Research Journal of Applied Sciences, Engineering and Technology 6(7): 1240-1245, 2013
DOI:10.19026/rjaset.6.3938
ISSN: 2040-7459; e-ISSN: 2040-7467

Submitted: October 30, 2012 Accepted: December 21, 2012 Published: July 05, 2013

Research Article

Analysis of the Optimal Customization Degree of Different Service Industries by Integrating the Neural Network and the Genetic Algorithm

[1]Shen-Tsu Wang, [2]Meng-Hua Li, [1]Yo-Chen Yeh and [1]Ting-Li Lan
[1]Department of Commerce Automation and Management, National Pingtung Institute of Commerce, Taiwan, R.O.C
[2]Department and Institute of Industrial Management, Taiwan Shoufu University, Taiwan, R.O.C

Abstract: Customers have different emotions towards service industries of different natures, leading to inconsistent service quality characteristic items and levels of demands. Different emotions would affect customer perceptions of the customization degree of a hospital (the emotion is relatively sad) and a theme park (the emotion is relatively joyful); while different service quality characteristic-related contents of the budget-limited DOH (Department of Health) hospitals and theme parks also affect the customization degree. Therefore, this study established the PZB (Parasuraman, Zeithaml and Berry) service quality characteristic scale for different DOH hospitals and theme parks, conducted a questionnaire survey (qualitative) and integrated the neural network and genetic algorithm in order to analyze the service quality gap item rankings of different services. Next, this study incorporated the quantitative contents of the top five service quality gap items into a quantitative customized mathematical model. The model considers the occurrence of demand in unit time as a Poisson distribution, the demand in normal distribution and the uncertain parameter subject to the effect of the boom countermeasure signals. This study then established and verified the correct method for a customization degree profit model. Decision-makers can determine improvement items according to the optimal customization degree. The research findings can serve as the basis for DOH hospital and theme park operational improvements. In addition, this study analyzed the managerial implications of the research findings in different service industries.

Keywords: Different services, genetic algorithm, neural network, quantitative customized mathematical model

INTRODUCTION

Service refers to any activity or interest provided by an organization to another group of people; it is intangible and cannot generate ownership. Therefore, the generation of service may or may not be related to a physical product (Kotler, 2003). Hospitals and theme parks belong to the service industry (Lang, 2006; Kolk and Pinkse, 2004). According to the definition of the competent authorities, medical services include; "the part or total of the behaviors or activities of prescription or application of medicine with the purpose of treatment on the basis of inspection and diagnosis results; or behaviors or activities aiming to treat, rectify, or prevent human disease, injury and disability, or inspection, diagnosis and treatment for healthcare". DOH hospitals are major hospitals widely distributed in Taiwan (Chang and Chang, 2005). Kolk and Pinkse (2004) argued that the service industry is the common trend of industrial development in the world. Countries across the world regard the development of the tourism industry as the key for the administration and promote tourist sites through government bureaus or government-sponsored organizations. Theme park is one of the most important promotional sites. Therefore, regarding DOH hospitals and theme parks, this study established the PZB (Parasuraman, Zeithaml and Berry) service quality characteristic scale, conducted a questionnaire survey (qualitative), integrated a neural network and genetic algorithm and analyzed the service quality gap item rankings of different service industries (Ishigami *et al*., 1995; Gao *et al*., 2007). It incorporated the quantitative contents of the top five service quality gap items into the quantitative customized mathematical model and discussed the research findings.

LITERATURE REVIEW

Hospital service quality: Based on literature review, Leach (2006) defined the meaning of integration as: integrated medicine is a comprehensive and holistic method. Professional doctors in various medical fields

Corresponding Author: Shen-Tsu Wang, Department of Commerce Automation and Management, National Pingtung Institute of Commerce, Taiwan, R.O.C

