Examining the Relationships among Motivation, Service Quality and Loyalty: The Case of the National Museum of Natural Science (NMNS)

Abstract

This study explores causal relationships between push and pull motivations, perceptions of service quality and loyalty intention, and examines the moderating role of membership status in the National Museum of Natural Science (NMNS), the largest museum in Taiwan. Data were collected from 405 paid admission visitors, with a quota and systematic sampling, from two stages of pre- and post-visit corresponding with two questionnaires. The results demonstrate that push and pull motivations impact on service quality perceptions, which in turn influences museum loyalty; the effect of pull motivation on service quality perceptions in the non-member group was stronger than member group; the effect of service quality perceptions on loyalty in the member group was stronger than the non-member group. Museum managers could tailor and advertise existing museum products and services to different types of visitors; assuring the museum's continued operation and success.

Introduction

According to Taiwan Tourism Bureau Ministry (2014), the annual number of visitors to all national museums between 2001 and 2013 was 39.42 million. This study focuses on the National Museum of Natural Science (NMNS) which is not only an important educational facility, but is also a major tourism attraction in Taiwan receiving around 3.3 million visitors annually. It is difficult to disaggregate the total figure in terms of leisure and educational visitors, partly because in a museum context both activities may be pursued simultaneously; however it is reasonable to regard it as a significant tourism resource. Whether there really is a case to be made for regarding cultural tourism as a distinctive and growing niche market (Alaeddinoğlu & Can, 2009), clearly cultural attractions such as museums play a highly significant role in attracting tourists with nearly forty thousand museums accounting for an estimated 50 percent culturally orientated visits worldwide (Richards, 2007). Museums clearly rank among the top visitor attractions and eight of the top ten most popular attractions in the UK are national museums in 2012 (National Museum Directors' Council, 2014). This is nowhere more apparent than in the 2013 statistics of the UK's Association of Leading Visitor Attractions which places museums in the top six positions before any other kind of attraction (Association of Leading Visitor Attractions, 2014). Interestingly, Taiwan's NMNS compares favorably the Science Museum South Kensington, which received 3.32 million visitors in 2013 and is the fifth most visited institution in the UK (Association of Leading Visitor Attractions, 2014). This pattern is replicated elsewhere and, according to the U.S. Census Bureau (2012), museums and historical institutions represented the fastest growing segment of the market of arts, entertainment and recreation annually in the years 2008-2012. Culturally induced visits account for approximately one-third of the entire tourism and recreation market in Taiwan, with museums comprising a quarter of such attractions and functioning as primary destinations (Taiwan Tourism Bureau Ministry, 2014). Accordingly, museums are becoming more visitor-oriented and are "paying greater attention to the wishes and needs of their visitors" (Gil & Ritchie, 2009; Johnson, 2003; Kotler & Kotler, 2000), but this is not necessarily a novel phenomenon as certain kinds of museums, such as the world's first open air museum at Skansen near Stockholm in Sweden have always been attractive to leisure visitors. Skansen opened its doors in 1891

and by 1938 it was receiving two million visitors annually (Hudson, 1987). What is significant in the 21st century, is the widespread acceptance that nearly all kinds of museums have a role to play in tourism and, that like other tourism attractions, they have to listen more attentively to the various segments that comprise their markets as a means of improving service quality, and enhancing the satisfaction of visitors and other stakeholders (Caldwell, 2002), and encouraging repeat visits.

Bansel and Eiselt (2004) have drawn attention to the importance of comprehending tourist motivations in order to better understand visitors' choices, preferences and needs and it is widely agreed that motivation plays a major role in determining tourists' decisions regarding when, where and what type of tourism to pursue at the pre-visit stage (Pizam & Mansfeld, 1999). Motivation has a huge influence on the choices visitors make regarding what to attend, the amount of effort they devote to learning, and the extent to which they enjoy the experience (Packer, 2004; Park, 2009). Tourists frequenting cultural attractions are more likely to search for new experiences and to value learning than tourists engaged in other kinds of pursuits (Packer & Ballantyne, 2002; Richards, 2001). Kuo (2005) noted that museums view visitors' motivations and expectations as top priorities, and consequently the products and services designed satisfy visitors' needs to reflect this (Prentice et al., 1997).

Few studies have explored the specific relationship between needs of culturally orientated tourists' motivations and perceptions of service quality (Shen & Tseng, 2006; Wu et al., 2004) and this study addresses this gap by examining the antecedents (push and pull motivations) and consequences (loyalty) of museum service quality across distinct temporal phases. Moreover, research in museums reveals that socio-economic class and education strongly correlate with the habit of museum visiting (Falk, 1998; Harrison & Shaw, 2004; Kawashima, 1999; Yucelt, 2000). For instance, earlier studies have shown that various types of customers rate perceptions of service quality, and loyalty differently (Bowman & Narayandas, 2001; Evanschitzky & Wunderlich, 2006; Garbarino & Johnson, 1999). Some research has tested the moderating effect of membership status on the relationship between "motivations" and "perceptions of service quality," and between "perceptions of service quality" and "loyalty" within a non-cultural tourism context (e.g., DIY industry (Evanschitzky & Wunderlich, 2006), ski resort (Matzler et al., 2008). This study theoretically develops and empirically tests a causal model of museum visitors

among push and pull motivations, perceptions of service quality, and loyalty. The study further examines the moderating role of membership status on motivation, service quality and loyalty relationship within the Taiwan national museum context.

Literature Review

The review discusses tourist behavior and four constructs of tourist behavior (push motivations, pull motivations, perceptions of service quality, and loyalty), and explores the antecedents and consequences of museum quality (MUSEQUAL)—as well as the determinants of visitor loyalty across two temporal stages.

