行政院國家科學委員會專題研究計畫 成果報告

整合 Kano 模型與決策樹分析來瞭解旅館產業中之顧客特性、顧客服務品質知覺及其購後行為：國際觀光旅館之實證研究
研究成果報告(精簡版)

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中 文 摘 要 ： 本計畫利用一整合性的分析方法（決策樹、關聯法則分析及 Kano 模型）來瞭解國際旅客於國際旅館中的服務體驗及其購後行為。以居住於台北地區國際旅館之大陸旅客為研究對象，本計畫共獲得 392 份可用之有效問卷。經由決數樹之分析，結果顯示旅客對於居住旅館的整體滿意度、核心的無形服務品質（接待人員、房務人員及餐飲人員之服務）與特定的人口統計變項（月收入）等三項重要因素影響了旅客對於旅館的忠誠意向。經由關聯法則之分析，結果進一步顯示核心的無形服務和有形的接待與房間設備與顧客忠誠意向間有具有強烈的關聯性。再者，經由 Kano 模型之分析，大陸旅客對於國際旅館所有的服務要素均視為是具有一元的服務品質特性。根據研究發現，本計畫亦提出討論並對後續研究提出建議。

中文關鍵詞 ： Kano 模型、決策樹分析、人口統計資料、顧客滿意度、顧客忠誠度

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discussions and directions for future research are
highlighted.

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中　華　民　國　101　年　8　月　26　日

專題研究計畫題目與中英文摘要

整合 Kano 模型與決策樹分析來瞭解旅館產業中之顧客特性、顧客服務品質知覺及其購後行為：台灣國際觀光旅館之實證研究

摘要：本計畫利用一整合性的分析方法（決策樹、關聯法則分析及 Kano 模型）來瞭解國際旅客於國際旅館中的服務體驗及其購後行為。以居住於台北地區國際旅館之大陸旅客為研究對象，本計畫共獲得 392 份可用之有效問卷。經由決數樹之分析，結果顯示旅客對於居住旅館的整體滿意度、核心的無形服務品質（接待人員、房務人員及餐飲人員之服務）與特定的人口統計變項（月收入）等三項重要因素影響了旅客對於旅館的忠誠意向。經由關聯法則之分析，結果進一步顯示核心的無形服務和有形的接待與房間設備與顧客忠誠意向間有具有強烈的關聯性。再者，經由 Kano 模型之分析，大陸旅客對於國際旅館所有的服務要素均視為是具有一元的服務品質特性。根據研究發現，本計畫亦提出討論並對後續研究提出建議。

關鍵詞：Kano 模型、決策樹分析、人口統計資料、顧客滿意度、顧客忠誠度

Integration of Kano's model into decision trees analysis for understanding customer characteristics, customer perceptions of service quality, and post-purchasing behaviors in the hotel sector: an empirical study of the international tourist hotel industry in Taiwan

Abstract: An integrated analytical approach (Decision Tree Analysis, Association Rule Analysis, and Kano's Model) was used to understand international tourists' service experience and post-purchasing behaviors in the international tourist hotel sector. A total of 392 usable questionnaires were collected from the mainland China tourists stayed at the international tourist hotels in Taipei city. Using decision tree analysis, the results showed that tourist's overall satisfaction with the lodging experience, satisfaction with the core intangible services quality (i.e. service from receptionist, housekeeping personnel, and food & beverage personnel), and the certain demographics (i.e. monthly income) are three important determinants for tourist loyalty intentions towards the hotels. Using association rule analysis, the results further indicated that core intangible services incorporated with tangible reception and room facilities are strongly associated with customer loyalty intentions. In addition, using Kano's model to categorize the hotel service elements, the results indicated that all of the service elements were regarded as one-dimensional quality attribute by the tourists from mainland China. Based on the findings, the discussions and directions for future research are highlighted.

KEY WORDS: Kano's model, decision trees analysis, demographics, customer satisfaction, customer loyalty

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報告內容

1. Introduction

As the effect of the global financial crisis on tourism and travel activities gradually diminished, the number of foreign tourists visiting Taiwan in 2010 totaled 5.5 million, an increase of 26.67% compared to 2009. Foreign tourists greatly contributed to Taiwan's economy through tourism and travel activities. According to the *2010 Annual Survey Report on Visitors Expenditure and Trends in Taiwan* (Taiwan Tourism Bureau, 2010), most foreign tourists stayed at hotels while traveling in Taiwan, and international tourist hotels are one of the most popular choices of places to stay (34.98%). In addition, the report also showed that the daily average expenditure of foreign tourists is approximately 221.84 US$, of which spending in hotels was the largest portion (37.83%), followed by shopping expenditures (34.55%) and dining outside the hotels (11.43%). Accordingly, the international tourist hotel industry plays an important service role in tourism and travel activities. Therefore, to encourage tourists' intentions to return to the hotels, the improvement of hotel service quality incorporated with some other important influential factors should be a constant concern of international tourist hotel managers.

Because hotels make an essential contribution to overall visitor satisfaction at a particular destination (Presbury, Fitzgerald, & Chapman, 2005), service quality has been recognized as an important topic in the hotel industry (e.g. Davidson, 2003; Ladhari, 2009; Mohsin & Lockyer, 2010; Tamagni & Zanfardini, 2005; Wilkins, Merrilees, & Herington, 2007). Identifying the effect of service quality on customer post-purchase events, such as customer satisfaction (Ladhari, 2009; Lee, Lee, Lee, Park, & Moon, 2004; Wilkins et al., 2007) and customer loyalty (Gil, Hudson, & Quintana, 2006; Ladhari, 2009), is pivotal to tell hotel managers how the hotel service offerings were experienced by their customers (Min & Min, 2005). If customer responses to service quality could be clarified, better hotel service quality improvement can be achieved to more closely meet customer expectations (Gundersen, Heide, & Olsson, 1996), which in turn would generate numerous benefits to service providers, such as revisit loyalty (Chiu & Huang, 2002).