work together with mutual respect and equal attitude to satisfy the needs of patients and community. In a study on the outpatient services of a medical center, Camacho *et al*. (2006) found that a declining perceived waiting time of outpatients can improve the patients' satisfaction and willingness to revisit the medical center. The increasing time to wait for outpatient services, with declining diagnosis time by the doctor, can result in a significant decline of patients' satisfaction. Okkonen and Vanhanen (2006) argued that, before heart surgery, patients without family support are more likely to experience depression, anxiety and feelings of hopelessness. Therefore, in addition to physiological assistance, education and emotional support are required for the patients. Quinlan *et al*. (2007) suggested that patients' perceptions of care quality depend on the degree of compliance for physical and spiritual comfort with their expectations. Pang and Suen (2008) indicated that nursing staffs in critical care have greater perceived pressure than the patients, which is due to the seriousness of the patient's disease or overemphasis of the relevant functions of the ICU ward. Krass *et al*. (2009) found that performance evaluation is a very good patient satisfaction measurement method, when a patient has expectations regarding health care medical services. From the perspective of the influence-based evaluation, satisfaction can be defined as a joyful reaction after receiving the service. From the perspective of an evaluation based on fairness, satisfaction is a comparison of the service results and processes for the patient and others. According to the survey, Shieh *et al*. (2010) established seven standards based on the SERVQUAL model. The relevant contents were learnt from the viewpoints of patients or their families. The significance of hospital management evaluation standards, as well as their causal relationship principles, is identified in this literature. Elkin *et al*. (2010) suggested that the diagnosis and identification of relevant contents may be neglected by a hospital in the case of a short period of hospitalization of the patient. If the first primary diagnosis is wrong, it may take a longer time and consume a higher cost for the appropriate evaluation and treatment of the patient.

Theme park service quality: According to Swanson and Horridge (2006), tourism is mainly for psychological recovery, social status, getting away from ordinary life and culture conservation. They argued that tourism motivation comes from the mentality of disengagement, where individuals intend to avoid daily and uninteresting routines, as well as familiar places and ordinary things, such as family and superiors. In a discussion of destination image and behavioral intentions of tourists, Castro *et al*. (2007) found major conflicts. Overall satisfaction will affect the destination image to create a willingness to revisit the location and recommend it to friends and family. Tang and Jang (2008) argued that a study of overall satisfaction (integrated satisfaction) can be positive to the improvement of tourism service product attributive values. Recreational satisfaction is composed of the psychology, educational, socialization, relaxation, physiology and atheistic (Hede and Hall, 2006; Chen *et al*., 2008). Chen and Tsai (2007) argued that tourist behaviors can be divided into three stages, including pre-trip decision making, the experience stage and post-trip behavioral intention. Regarding destination image measurement dimensions, Chi and Qu (2008) proposed tourism environment, natural attractiveness, amusement, historical attractiveness, general infrastructure, accessibility, relaxation degree, outdoor activities, value and price are the dimensions for measurement. Clave (2008) proposed an inter-disciplinary method to study the global theme park industry. Its inter-disciplinary nature indicates knowledge from a wide range of different fields, including sociology, correspondence, common sense and cultural study in order to discuss the development issues of the global theme park industry from different perspectives. Pedragosa and Correia (2009) indicated that expectations, facilities and service contents are to promote the evaluation of service and consumption, namely, the evaluation attributes of satisfaction.

RESEARCH METHODOLOGY

Analysis of the optimization of the selection of service parameters by integrating neural network and genetic algorithm: This study first applied grey theory and the ambidextrous capacity learning theory to determine the major service factors relating to different service industries (Deng, 1982; Cao *et al*., 2009; Lubatkin *et al*., 2006). Then, according to the project samples, this study established an approximation model of the neural network and used the genetic algorithm to search for the optimized service characteristics design of different service industries. This study searched the confidence interval of the model, defined as the range of the distance smaller than the learning samples. By verification testing of the optimization parameter prediction, we retrained the approximation model, which automatically adjusted the confidence radius by fuzzy logic according to the prediction accuracy. The approximation model and the optimal search regression were repeatedly evolved until convergence to obtain the optimization of parameters (Ishigami *et al*., 1995; Gao *et al*., 2007). The parameters of the neural network used in this study are as shown in Table 1.

Genetic algorithm: A vector function is used to represent the target of each multi-objective problem. The definition of the vector function is as shown in Eq. (1) and (2) (Gao *et al*., 2007; Hong and Ho, 2005):

$$Max\, Z = f(x) = [f_1(x), f_2(x), ..., f_n(x)] \quad (1)$$

Table 1: Neural network parameter optimization in this study

Control factors	Optimal parameter
Hidden neurons of hidden layer #1	3
L	0.3
L+	6
L-	0.1
Total number of search generations	200
Fitness value of the optimal chromosome (RMSE)	0.0861

Table 2: Genetic algorithm parameter settings in this study

Parameter	Numerical value
Generation of initial population	Random
Selection type	Competitive selection
Cross-over type	Single-point crossover
Size of the population	20
Number of evolution generations	800
Optimal solution search time	10.2 (min)

$$s.t. x = (x_1, x_2, ..., x_n) \in X$$
$$y = (y_1, y_2, ..., y_n) \in Y \quad (2)$$

where,
$f_i(x)$ = The non-linear target function
x = The decision vector
X = The decision space
y = The target vector
Y = The target space

The settings of the parameters of the genetic algorithm, as used in this study, are as shown in Table 2.