Tourist Behavior

Tourist behavior is subjective, dynamic and multi-faceted; it involves and is influenced by many factors over time. Pizam and Mansfeld (1999) pointed out that research on consumer behavior in travel and tourism primarily focuses on the relationships between travel motivation, choice of destination choice and consequent travel behavior over time. Tourist behavior is studied to determine why tourists purchase tourism products/services (Hudson, 2000), how they make decisions (where to go, how long to stay), and what determines their subsequent behavior, such as post-purchase evaluation and future decision-making (Moutinho, 1987). Lee, Lee, and Lee (2005) pointed out that tourist behavior is an umbrella term that labels a set of temporal stages mainly comprising decision-making, on-site experience, experience evaluation, and post-trip behavior. One of the most widely accepted is Clawson and Knetsch's (1966) recreational behavior model, which identifies the main drivers affecting the choice and later evaluation of a tourism destination by tourists over time, including pre-visit, on-site, post-visit and/or future intention stages. John and Clark (1993) applied this recreation behavior model to the museum context. They maintained that museum tourists view the experience of visiting museum as a "journey" that includes the stages such as pre-visit, visitor experience and post-visit. This study adopted Clawson and Knestch's (1966) model to provide the general temporal framework for museum visitor behavior, and have integrated four constructs to develop a museum tourist behavior model. Specifically, a two-phase

process of museum tourist behavior was used: 1) pre-visit stage, determinants of destination choice (push and pull motivation); and 2) post-visit stage: evaluation of on-site experience (perception of service quality) and future intention (museum loyalty). Thus, the effects of tourists' push and pull motivation at pre-visit stage on their museum loyalty at the post-visit stage will be mediated by the perceptions of service quality.

Push and pull motivation theory

Motivation has long been recognized as the driving force of tourist behavior (Kim, 2006). Motivations differ from one tourist to another because of their diverse needs and desires and from one destination to another because of differences in the various products and services (Andreu, Kozak, Avci, & Cifter, 2005). Many studies show that motivations can be defined as the fundamental reasons for behavior (Mayo & Jarvis, 1981; Pearce, 1991), as critical to understanding the vacation decision-making process (Dann, 1977; Sirakaya & Woodside, 2005) and as essential in assessing satisfaction with the experience (Ross, Elizabeth, & Iso-Ahola, 1991; Ryan, 2002 Yoon & Uysal, 2005). Some of the most widely cited theories associated with the importance of visitor motivation comprise: Maslow's Hierarchy of Needs (Maslow, 1970), Plog's (1973) Tourism Motivation Model, Dann's (1977) Push and Pull Motivation Theory, Crompton's (1979) Nine Motives, and Bettman's (1979) Information-Processing Model of Consumer. Recent studies shown that push and pull motivation factors in choosing a travel destination have been more widely accepted (Alghamdi, 2007; Bogari et al., 2003; Park, Hsieh, & McNally, 2010; Jang & Cai, 2002; Kim et al., 2003; Sung, 2004). In an early paper, Dann (1977) classified travel motivations as push factors which reflect travelers' internal (social-psychological) needs and desires, generating the demand for travel, as well as pull motivations which are external forces relating to destinations or a destination's attributes. Uysal and Hagan (1993) argued that push motivations are intangible or intrinsic desires of the individual tourist, such as the desire for escape, rest and relaxation while pull motivations refer to the attractiveness of a given destination and its tangible characteristics, including accommodation, recreational facilities and cultural resources. For example, Jang and Cai (2002) found that British travelers to Asia were likely to be influenced by the push motivations of "novel experience," while British travelers who

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selected the U.S as a holiday destination were affected by the pull motivations of "enjoyable and exciting outdoors activities." Sung (2004) maintained that the examination of push and pull motivations of tourists should be beneficial to destination marketers and researchers because individuals' various needs, attitudes, and lifestyles can be identified, understood and incorporated into programming and marketing activities. Therefore, push and pull motivations are regarded as a starting point and driving force of museum visitor's perceptions and loyalties that could explain and predict their decisions.

Service quality

The ways in which tourists evaluate the quality of the services they make use of on visits has been the subject of studies by Baker and Crompton (2000), Atilgan *et al*. (2003), Frochot (2004), Hudson *et al*. (2004) and Shonk (2006). It has been argued that service delivery becomes especially important to businesses and governmental units in the public recreation, tourism, and hospitality areas (Vogt & Fesenmaier, 1995). Service quality can be adopted as an indicator of profitability and the success of organizational objectives (Lee, Graefe, & Burns, 2004). Parasuraman *et al*. (1985) first developed a multiple-item scale, PZB SERVQUAL model, and revised it in 1991, to conceptualize and measure elements of service that are evaluated by customers. The SERVQUAL scale covers five generic dimensions, including Tangibles, Reliability, Responsiveness, Assurance, and Empathy. This instrument has been used for applicability across different industries and sectors, although there are many different approaches or methods for measuring service quality. Williams (1998) adapted the SERVQUAL model for a museum study and assessed the original five dimensions for service delivery quality with a consideration of the perspectives of both consumers and employees. Frochot (2001, 2004) developed HISTOQUAL, based on SERVQUAL, to identify the service quality dimensions of cultural, heritage and historical attractions. The HISTOQUAL instrument includes the original SERVQUAL dimensions, plus additional two dimensions of communication and consumables. MUSEQUAL, another instrument from the SERVQUAL model developed by Allen (2001), emphasized primarily cultural tourist service experience and satisfaction with five dimensions, including tangibles, responsiveness, awareness, communication and consumables. In particular, museum patrons perceive assurances of service to be most

important, followed by the tangible aspects of services (Maher & Clark, 2005). Furthermore, SERVPERF, a modification of the SERVQUAL, was proposed as an approach suitable for assessing visitors' perceptions of service quality (Cronin & Taylor, 1992). The adapted museum SERVPERF measurement was conceptualized as a second-order five construct structure comprising tangibility, responsiveness, empathy, communication, and consumables which is a better predictor of overall satisfaction than the SERVQUAL (Lee & Beeler, 2007). Numerous studies stress that service quality is an overall evaluation of a service and considered it to be a second-order five-construct structure (Bagozzi & Dholakia, 2006; Bauer et al., 2006; Dholakia & Bagozzi, 2004; Kaul, 2007; Parasuraman et al., 2005; Park & Baek, 2007). Therefore, this study adopts five dimensions (tangibility, responsiveness, empathy, communications, consumables), from a combination of Frochot's HISTOQUAL (2001) and Allen's MUSEQUAL (2001), to evaluate the visitor services element of the museum experience.