Along with the service quality issue, studies also have confirmed that personal demographic characteristics (e.g. gender, age, and income) (Lee & Chen, 2006), and specific travel variables (e.g. travel purposes and duration of stay) (Reid & Sandler, 1992; Tamagni & Zanfardini, 2005; Wang, Vela, & Tyler, 2008) influence hotel guests' satisfaction and loyalty level towards hotels. If hotels could improve the quality of service offerings for tourists while considering their demographics and travel variables, those hotels would provide their service offerings to customers in a more effective and competitive way. Furthermore because tourists from mainland China make up the largest portion of the foreign tourists to Taiwan (more than 1.6 million tourists from mainland China in 2010), clarifying their loyalty intentions in terms of the aforementioned issues of service quality perceptions, demographics, and travel variables would provide important information to allow international tourist hotel managers to effectively operate their service businesses.

In light of the above discussions, this study proposes using an integrated analytical approach combining the methods of decision tree analysis, association rule analysis, and Kano's model to explore tourists' loyalty intentions in the international tourist hotel sector. This approach has been designed for the following reasons: First, decision tree analysis is a predictive technique (Wong, Chen, Chung, & Kao, 2006) used to explore the relationships between independent and dependent variables. As proposed by Thomas and Galambos (2004, p.

254), "although multiple regression analysis provides one means of identifying highly important influences, decision tree analysis offers a richer account," and the results of the decision tree analysis "indicate which independent variables are most strongly related to the dependent variable" (Byrd & Gustke, 2007, p. 179). Accordingly, in this study, the independent variables include the hotel customers' demographic characteristics, travel variables, overall satisfaction level with their hotel lodging experience, and their perceptions of hotel service quality elements, while the dependent variable is the hotel customer's loyalty intentions towards the hotels. Second, the association rule analysis is a type of descriptive technique (Wong et al., 2006) used to understand the interdependent relationships among the data. Using the association rule algorithm, useful rules are presented based on the items or features that are liked to occur simultaneously to find out synchronous relationships by "analyzing the random data and to use this data as reference during decision making" (Wang, Chuang, Hsu, & Keh, 2004, p. 428). Therefore, this study also tries to find out the best item sets of hotel service elements based on customer satisfaction that would strongly relate to the customer's loyalty intentions towards the hotel. Third, Kano's model "uniquely details customer requirements by assigning different categories to different requirements" (Sireli, Kauffmann, & Ozan, 2007, p. 380), which provides a more accurate voice of the hotel customers to further clarify the quality attributes of hotel service offerings for hotel managers.

In summary, this study proposed an integrated analytical approach using the methods of decision trees, association rules, and Kano's model to explore the relationships among the aforementioned independent and dependent variables to extract the behavior patterns of mainland China tourists in the international tourist hotel sector of Taiwan.

2. Literature review

2.1 Service quality in hotels

Most of the studies that have explored service quality issues have defined service quality in terms of the overall customer judgment of the service offerings (Parasuraman, Zeithaml, & Berry, 1988) and have treated service quality as a gap between customer expectation and perception of the actual service offerings they experienced (Parasuraman, Zeithaml, & Berry, 1985). Understanding which aspects the customer considers most important when evaluating hotel service offerings has become a priority for hotels (Gundersen et al., 1996). As proposed by Wyckoff and Lovelock (2001, p. 30), "quality exists only to the extent that a product or service meets the customer's requirements," which not only facilitates the future intentions of customers to support a hotel but also establishes lasting customer loyalty towards the hotel.

Although hotel service quality has been discussed by scholars in several ways (e.g. Mei, Dean, & White, 1999; Patton, Stevens, & Knutson, 1994), Ekinci, Riley, & Fife-Schaw (1998) have compared the service quality models developed by the Nordic European School and the North American School and concluded that the dimensions proposed by the Nordic European School are reliable to the extent that a two-factor model (i.e. tangibles and intangibles) is produced to measure hotel service quality with desirable results. That conclusion is consistent with the study of Gundersen et al. (1996), which found that the majority of the variations in overall satisfaction could be explained by the tangible and intangible features related to three hotel service areas (i.e. reception, housekeeping, and food & beverage) as the dimensions that evaluate hotel service quality. According to service management literature, tangibles have defined as "tangible elements that can be described precisely and that are subject to physical examination or photographic reproduction or quantitative

measure," while intangibles can be defined as "dynamic, subjective, and ephemeral, and they cannot be touched, tried on for size, or displayed on a shelf, and they are exceedingly difficult to quantify" (Shostack, 1977, p. 75-76). Accordingly, in the hotel industry, the tangible and intangible service features describe how customers encounter hotel service offerings and how they would evaluate hotel service quality.