By integrating the analysis results of the neural network and genetic algorithm, this study selected the top five items of the service quality gap analysis for the DOH hospitals and theme parks in order to establish and analyze the quantitative customization model under the impact of boom countermeasure signals and market effect. This study quantified the relevant selected service quality gap items by cost, time and frequency and considered the relevant parameters for the quantitative customized model under the impact of boom countermeasure signals and market effect, as shown in Eq. (9). Customization degree is also subject to the impact of boom countermeasure signals and market effect.

The total weight ranking (the one with higher *TW* score is relatively in need of improvement) of the semantic level GA (Gap Analysis) and actual quantitative service quality characteristic items (Γ_{0i}) is as shown in Eq. (3), which determines the gap ranking of the service quality characteristics items to be improved (Shieh *et al*., 2010; Deng, 1982):

$$TW = 0.5(GA) + 0.5(\Gamma_{0i}) \quad (3)$$

Boom countermeasure signals: Five lights are used to indicate the boom countermeasure signals, with the corresponding scores as shown in brackets (Ou-Yang and Chuang, 2007):

- **Red light (38-45 points):** Overheated economy, the government should adopt austerity measures to gradually change the economy back to normal status.
- **Yellow-red light (32-37 points):** Active economy, a signal of attention, the follow-up economic trends should be closely watched and response measures should be taken appropriately.
- **Green light (23-31 points):** Indicates that the boom is stable.
- **Yellow-blue light (17-22 points):** Indicates the boom is not good, it is a signal of attention and follow-up economic trends should be closely watched and response measures should be taken appropriately.
- **Blue light (9-16 points):** Indicates a recession, the government should take strong measures to stimulate economic recovery.

In the study of boom countermeasure signals, this study determined the light signals of the segmented intervals according to the changes of individual indicators. Hence, when the indicator changes are in the same segment, the lights remain the same. However, if the indicators of a certain month are beyond a critical point and entering a different segment, the lights will be changed even if the differences from the previous month are insignificant. This is a characteristic and a limitation of the light signal system, suggesting that the boom countermeasure signals judge the overall economic conditions by segmentation, with the purpose of displaying the economic boom status in a brief manner:

$$C_{A,M}(A, M) = dAM + F$$

According to the described service quality characteristic items, this study obtained the top five service quality gap items of DOH hospitals and theme parks, discussed the impact of the boom countermeasure signals and analyzed the relevant parameters of the market effect and customization model degree. In reference to the assumption of marketing effects (Gerchak and Parlar, 1987; Allen *et al*., 2006), this study assumes that the pattern of market activities and boom countermeasure signals is $f(A, M) = AMe^x$; which is a function subject to the influences of market activities, boom signals and customization degree. Moreover, it is assumed that market activities, boom signal effect and customization degree and demand affect each other. For example, regarding demand-related influences, when boom countermeasure signals are good, service providers will have higher costs in market activities in order to stimulate customer demand. As a result, customer willingness to purchase products will be higher and generate a higher degree of customization products. On

the contrary, when the boom countermeasure signals are poor, the costs of the service provider for market activities and customer willingness to purchase the product are lower and thus, generate fewer customization products. Therefore, it is assumed that the customization degree has a positive impact on market effect, as shown in Eq. (4):

$$f(A,M) = AMe^{x} \tag{4}$$

If the original market demand function is $D = BM_d - ES\ [1 + f\ (\lambda, \sigma^2)]$, during market activities, market effect has an impact on the original demand and the demand function is as shown in Eq. (5):

$$D = \{BM_d - ES[1 + f(\lambda, \sigma^2)]\}(AMe^{x}) \tag{5}$$

The profit of the service industry is as shown in Eq. (6):

$$\pi = (S - c_1)\{BM_d - ES[1 + f(\lambda, \sigma^2)]\} (AMe^{x}) - C_{A,M}(A,M) \tag{6}$$