Several studies have reported that push and pull motivations can directly affect visitors' perceptions of service quality in a positive direction, which then determines levels of revisit intentions (Lee, Jeon, & Kim, 2011; Shen & Tseng, 2006; Wu et al., 2004; Yoon & Uysal, 2005). For example, Shen and Tseng (2006) explored spa visitors' motivations in which their push and pull motivations had a positive impact on their perceptions of service quality, which then affected their level of satisfaction and revisit intention. Wu, Huan, and Chiu (2004) demonstrated that national park visitors' push and pull motivations had a direct positive effect on their expectation of service quality and satisfaction. Yoon and Uysal (2005) illustrated that the causal relationship between push and pull motivations and satisfaction among cultural tourists. Based on prior empirical studies, two sets of hypotheses are proposed to test the causal relationship between push and pull motivations and museum visitors' perceptions of service quality, in a positive direction as follows:

Hypothesis 1: Museum visitors' push motivations positively affect their perceptions of service quality in the museum.

Hypothesis 2: Museum visitors' pull motivations positively affect their perceptions of service quality in the museum.

Loyalty

Customer loyalty usually refers to repeat purchases or recommendations to others (Chen & Tsai, 2007; Yoon & Uysal, 2005). Loyalty has been viewed as one of the most important subjects in contemporary marketing. It shows benefits such as attracting previous customers is more cost-effective than gaining new ones and increasing a five percent in customer retention can increase profits by 25-85% (Jang & Feng, 2007). Several studies show that visitors' loyalty is important to public museums, in terms of repeat visitors and recommendations to others (Chen & Lu, 2006; Huang et al., 1999; Lu, 2003). It is generally accepted that past experience can positively influence attitude toward behavior (Huang & Hsu, 2009). For example, perceptions of service quality is an effective predictor of repurchase or revisit intentions, and of recommendation intentions (Baker & Crompton, 2000; Cole & Illum, 2006; Kozak, 2001; Kuo et al., 2009; Lee, Petrick, & Crompton, 2007; Petrick, 2004; Yuksel, 2001). Cina (1989) and Walker (1995) noted that satisfied customers with services are believed to influence the long-term viability of organizations through repeat purchases, brand loyalty and positive word-of-mouth communication. Backman and Veldkamp's (1995) study revealed a positive relationship between consumers' perceptions of service quality gaps and their degree of loyalty. Kuo *et al*. (2009) pointed out that customers' perceptions of service quality influenced customer loyalty. Movafegh and Movafeg's (2013) study identified the correlation between five factors (tangibles, reliability, responsiveness, assurance, empathy) and loyalty. Perceived museum service quality is therefore assumed to directly and significantly affect visitors' loyalty. This study proposes the following hypothesis:

Hypothesis 3: Museum visitors' perceptions of service quality positively affect their loyalty.

Moderating effect of membership status (member and non-member)

Visitor type can be referred to as the category of ticket at which different prices are set based on the buyer's demographic characteristics (e.g. age, occupation, residence); another visitor type can be referred to as membership status (member and non-member). Luk, Sharma and Chen's (2013) study demonstrated that motivations could be a moderator of the service evaluation process, indicating that the relationships between service quality, value, satisfaction, and behavioral intentions are stronger in hedonic shopping motivation than in utilitarian retail. Prior studies have shown that various types of customers and different membership status show different rates of perceived service quality, overall satisfaction and loyalty (Bolton, Kannan, & Bramlett, 2000; Bowman & Narayandas, 2001; Evanschitzky & Wunderlich, 2006; Garbarino & Johnson, 1999; Gruen, Summers, & Acito, 2000; Slocum & Mathews, 1970). For example, Garbarino and Johnson (1999) found that theater visitors in three groups (subscribers, occasional subscribers, and individual ticket buyers) had different satisfaction and loyalty. In another case, Evanschitzky and Wunderlich (2006) reported that visitor type (general customers, and loyalty card members) acts as a moderator variable in chain stores resulting in different moderating impacts on the relationships between satisfaction and loyalty; loyalty card owners who intend to buy at a particular retailer are more likely to actually purchase there than are those who are general customers. Three hypotheses are proposed to examine the moderating effect:

Hypothesis 4: Visitor type by membership status (member and non-member) moderates the effect of museum visitors' push motivations on the perceptions of service quality of museum service;

Hypothesis 5: Visitor type by membership status (member and non-member) moderates the effect of museum visitors' pull motivations on the perceptions of service quality of museum service; and

Hypothesis 6: Visitor type by membership status (member and non-member) moderates the effect of museum visitors' perceptions of service quality of museum on their

intentions to return, to recommend visiting to others, and to renew or gain membership.