Another concern observed in the previous studies is that the measuring instruments have frequently been too general to track the quality perceptions of customers regarding hotels. For example, some studies (e.g. Akbaba, 2006) assess hotel service quality based on customer perceptions towards general hotel service offerings (e.g. the hotel performs the services right the first time). This method evaluates hotel service quality from a broad perspective, but to some extent, this method may cause customers to inaccurately reflect on their experiences if particular services occur in different service areas. Thus, after identifying the service features that determine hotel service quality, the next step is to ensure that key hotel service dimensions are performed to best offer both tangible and intangible offerings. Accordingly, this study summarizes five important areas of hotel service offerings to clarify the holistic experience of customers with these hotels (Wilkins et al., 2007). The five points are as follows: 1) reception service, 2) housekeeping service, 3) food & beverage service, 4) entertainment service, and 5) business service. In summary, these five domains of hotel services guide the service offerings a hotel provides to customers in terms of the tangible and intangible features mentioned above. The detailed acquisition of service elements is further discussed in the methodology section.

2.2 Service quality, customer satisfaction, and loyalty

Service quality is generally regarded as a key antecedent of customer satisfaction and loyalty (Hoare & Butcher, 2008). As proposed by Bearden and Teel (1983), "customer satisfaction is a post-purchase event indicating how much the customer likes or dislikes the service after experiencing it" (cited from Lee, et al., 2004, p. 71). Thus, managers are interested in customer satisfaction because it is a strong predictor of loyalty (Tuu & Olsen, 2009), which can bring enormous benefits to a company (Brunner, Stöcklin, & Opwis, 2008). According to Oliver (1997, p. 392), loyalty is "a deeply held commitment to rebuy or repatronize a preferred product/service." Because hotel customer satisfaction and customer loyalty are important constructs of post-purchase behavior (Eggert & Ulaga, 2002), this study considers the associations of these constructs with the hotel customer perceptions of service quality.

Empirically, as demonstrated by a number of studies on the subject, hotel service quality has significant direct effect on customer satisfaction (e.g. Gundersen et al., 1996; Ladhari, 2009; Min & Min, 2005; Olorunniwo, Hsu, & Udo, 2006; Ramsaran-Fowdar, 2007), and customer satisfaction is an important strategic imperative for companies (Jones & Sasser, 1995). As shown in many previous studies, service quality leads to customer satisfaction, and customer satisfaction leads to customer loyalty (Gagnon & Roh, 2008). Thus, the satisfaction experienced by customers directly and positively influences their loyalty towards a hotel (Campo & Yagüe, 2008), which is recognized as the customer's willingness to build relationships with the service providers. In summary, service quality is linked to the premise that customer satisfaction produces a significant effect on customer repurchasing intentions (Cronin, Brady, & Hult, 2000). Thus, patrons will return to consume only when they experience total customer satisfaction with the service offerings (Garbarino & Johnson, 1999).

2.3 The concern of customer demographic characteristics and travel variables

Although some scholars have proposed that demographic characteristics (e.g. gender and income) have not

performed significant effect on customer perceptions of service quality (e.g. Lim-Ganesan, Bennett-Russell, & Dagger, 2008; Ndhlovu & Senguder, 2002), many previous studies in different research fields have argued that different demographics among customers could indicate different responses to service offerings. For example, Wheatley and Chiu (1977) showed that customer income and educational level influence perceptions of service quality. Webster (1989) found that the demographic variables of age, gender, occupation, and income have significant effects on expectations of service quality. Gagliano and Hathcote (1994) investigated customer expectations and perceptions of the service quality offered in specialty apparel stores and determined that demographic characteristics have a significant impact on customer perceptions of service quality. This argument assumes that service offerings may be viewed to be different kinds of demands, depending on the demographic characteristics. In the hotel service sector, for example, people of different ages will be interested in different issues, such as whether receptionists assist hotel guests in filling out registration documents. In the restaurant field, Kim, McCahon, and Miller (2003) found that gender, average spending, and dining occasions impacted the perceptions of service quality in a restaurant. In conclusion, as suggested by Lin, Lee, and Jen (2008), the expectations of service quality differ among individual customers, and service providers who want to retain customers should set a maximum expected service quality as a target reference. Accordingly, demographic characteristics (e.g. gender, education, age, occupation, and monthly income) affect the experiences of hotel customers, which could influence their levels of satisfaction and loyalty towards the hotel.

Another key issue is that hotel customers with different travel purposes (i.e. business travelers and leisure travelers) may have different perceptions of hotel service offerings (Reid & Sandler, 1992; Tamagni & Zanfardini, 2005; Wang et al., 2008). For example, business travelers expect meetings to proceed flawlessly in a hotel or that rooms have sufficient business facilities (Bernstein, 1999). However, leisure travelers are more likely to stay at a hotel that provides entertainment facilities for them to enjoy (Hankinson, 2005). Aside from tangible concerns, some intangible concerns, such as employee attitudes or the feelings produced by certain hotel services, may be perceived differently based on the travel purposes of the customers (Tamagni & Zanfardini, 2005). Other travel-related variables that influence customer perceptions of hotel service quality must be taken into account, such as duration of stay, travel group, and whether the customer joins the package tour or takes an independent tour. As suggested by Neal (2003), the duration of time a tourist remains at the location influences his or her service quality perceptions of the location. Tamagni and Zanfardini (2005) concluded that traveling with a travel group can have a certain influence on the service quality perceptions of a hotel. Furthermore, whether tourists join the package tour or travel by independent tour would influence tourists' choice of a hotel, which also could affect their duration time of staying at a hotel and using the hotel's facilities. Therefore, a tourist's travel style (i.e. joining a package tour or independent tour) is assumed to be a factor that would affect customer perceptions of hotel service offerings at a hotel. In conclusion, this study also investigates hotel customers with different travel variables that may result in different demands from hotel service offerings. These customers would, in turn, perform differently in a set of hotel service quality-satisfaction-loyalty relationships.