First and second order differentiation of the profit function is conducted to obtain the optimal customization degree, as shown in Eq. (7) and (8):

$$\frac{\partial \pi}{\partial x} = (AMe^{x})\{BM_d - ES[1 + f(\lambda, \sigma^2)]\} \{S[1 + f(\lambda, \sigma^2)] - 2c - xc\} \tag{7}$$

$$\frac{\partial^2 \pi}{\partial x^2} = (AMe^{x})\{BM_d - ES[1 + f(\lambda, \sigma^2)]\} \{S[1 + f(\lambda, \sigma^2)] - 3c - xc\} \tag{8}$$

As the second order derivative of the profit function should be below zero when the profit is maximized and $A \geq 0$, $M \geq 0$, $x \geq 0$, $D = BM_d - ES\ [1 + f\ (\lambda, \sigma^2)]$ is positive; therefore, the profit maximization condition is $S < \{((3 + x)\ c) / (1 + f\ (\lambda, \sigma^2))\}$, in this case, $\frac{\partial^2 \pi}{\partial x^2} < 0$. Under the condition of profit maximization, the optimal quantitative customization degree is as shown in Eq. (9). For an average service cost for each customer (S), by considering the definition of Eq. (10), the occurrence of demand in unit time is in a Poisson distribution and the demand is in a normal distribution of probability (Chu and Lin, 2004):

$$x^{*} = \frac{S[1 + f(\lambda, \sigma^2)] - 2c}{c} \tag{9}$$

$$\sum_{n=0}^{\infty} P_n(n)\left[f_x^{T}(S) \right]^n \tag{10}$$

In Eq. (10), it is assumed that n and X are independent random variables, n is discrete, X can be discrete or continuous ($X \geq 0$), if the random variable Y is the addition of n X random variables, Y is the probability distribution, the discrete random variable n's p.m.f. is Pn (n), the continuous random variables X p.d.f. is fx (x), the Z-transform of Pn (n) is $P^{T}_{n}(Z)$ and the S-transform of fx (x) is $f^{T}_{x}(S)$.

Prediction model control tracking signals: The Tracking Signals (TS) of the prediction model control are used to estimate the profit estimation errors of Eq. (6). In case of incompliance with standards, the DOH hospital or theme park is modified, as shown in Eq. (4) to (10). TS is the ratio of the cumulative error (Bias) divided by MAD ((Mean Absolute Deviation), which is generally in a range from -4 to 4 and *a* is generally in a range of 0.1~0.5. The *a* used in this study is 0.2 (Render, 2004; Chase *et al*., 2005).

CONCLUSION AND RECOMMENDATIONS

According to the calculation results, all the predicted values are consistent with TS standards. The top five service items requiring improvement are discussed regarding the impact on customization degree of DOH hospitals and theme parks, as below.

DOH hospital service quality factors: The main task of a hospital is to provide patients with full and timely treatment. However, many DOH hospitals cannot provide such services (25 to 40 years old), due to varied causes, such as frequent medical disputes, shortage of medical staff and the excessive gaps between rural and urban areas. The most frequent complaint of patients is the waiting time. In particular, well-known doctors have many registered patients that must spend more time waiting for the diagnosis and treatment. Hospitals have no appropriate measures to shorten the waiting time of patients, making it one of the most important complaints of patients. Before a major surgery, many patients often experience anxiety and nervousness. Therefore, relevant psychological consulting services are provided in many teaching hospitals. However, in DOH hospitals, before a major surgery, the psychological concern and care of the patient seems relatively incomplete, especially in DOH hospitals of remote areas. Thus, how to make the patients feel psychologically and physically cared for is the common goal of hospitals and patients. However, there will be many gaps causing poor communications and misunderstandings between medical service providers and patients (30 to 65 years old). Nursing staffs working in ICU wards have more professional pressure. Although many of them have years of experience in related work, there remain many problems in the face of different emergencies, such as the emotional

breakdown (20 to 25 years old of nurses). By different methods of performance evaluation, the patients can understand the overall performance of the hospital and furthermore, can learn about the concrete differences between the two parties. Through relevant communication channels, the relationship between the medical service provider and the patient will be more harmonious. The hospital may neglect the relevant diagnosis content of short term inpatients, resulting in infringement of patient rights (25 to 35 years old, engineers). Therefore, the hospital should have a complete diagnosis process for short term inpatients in order to fully protect their rights (Leach, 2006; Camacho *et al*., 2006; Krass *et al*., 2009; Shieh *et al*., 2010; Elkin *et al*., 2010; Okkonen and Vanhanen, 2006; Pang and Suen, 2008).

