

A study on the effect of the physical environment in an airplane on customer loyalty

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Abstract

Purpose: The purpose of this study is to identify the effect of the in-flight physical environment on perceived quality and customer loyalty.

Design/methodology: For this analysis, a survey was conducted with airline passengers at Gimpo International Airport and Incheon International Airport. A total of 264 questionnaires were analyzed using structural equation modeling.

Findings: This study found that physical environment factors such as spatiality, amenity, aesthetics and entertainingness would have a positive impact on perceived quality. In addition, this study found that perceived quality would have a positive impact on satisfaction, whereas satisfaction would have a positive impact on image and behavioral intention.

Originality/value: This paper is the first research that examines the effect of in-flight physical environment on satisfaction, image, and customer loyalty simultaneously in Korea. Results of this study could be used as basic data for an enhancement strategy of the in-flight physical environment.

Keywords: Physical environment; perceived quality; satisfaction; image; customer loyalty

1. Introduction

As for airlines, customers spend a long time in physical environments such as the airplane cabin. Thus, the perceived quality of the in-flight physical environment may have an important impact on customer satisfaction. Moreover, passengers choose airlines based on through their personal experiences or information from the Internet. Psychological images and physical environments often play a critical role for them to choose airlines. In the same context, Korean Air introduced a new uniform in 2007 and improved the in-flight physical environment with the next-generation airplane A380 in order to create the image of being a world-class airline. Hereupon, it is imperative for airlines to meet the expectations of passengers and have differentiated points for the physical environment in order to manage their corporate image. In addition, it is also imperative for them to improve customer satisfaction and customer loyalty. Despite the importance of the physical environment for airlines, there have been only a handful of studies on the physical environment applied to airlines. On that account, it is necessary required to highlight the importance of the in-flight physical environment for airlines and to identify the configurations thereof more specifically.

The purposes of this study are to analyze which factors of the in-flight physical environment would influence perceived quality the most and to identify what impact these factors would have on satisfaction, image and customer loyalty. This study is designed to serve as preliminary data for an enhancement strategy of the in-flight physical environment to gain competitive advantages over competing airlines.

2. Theoretical Background

2.1 Physical environment

There is a growing importance in regards to the physical environment for the services of service-centric companies. Therefore, there is a need for the studies related thereto. In particular, the competition between airlines is getting more intense. Thus, it is imperative to have differentiated points for the physical environment by meeting the expectations of passengers. Kotler (1973) defined atmosphere (physical environment) as an effort to design purchase environment to increase purchase possibility and generate specific effects of purchases. He also defined this atmosphere as something that included vision, audition, olfaction and tactile sense. He argued that the atmosphere of the airline industry included modern elements and the efficiency of the airport terminal, music, color and the number of attractive restaurants and bars, the attractiveness of the interior and the exterior appearance of airplanes, the offering of movies and music and even the appearance and clothes of airline staff. He said that the aforementioned things were designed to remove the fear of passengers

who were strained due to flight. Davis (1984) argued that the physical environment inside an organization consisted of a physical structure, physical stimuli, symbolic artifacts, etc. He defined physical structure as architectural design to influence or control social interactions and the physical placement of furnitures. He also defined physical stimuli as those to obstruct the awareness of executive managers and organizational members and influence their behaviors. In contrast, Baker (1987) defined the physical environment as a combination of ambient factors, design factors, and social factors. Bitner (1992) named the physical environment of the service industry "servicescape". Also, he defined it as an objective and physical factor controlled by a company, which could influence consumers and employees. To easily describe the concept of physical environment, he expressed "built environment" or the physical environment of the service industry as servicescape. Moreover, he defined the physical environment as a man-made artificial environment as something that was differentiated from the natural and social environment.