In keeping with the aforementioned discussions, the hotel guests in this study will provide us with information on the following aspects for investigation: 1) demographic characteristics (i.e. gender, age, education, occupation, and monthly income), 2) travel-related information (i.e. duration of stay at the hotel, travel group, travel purpose, and travel type), 3) hotel service quality perceptions, and 4) an overall

satisfaction level with the hotel lodging experience and their customer loyalty intention based on their service experiences at the hotels.

2.4 An integrated analytical approach of the decision tree analysis, association rule analysis, and Kano's model

Data mining is "the process of exploration and analysis of large quantities of data to discover meaningful patterns and rules" (Kim, Song, Kim, & Kim, 2005, p. 193). As shown in the research framework of Fig. 1, the data regarding hotel customer demographics, travel variables, overall satisfaction level with the hotel lodging experience, and their perceptions of hotel service quality elements were obtained through a questionnaire survey, and a decision tree analysis, association rule analysis, and Kano's model were then used to explore the research questions described in the following paragraphs.

A decision tree analysis is one of the common tools for classification that, based on the values of the variables, classifies data into a finite number of classes by generating a hierarchy of if-then statements (Menon & Sharda, 1999; Min, Min, & Emam, 2002). Among the various data mining methods, the decision tree method is recommended because of its visual appeal and the simplicity of setting up useful rules (Min et al. 2002). A decision tree analysis structures top-down trees in with decisions engendered at each node (Han & Kamber, 2006). The decision tree model is "considered as a chain of rules that classify records in different bins or classes called nodes. Based on the model's algorithm, every node may have two or more children or have no child, which is called in this case leaf node" (Berry & Linoff, 1997, cited from Al Ghoson, 2010, p. 58). The decision tree method allows researchers to predict a dependent variable by joining numerous and diversely measured independent variables into the model (Moore & Caepenter, 2010). When a data set is put into a tree model, the data will be examined by a series of tests until relevant information reaches a leaf or terminal node of the tree (Lee, Lee, & Park, 2007). Each decision tree has its own decision-tree algorithm features, and some features are better than others, depending on the case (Al Ghoson, 2010). For example, Kim, Timothy, and Hwang (2011) demonstrated the shopping preferences of Japanese tourists in Korea, showing that the return of Japanese tourists to Korea (dependent variable) can be predicted by certain important independent variables, such as their satisfaction level, whether they were accompanied or not, and their shopping expenditure. As suggested by Lee et al. (2007), depending on whether the final result is a continuous value or a discrete value, a regression tree or a classification tree will be developed. This research developed a classification tree with customer loyalty as a dependent variable having a categorical value (i.e. Yes, No, or Neutral), and tourist demographic characteristics, travel-related information, overall satisfaction level of the hotel lodging experience, and customer perceptions of hotel service quality as predictor variables. A classification tree will tell us "the probability of belonging to a specific class and so is used to predict a membership of cases in the classes of a categorical dependent variable based on their measurements of several predictor variables" (Lee et al., 2007, p. 573).

Association rule analysis is another data mining method used to "find out the relationships between items or features that occur synchronously in the database" (Wang et al., 2004, p. 428). The association rule algorithm was proposed by Agrawal, Lmilienski, and Swami (1993) (Shahbaz, Srinivas, Harding, & Turner, 2006) initially for market basket data analysis in the retail sector. This method was then applied to various fields to detect customer purchase behaviors. For example, Wong, Chang, Jeng, Chung, and Lin (2006) used this method to discover the best combination of service items for customer satisfaction in the airline industry. In that case, if-then statements were used to describe which service items are continuously satisfying to

customers and generate a higher overall satisfaction towards the airline service providers. Rules generated with very high levels of criteria such as support, confidence, and lift are less likely to be misleading than rules generated with lower levels of those criteria (Shahbaz et al., 2006; Wang et al., 2004). In summary, association rule analysis allows clarification of the relationships between synchronous service quality elements, in terms of customer satisfaction and customer loyalty intention. This information could be useful for hotel mangers to understand which hotel services influence customer satisfaction and loyalty intentions most.

In addition, research into customer satisfaction suggests that the quality attributes of a service or product fall into different categories (e.g. attractive, one-dimensional, must-be, indifferent and reverse) that have a different impact on customer satisfaction (Kano, Seraku, Takahashi, & Tsuji, 1984; Matzler, Renzl, & Rothenberger, 2008; Witell & Löfgren, 2007). If the customers' perceptions of the service elements could be clarified, based on the outcomes of the association rule analysis, and the attributes of these elements could be further inspected with Kano's model, the service provider could raise customer satisfaction levels for the attributes of the service elements (Tan & Pawitra, 2001).

