of Medical Tourism in Taiwan

CDP aspect	Taiwan and Japan	Taiwan	Japan
Need Recognition			
Setting	.89	.84	.85
Actor	.88	.70	.82
Audience	.83	.85	.64
Performance	.91	.88	.84
Information Search	.80	.84	.71
Alternative Evaluation	.75	.76	.75
Purchase	.74	.62	.45
Post-purchase Evaluation	.81	.76	.70

5.1. Reliability and Validity Analysis

In our sample analysis, our reliability coefficient, based on Nunnally's theory (1978), is considered high. When α is more than 0.7, it means high reliability coefficient; when α lies between 0.7 to 0.35, it means reliability coefficient is fair; when α is lower than 0.35, it means low reliability coefficient. According to the following statistics, only few samples in "purchase" and "need

recognition" phases are fair, others are all high reliability coefficients.

We have also high reliability coefficients. We have used Content Validity, which refers to the extent to which a measure represents all facts of a given social construct, and in addition, we took former researches as references, and we also interviewed experts and scholars to make our questionnaire more valid.

5.2. Sample Characteristics

We analyze sample population to realize the relation between consumers and Medical Tourism. Among both the Japanese in Japan and the Japanese businessmen in Taiwan, middle age and elder people spend more on real estate, medical services and education expenses. From family's perspective, single parent families spend less money than traditional families do, while the purchase decisions in single parent families are mostly made by children (Etzel et al, 2006). Below we summarize the profile of the both researched groups.

A. The Japanese in Japan: 64.4% of our samples are women; 54.8% of them owns bachelor degree; 27.4% of them are housewife; 25.3% of them are professionals; 19.9% of them are in the age between 30 to 34; 17.1% of them are between 55 to 59; 45.9% of them earn around 200,000 yen (about 1,800 U.S. dollars) 74.7% of them are married; 52.1% of them have 3 to 4 family members and 43.2% of them have 1 to 2 family members.

B. The Japanese business travelers in Taiwan: 78.8% of them are male; 54.5% of them owns bachelor degree; 40.9% of them do manufacturing as a job; 42.4% of them are between the age of 30 to 34; 28.8% of them earn 200,000 to 300,000 yen per month (about 1,800 to 2,700 U.S. dollars); 25.8% of them earns 400,000 to 500,000 yen per month (about 3,500 to 4,500 U.S. dollars.). 51.5% of them are not married yet; 63.6% of them have 1 to 2 family members.

5.3. Descriptive Statistics Analysis

In this part we analyze the "purchase" phase in CDP to better understand the Japanese consumer behavior. We looked into when they purchase, where they

purchase, how they purchase, and how much do they purchase.

A. When they purchase: Statistics show that The Japanese consumers in both Japan and Taiwan attend to Medical Tourism mostly on weekends in succession or after their retirement. 33.6% of the Japanese in Japan suggested that they would like to take Medical Tourism on weekends in succession; 31.5% of them would take it after their retirement. In Taiwan, 40.9% of the Japanese would like to take Medical Tourism on weekends in succession; 40.9% of them would take it after their retirement.

B. Where they purchase: Statistics show that 76% of the Japanese in Japan and 84.4% of Japanese in Taiwan prefer to take Medical Tourism service in medical institutes. As a human oriented industry, Medical service in medical institutes seems to have better care for customers with less danger or difficulties.

C. How do they purchase: Both the Japanese in Japan and the Japanese in Taiwan are aware of health insurance and organic food importance. The difference between them is the way to travel. 45.2% of the Japanese in Japan prefer to go on a tour, while 33.3% of the Japanese in Taiwan prefer to arrange trip themselves. We consider the difference depending on the oversea working experience, including the familiarity with local culture and formality for departing and arriving.

D. How much do they purchase: Since most of the Japanese respondents in our research are housewives, averagely, they do health examination once or twice a year. On the contrary, the Japanese in Taiwan are mostly business travelers, who do health examination half to once a year. Normally, The Japanese enterprises emphasize on health of their employees.

5.4. Grey Relational Analysis

In this part, we use GRA to determine the Key Success Factors (KSF) in the five phases of the CDP. The KSF theory was referred to by Daniel(1961), who indicated that the organization should take note of these factors, attempt to contribute to them. By implementing company's KSF seriously, there is a better chance to succeed. If not, there is a great chance of failure.

We can find the gender difference in our samples analyzis above - 64.4% of the Japanese in Japan are female, while 78.8% of the Japanese in Taiwan are male. To avoid the deviation, we do the GRA separately. The difference shows in two aspects: "need-recognition and actors" dimension and "Information Research" dimensions. Other results are all more consistent. We are going to explain the differences in each CDP phase using GRA below.

A. Need recognition - Actors dimension

In Table 2, Grey Relational Grade and Grey order show that the Japanese in Japan put more emphasis on tour leader's attitude than The Japanese in Taiwan. It suggests that people in the latter group are familiar with Taiwanese culture than the former.