Summarizing the findings of the aforementioned studies, we can conclude that those people providing service such as physical environment in service industry is also a place to produce service and also a place in which customers participate to receive service. That is, the physical environment of airlines can be limited to the aircraft cabin and airport terminal. Many scholars have a different way of defining the configuration of physical environment. Kotler (1973) classified it according to vision, audition, olfaction and tactile sense. He argued that the physical stimuli related to vision included color, light, size and shape while audition included sound pitch, speed, frequency, etc. He also argued that olfaction included smell, freshness, etc. while tactile sense included tenderness, softness, temperature, etc. Davis (1984) reported that the physical environment of an organization consisted of physical structure, physical stimuli, symbolic artifacts, etc. Physical structure refers to such things as wall, hallway, doorway, furniture and seating arrangement, etc., which had the tendency of regulating physical movement and limiting social interactions. Physical stimuli could be as diverse as including phone ringer sound that would disturb the attention of organizational members, the sound of a clock, the sound of an interphone, coffee or cigarette smell, computer printing sound, etc. Symbolic artifacts refer to office design, furniture arrangement, wall color, exhibition photos, etc.

Baker (1987) classified the physical environment into ambient factors, design factors and social factors. Ambient factors are the background conditions that cannot be immediately recognized. For instance, inside temperature and light that attract attention only in an insufficient or uncomfortable situation are some examples of ambient factors. These are deemed as mandatory elements. Thus, customers tend to avoid the physical environment of that service when they recognize such an ambient factor. Design factors consist of such aesthetic factors as architectural beauty and color and such functional factors as layout and

stability. Thus, it is the visual factors, which customers can clearly recognize, compared to the ambient factors. It forms more positive vision as to services as compared with ambient factor. In contrast, social factors refer to customers and employees that are human components. It is argued that the number, appearance and behavior of customers and employees who are in the physical environment of a service provided to customers may lead to approach behavior or avoidance behavior.

Kim (1999) classified the components of the physical environment into the following six dimensions: amenity, spatiality, aesthetics, entertainingness, cleanliness and convenience. They are frequently utilized as the measurement factor of various studies on physical environment. Amenity refers to physical and psychological states felt when one feels very good because the spirit and body of a human are integrated. It can also be said as a very personal and subjective thing. Such factors as noise, temperature, air, light and color in a specific place are important determinants of the comfort of a given place. The psychological state and behavior of humans vary in accordance with the aforementioned factors. Spatiality refers to the spatial relationship between office furniture, supplies, equipment, service place, passageway placement method and the components hereof. It will be easier for customers to enter when the physical environment is designed to have spatiality. Also, they will be able to access complementary services such as the washroom, restroom, and snack bar. Those aesthetic factors provided by such complementary tools as staff uniform, pen and paper perform a critical role in increasing the attractiveness of the physical service environment in addition to service facilities. Furthermore, they may have a significant impact on the positive awareness of customers for the quality of services provided to them. Entertainingness is the property related to pleasure. Hereupon, it is related to stimulating entertainment by providing pleasant shopping experience to customers. The components of entertainingness include comfortable fragrance, nice background music, sufficiency of entertainment facilities or cultural space for pleasure, sufficiency of rest places for short breaks and pleasure caused by natural or artificial decorations, just to name a few. Cleanliness is very important for the physical service environment. A majority of customers have a strong tendency to relate service quality to the cleanliness of the physical service environment. That is to say, they tend to deduct or perceive the degree of service quality through whether washrooms are clean, staff uniforms, furniture or supplies are clean, the floors are clean, the restrooms are well organized, and whether passageways or doorways are clean. Convenience is the word referring to convenience and easiness. It varies with changes in living conditions, motives and attitude of consumers. The factors forming convenience include identifiability of guide signs, convenience of parking facilities, convenience of additional facilities, convenience of passage, easiness of searching services to purchase and convenience of use for the restroom or waiting room.