Kano et al. (1984) proposed a two-dimensional model of quality designed to categorize the attributes of a product or service based on how well the product or service satisfies customer needs in terms of customer perceptions (Kuo, 2004; Tan & Pawitra, 2001). As discussed by Chang and Chen (2011), this model was applied by scholars in various fields, such as product development projects (Matzler & Hinterhuber, 1998), web-community service quality (Kuo, 2004), and supply chain performance (Zokaei & Hines, 2007). Cheng & Chiu (2007, p. 453) have summarized the five categories of Kano's model as follows: 1) Attractive quality attributes: These attributes are not expected by the customers, and fulfilling this attribute leads to more satisfaction. Even if the attributes are not met, the customers do not feel dissatisfied; 2) One-dimensional quality attributes: These attributes result in customer satisfaction when they are fulfilled and dissatisfaction when not fulfilled. That is, customer satisfaction is proportional to their level of fulfillment. They are usually explicitly demanded by the customers; 3) Must-be quality attribute: Customers take an attribute for granted when fulfilled. However, if the attribute is not fulfilled, the customers will be very dissatisfied; 4) Indifferent quality attribute: Customers are indifferent to these attributes. That is, customers do not care whether they are fulfilled or not; and 5) Reverse quality attribute: These attributes cause customer dissatisfaction when fulfilled and satisfaction when not fulfilled. The key purpose of Kano's model is to find the hidden interrelationship between the requirements of customers and the quality attributes of the service offerings. The results from the categorization of Kano's model could provide further managerial information for hotel managers to understand the quality attributes of the service offerings in the hotel.
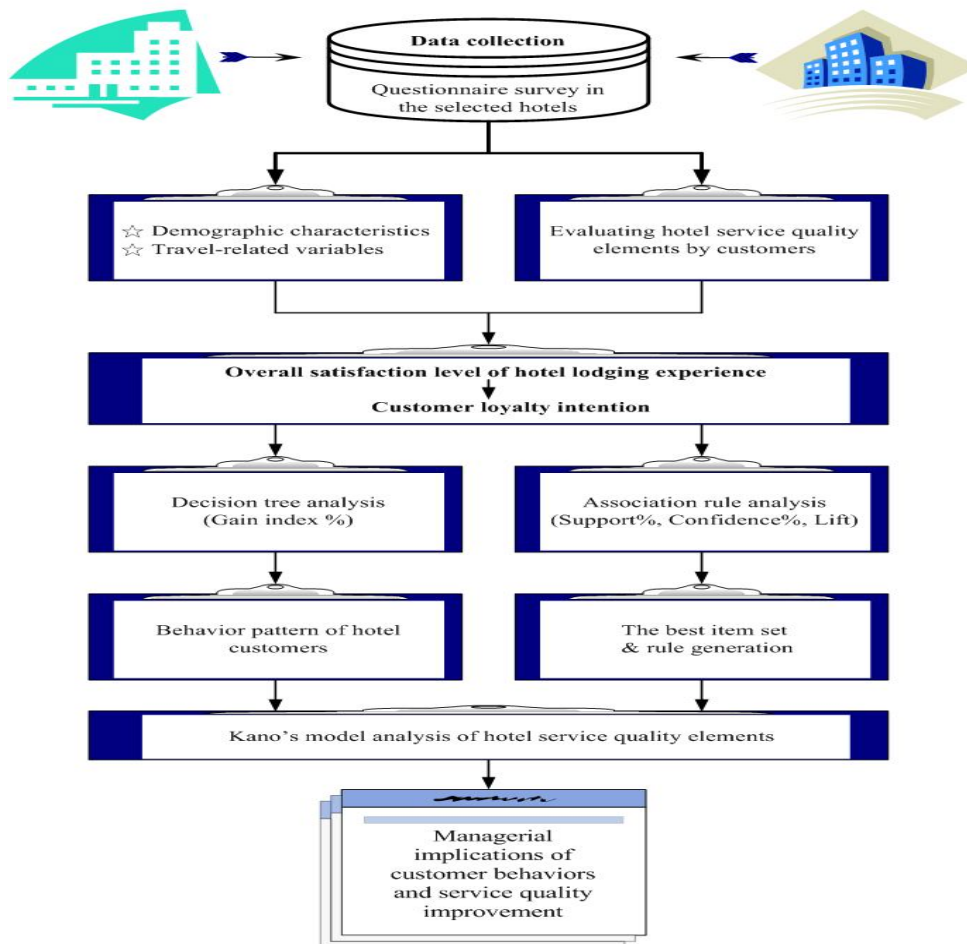
Figure 1. The research framework

2.5 Conceptualization of the study

This paper attempts to identify the intention of hotel guests to return to the hotels where they previously stayed when revisiting Taiwan. Thus, customer loyalty (the intention of hotel guests to return to certain hotels) is the dependent variable, and customer demographic characteristics, customer travel information, the overall satisfaction level of their hotel lodging experience, and their perceptions of hotel service quality elements are independent variables. The research framework shown in Figure 1 and the following research questions are explored in the study.

Question 1: To explore, using decision tree analysis, whether the demographic characteristics of mainland China tourists, their travel variables, and their overall satisfaction level with their hotel lodging experience are likely to have an effect on their loyalty intention.

Question 2: To explore, using decision tree analysis, whether the demographic characteristics of mainland China tourists, their travel variables, their overall satisfaction level with their hotel lodging experience, and their satisfaction level for different parts of hotel service quality are likely to have an effect on their loyalty intentions.

Question 3: To explore, using association rule analysis, whether the best item set of hotel service elements is likely to be strongly linked to their loyalty intention.

Question 4: To explore, using Kano's model analysis, whether the hotel service elements are considered by

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mainland China tourists as belonging to a certain type of quality attribute.