To put their grey relational order on line and group the factors with close numbers, we get Grey Relational Grade figure (Figure 4). The black dots represent the Grey Relational Grade for each factor. There are five groups (named 1, 2, 3, 4, 5) in Figure 4. According to the Daniel (1961) the optimum number of KSFs is 4 to 6, so we can see the Japanese in Japan regard "Medical Profession", "Commitment from health care personnel", "Attitude of tour leaders", and "Attitude of health care personnel" as KSFs.

Therefore, we chose "Medical profession", "Commitment from health care personnel", "Attitude of tour leaders", "Attitude of health care personnel" and "Appearance of tour leader" to be representative KSFs for the both surveyed groups.

B. Information research dimension

In Table 3, samples of Grey Relational Grade and Grey Relational Order show that the Japanese in Japan acquire information of new products from "Books, newspapers and magazines." However, the Japanese in Taiwan rank it the second-last. We draw the inference that The Japanese in Taiwan are mostly business travelers who acquire latest information from the Internet.

Figure 4

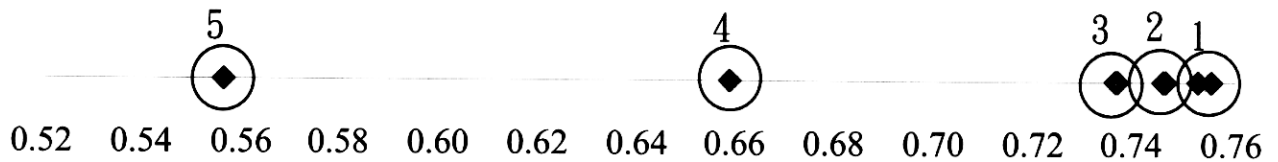**Grey Relational Line from The Japanese in Japan in Need Recognition-Actor Dimension**

Table 2

Grey Relational Grade and Order in Two Samples in Need Recognition

Items	The Japanese in Japan		The Japanese in Taiwan	
	Grey Relational Grade	Grey Relational Order	Grey Relational Grade	Grey Relational Order
Medical Profession	0.7550	1	0.6490	2
Commitment from health care personnel	0.7528	2	0.7179	1
Attitude of tour leaders	0.7458	3	0.5417	8
Attitude of health care personnel	0.7458	4	0.6439	3
Tour leader's skill	0.7366	5	0.5997	5
Tour leader's commitment to travelers	0.7359	6	0.5615	6
Appearance of health care personnel	0.6582	7	0.5586	7
Appearance of tour leader	0.5560	8	0.6031	4

On the other hand, after our analysis, we found that The Japanese people in Taiwan regard "Medical profession", "Attitude of health care personnel" and "Appearance of tour leader" as KSFs (Figure 5).

Figure 5

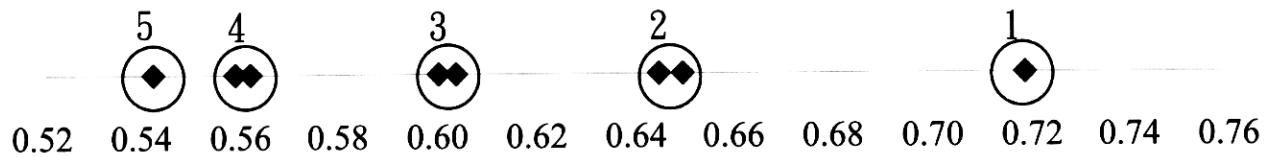**Grey Relational Line of The Japanese People in Taiwan in Need Recognition-Actor Dimension**

Table 3

**Compare GRA Result Between The Japanese in Japan and The Japanese in Taiwan**

Items	the Japanese in Japan		the Japanese in Taiwan	
	Grey Relational Grade	Grey Relational Order	Grey Relational Grade	Grey Relational Order
Newspaper and magazines	0.6282	1	0.4949	11
Experts	0.6263	2	0.6263	4
Internet	0.6092	3	0.6894	1
Experience	0.5986	4	0.6089	5
Media(Ex: news report)	0.5947	5	0.4924	12
Television	0.5816	6	0.6424	2
Relatives and friends	0.5734	7	0.6318	3
Packages or product exhibition	0.5708	8	0.5949	7
Advertisement	0.5676	9	0.6030	6
Public relations(Ex：workshop)	0.5278	10	0.5778	9
Consumer protection commissions(Ex: Consumers' Foundation)	0.5226	11	0.5768	10
Sales promotion	0.4979	12	0.5808	8

We put Grey Relational Grades out of the two samples on a line and group the close numbers in groups. The data was divided into seven groups as shown in Figure 6. According to Daniel's (1961) rule about the number of KSFs, we choose "Newspaper and magazines", "Experts and the Internet" are the KSFs.