Bitner (1992) reported that the physical environment had a significant impact on not only the pre-purchase behavior of service consumers but also service quality evaluation and satisfaction. He also argued that those affected customers and staff would behave in a certain way in accordance with the inner reaction as to the physical service environment. The positive inner reaction of the physical environment leads to approach behavior. This approach behavior is something friendly to staff, whereas it refers to such approaches as re-visit, increased expenses, length of visit and loyalty. Wakefield and Blodgett (1996) revealed what impact the environment of a leisure service had on perceived service quality and purchase intention. According to this research, leisure service is generally consumed for a long time in a physical environment; thus, perceived quality as to the physical service environment can have a significant impact on the studies of satisfaction and purchase of customers. This study conducted empirical research on the effect of such physical service environment factors as spatial arrangement, accessibility, aesthetic factors and cleanliness of facilities, comfort of chairs, electronic devices and displays on customer satisfaction and purchase intention for leisure service companies such as sports stadiums and casinos. As a result, it revealed that the physical service environment variables would have a positive impact on not only perception of service quality but also service satisfaction, the chances of re-visit and intention for staying longer. Lucas (2003) deduced the five physical environment components (cooperation condition, layout and design, interior decoration, seat comfortability and cleanliness) that could be applied to casinos through reviewing the previous studies including the one of Wakefield and Blodgett (1996). He presented the result that the behavioral intention of customers would increase with a higher level of satisfaction regarding the physical environment. Harris and Ezeh (2008) identified that the physical environment factors for the nine areas would have a positive impact on customer loyalty through ambient factors and design factors for the restaurants. Kim (1999) sub-divided the physical environment factors into spatiality, amenity, convenience, entertainingness, cleanliness and aesthetics for the customers of department stores, restaurants, banks and hospitals. Then, he studied the impact thereof on the perception of service quality, service satisfaction, intention of staying longer, word-of-mouth and re-purchase intention and preference. As a result, he revealed through the empirical analysis that the physical service environment was one of the important influencing factors for customers to evaluate service quality. As a result of the analysis, the important factors of the physical environment for the four service industries commonly included the factors related to the cleanliness of the physical environment, the factors facilitating the adaptation to an environment and the factors facilitating the name of the space. It was also proved that the factors forming the physical service environment had a different degree of importance for each service industry. Kim (2006) studied the role and importance of the physical environment. Also, he studied the determinants of the physical environment including renovation. Hereupon,

he aimed to identify the impact of the determinants of the physical service environment on satisfaction, relationship quality and customer loyalty. As a result, it was found that such physical environment factors as amenity, aesthetics, renovation and service staff had a positive impact on satisfaction. It was also found that the overall satisfaction of the physical environment would have a significant impact on relationship quality and customer loyalty. Kim (2008) studied the impact of the four in-flight physical environment components (amenity, cabin crew appearance, seating arrangement and aesthetics) on airline service trust, satisfaction and preference with the customers of airlines at Incheon International Airport. As a result, they responded that amenity was the most important factor for them. Also, they said that the in-flight physical environment would have a significant impact on service trust and customer satisfaction for airlines. Therefore, they said that it would be possible to make customers have favorable attitudes for re-visit by improving trust and maximizing customer satisfaction.

Bitner (1992) expressed the physical environment of the service industry with the term "servicescape". He defined it as objective and physical factors controlled by companies which could influence consumers and employees. He sub-divided the components of the physical environment into ambient factors that would affect the five senses of humans in the surrounding environment such as temperature, noise, light, background music, method of arranging office furniture, supplies, equipment, service sites and passageways and spatial relationships and arrangements (space/function) between these components, signs, symbols and artifacts to form first impressions as to the places and services for customers. This study set the variable of spatiality by applying spatial arrangements and another variables of amenity by applying the ambient factor. Moreover, Wakefield and Blodgett (1996) classified the physical environment factors into layout/accessibility, facility aesthetics, electronic equipment/displays, seating comfort and facility cleanliness. This study set the variable of entertainingness for the factor of electronic equipment/displays to improve the leisure experience and the variable of aesthetics for facility aesthetics that would increase the attractiveness of physical environment through customer perception as to such factors as indoor/outdoor facilities and functions of decorations. That is to say, this study set a total of four factors such as spatiality, amenity, aesthetics and entertainingness as a variable to measure the in-flight physical environment. In-flight spatiality refers to the spatial relationship between seats, between passageways and between facility components including storage space for carry-on baggage, seat arrangement and convenience of movement in the cabin. In-flight amenity refers to in-flight air, temperature, light, cleanliness of the cabin and the cabin crew uniforms, which would have an impact on the freshness of the in-flight environment. In-flight aesthetics means the aesthetic attractiveness of airlines such as the indoor/outdoor appearance of the airplane, whereas in-