3. Research methodology

3.1 Data collection

This study sampled tourists from mainland China as the study objectives. Because international tourist hotels are most frequented by foreign tourists (47.31%), this study used the four five-star international tourist hotels in Taipei city recognized by the Tourism Bureau of Taiwan as the target hotels in the questionnaire survey. The back-translation method proposed by Sinaiko and Brislin (1973) was used to ensure the quality of the translation; therefore, the questionnaire was translated from English to Chinese with simple Chinese characters for tourists from mainland China. The subjects were asked whether they were willing to participate in the study (the data collection occurred in souvenir stores, restaurants, shopping mall, and night markets, etc.). The chosen respondents received a small gift (Taiwanese symbol key chain) as an incentive to fill out the questionnaire. To prevent data from being collected repeatedly from the same tour groups, no more than ten respondents were sampled in any group. The sampling period lasted for almost three months, and a total of 450 questionnaires were distributed to tourists from mainland China. All outcomes, including reliability and validity analysis, are shown and discussed in the empirical Results section.

3.2 Analysis method

Decision trees generate sets of rules that can be easily understood by a hotel manager and can be replicated in other hotel settings. These rules give important cues regarding how the hotel customer will respond to hotel service deliveries and consequently help hotel management to formulate a successful customer retention strategy. The CHAID is a "criterion-based approach that allows marketers to understand segments in relation to a dependent variable (criterion) having two or more categories according to the combination of independent variables (predictors)" (Kim et al., 2011, p. 547). The results will indicate, for example, that hotel customer patronage behavior tends to be linked to both customer characteristics and their preference regarding hotel service items. SPSS Clementine v11 was used to conduct the association rule analysis to understand what sets of satisfactory service elements are connected to the loyalty intentions. Among the methods of association rules, the Apriori algorithm is the most remarkable and widely used algorithm (Liao & Wen, 2009). These service elements would be categorized by Kano's model to understand which attributes of the service elements in the customer's mind would lead to customer loyalty towards the hotels.

4. Results and discussion

This study used the methods of decision tree analysis, association rule analysis, and Kano's model to explore the behavior patterns of mainland China tourists staying at the international tourist hotels in Taiwan. To this end, the data of their demographics, travel variables, overall satisfaction with the lodging experience, different service quality perceptions, and loyalty intentions were included. An understanding of the relationship between related factors influencing customer loyalty intentions urges hotel managers to continually provide good service quality to succeed in meeting customers' requirements.

With regard to the decision tree analysis (Figure 2), the results fulfill the following: First, it is consistent with previous studies that customer satisfaction (i.e. overall satisfaction with the lodging experience) is an important factor determining customer loyalty towards a service provider (Brunner et al., 2008; Tuu & Olsen

2009). Specifically, satisfaction experienced by customers directly and positively influences their loyalty towards the service provider (Lee, Park, Park, Lee, & Kwon, 2005). Next, in terms of the effect of demographics, the customers' monthly income and length of stay at the hotel are two main determinants in this study. A basic and logical explanation is that the selected hotels are five-star level hotels that charge higher prices than other hotels. Customers with higher income can afford to return to the hotels again. Customers who stay at the hotel for fewer than four days are willing to return to the hotels again because they did not have enough time to experience all the service areas (e.g. entertainments or restaurants) in the hotels, and the remaining attractions motivate their return intentions. These demographics and travel variables assume that tour package tourists did not have enough time to stay at the hotel to experience the extra facilities or services offered by the hotel. In addition, as showed in Figure 3, if the customer perceptions of different parts of hotel service quality are taken into account, among the five hotel service quality domains, core intangible services from the receptionist, housekeeping personnel, and food & beverage personnel are found to be important influences on hotel customer loyalty intention. Package tour tourists are less likely to have the chance to use the extra tangible facilities (e.g. entertainment facilities or business center), so the service personnel in these areas also lack opportunities to encounter package tour tourists. However, the package tour tourists pay more attention to the core intangible service aspects (e.g. reception, housekeeping, and food & beverage). In particular, higher income tourists are more concerned about these core intangible services provided by the hotels. In other words, high quality intangible services are important for luxury hotels to demonstrate their unique ability to help customers experience the service quality that creates loyalty intentions (Presbury et al., 2005).

With regard to the association rule analysis, the results showed that core intangible service aspects from the receptionist, housekeeping personnel, and food & beverage personnel are strongly associated with customer loyalty intentions, as are the tangible aspects of the reception and hotel room facilities. The former indicated that reception in the hotel lobby could be considered one of the most important servicescapes because of its impact in forming many of the first impressions of hotel guests (Countryman & Jang, 2006), while the latter is treated as core offerings (Carman & Langeard, 1980) in hotels that would be encountered by most hotel customers. If the tourists are mainly from package tours, the intangible services and tangible facilities of these areas are the important areas to create customer satisfaction. However, if the tourists are mainly independent tourists because they have more time and free choice to stay at the hotel longer than the package tour tourists, the intangible services and tangible facilities of the entertainment or business centers would be even more important to these tourists than to the package tour tourists. Although the hotel should provide the best services and facilities to customers in all areas, if the hotel managers take the customer travel type into account, they can better allocate resources, always a concern of the firms (Wu, 2006). Furthermore, managers should invest resources into improving low performance in the service quality dimensions that have the strongest impact on customer satisfaction and the highest negative asymmetry (Stan, Evans, Wood, & Stinson, 2007), i.e., at a minimum cost but with maximal positive impact (Chang & Chen, 2011).