Table 4

**KSF From Two Samples on Medical Tourism in Taiwan**

CDP dimension	KSF	Factor number
Need Recognition —settings	Medical equipment	F1
	Environment of medical institutions	F2
	Decoration in tourist spots	F3
Need Recognition —actors	Medical Profession	F4
	Commitment from health care personnel	F5
	Attitude of tour leaders	F6
	Attitude of health care personnel	F7
	Appearance of tour leader	F8
Need Recognition —audience	Cooperation with health care personnel	F9
	Cooperation with travelers in the tour group	F10
	Cooperation with tour leaders	F11
Need Recognition —performance	Service quality of medical institutions	F12
	Sufficient medical service	F13
	A well-arranged travel group	F14
Information Research	On newspaper and magazines	F15
	From experts	F16
	On the internet	F17
	On television	F18
	From relatives and friends	F19
Alternative evaluation	After treatment follow-up	F20
	Online transaction's security	F21
	Operations or treatments work without medical failure	F22
Purchase	In medical institution	F23
	Through travel agency	F24
	In representative office	F25
Post-purchase Evaluation	Never join Medical Tourism again	F26
	Tell others about the bad experience	F27
	Complain to consumer protection commissions in Taiwan	F28

Figure 6

Information Research from The Japanese in Japan in Grey Relational Line
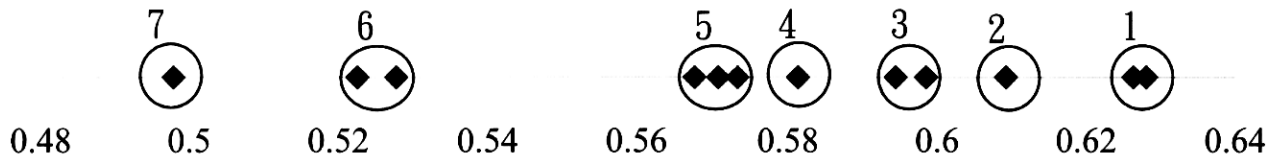
The "information search" results of the Japanese in Taiwan in Grey Relational line are presented below. Data is divided into six groups. From Figure 7, we can tell that "the Internet", "Television", "Experts" and "Relatives" are the 4 KSFs.

Figure 7

"Information Research" from The Japanese in Taiwan in Grey Relational Line
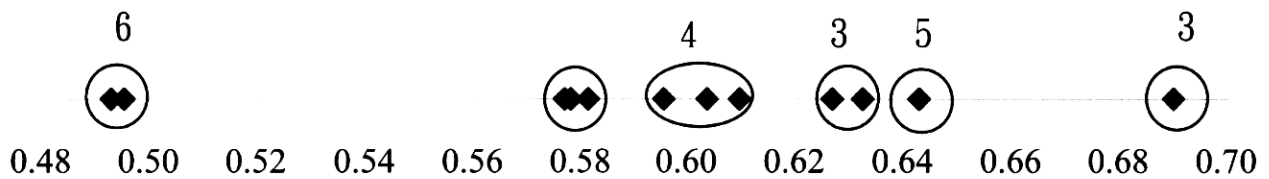
The Japanese in Japan share the same opinion with The Japanese in Taiwan. The results for other phases (except the above two) prove this point. We draw the inference that the Japanese in both Taiwan and Japan are no different in the evaluation aspect because they grow up and live in the same environment. Therefore, we combine samples from Japan and Taiwan to make the second GRA and put the Grey Relational grade on a line. We group the data with close numerical result in groups. According to KSF from Daniel (1961), we come to the conclusion by finding 28 KSFs for all the CDP phases, presented in Table 4.

6. Apply TRIZ to Medical Tourism Development

In this part, we will introduce TRIZ first, and explain how to apply TRIZ to develop strategies for Medical Tourism.

6.1. TRIZ

"TRIZ" is the acronym for phrase in Russian. It means "The theory of inventive problem solving (Rantanen and Domb, 2002). It was firstly developed by a Soviet engineer and researcher Genrich Altshuller in 1946. In a problem formulation, TRIZ generates innovative ideas to solve the contradiction to make the whole system works smoothly. Contradiction refers to positive and negative contradictory results of an action (Zhang *et al.*, 2005).

In our research, by using GRA, we have medical profession as our KSF in Medical Tourism. However, even the organization recognizes this factor as a KSF; health care personnel should take time to gain experience. In this case, it is a contradiction. That is, when we increase more medical profession in medical care for health care personnel need, they need more time. We can utilize TRIZ to solve the contradiction and make a new strategy.

Researchers use Contradiction Matrix (see Appendix B) and Forty Inventive Principles (see Appendix C) in solving contradictions by using TRIZ. The Contradiction Matrix is a matrix composed of 39 improving parameters and 39 worsening parameters. (see Appendix D) According to Contradiction Matrix, users can find out the solution of contradiction in it.