Theme park service quality factors: Most visitors in a theme park expect to avoid familiar places and ordinary things, such as family, and routine life to achieve full relaxation, both physically and spiritually. The overall services provided in a theme park can affect the willingness of tourists to revisit or recommend the location to family and friends (18 to 30 years old, students). The pre-visit decision making, experience stage and post-visit behavioral intention of the visitors of the theme park should be the factors of consideration for operators of theme parks. Services that allow the customers think positively at the three stages will provide the direction for the efforts of the operators. Theme park visitors will have different considerations regarding general facilities, accessibility, relaxation degree, outdoor activities, price and value, according to age. Therefore, a major challenge of theme park operators is to attract visitors of different age groups (16 to 60 years old). How to continuously innovate the business operational dimensions of a theme park to further attract more customers should be taken into consideration for the operation of a theme park (30 to 50 years old, managers). When coupled with the marketing and promotion in different fields, including cooperation with tourism agencies and signing contracts with large companies, the development of a theme park can be made more diversified (Swanson and Horridge, 2006; Clave, 2008; Pedragosa and Correia, 2009; Castro *et al*., 2007; Tang and Jang, 2008; Hede and Hall, 2006; Chen *et al*., 2008; Chen and Tsai, 2007; Chi and Qu, 2008).

ABBREVIATIONS

x : Customization degree, $0 \le x \le 1$

S : Average service cost for each customer, $BM_d/E > S > 0$

B : Basic demand on price of the customer, $B \ge 0$

E : Price sensitivity of customer demand, $E > 0$

c : Constant unit product cost, $c \ge 0$

$c_1 = c + cx$: Unit product cost, $c_1 \ge 0$

A : Market activity level, $A \ge 0$

d : Customer demand, under consideration of the market activity level and boom countermeasure signals, $d \ge 0$

M : According to the estimation of historical data, this study adjusted the parameters of the DOH hospitals and theme parks in cases of different boom countermeasure signals, $M \ge 0$

$C_{A,M}(A,M)$: Considering the cost of the impact of the market activity level and boom countermeasure signals, $C_{A,M}(A, M) \ge 0$

$F(A, M)$: Considering the effect of market activities and boom countermeasure signals

M_d : Demand parameter, subject to the adjustment of the current period boom countermeasure signals, $-\infty < M_d < \infty$

F : Considering the fixed cost of the impact of the market activity level and boom countermeasure signals, $F \ge 0$

$f(\lambda, \sigma^2)$: Considering the occurrence of demand, n unit time, is subject to Poisson distribution, the demand is in normal distribution of probability, the definition is as shown in Eq. (10)

REFERENCES

Allen, W.B., N.A. Doherty, K. Weigelt and E. Mansfield, 2006. Managerial Economics Theory, Applications and Cases. Norton, US.

Camacho, F., R. Anderson, A. Safrit, A.S. Jones and P. Hoffmann, 2006. The relationship between Patient's perceived waiting time and office-based practice satisfaction. North Carolina Med. J., 67(6): 409-413.

Cao, Q., E. Gedajlovic and H. Zhang, 2009. Unpacking organizational ambidexterity: Dimensions, contingencies and synergistic effects. Organ. Sci., 20(4): 781-796.

Castro, C.B., E.M. Armario and D.M. Ruiz, 2007. The influence of market heterogeneity on the relationship between a destination's image and tourists' future behavior. Tourism Manage., 28: 175-187.

Chang, H.C. and W.G. Chang, 2005. Medical Marketing Management. Hua Hsin Publishing, Taiwan (Taipei).

Chase, R.B., F.R. Jacobs and N.J. Aquilano, 2005. Operations Management: For Competitive Advantage. Mc Graw Hill Education, New York.

Chen, F.C. and C.D. Tsai, 2007. How destination image and evaluative factors affect behavioral intentions. Tourism Manage., 28: 1115-1122.

Chen, L.S.L., J.Y.C. Lin and M.C.H. Wang, 2008. The relationship between leisure satisfaction and life satisfaction of adolescents concerning online games. Adolescence, 43: 177-184.

Chi, G.Q. and H. Qu, 2008. Examining the structural relationships of destination image, tourist satisfaction and destination loyalty: An integrated approach. Tourism Manage., 29: 624-636.