With regard to Kano's model analysis, the results showed that, based on mainland China tourists' perceptions, most of the service elements fit into the category of one-dimensional quality attributes. This means that these service elements are positively and linearly related to customer satisfaction, and the greater fulfillment of the attribute results in a greater degree of satisfaction. This also means that hotels should make more effort to innovate their intangible services and tangible facilities to create business advantages in the

market. That is, "what differs between high and low quality accommodation is the quality of the extra services and tangibles" (Orfila-Sintes & Mattsson, 2009, p. 381). Therefore, in terms of Kano's model, attractive quality should be an important consideration of hotel managers. Attractive quality includes elements with attractive attributes that give satisfaction if present but no dissatisfaction if absent. However, the attractive quality attribute is not significant enough to have the most potential to become a firm's 'competitive weapon' in terms of the thinking of "beyond expectation" (Yang, 2005). For example, using differentiating technologies in hotels (Ruiz-Molina, Gil-Saura, & Moliner-Velázquez, 2011), such as a mobile sightseeing device for tourists to use when strolling around the hotel, is a good way to create attractive quality services for tourists.

In summary, from an academic point of view, this paper proposes an integrated analytical approach to explore the relationships between tourists' overall satisfaction with their hotel lodging experience, demographics, travel variables, different service quality perceptions, and their effects on tourist loyalty intentions in the context of an international tourist hotel. From a practical standpoint, this study adds to existing knowledge by providing empirical evidence of tourists from mainland China to demonstrate the customer loyalty intentions that occur when certain demographics and specific intangible and tangible service quality elements are considered. For hotel managers, it is critical to frequently manage and supervise the quality of service offerings and the process of service delivery to achieve target customers' requirements.
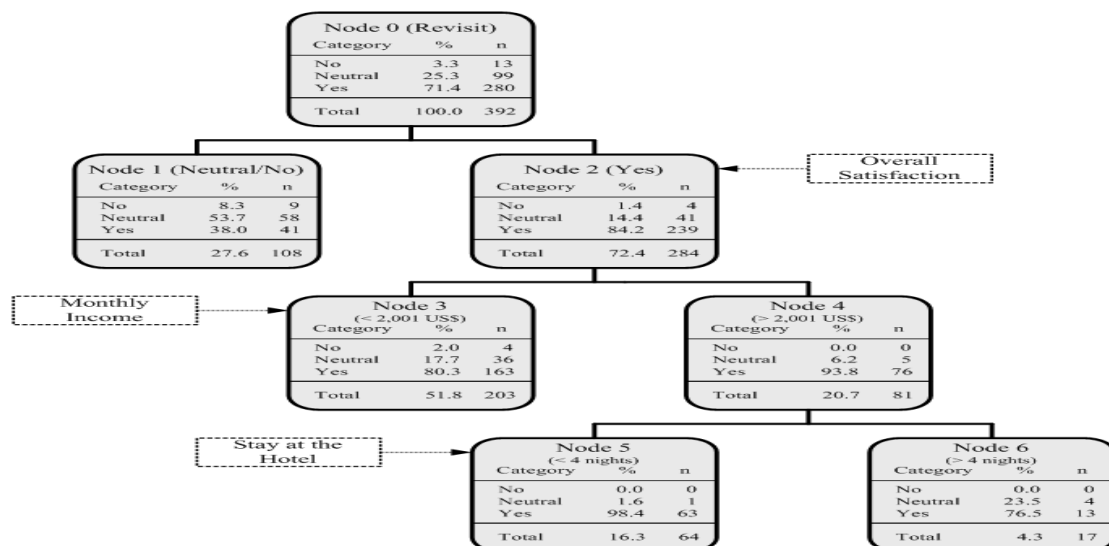

Fig. 2. Results of identifying intention return to the hotel by the factors of overall   satisfaction level of hotel lodging experience, demographics, and travel variables.
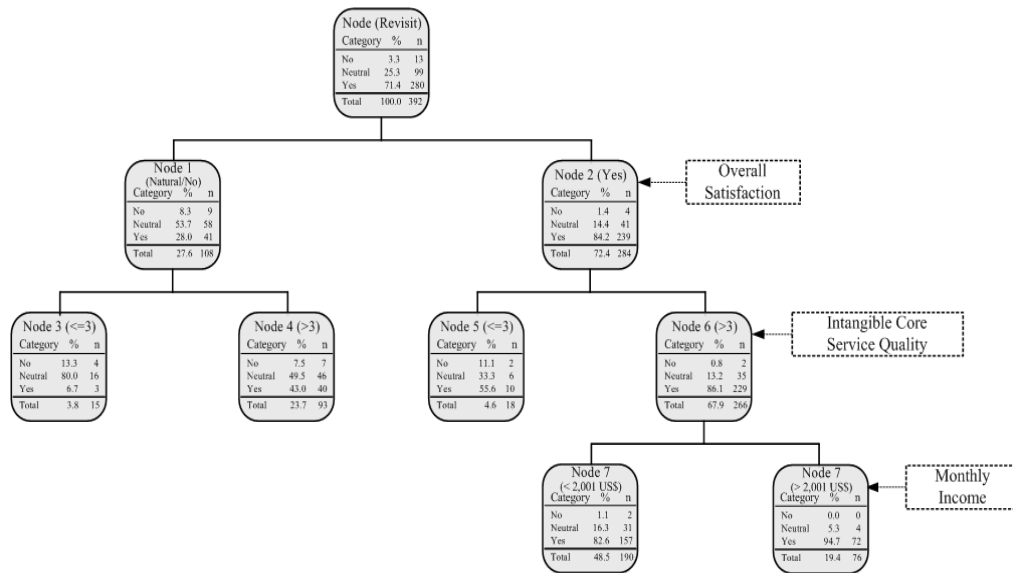
Fig. 3. Results of identifying intention return to the hotel by the factors of overall satisfaction level of hotel lodging experience, demographics, travel variables, and hotel service quality perceptions.