Forty Inventive principles are conclusions from four hundred thousand patents. It is widely used in other fields such as business, service industry, quality control, education (Marsh *et al.*, 2004). Other experts like Terninko (2001) in social science, Belski *et al.* (2003) in public health, Dourson (2004)in finance, and Retseptor (2005) in marketing and advertisement use this as well. According to their professions and background, they develop different strategies to solve the problems they faced.

6.2. Apply TRIZ Theory to Medical Tourism

After determining KSFs for Medical Tourism in Taiwan, we are going to turn these factors into key problems. We do it because when people are promoting Medical Tourism through KSF, there are problems and difficulties on the way. Therefore, it would definitely be helpful to find and solve them beforehand. These

problems and difficulties are named key problems, and we are going to systematically find out solutions to them. There are two ways to transfer the KSF to key questions. One is one-to-one mapping approach. Take medical equipment (F1) as an example: Though it might be helpful to offer patients a better diagnosis and treatment, medical personnel might also need time to get accustomed to these equipment, the whole medical room needs to be rearranged as well. These changes could make the whole medical service unstable for a period of time. In this case, we transfer F1 to P1 (Problem 1), where P1 means to "upgrade the facilities of medical institution" (P1). The other approach is to combine factors with similar contradictions, such as "the environment of medical institute" (F7), "the quality of health care personnel" (F8), and "provide the medical service with no medical failure" (F9). These factors can be presented as to improve service quality of medical treatment, which is our key problem (P7). Finally, we conclude 15 key problems out of 28 KSFs (see Table 5).

Next, we are going to apply TRIZ theory to find out solutions to 15 key problems, and we take the "upgrading the facilities of medical institution" (P1) and "Emphasis on appearance of tour leaders" (P4) as examples.

6.2.1. Upgrade the Facilities of Medical Institution (P1).

A. Description of the problem: upgrading the facilities of medical institution (P1)

In Table 5, KSF "Upgrading the facilities of medical institution (F1)" is to improve the quality and quantity of Taiwan's medical facilities; however, before reaching this goal, we need to upgrade Taiwanese medical facilities. So, the key problem is "Upgrading the facilities of medical institution (P1)". With the advanced technology and sophisticated medical facilities, we can provide a better diagnosis and treatment for patients. On other hand, when the facilities of medical institutions are not advanced enough, it will be hard to give patients adequate and sufficient health care.

Table 5
Key Questions, Strategies and Performance Phases

KSF	Key problemss	improving parameters	worsening parameters	Usable inventive problem solving principles	Chosen inventive problem solving principles	strategy	phases
F1	Upgrading the facilities of medical institution (P1)	39	13	35, 3, 22, 39	3	According to the need of customers and take Japan as a reference to improve medical equipments(S1)	medium
F3	Arrangement in tourist spots (P2)	12	17	22, 14, 19, 32	14	Combine Japanese and Taiwanese culture in the spot and provide interactive services with tourists (S2)	medium
F4	Medical Profession (P3)	29	25	32, 26, 28, 18	26	Develop knowledge management system (S3)	short
F8	Appearance of tour leaders (P4)	12	33	32, 15, 26	15	Design comfortable uniforms(S4)	short
F10	Characteristics of customers (P5)	10	31	13, 3, 36, 24	24	Develop customer relationship management system (S5)	long
F16	Professionals' Influence (P6)	14	11	13, 17, 35	35	Develop focus service target based on Taiwanese and The Japanese tourists(S6)	long
F2 F12 F22	Improve service quality of medical treatment (P7)	28	35	13, 35, 2	13	Make abstract service concrete(S7)	short
F5 F6 F7	Service attitude (P8)	17	19	19, 15, 17, 3	17	Apply total appraisal to improve the attitude of servers(S8)	short
KSF	Key problemss	improving parameters	worsening parameters	Usable inventive problem solving principles	Chosen inventive problem solving principles	strategy	phases

F9 F11	Make the service procedure flexible (P9)	35	37	1	1	Make customers part of the procedure(S9)	long
F13 F14 F20	Build a sound workflow (P10)	33	12	15, 34, 29, 28	28	Build a Taiwan-Japan e-communication platform to improve workflow (S10)	medium
F15 F18	Improve the traditional channels for information search (P11)	18	5	19, 32, 26	32	The story marketing should base on the culture of Taiwan and Japan, and launch a series of contents of medical tourism services (S11)	long
F17 F21	The use of internet technology (P12)	38	36	15, 24, 10	10	Build a good environment for online transaction (S12)	medium
F23 F24	Expand the local channels (P13)	9	27	11, 35, 27, 28	11	Develop the relationship with partners to work together (S13)	medium
F25 F28	Build direct channels (P14)	30	37	22, 19, 29, 40	22	Build a customer service center with functions of the channel (S14)	medium
F19 F26 F27	Effect of human networking (P15)	21	24	10, 19	19	Develop customer relationship management system (S15)	long

B. Definition of contradictory attribute of a question

(A)　Improving parameters：Parameter 39 (productivity)

Upgrade the facilities of the medical institute will not only provide an accurate diagnosis but also a better treatment. This will improve the whole medical system by obtaining customers satisfaction with the treatment.