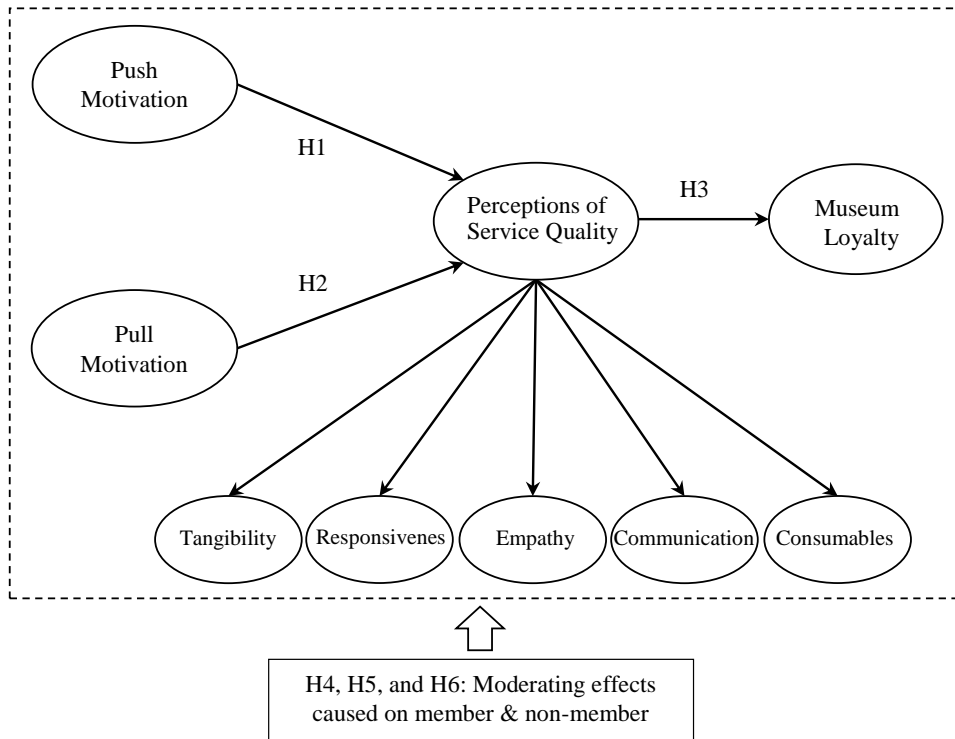The hypothesized relationships are presented graphically in Figure 1.

Figure 1. The proposed hypothetical model of the relationships among all constructs

Methodology

Study site

This study was conducted at Taiwan's largest national museum, the National Museum of Natural Science (NMNS) in Taichung. The NMNS has two main features that qualify it as a representative public museum in Taiwan: it is located in one of the five major metropolises and has large numbers of annual visitors (3.3 million visitors including approximately 13,000 members annually for the past seven years). The museum also provides varied facilities and services for the public and has permanent and temporary

offerings. NMNS was the first museum membership launched in Taiwan and was successful in persuading visitors to join and renew their memberships annually, eventually achieving a total of 47,331 members (NMNS, 2008). When comparing members and non-members of the museum it is important to be aware of differences in the frequency of visit and levels of satisfaction, which this study addresses.

Study instrument and measurement

A self-administered questionnaire comprising five parts was developed and the structure of the survey includes two components. The main purpose of dividing the study into two stages was to ensure that participants could fairly and objectively rate motivations before their visit to avoid mutual interaction forces from perceived service quality after the visit. The first half of the questionnaire included three parts such as eight socio-demographic characteristics, nine travel behaviors, and 12 push and pull motivations. The motivation items were developed from previous studies in educational and leisure settings, including museums, art galleries and aquariums (Jang & Cai, 2002; Kau & Lim, 2005; Kotler & Kotler, 2000; Packer & Ballantyne, 2002; Oh et al., 1995; Prentice et al., 1997; Richards, 2001; Zhang et al., 2004). The items were measured on a seven point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The second half of the questionnaire, completed during the post-visit phase, contained participants' evaluations of service quality and loyalty. Twenty items of service quality were derived from previous studies of Allen's MUSEQUAL (2001), Frochot's HISTOQUAL (2001), Harrison and Shaw (2004), and Wang (2001) to evaluate the visitor service element of the museum experience. Respondents were asked to rate the museum performance of each service characteristic measured on a seven-point Likert scale. Three loyalty items, such as participants' intentions to return to the museum, to recommend visiting it to others, and to renew their membership or become a new member of the museum within a year, were asked to rate according to prior studies (Baker & Crompton, 2000; Kozak, 2001; Oliver, 1999; Oppermann, 2000; Yuksel, 2001).

The questionnaire was originally developed in English and translated into Chinese. Then the Chinese version was back-translated to English by two bilingual researchers from Taiwan who had studied at universities in the United States. Twelve Taiwanese

graduate students in recreation and tourism, and two NMNS research staffs were invited to review the translation of both the English and Chinese questionnaires for accuracy and consistency, and were asked to assess the face and content validity of the measurement scales. Subsequently, the questionnaire was given to 389 visitors in the NMNS for refining items and examining the construct reliability and validity of the scales. The result of the pilot study ensured that the measurement scales were reliable and valid because critical ratio analysis, item-to-total correlation, and internal consistency reliability were higher than the recommended values by Chiou (2002), Nunnally (1978), and Wu (2001).

Data collection and procedures

The sample frame for this study included domestic Taiwanese aged 20 to 64 years who bought tickets and visited NMNS during a four-week period in May of 2010. This study targeted only paid-admission visitors who visited NMNS at least two times a year. With a quota and systematic sampling, participants were screened and selected regarding their visitor type (Adult, Discount, Dinosaur, and Family). This study selected one participant approximately every ten minutes, with that person being approached as they entered the main entrance of the study museum, until the number of subjects met the specific fraction predetermined for each type. Following the design of the survey instrument, data collection was divided into pre-visit and post-visit stages corresponding with the two questionnaires. Before starting the museum tour, the respondents completed the first part of the survey, which assessed push and pull motivations and respondent travel behaviors and demographics. After completing the tour, the respondent was reminded to fill out the second part of the survey, which evaluated service quality perceptions and loyalty intentions before they left. A museum souvenir served as an incentive for completing and returning the second half of the questionnaire at the end of the visit to increase the number of completed two-stage surveys. A total of 610 respondents returned the first half of the questionnaire. Of these, 405 respondents completed and returned the second half of the questionnaire, yielding a usable survey response rate of 66.4%.