5. Limitations and directions for further research

The limitations of this research provide direction for future research. First, according to the demographics, most of the tourists are traveling on package tours due to legal limitations. Thus, most of the behavior patterns determined in this study can probably be applied to package tour tourists. However, in 2011, the Taiwan government now permits mainland China tourists to travel to Taiwan as independent tourists. In the near future, more independent tourists from mainland China will stay in hotels and could have different expectations for the hotels (King, Dwyer, & Prideaux, 2006). Therefore, future research can compare the behavior patterns between package tour tourists and independent tourists to provide further suggestions to the hotel managers. Second, studies have also suggested that nationality may cause different service quality perceptions of hotels (Matzler et al., 2008; Patton, Stevens, & Knuston, 1994). The effect of nationality (e.g. tourists from mainland China versus tourists from Japan or western countries) on the perceived experiences of hotel customers and how this influences their levels of satisfaction and loyalty towards the hotel (Matzler et al., 2008) should be a subject of future study. Third, as discussed by Kim et al. (2007), because loyal customers and frequent visitors are significantly different, future researchers should notice and distinguish their behavioral intentions of these two groups. Finally, because the international tourist hotel industry was the only selected service in this study, any further research should involve other types of hotel industries (e.g. business hotel versus leisure hotel) to make comparisons to understand customer perceptions towards different types of hotel service offerings across different types of demographics and other travel-related variables.

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國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

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1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估
   - ☑ 達成目標
   - ☐ 未達成目標（請說明，以 100 字為限）
       - ☐ 實驗失敗
       - ☐ 因故實驗中斷
       - ☐ 其他原因

   說明：

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2. 研究成果在學術期刊發表或申請專利等情形：
   論文：☐已發表 ☐未發表之文稿 ☑撰寫中 ☐無
   專利：☐已獲得 ☐申請中 ☑無
   技轉：☐已技轉 ☐洽談中 ☑無
   其他：（以 100 字為限）

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3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

   本計畫利用一整合性的分析方法（決策樹、關聯法則分析及 Kano 模型）來瞭解國際旅客於國際旅館中的服務體驗及其購後行為。以居住於台北地區國際旅館之大陸旅客為研究對象，本計畫共獲得 392 份可用之有效問卷。經由決數樹之分析，結果顯示旅客對於居住旅館的整體滿意度、核心的無形服務品質（接待人員、房務人員及餐飲人員之服務）與特定的人口統計變項（月收入）等三項重要因素影響了旅客對於旅館的忠誠意向。經由關聯法則之分析，結果進一步顯示核心的無形服務和有形的接待與房間設備與顧客忠誠意向間有具有強烈的關聯性。再者，經由 Kano 模型之分析，大陸旅客對於國際旅館所有的服務要素均視為是具有一元的服務品質特性。根據研究發現，本計畫亦提出討論並對後續研究提出建議。

國科會補助計畫衍生研發成果推廣資料表

國科會補助計畫	計畫名稱: 整合Kano模型與決策樹分析來瞭解旅館產業中之顧客特性、顧客服務品質知覺及其購後行為：國際觀光旅館之實證研究
	計畫主持人: 張國謙
	計畫編號: 100-2410-H-263-004-　　　　學門領域: 休閒遊憩

無研發成果推廣資料

計畫名稱: 整合Kano模型與決策樹分析來瞭解旅館產業中之顧客特性、顧客服務品質知覺及其購後行為：國際觀光旅館之實證研究

計畫主持人: 張國謙

計畫編號: 100-2410-H-263-004-

100 年度專題研究計畫研究成果彙整表

計畫主持人：張國謙　　計畫編號：100-2410-H-263-004-

計畫名稱：整合 Kano 模型與決策樹分析來瞭解旅館產業中之顧客特性、顧客服務品質知覺及其購後行為：國際觀光旅館之實證研究

成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	1	1	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	0	1	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		

	其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)	無	

	成果項目	量化	名稱或內容性質簡述
科 教 處 計 畫 加 填 項 目	測驗工具(含質性與量性)	0	
	課程/模組	0	
	電腦及網路系統或工具	0	
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

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1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

   ■達成目標

   □未達成目標（請說明，以 100 字為限）

   　　　□實驗失敗

   　　　□因故實驗中斷

   　　　□其他原因

   　說明：

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2. 研究成果在學術期刊發表或申請專利等情形：

   論文：□已發表 □未發表之文稿 ■撰寫中 □無

   專利：□已獲得 □申請中 ■無

   技轉：□已技轉 □洽談中 ■無

   其他：（以 100 字為限）

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3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

   本計畫利用一整合性的分析方法（決策樹、關聯法則分析及 Kano 模型）來瞭解國際旅客於國際旅館中的服務體驗及其購後行為。以居住於台北地區國際旅館之大陸旅客為研究對象，本計畫共獲得 392 份可用之有效問卷。經由決數樹之分析，結果顯示旅客對於居住旅館的整體滿意度、核心的無形服務品質（接待人員、房務人員及餐飲人員之服務）與特定的人口統計變項（月收入）等三項重要因素影響了旅客對於旅館的忠誠意向。經由關聯法則之分析，結果進一步顯示核心的無形服務和有形的接待與房間設備與顧客忠誠意向間有具有強烈的關聯性。再者，經由 Kano 模型之分析，大陸旅客對於國際旅館所有的服務要素均視為是具有一元的服務品質特性。根據研究發現，本計畫亦提出討論並對後續研究提出建議。