(B)　Worsening parameter：Parameter 13(Stability of the facilities.)

Health care personnel have to be familiar with those upgrading facilities and devices in order to improve diagnosis and treatment. Thus, it is essential for healthcare personnel to keep learning to get accustomed to those facilities and devices. Furthermore, purchasing new facilities might change the whole environmental layout, or even effect on the stability of the whole medical system.

C. From the contradiction matrix to obtain principles out of 40 innovation principles.

According to the worsening parameter and the improving parameter above, the counterparts are in Table 6 below. Other key questions and their worsening parameters, improving parameters and innovation principles are in Table 5.

D. Apply the principles found in 40 innovation principles

(A)　Principle 35: Changing parameter, this is to distinguish changes in each phase according to the result. From management viewpoint, it is sales promotion with special discount (Retseptor, 2005).

(B)　Principle 3: Partial quality, this is to make partial instruments and systems work more efficiency. From management viewpoint, it is to use differentiated market tactic to different markets (Retseptor, 2005).

(C)　Principle 22: To turn worsening factors improving ones, it is to take advantage of the inferior factors, and make it effect positively. From management viewpoint, it is to change customers' compliant into the improvement of the organization (Retseptor, 2005).

(D)　Principle 39: Inert environment: To replace regular environment by inert environment. For example, in market research, use anonymous questionnaires to enhance the recovery and make them less nervous or

insecure. From management viewpoint, it is to use anonymous questionnaire or interviews to know the solutions to problems (Retsepor, 2005).

E. To develop strategies based on the principles found in 40 innovation principles

According to Table 6, we understand that key problem can be corresponded to 4 innovation principles. However, considering of the viability when it is applied on Medical Tourism, we choose one of the principles as a solution to solve the key problem. So, we adopt innovation principle 3 "local quality." That is, to make each part of the object or system become easier to be operated, making each part of the object or system performs different and providing diverse functions. We suggest that when it is applied on the strategy development of Taiwan's Medical Tourism services, it should meet the target consumers' needs. For example, for middle-aged consumers, cancer screening test can be added to the health check. To have better detection of cell mutation, medical instruments with high detection rates should be purchased such as ultrasound, blood test apparatus etc. This will provide better detection for patients. In this field of detection technology and cure, the Japanese have superior technology than Taiwan because of their average life expectancy is longer. As a result, the strategy that we should develop is to "meet the need of customers, learn the Japanese technology, and introduce new medical facilities (S1). Other core problems and their strategies are presented in Table 5.

6.2.2. Emphasis on Appearance of Tour Leaders (P4)

A. Description of the question: Emphasis on appearance of tour leaders (P4)

In Table 7, with neat and tidy uniforms, emphasis on appearance of tour leaders (P4) can not only make good impression among customers but also make tour leaders look more professional. In general, Taiwanese tour leaders are more passionate and outgoing. Normally, they just put on casual clothes on duty. Compared to Taiwanese tour leaders, most of the The Japanese are wearing uniforms in service industry, like The Japanese taxi drivers. For us, Taiwanese should make their customers a professional

impression on tourism,

B. Definition of contradictory attribute of the question

 (A) Improving parameter: Parameter 12, shapes.

   Charming packages attract people. Similarly, how to make us charming is the first step of making a good impression. Appearance of tour leaders shows their profession and reliability to tourists. Therefore, improving their appearance makes a positive impression for tourism service in Taiwan,

 (B) Worsening parameter: Parameter 33(easy to work)

  Tour leaders play important roles during the journey. They should be capable of dealing with emergencies and taking charge of complicated assignments. Therefore, light and casual clothes may be suitable for them to work outside. Relatively, travelers may be doubtful of their profession of tour leaders or even about other services when they dressed light and casual clothes.

C. Find corresponding 40 innovation principles from contradiction matrix

 According to the results of improving parameters and worsening parameters above, other key questions and their corresponded improving parameters, worsening parameters and innovation principles are listed in Table 7.

D. Develop strategies according to 40 innovation principles.

E. Develop comfortable uniform designing strategy for appearance of tour leaders.

 We take innovation principle 15, movement, to balance both the tour system and the service. While applying this theory to develop strategies of Medical Tourism in Taiwan, we suggest that uniform should be designed comfortable for employees to wear. Due to the connection of employees' appearance and image of enterprises, uniforms could be designed with special marks of their brands. According to employees' departments, uniforms could be designed differently as well. For instance, enterprises can use same marks or images on polo shirts for tour leaders and t-shirts for administers. Consistent uniforms make customers impressed by the brand of the enterprise.