Results

Respondents' profile

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Of the 405 respondents, more were female (53.3%) than male (46.7%) and their ages ranged from 20 to 64 years, with a higher percentage in the ages between 30-39 and 20-29 (37.3% and 28.4%, respectively). The majority (46.7%) of them resided in Taichung City/County and more were married 63.2%) than single (36.3%). The majority (87.9%) had at least a college degree; and the average monthly income was in the range of US $666-$1,000, excluding the no-income group (students, retired people, and housewives). In addition, over half of them (55.1%) had visited the NMNS more than four times and most (96.3%) of the participants had two or more accompanying members who were family members (75.1%) and/or friends (24.9%); there were more day-trippers (64.7%), whereas 35.3% of respondents were taking an overnight trip; and the average length of stay for all visitors was 1.8 hours.

The socio-demographic characteristics (e.g., gender, age, marital status, educational level, monthly income, and occupation) and travel behavior variables (visit frequency, stay length) were tested via T-test and ANOVA to find any significance among participants. The results demonstrated that three socio-demographic factors (age, marital status, educational level) had significant influences on visitors' push and pull motivations, perceptions of service quality, and loyalty. Older visitors were more likely to have stronger pull motivations (e.g., comfortable environment, safe and secure) and higher loyalty than younger visitors. Married visitors had higher pull motivations (enjoyable facilities and activities, special events) and higher loyalty than single visitors. Less educated visitors were more likely to have higher level of perceived service quality than higher educated visitors. As for the factors of visit frequency and stay length, the test results showed that only stay length had a significant impact on visitors' loyalty, indicating that loyalty levels were significantly higher for visitors who stayed at the museum longer than for those whose stay was shorter.

Structural equation modeling

The proposed model was tested through structural equation modeling (SEM), which incorporated two elements: a measurement model and a structural model. First, confirmatory factor analysis (CFA) was performed to estimate the overall fit of the measurement model among the four latent constructs (push motivation, pull motivation,

MUSEQUAL, and museum loyalty). A summary of the four first-order constructs as well as one second-order construct, 31 observed variables were included in the measurement model, removing four items with a low factor loadings less than 0.63 (Hair et al., 1998). Construct validity was evaluated by examining the item loadings and their associated t-values, as well as the composite reliabilities and average variance extracted in this study, as presented in Table 1.

Table 1. Overall Measurement Model (N=405)

Construct & Indicators	FL	t-Value	CR	AVE
First-order Constructs				
Push Motivations Construct			0.86	0.55
To relax	0.76	11.25		
To spend quality time with family or friends	0.78	12.59		
To expand knowledge	0.68	12.80		
To enjoy new experiences	0.72	12.75		
To enjoy exhibits in different settings	0.75	10.79		
Pull Motivations Construct			0.88	0.55
Because museum has enjoyable facilities	0.78	9.07		
To see new exhibits	0.81	13.87		
Because museum has comfortable environment	0.69	11.05		
Because museum has enjoyable activities	0.79	13.57		
Because museum is safe and secure	0.67	12.08		
To attend special events	0.71	8.44		
Tangibility Construct			0.76	0.51
The parking lot is available	0.70	11.93		
The exhibits are well maintained	0.76	12.56		
The exhibit themes are diverse	0.68	11.84		
Responsiveness Construct			0.84	0.56
Staff responds to visitors' requests promptly	0.75	15.18		
Interpreters are professional (e.g., accessible, knowledgeable of the subjects)	0.69	13.77		
Staff is willing to spend time helping visitors	0.80	16.44		
Staff is friendly	0.75	12.85		
Empathy Construct			0.76	0.52
The level of noise is acceptable	0.73	12.74		
The museum caters to the needs of less able visitors	0.74	12.91		
The facilities for children are sufficient	0.69	11.31		

Table 1. (cont'd)

Construct & Indicators	FL	t-Value	CR	AVE
Communication Construct			0.82	0.53
Directional signs in the museum make it easy to navigate	0.67	13.32		

	FL	CR	AVE
Overall, physical display of the interpretation/ exhibits (size of signs, layout of design, brightness of light) is well provided	0.75	13.04	
Interpreters have good communication skills (e.g., clarity, speed, fluency, interaction with audience, time control, etc)	0.71	14.26	
Exhibit descriptions are understandable (texts i9 and graphs)	0.77	λ set to 1	
Consumables Construct		0.78	0.55
The restaurants' staff provides efficient service	0.73	9.04	
The shops offer diverse choices of items	0.78	8.84	
The shops offer quality items	0.71	9.71	
Loyalty Construct		0.84	0.64
Revisit this museum	0.87	13.09	
Recommend this museum to others	0.84	12.88	
Renew membership or become a member	0.68	17.94	
Second-order Constructs			
MUSEQUAL construct		0.93	0.74
Tangibility *construct*	0.91	10.11	
Responsiveness *construct*	0.85	11.33	
Empathy *construct*	0.87	10.25	
Communication *construct*	0.82	11.47	
Consumable *construct*	0.84	12.07	

Note: Pus = Push Motivations, Pul = Pull Motivations, Tan = tangibility, Res = Res responsiveness, Emp = Empathy, Com = Communication, Con = consumables, Loy = Museum Loyalty, FL = Factor Loading (λ), CR = Composite Reliability, and AVE = Average Variance Extracted.