flight entertainingness was defined as such pleasure related entertainment factors as movie, music, reading materials, etc., which passengers could enjoy in the cabin.

2.2 Perceived quality

Perceived quality refers to the evaluation or perception of services or products by the overall experience of customers. The studies on service quality from a perceived perspective of customers began with the establishment of the concept of perceived service quality by Grönroos (1984). According to Bettman and Park (1980), perceived quality is the overall emotion as to unseen brand; thus, it refers to the trust perceived by consumers for specific brands and the holistic dimension of a quality nature. Consumers would not remember the specific features of a particular product. Rather, they would perceive the comprehensive and overall quality of a particular product. Grönroos (1984) defined service quality as the outcome of a comparative evaluation of customers' perceived service and their expected service. Thus, service quality would have a functional relationship with such variables as customers' expectations, technical functional features and images. Keller (1993) defined perceived quality as the quality level of a particular brand as perceived by consumers. Cronin and Taylor (1992) pointed out that perceived service quality should be conceptualized and measured as an attitude of meaning long-term and overall evaluation as to a particular service. Thus, they argued that service quality should be the preceding factor of customer satisfaction. A countless number of researchers have studied service quality. However, the most commonly used definition of service quality is the perceived service quality proposed by Zeithaml, Parasuraman and Berry (1990). It was each individual person's overall judgement or attitude as to the excellence of a particular product. They also mentioned that it would be shown as a degree of difference and direction between customers' perceptions and expectations; thus, they linked perceived quality to the difference between expectation and performance.

Relating these previous studies to the studies of the physical service environment, we could learn that it would have a significant impact on perceived service quality and customer satisfaction of customers after purchasing a service because customers would remain in the physical environment. Such a result was derived from the basic nature of service. In this regard, customers tend to explore evidence with which they can deduct the ability and qualification of service providers due to the intangible nature of service. The physical environment of service provides such evidence and also becomes a tool to inform corporate image or purpose. In particular, they appear as an influencing factor on store image or purchase behavior in such places as hotels, restaurants, specialty services, banks, retailers, hospitals, etc (Baker, 1987; Bitner, 1986; Boom and Bitner, 1982; Kotler, 1973; Shostack,

1977). In this study, perceived quality was defined as an attitude meaning the evaluation of overall quality and expectation level through the physical in-flight environment.

2.3 Customer satisfaction

Many studies on the concept of customer satisfaction have been steadily conducted. Also, there have been many studies thereof that gained a lot of attention. As for the definition of the concept of customer satisfaction, many researchers had a different way of interpreting and using such terms as customer impression, customer first, customer success and customer value. Thus, the concept of customer satisfaction varies depending on the approach perspective of the researchers. Czepiel and Rosenberg (1976) defined customer satisfaction as the subjective evaluation of consumers as to the degree of satisfying the desire and need to be derived by acquiring or consuming products or services. Engel and Blackwell (1982) argued that it was the evaluation as to whether a chosen alternative matched with the previous belief as to the alternative thereof. Cronin and Taylor (1992) defined satisfaction as the judgment of customers formed based on a particular service. Oliver and Swan (1989) argued that satisfaction should be a reaction of consumers to an achievement of something as regarding it as the concept of the overall experience of consumers. Thus, he argued that it would be evaluated by providing a pleasant level of consumption related satisfaction from the nature of products or services or from products or services themselves. Bitner (1990) concluded that customer satisfaction led to the judgment of service quality by analyzing the influence of relationship as to service quality and customer satisfaction. Thus, he proved empirically the causal relationship between satisfaction and service quality. Bolton and Drew (1991) argued that customer satisfaction was a temporary judgment as to the experience of present while service quality was a long-term attitude. Thus, they argued that customer satisfaction would affect service quality.