Table 6

The Contradiction Matrix of

"Upgrade the Facilities of Medical Institution (P1)"

	The worsening parameter
	Parameter 13：Stability of object （Stability of healthcare workers to adapt to the new facilities）
The improving parameter	Principle 35：Transformation of the physical and chemical states of an object
Parameter 39：Productivity （Improvement of medicalservices）	Principle 3：Local Quality Principle 22：Convert harm into benefit Principle 39：Inert environment

Table 7

Contradiction Matrix of Emphasis on Appearance of Tour Leaders (P4)

	Worsening parameter
	Parameter 33, easy to work （Appearance can make difference about how tour leaders work）
Improving parameter	
Parameter 12：Shape （Professional image make tour leaders reliable）	Principle 32：Change the color Principle 15：movement Principle 26：Duplication

7. Develop Short, Medium and Long-Term Strategic Implementation Goals.

In order to implement the 15 strategies in Table 5 effectively, we establish goals for the short, medium and long-term phases based on the experience in Taiwan. The method to differentiate the three phases is in the paragraph below:

The main point of the short-term phase is to explain the construction that

requires to be notified because it's in initial phase. The medium-term phase inherits the past and lead to the future. In the medium-term phase, it takes over constructions in the short-term phase and strengthens for the long-term development in the future. The main point of long-term stage is to help Taiwanese promote the development in the future in this industry. Therefore, the implementation strategies are as follows:

A. The short-term goal: To cultivate people in Medical Tourism in Taiwan for serving the overseas Chinese in Japan, the strategies that we suggest are S3, S4, S7 and S8.

Since Medical Tourism service in Taiwan is in initial phase in global market, domestic healthcare personnel are not ready to serve international patients yet. Therefore, the short-term goal can focus on the overseas Chinese in Japan as our target customers and encourage them to take Medical Tourism services. We are promoting the strategy, "making intangible service tangible" and present the profession in Taiwan's Medical Tourism service to patients all over the globe. Meanwhile, to make our healthcare personnel accumulate their experiences in international service, we should "develop knowledge management system" and "applying total appraisal to improve the attitude of servers". By these two strategies, members learn and grow through knowledge management system; moreover, we encourage them by diverse performance evaluation. In addition, taking employees' welfare and consumers' need into account, we can meet the both demands by "designing comfortable uniforms".

B. The medium-term goal: Establish the hardware and channel network in Taiwan's Medical Tourism services, so the strategies we suggest are S1, S2, S10, S12, S13 and S16.

When the market of the overseas Chinese is progressing step by step, the market of the non-overseas-Chinese can be further developed (ex: developed countries such as EU countries and Japan). In order to make Taiwan's Medical Tourism more competitive, basic construction is highly valued before accessing to the market of the non overseas Chinese: Establishing hardware and channels to build a sufficient environment for

Taiwan's Medical Tourism; improving current quality in service to develop long-term marketing strategies. We take the "need of target customers" and "introducing The Japanese technology with new facilities" as our reference, aiming at The Japanese market because of their rapid pace of living and the great number of hypertensive patients. Seeing The Japanese as our target customers, we purchase precision instruments to detect or treat hypertension. This will improve health care of The Japanese tourists in Taiwan, enhancing the current quality of medical services.

C. The long-term goal: In order to serve non-overseas-Chinese customers in Taiwan's Medical Tourism, the strategies that we suggest are S5, S6, S9, S11 and S15.

In order to gain competitive advantages in global market of Medical Tourism, domestic medical institutions need to find more target customers who are non-overseas-Chinese. Hence, in this phase, we develop the long-term plan aiming at international customers. Take the strategy of "building customer database system" as an example, medical institutions can develop or enhance international customers' intention to visit Taiwan for another Medical Tourism service by analyzing customers' characteristics, preference or attitude from the customer database system, and then they can develop new Medical Tourism services. Take The Japanese market as an example, statistics shows that most of the families in Japan are small families. When Taiwan's Medical Tourism designs the whole set of services for adults, we could also design services for children. For instance, weight loss camps can solve the problems such as obesity and overweight among current children for loving to eat fast food.

8. Conclusions

Medical Tourism has been a new type of innovative industry around the globe in 21st century. In our research, we take the consumer's perspective of the Japanese consumers as to develop the strategies for Medical Tourism in Taiwan. To prove our point and make it both valid and credible, we apply the CDP to

design the questionnaire distributed among the Japanese. Using the GRA we have determined KSFs for Medical Tourism in Taiwan and turned them into the key problems. Finally, we used TRIZ theory to make short-, medium- and long-term strategies to systematically promote its development.

According to the strategies presented in the paper, we suggest that the size and features of the Taiwanese medical institutions, such as medical centers, regional hospitals, district hospitals, clinics and all other medical institutions, would be categorized to develop their own strategies. Due to their differences in levels and scales, these medical institutions' resources would be different. We recommend that when discussing a strategic problem of Medical Tourism, researchers assist the Taiwanese medical institutions to do market segmentation and benefit the whole medical industry in Taiwan.