The discriminant validity was then examined by comparing the square root of the average variance extracted, which was greater than absolute correlations between two constructs (Fornell and Larcker, 1981). As shown in Table 2, the diagonal elements have been replaced by the square roots of average variance extracted (AVE) ranged from 0.74 to 0.86, which were greater than their correlation coefficients off the diagonal; these ranged from 0.33 through 0.56, indicating that each construct shared more variance with its items than it did with other constructs. All four first-order constructs for the entire model passed the tests of convergent validity and discriminant validity, indicating that the final modified measurement model possesses construct validity and reliability.

Moderating effect of membership status

All of the respondents were split into two subgroups who visited NMNS at least two times a year: member group (those who had NMNS membership, with a total number of 101)

and non-member group (those who purchased adult and discount ticket, with a total number of 304). This study compared the equivalence of the factor structures across two subgroups and demonstrated support for full- and partial-measurement invariance for the model (Byrne et al., 1989; Watson et al., 2007). Hence, a further examination of moderating effects across groups was conducted using the following three steps:

First, a chi-square difference was performed to test the difference between the constrained and unconstrained models. Table 5 shows that the χ^2 values of the unconstrained and the constrained models were 1652.97 (df = 142) and 1678.57 (df = 139), respectively. The difference between the two χ^2 values was 25.6 with 3 degrees of freedom, which was statistically significant at the level of $\alpha = 0.001$ (p < .001). This indicates that membership status has a moderating effect on the structural model.

Table 5. Results of the Moderating Effects of Visitor Type (Member and Non-member)

	Unconstrained model	Partial constrained model	χ^2 difference	Moderating effect
χ^2 (df)	$\chi^2 = 1652.97$ (df = 142)	$\chi^2 = 1678.57$ (df = 139)	25.6 (df = 3) p = 0.000***	Supported

Note. χ^2 (df = 3) = 14.44 at $\alpha = 0.05$. ***p < 0.001.

Second, the chi-square difference was performed again, to test for the moderating effects on three hypothesized paths: Push motivations → Perceptions of service quality, Pull motivations → Perceptions of service quality, and Perceptions of service quality → Loyalty. Table 6 indicates that the moderating effect of membership status on the hypothesized path of Pull motivations → Perceptions of service quality, and the hypothesized path of Perceptions of service quality → Loyalty were significant, with $\Delta\chi^2$ (1) = 4.54, p < 0.05, and $\Delta\chi^2$ (1) = 20.34, p < 0.001, respectively.

Table 6. Results of the Moderating Effects of Visitor Type (Member and Non-member)

Hypothesized moderated path	Unconstrained model	Partial constrained model	χ^2 difference	Moderating effect
H4: Push → PSQ	$\chi^2 = 1652.97$ (df = 142)	$\chi^2 = 1653.29$ (df = 141)	$\Delta\chi^2 = 0.32$ (df = 1) p = 0.57	Not Supported

H5: Pull → PSQ	$\chi^2 = 1652.97$ (df = 142)	$\chi^2 = 1657.51$ (df = 141)	$\Delta\chi^2 = 4.54$ (df = 1) p = 0.03*	Supported
H6: PSQ → Loy	$\chi^2 = 1652.97$ (df = 142)	$\chi^2 = 1673.31$ (df = 141)	$\Delta\chi^2 = 20.34$ (df = 1) p = 0.003***	Supported

Note. χ^2 (df = 1) = 3.84 at $\alpha = 0.05$. *p < 0.05

Finally, the independent t-value step compared the path coefficient between the two groups. Table 7 indicates that the effect of pull motivations on the perceptions of service quality was stronger in the non-member group ($\beta = 0.56$, t = 5.03, p < 0.001) than the effect in the member group ($\beta = 0.23$, t = 3.21, p < 0.001); perceptions of service quality on museum loyalty was stronger in the member group ($\beta = 0.65$, t = 4.65, p < 0.001) than the effect in the non-member group ($\beta = 0.35$, t = 1.98, p < 0.05). The results of the three moderating effects are shown in Figure 2.

Table 7. Comparison Results of Multigroup Analysis (Member and Non-member)

Hypothesized moderated path	Member		Non-member		Comparison
	Path coefficient	t-value	Path coefficient	t-value	(M[b], NM[c])
H4: Push → PSQ	0.37	1.12	0.15	2.56**	M = NM
H5: Pull → PSQ	0.23	3.21***	0.56	5.03***	M < NM
H6: PSQ → Loy	0.65	4.65***	0.35	1.98*	M > NM

[b] "M" indicates member group.
[c] "NM" indicates non-member group.
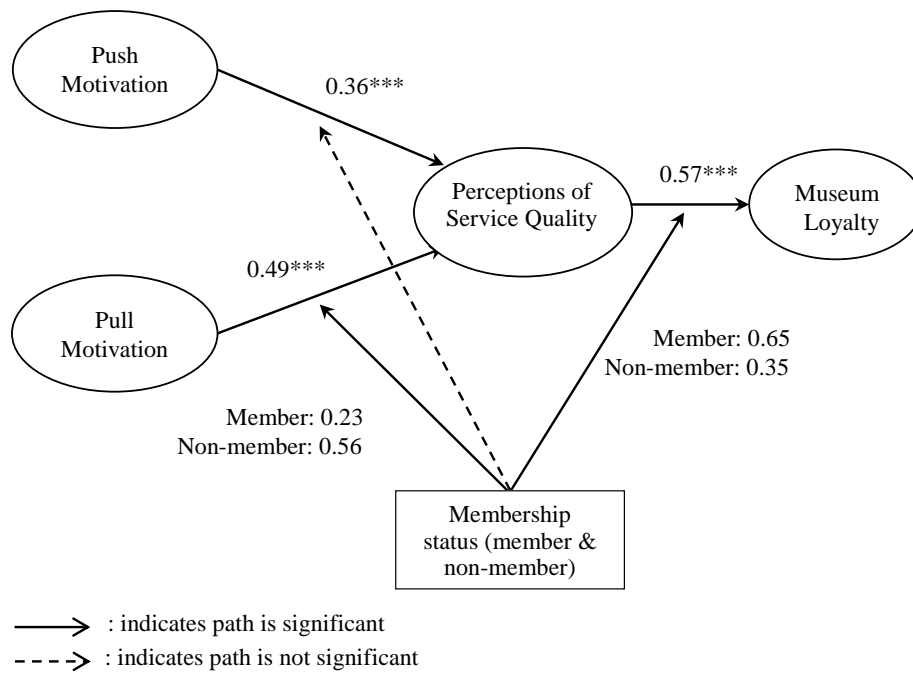*p < 0.05, *** p < 0.001.