Hereupon, customer satisfaction is the factor to ponder over all the management aspects from a customer perspective and to maintain companies by satisfying customers. Thus, it has gained a lot of attention in the United States and Europe since the 1980s. In modern society, people are aware that customer satisfaction is the most important tool to create corporate profits. Thus, corporations are focusing on customer satisfaction for corporate management activities. To increase customer satisfaction, it would be imperative to provide products to satisfy customers' expectations and respond effectively to customers' complaints. Also, it would be imperative to increase customer loyalty by satisfying customers through providing corporate images and product images inherent in products in addition to product quality. Lastly, it would also be required to care about the level of satisfaction of employees in their company. In general, the service quality of human resources and goods is measured in relation

to the measurement of customer satisfaction in the aviation industry. However, this study aims to examine the reaction to results to service (that is to say, overall satisfaction and emotion of customers) of those passengers who had actual experiences in using in-flight services through the aforementioned in-flight physical environment factors.

2.4 Image

Kotler (1975) defined image as the combination of belief, idea and impression of an individual person for a particular subject. Bitner (1991) defined image as the picture in a human mind as to the personality of a subject. Gartner said that an image was an intangible thing. It would be formed through perceiving a series of stimulating contents differentially when experiencing some expected things. An image of a relative concept such as an attitude of humans for a particular subject was something that implied some overwhelming impression or stereotype. Thus, it would be formed without direct experience as to a subject. Consumers use an image in order to avoid the inconvenience of judging and processing new information again whenever they encounter it. Corporate image refers to an image owned by corporations rather than the products and brands owned by consumers and several institutions. In general, those industries having a levelised technological level would find it more important to obtain a positive corporate image in terms of corporate excellence, progressiveness and contribution to local communities.

It is possible to guess that corporate image would have more impact on the choice of consumers when it is difficult to evaluate service properties like the aviation industry. It is perceived that corporate image in service marketing is an important factor for the overall evaluation of services and companies (Gronroos, 1984). Corporate image can be evidence of external information for potential customers and current customers. It may or may not influence customer loyalty (Andreassen & Lindestad, 1998). The physical environment that influences customer behavior and forms an image is particularly clear in service industries such as hotels, hospitals and restaurants (Baker, 1987; Bitner 1986). The visual appearance and inner space of airplanes is a corporate identity program of airlines that passengers can feel. Thus, it is an important marketing factor that induces the perception of and interest in the corporate image. In addition, company name, uniform, etc. can create a unique corporate image. Such an image for airlines can be deemed as a factor to perform a very important role for decision-making and evaluation process of customers. Thus, it would be essential to strengthen corporate image competitiveness in order to position differentiated strategies to overcome similarities to competing airlines and secure relative competitive advantages in the aviation service industry (Fyall & Singh, 1999).