Secondly, we suggest that researchers can in future apply supply chain theory to satisfy supply and demand of Medical Tourism. For example, post-purchase activities is an interesting research direction. Because Medical Tourism is related to medical service, it can lead to malpractice lawsuit caused by careless medical care, which might influence the whole Medical Tourism industry. Hence, it is advisable to use supply chain to realize customers' attitudes and lifestyles after their returning to their own countries.

At last, from supply aspects, post-purchase activities can let us realize the relation between supplier and the Taiwanese Medical Tourism service providers. For the Taiwanese organizations in this industry, to open the local channels, it is very important to choose suppliers carefully. To seize commercial potential, choosing a channel is one of the most crucial matters. For those companions who offer medical service for homecoming consumers, both them and their suppliers should offer consistent quality of medical services. From the consumers point of view, all the follow-up services are also related to the Taiwanese Medical Tourism. Accordingly, services of the suppliers and retailers should be well integrated to make it more efficient. This can make the Taiwanese Medical Tourism play an important role in the medical services of the world.

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Appendix A Items Developed in the Questionnaire

Aspects		Variables	Dependency	References
Need recognition	setting	Devices	Devices in medical institute such as high-tech medical equipment	Eroglu and Machleit(1993), Arnould and Price(1993), John(1996), Wakefield and Blodgett(1999), Lockyer(2005)
			Facilities in tourist spots such as toilets, chairs and tourist center.	
		Decoration	Decoration of medical institute in the environment.	
			Arrangement in the tourist spots such as controlling the number of people.	
		Sanitization	A sanitary environment of medical institute.	
			Preservation of the tourist spot.	
		Arrangement	Distance between one tourist spot and another.	
			Arrangement of medical institute in the environment like the distance between treatment room and waiting room.	
	Actors	Clothing	Clothing of the healthcare personnel.	Grove *et al.* (1992), John(1996),
			Clothing of the tour leaders.	
		Attitude	Attitude of the medical personnel.	
			Attitude of the tour leaders.	
		Profession	Profession of the healthcare personnel.	
			Profession of the tour leaders.	

Aspects			Variables	Dependency	References
			Commitment to customers	Commitment from health care personnel.	
				Commitment from the tour leaders.	
	Audi-ence		Reasons for joining Medical Tourism.	For health promotion.	Parasuraman *et al.* (1985), Grove *et al.* (1992), John(1996), Garbarino andJonson(1999), Wu(2007)
				For travel	
			Actions during Medical Tourism	Cooperation with the health care personnel.	
				Cooperation with the tour leaders.	
			Interactions between customers	Whether patients like social interaction during Medical Tourism.	
				Whether travelers like social interaction during Medical Tourism.	
	Perfor-mance		Time arrangement	Schedule of medical treatment works smoothly or not	Grove *et al.* (1992), John(1996), Bitner *et al.* (1997), Blackwell *et al.* (2006)
				Schedule of tourist spots works smoothly or not	
			Service quality	Service quality in tourist spots. (Ex: Famous ancient monuments or constructions.	

Appendix A Items Developed in the Questionnaire (continued 1)

Aspects		Variables	Dependency	References
Need recognition	Perfor-mance	Service quality	Service quality in medical institutions. (Ex: Secure Socket Layer or certification of ISO.)	
		Processing	Well-arranged medical service.	
			Well-arranged travel service.	
		Synthetic evaluation	Overall atmosphere during medical treatment	
			Overall atmosphere during the travel	
Information Research		Personal experience and knowledge	I used to make a guess about the new product depending on my personal experience and knowledge.	Larson(2001), Blackwell *et al.* (2006), Kotler and Keller(2006), Translated from English by Lou and Fang
		Interpersonal relationship	Relatives and friends are the main resource of my new information.	
			Experts are the main resource of my new information.	
		Public media	Mass media are the main resource of my new information. (Ex: News Report)	
			Public relation like school or informal discussion meetings are the main resource of my new information.	
			Consumer protection commissions (Ex: Consumers' Foundation) are the main resource of my new information.	
		Business Information resource	I receive the information of the new product from advertisement.	
			I receive the information of the new product on television.	
			I receive the information of the new product in newspaper and magazines.	
			I receive the information of the new product on internet.	
			I receive the information of the new product from packaging or product exhibition.	
			I receive the information of the new product from sales promotion.	
Purchase evaluation		Location (distance)	Convenience to purchase at the store. (Ex: easy to find a parking space)	Park and Smith (1989), Blackwell *et al.* (2006),

Aspects	Variables	Dependency	References
		Convenience to purchase on the internet. (Ex: simple to place an order on line)	Kotler and Keller(2006) Translated from English by Lou and Fang, Parasuraman *et al.* * (1988), Akama and Kieti* (2003),
		Security to purchase online (Ex: Make sure the security of your personal profile)	

Appendix A Items Developed in the Questionnaire (continued 2)