Figure 2. Results of the moderating effects with the hypotheses (H4-H6)

Conclusion and Discussion

Table 2. Summary of Discriminant Validities and Correlations

Construct	1	2	3	4
1. Push	**0.74**[a]			
2. Pull	0.45***	**0.74**		
3. MUSEQUAL	0.39***	0.56***	**0.86**	
4. Loy	0.33***	0.40***	0.38***	**0.80**

[a] The bold numbers on the diagonal are the square root of Average Variance Extracted (AVE); off diagonal numbers are the correlations among constructs.
*** $p < 0.001$.

Afterward, the proposed structural model (Figure 1) was estimated through the refined constructs and variables derived from the measurement analysis processes. The overall goodness-of-fit statistics for the structural model revealed a moderate fit of the data to the model, with $\chi^2 = 965.91$ (df = 425, $p < 0.001$), $\chi^2/df = 2.27$, CFI = 0.91, NNFI = 0.90, RMSEA = 0.06, and SRMR = 0.05. A summary of the goodness-of-fit statistics for

MUSEQUAL, the revised measurement model and the structural model is listed in Table 3. Details of the testing results of the three hypotheses are shown in Table 4. All of the three cause-effect hypotheses were supported with a positive relationship (most values of $\beta \geq 0.36$). A full mediating effect of the perceptions of service quality in the relationship between push and pull motivation and loyalty were also confirmed along with the three hypothesized paths in this study.

Table 3. Summary of Goodness-of Fit Indices for the Final Measurement and Structural Models

Model	χ^2	df	χ^2/df	CFI	NNFI	RMSEA	SRMR
Second-order measurement model of MUSEQUAL	353.42	111	2.65	0.93	0.91	0.07	0.05
Overall revised measurement model	952.47	423	2.25	0.91	0.90	0.06	0.05
Structural model	965.91	425	2.27	0.91	0.90	0.06	0.05
Recommended value	N/A	N/A	< 3.00	≥ 0.90	≥ 0.90	< 0.070	< 0.08

Note. Recommended value: χ^2/df < 3 (Kline, 2004); the comparative fit index (CFI) ≥ 0.90 (Byrne, 1998; Hoyle and Panter, 1995); the non-normed fit index (NNFI) ≥ 0.90 (Byrne, 1998; Hu and Bentler, 1999); the root mean square error of approximation (RMSEA) < 0.07 (Bollen, 1989; Byrne, 1998); and the standardized root mean residual (SRMR) < 0.080 (Hu and Bentler, 1999).

Table 4. Summary of the Tested Hypotheses 1-3

Research hypothesis	Hypothesized path	Path coefficient	t-value	Results
H1	Push Motivations → Perceptions of Service Quality	0.36	10.60***	Supported
H2	Pull Motivations → Perceptions of Service Quality	0.49	6.94***	Supported
H3	Perceptions of Service Quality → Loyalty	0.57	8.91***	Supported

***p < 0.001.

This study adapted Clawson and Knestch's (1966) recreational behavior model as a temporal framework for examining visitors' needs, experiences and behavioral intentions in a museum context. The significant findings indicate that the NMNS visitors' push and pull motivations were initializing points in positively affecting perceptions of service quality, which in turn influence museum loyalty among visitors. The NMNS delivered the appropriate quality of service to match visitors' needs and desires, and then established their loyalty, consistent with prior studies (Baker & Crompton, 2000; Davidow, 2003; Kozak, 2001; Yuksel, 2001). Moreover, visitor type by membership status played a substantial moderator role in two different relationships, including the relationship between pull motivation and perceptions of service quality, and the relationship between perceptions of service quality and loyalty. The practical implications drawn from the significant findings are provided.

The empirical results indicate that examining both visitors' push and pull motivations simultaneously can facilitate an analysis of the market demand for visiting museums; market segmentation of museum visitors; and design, planning and promotion of museum exhibits, activities and events. Push and pull motivation theory (Dann, 1977) was used in this study as a theoretical basis for determining the decision-making process people use in choosing to visit a museum. Museum visitors with strong internal motivations agreed that the quality of museum services matched their internal needs (i.e., the average performance of museum service quality was higher than their average expected desire). Specifically, this study identified five push and six pull motivations of visitors as the primary driving forces in choosing to visit a museum. People who visited the museum exhibited the following push motivations (internal needs) including "to relax," "to expand knowledge," "to enjoy new experiences," "to spend quality time with family or friends," and "to enjoy exhibits indifferent settings." Museum visitors who want to spend quality time with their families and friends or to relax in the museum might consider more deeply their existence of sufficient and well-maintained service facilities in the rest areas whereas others who would like to expand their knowledge may seek to special educational seminars. The finding also demonstrates that visitors' pull motivations, such as "to attend special events," "because museum has enjoyable activities," and "because museum has enjoyable facilities" are strongly related to museum service quality in terms of tangibility and communication factors. The ideas that push and pull motivations were good

predictors of the perceptions of service quality identified in this study, filling the gap in the literature. For example, museum visitors who would like to attend special events might feel satisfied with the experience of joining special exhibitions or seminars the museums provide for them because of a consistency between their expected activities and the service offered. Another explanation is that visitors who preferred enjoyable activities and/or facilities, might feel satisfied with service offered in a well-maintained environment. Therefore, museum managers could focus resources on influencing visitors' perceptions of service performance through the appropriate allocation of resources. Museums are expected to accommodate visitors' expectations by matching visitors' push and pull motivations with the museums' external attributes, which in turn reinforces the visitors' perceptions of service quality, and builds visitor loyalty toward museums.