2.5 Customer loyalty

Customer loyalty is the most important factor for the survival and growth of service companies. Thus, customer loyalty becomes an important basis for the development of solid competitive edges that can be achieved through marketing efforts as one of the important strategic objectives in a marketing plan. Customer loyalty refers to intended behavior related to services or corporations. This includes service contract renewal possibility, the possibility of changing favorite places, telling positive things to someone and giving advice. Dick and Basu (1994) defined loyalty as the relationship between consumers' relative attitude towards trademarks, stores, services and staff and re-purchase. Czepiel and Gilmore (1987) viewed consumer loyalty as an attitude expressed in the result of the dynamic and psychological process in a special situation. They also argued that loyalty was the tendency supported by commitment, positive attitude, prior-knowledge, consentience and trust. If there was a realistic alternative or the barrier of conversion was low, then it would be imperative for managers to discover the incompetence of an organization through exit and such feedback as customer voice in order to satisfy customers (Hirschman, 1970). Exit refers to an unwillingness of customers to purchase the services of a particular company. Customer voice means expressing complaints directly to companies. This is because exiting customers or changing favorite things of customers would have a significant impact on the long-term profits of companies. Customer loyalty is one of the most important influencing factors for the survival and growth of service companies. Therefore, customer loyalty becomes an important basis for the development of a competitive edge to be achieved through marketing efforts as one of the important strategic objectives of a marketing plan.

3. Research Methodology

3.1 Research model

This study aims to examine the impact the physical environment would have on perceived quality and the impact this perceived quality would have on satisfaction, image and customer image. This study developed the structural equation model based on the theoretical review on the physical environment, perceived quality, satisfaction, image and customer loyalty. This study established the research model as shown in Figure 1. This study conducted the empirical analysis by setting the hypotheses under the aforementioned assumptions. The hypotheses established in this study are shown in Table 1.

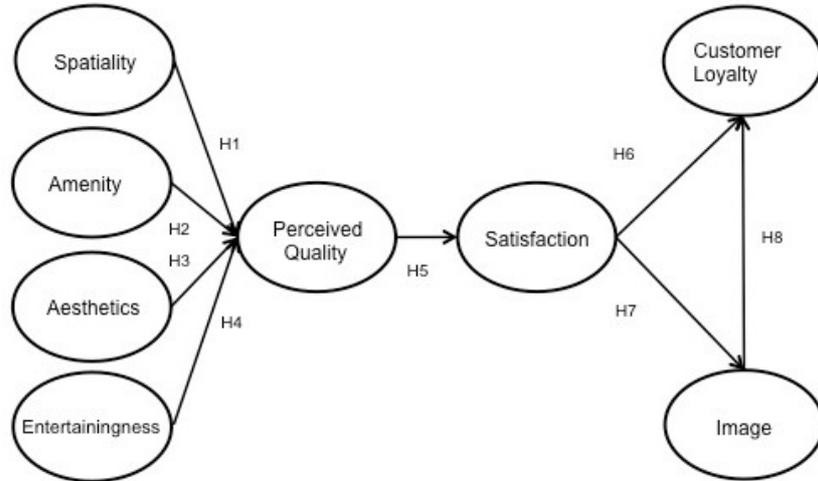


Figure 1. Conceptual model

H1	In-flight spatiality would have a positive impact on perceived quality as to the physical service environment.
H2	In-flight amenity would have a positive impact on perceived quality as to the physical service environment.
H3	In-flight aesthetics would have a positive impact on perceived quality as to the physical service environment.
H4	In-flight entertainingness would have a positive impact on perceived quality as to the physical service environment.
H5	Perceived quality of the in-flight physical environment would have a positive impact on customer satisfaction.
H6	Customer satisfaction for the in-flight physical environment would have a positive impact on customer loyalty.
H7	Customer satisfaction for the in-flight physical environment would have a positive impact on the image of airlines.
H8	The image of airlines would have a positive impact on customer loyalty.