Aspect	Variables	Dependency	References
Purchase evaluation	Reliability	It is important for tourist spots to apply tourists the real-time information and service.	
		It is important to make sure all the items on the travel plan will be done accurately.	
		It is important to complete medical treatment without failure.	
		It is important to give a sufficient explanation after medical treatment.	
Purchase	channel	I prefer to purchase Taiwan Medical Tourism in travel agency in Japan.	Slovic and MacPhillamy(1974), Park and Smith (1989), Blackwell *et al.* (2006), Kotler *et al.* (2007) Translated from English by Xie, Hoehn and Randall* (1987), Alberini *et al.* * (1997), Tourism Bureau, Rep. of China.(Taiwan) * (2008)
		I prefer to purchase Taiwan Medical Tourism in Medical institutes in Japan	
		I prefer to purchase Taiwan Medical Tourism on-line.	
		I prefer to purchase Taiwan Medical Tourism in convenience stores in Japan.	
		I prefer to purchase Taiwan Medical Tourism in Taiwan representative office in Japan.	
Post-purchase evaluation Actions of satisfied customers and not satisfied ones	Intention to another purchase	When I feel satisfied, I will join Medical Tourism in Taiwan again.	Day and Landon (1977), Phau and Sri (2004), Zhang *et al.*(2005), Litvin *et al.**(2008), Goetzinger and Widdows*(2006)
	By word-of-mouth	When I feel satisfied, I will share this pleasant experience with my relatives and friends.	
	Complaint level	When I am not satisfied, I will not tell my friends nor complain about it. I will not ask for compensation nor complain to the organizer.	
	Complain in public	When I am not satisfied, I will request charge refund from the organizer	
		When I am not satisfied, I will take action under the court.	
		When I am not satisfied, I will complain to Consumer protection commissions (Ex: Consumers' Foundation).	
		When I am not satisfied, I will turn to media for this bad experience.	
		When I am not satisfied, I will complain to my friend on-line.	
	Complain in Private	When I am not satisfied, I will complain to my relatives and friends.	
		When I am not satisfied, I will not join this medical tourism group again.	

Appendix B The Contradiction Matrix

Deteriorated Attributes / Improved Attributes	Attribute 1	Attribute 2	Attribute 3	Attribute 4	Attribute 5	...	Attribute 39
Attribute 1			15, 8 29,34		29, 1, 38, 34	...	35, 3, 24, 37
Attribute 2				10,1, 29, 35		...	1, 28 15, 35
Attribute 3	8, 15, 29, 34				15, 1, 4	...	14, 4 28, 29
Attribute 4		35, 2 40, 29				...	30, 1 7, 26
Attribute 5	2, 17, 29, 4		14, 15 16, 4			...	10, 2 34. 2
...	...	...	...	...	...	...	...
Attribute 39	35, 2, 24, 37	28, 2 15, 3	18, 4, 28, 38	30, 7 14, 26	10, 2 34, 3	...	

Appendix C The Order of 40 Inventive Principles

Order	Principle	Order	Principle	Order	Principle
1	Segmentation	15	Dynamics	28	Mechanics substitution
2	Taking out	16	Partial or excessive action	29	Pneumatics and hydraulics
3	Local quality	17	Another dimension	30	Flexible shells and thin films
4	Asymmetry	18	Mechanical vibration	31	Porous materials
5	Merge	19	Periodic action	32	Color changes
6	Universality	20	Continuity of useful action	33	Homogeneity
7	Nesting	21	Skipping	34	Discarding and recovering
8	Anti-weight	22	Blessing in disguise	35	Parameter change
9	Preliminary anti-action	23	Feedback	36	Phase transition
10	Preliminary action	24	Intermediary	37	Thermal expansion

11	Beforehand cushioning	25	Self-service	38	Boosted interactions
12	Equipotentiality	26	Copying	39	Insert atmosphere
13	Inverse	27	Cheap short-living objects	40	Composite structure
14	Spheroidality				

Source：Retseptor (2005)

Appendix D The Original TRIZ Attributes

Attribute	Original TRIZ attributes	Attribute	Original TRIZ attributes
1	Weight of moving object	21	Power
2	Weight of stationary object	22	Loss of energy
3	Length of moving object	23	Loss of substance
4	Length of stationary object	24	Loss of information
5	Area of moving object	25	Loss of time
6	Area of stationary object	26	Amount of substance
7	Volume of moving object	27	Reliability .
8	Volume of stationary object	28	Measurement accuracy
9	Speed	29	Manufacturing precision
10	Force	30	Object affected harmful factors
11	Stress or pressure	31	Object generated harmful factors
12	Shape	32	Ease of manufacture
13	Stability of object's composition	33	Ease of operation
14	Strength	34	Ease of rep
15	Duration of action by a moving object	35	Adaptability / Versatility
16	Duration of action by a stationary object	36	Device complexity
17	Temperature	37	Weight of moving object
18	Illumination intensity/brightness	38	Extent of automation
19	Use of energy by moving object	39	Productivity
20	Use of energy by stationary object		

Source: Wu, 2007