The findings verified that the five sub-dimensional structures of MUSEQUAL were appropriate for measuring service quality in a museum context, indicating that the theoretical evidence for the application of the service quality model and SERVPERF in this study were consistent with prior studies (Bagozzi & Dholakia, 2006; Bauer, Falk, & Hammerschmidt, 2006; Dholakia, & Bagozzi, 2004; Kaul, 2007; Parasuraman, Zeithaml, & Malhotra, 2005; Park, & Baek, 2007; Raajpoot, 2004). Museum managers are able to identify service quality areas that require improvement using the five-dimensional MUSEQUAL measurement scale, and can then track improvements in specific areas of service. In order to reinforce visitors' experiences, the study shows that particular attention should be paid to four issues relating to service quality: professional training and development programs attended by museum staff members, physical facilities and equipment, provision of understandable and sufficient information, and caring and individualized attention.

The results of the multi-group analysis were consistent with prior studies (Evanschitzky & Wunderlich, 2006); furthermore, the findings showed that members had different opinions of their experiences at NMNS than non-members. For instance, the relationship between pull motivation and perceptions of service quality was likely to be more positive for non-members than for members; and the relationship between perceptions of service quality and loyalty were likely to be more positive for members than non-members. Regarding socio-demographic characteristics, the moderating effect on the hypothesized path of "Pull → PSQ" highlights that special attention needs to be paid to the non-members'

pull motivations. Examples of these factors include the motivation to experience new exhibits, enjoyable activities, special events, and enjoyable facilities. The effect of these is stronger for non-members than members. As a result, non-member visitors require more frequent changes to exhibits (or museum attributes) to support their desire for the expansion of new experiences and knowledge. The finding that stay length positively affects loyalty seems reasonable. Visitors who remain in a large-scale museum such as NMNS for a longer period may spend additional time resting, rejuvenating, and engaging in exhibits and activities. Thus, long-stay visitors tend to derive more satisfaction from various aspects of the services offered and thereby establish a higher level of loyalty. Museum managers and marketers should seek to meet the needs of long-stay visitors by providing well-chosen and high-quality museum products and services, and provide incentives for short-stay visitors to extend their stay (e.g., a ticket package for visiting other areas in the museum), in an effort to increase the probability of their returning to the destination in the future. Other suggestions include the development of creative museum exhibits and activities (special exhibits and collections, events, interactive workshops) designed to cater to visitors' needs and encourage a lengthy stay. Since socio-demographic variables are nominal variables (categorical data items), this study did not estimate the relationships between these and the four studied constructs. This could, however, prove a fruitful line of research for future studies. Limited empirical research has been undertaken on the moderating effect of visitor type on the relationship between motivations and perceptions of service quality, and perceptions of service quality and loyalty, in a museum context. Also, this study successfully integrated one theory (i.e., push and pull motivation theory) and two models (i.e., recreational behavior model, service quality model) into a comprehensive research model of museum visitor behavior across two temporal stages. The theoretical implications identified above in this study should contribute to closing a gap in the literature on museums.

It is suggested that in order to cater to visitors' needs and entice repeat visits attention should be devoted to developing creative, innovative, interactive exhibits and enjoyable museum exhibits and programs (special exhibits, collections, events, workshops) to awaken visitors' curiosity. The moderating effect on the hypothesized path of "PSQ → Loy" indicates that member visitors tend to derive more satisfaction from various aspects of the services offered and thereby establish a higher level of loyalty. In order to meet the

needs of these visitors, well-chosen and high-quality museum products and services should be developed in an effort to increase their intentions to return, recommend visiting to others and renew membership. In 1992, NMNS first issued its museum membership card in Taiwan. This initiative has successfully attracted visitors to join and retain NMNS memberships each year, achieving a total of 38,191 valid members and a high visit frequency (5.38 times for family member, 8 times for individual member) (National Museum of Natural Science, 2012). As a further consideration it is suggested that membership could be expanded through agreements that with other museums at different sites, providing members with diverse choices. Future academic research should examine the impact of past experience or the frequency of return visits to identify how it operates in tourists' expectation formation.

This study has three limitations that need to be addressed. The first limitation concerns the scope and boundaries, including the museum attribute (natural science only), the time span (four weeks in the summer season), and the geographical location (NMNS in central Taiwan) may produce different test results in terms of the magnitude and direction of the relationships among the constructs studied, relative to a broader population or other types of museums. Future studies should expand the time period or look at a different season(s) and include different kinds of participants. The second limitation is that most of the constructs and their observed variables were adapted from prior studies in a non-museum context, or from museums with different attributes. Future researchers should pay attention to the selection or development of a well-established scale, and the examination of a wider respondent base across other museums. The third limitation is that is the selection and adaptation of the constructs and their observed variables (indicators). Most of the observed variables were selected based on the literature review and scholars' opinions. Prior studies have debated whether or not an adaptation of a measurement scale on service quality can account for a contextual difference, in terms of the industry being studied and the region, given distinct social, cultural and environmental factors (Kaul, 2007). Future researchers should pay attention to the selection or development of a well-established scale, the examination of a wider respondent base across other museums, and the assessment of the reliability and validity of the measurement items. Finally, the above-mentioned suggestions can be regarded as a means of producing more valid and comprehensive results, if the future studies in a relevant field can consider the identified

limitations found during the period in which a study was developed and conducted.

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