Table 1. Research hypotheses

3.2 Measurements

This study established a total of four items such as spatiality, amenity, aesthetics and entertainingness as the variables to measure the in-flight physical environment. Also, this study classified them into 19 questions (Table 2). In each item, the physical environment was measured on Likert’s five-point scale from “Very likely” to “Least likely”. Perceived service quality refers to an attitude meaning a long-term and overall evaluation as to whether there was a match between the physical and overall quality of airlines and customers’ expectations. As for the measurement variables for the evaluation of perceived quality, the two measurement items were measured in accordance with Likert’s five-point scale through various previous studies. Satisfaction can be deemed as an overall satisfaction of the physical environment of airlines and an emotion resulting from the use of airlines. The two measurement items were measured based on Likert’s five-point scale in relation to the

evaluation of satisfaction. Image can be deemed as a perception of the organization recalled in the memory of consumers. The measurement variables for image evaluation were measured based on Likert's five-point scale for the three measurement items through various previous studies. Loyalty refers to intended behavior related to services or corporations. This includes service contract renewal possibility, the possibility of changing favorite places, telling positive things to someone and giving information. This study deemed loyalty as the intention to re-use and the presence of positive word-of-mouth intention for acquaintances. The measurement variables for the evaluation of loyalty were measured based on Likert's five-point scale for the three measurement items through various previous studies.

Measures	Variables^a	Previous studies
Physical environment		
Spatiality	There is sufficient space between seats. There is sufficient space in the passageway. There is sufficient space in the storage for carry-on baggage. Seat is comfortable and cozy. Seat can be used comfortably. It is easy to access the washroom and doorway.	Bitner (1992) Wakefield and Blodgett (1996) Aksoy Atilgan and Akinci (2003), Kim (2006)
Amenity	Cabin air is fresh. Cabin humidity and temperature are adequate. Cabin light is adequately adjusted. Washroom and cabin are neat. Cabin crew uniform is neat.	
Aesthetics	Cabin color provides a comfortable feeling. Interior is stylish and modern. Airplane appearance is attractive. It is the latest model.	
Entertainingness	Audio and video system is excellent. Movie programs are diverse. Music programs are diverse. Reading materials (newspapers, duty free guide book and cabin articles) placed in cabin are diverse.	
Perceived Quality	The overall quality of the physical environment of this airline is good. The physical environment of this airline is better than expected.	
Customer Satisfaction	The overall quality of the physical environment of this airline is good. The physical environment of this airline is better than expected.	Wakefield and Blodgett (1996), Kim (2006)
Image	I have a good impression about this airline. The image of this airline is superior to the other airlines. I have a good image about this airline.	Bitner (1992), Kim (2006), Wakefield and Blodgett (1996)
Customer Loyalty	I will say positive things about this airline to others. I will recommend this airline when someone asks me about airlines. I will continue to use this airline for several years to come.	Park, Robertson and Wu (2004), Keller (1993)
		Andreassen and Lindestad (1998), Harris and Ezeh (2008)

* Note: a five-point Likert scale

Table 2. Measurement items

3.3 Samples

This study conducted the pilot test with the 45 passengers who had traveled by air in the past year and confirmed the final questionnaire through sentence modification and questionnaire configuration shape modification in order to help the respondents have a better understanding of it. This survey was conducted for about 2 weeks from May 16 to July 30 2012 at Gimpo International Airport and Incheon International Airport. A total of 300 questionnaire copies were collected. This study selected a total of 264 copies after excluding incomplete copies. The general characteristics of the samples are shown in Table 3.

Classification		Frequency (people)	Ratio (%)
Gender	Male	119	45.1
	Female	145	54.9
Age	20 years old or less	30	11.4
	21 to 30 years old	59	22.3
	31 to 40 years old	79	29.9
	41 to 50 years old	71	26.9
	51 years old or older	25	9.5
Marital status	Single	119	45.1
	Married	145	54.9
Number of travels	1	15	5.7
	2 to 4	70	26.5
	5 to 10	68	25.8
	11 to 20	39	14.8
	More than 20	72	27.3
Purpose of travel	Tour	210	79.5
	Business/commercial	37	14.0
	Visiting relatives	8	3.0
	Education/studying abroad	5	1.9
	Other	4	1.5
Airline used	Korean Air	148	56.1
	Asiana Airlines	73	27.7
	South Korean low-cost airlines	15	5.7
	Foreign airlines	28	10.6
Total of respondents		264	100%