Chu, Y.F. and W.C. Lin, 2004. A study of inventory model based on order quantity and lead time as decision variables: Demand frequency and quantities corresponding poisson and normal distribution. J. Chinese Inst. Ind. Eng., 21(4): 384-394.

Clave, S.A., 2008. The global theme park industry. Tourism Manage., 29(5): 1040-1042.

Deng, J.L., 1982. Control problems of grey systems. Syst. Control Lett., 1(5): 288-294.

Elkin, P.L., M. Liebow, B.A. Bauer, S. Chaliki, D. Wahner-Roedler, J. Bundrick, M. Lee, S.H. Brown, D. Froehling, K. Bailey, K. Famiglietti, R. Kim, E. Hoffer, M. Feldman and G.O. Barnett, 2010. The introduction of a diagnostic decision support system (DXplain™) into the workflow of a teaching hospital service can decrease the cost of service for diagnostically challenging Diagnostic Related Groups (DRGs). Int. J. Med. Inform., 79(11): 772-777.

Gao, J., M. Gen, L. Sun and X. Zhao, 2007. A hybrid of genetic algorithm and bottleneck shifting for multiobjective flexible job shop scheduling problems. Comput. Ind. Eng., 53: 149-162.

Gerchak, Y. and M. Parlar, 1987. A single period inventory problem with partially controllable demand. Comput. Oper. Res., 14(1): 1-9.

Hede, A. and J. Hall, 2006. Leisure experience in tourist attractions: Exploring the motivations of local resident. J. Hosp. Tourism Manage., 13(1): 10-22.

Hong, Y.Y. and S.Y. Ho, 2005. Determination of network configuration considering multiobjective in distribution systems using genetic algorithms. IEEE T. Power Syst., 20(2): 1062-1069.

Ishigami, H., T. Fukuda, T. Shibata and F. Arai, 1995. Structure optimization of fuzzy neural network by genetic algorithm. Fuzzy Set. Syst., 71: 257-264.

Kolk, A. and J. Pinkse, 2004. Market strategies for climate change. Eur. Manage. J., 22(3): 304-314.

Kotler, P., 2003. A Framework for Marketing Management. 6th Edn., Prentice Hall, N.J.

Krass, I., C. Delaney, S. Glaubitz and T. Kanjanarach, 2009. Measuring patient satisfaction with diabetes disease state management services in community pharmacy. Res. Soc. Admin. Pharm., 5(1): 31-39.

Lang, C.L., 2006. Application of quality function deployment launches to enhancing nursing home service quality. Total Qual. Manage. Bus. Excellence, 17: 287-302.

Leach, M.J., 2006. Integrative health care: A need for change? J. Complement. Integr. Med., 3: 1-11.

Lubatkin, M.H., Z. Simsek, Y. Ling and J.F. Veiga, 2006. Ambidexterity and performance in small-to medium-sized firms: The pivotal role of top management team behavioral integration. J. Manage., 32(5): 646-672.

Okkonen, E. and H. Vanhanen, 2006. Family support, living alone and subjective health of a patient in connection with a coronary artery bypass surgery. Heart Lung, 35(4): 234-244.

Ou-Yang, H. and S.S. Chuang, 2007. An empirical study on the relationship among corporate governance, relative performance evaluation and top executive turnover. Asia-Pacific Econ. Manage. Rev., 11(1): 53-86.

Pang, P.S. and L.K. Suen, 2008. Stressors in the ICU: A comparison of patients' and nurses' perceptions. J. Clin. Nurs., 17(20): 2681-2689.

Pedragosa, V. and A. Correia, 2009. Expectations, satisfaction and loyalty in health and fitness clubs. Int. J. Sport Manage. Market., 5(4): 450-464.

Quinlan, P., S.K. Magid, D. O'Flaherty, A. Peirce and P.W. Stone, 2007. Patient satisfaction with medication management. J. Nurs. Care Qual., 22(1): 34-39.

Render, B., 2004. Operations Management. Prentice Hall, New York.

Shieh, J.I., H.H. Wu and K.K. Huang, 2010. A dematel method in identifying key success factors of hospital service quality. Knowl-Based Syst., 23(3): 277-282.

Swanson, K.K. and P.E. Horridge, 2006. Travel motivations as souvenir purchase indicators. Tourism Manage., 27(4): 671-683.

Tang, L. and S.S. Jang, 2008. Tourism information trust as a bridge between information value and satisfaction: An exploratory study. Tourism Anal., 13(5-6): 565-578.