Table 3. Sample characteristics

4. Empirical Results

4.1 Evaluation of measurement items

To review the reliability and validity of the measurement items, this study conducted the confirmatory factor analysis. The measurement model showed an acceptable fit (CMIN/DF=2.732, $p=.000$; RMR=.057; GFI=.819; AGFI=.765; IFI=.907; TLI=.887; CFI=.906). As a result of the reliability analysis, squared multiple correlation (SMC) values

were amenity 5=.303, aesthetics 3=.122 and entertainingness 4=.134. Thus, they were lower than the reference value of 0.4. In addition, it is deemed that individual observation variable has a high degree of reliability only if the standardization regression coefficient is 0.7 or higher. Spatiality 5=.644, spatiality 6=.654, amenity 1=.698, amenity 2=.689, amenity 4=.695, amenity 5=.550, aesthetics 3=.350, aesthetics 4=.637 and entertainingness 4=.365. Because they were lower than the reference value of 0.7, there was a problem associated with the level of reliability (Table 4). Thus, those variables whose SMC and standardization regression coefficient were lower than the reference value were removed and inserted into the structural model.

Configuration concept		Measurement index	Reliability analysis	
			SMC	Standardized regression coefficient
Physical environment	Spatiality	Spatiality 1	.530	.728
		Spatiality 2	.627	.792
		Spatiality 3	.626	.791
		Spatiality 4	.613	.783
		Spatiality 5	.415	.644
		Spatiality 6	.428	.654
	Amenity	Amenity 1	.487	.698
		Amenity 2	.474	.689
		Amenity 3	.558	.747
		Amenity 4	.483	.695
		Amenity 5	.303	.550
	Aesthetics	Aesthetics 1	.644	.802
		Aesthetics 2	.696	.834
		Aesthetics 3	.122	.350
		Aesthetics 4	.406	.637
	Entertainingness	Entertainingness 1	.534	.731
		Entertainingness 2	.867	.931
		Entertainingness 3	.832	.912
		Entertainingness 4	.134	.365
	Quality	Quality 1	.722	.849
Quality 2		.690	.831	
Satisfaction	Satisfaction 1	.786	.887	
	Satisfaction 2	.738	.859	
Image	Image 1	.759	.871	
	Image 2	.739	.860	
	Image 3	.890	.943	
Loyalty	Loyalty 1	.792	.890	
	Loyalty 2	.835	.914	
	Loyalty 3	.590	.768	

Table 4. Result of confirmatory factor analysis

4.2 Hypothesis verification

As a result of analyzing the structural equation, it had the following results for goodness of fit: $\chi^2=673.628$, $p=.000$, $GFI=.839$, $AGFI=.801$, $RMR=.059$, $NFI=.873$, $IFI=.922$, $TLI=.911$, $CFI=.899$ and $RMSEA=.072$. In this structural model, GFI , $AGFI$, $PGFI$ and NFI had a relatively low degree of fit. However, the other goodness of fit indices such as IFI , CFI , RMR and $RMSEA$ were suitable for the recommended acceptance level. Thus, it was determined that goodness of fit for the overall model was acceptable. This study conducted the hypothesis verification as to the structural equation model. The results of hypothesis verification are shown in Table 5.

Hypothesis path	Standardized path coefficient	Non-standardized path coefficient	C.R	Verification result
Spatiality → Perceived quality	.318	.354	4.260 ^{***}	Accepted
Amenity → Perceived quality	.200	.219	2.162 [*]	Accepted
Aesthetics → Perceived quality	.286	.319	3.265 [*]	Accepted
Entertainingness → Perceived quality	.191	.170	3.221 ^{***}	Accepted
Perceived quality → Satisfaction	.995	1.098	16.856 ^{***}	Accepted
Satisfaction → Loyalty	.222	.210	4.421 ^{***}	Accepted
Satisfaction → Image	.738	.719	12.268 ^{***}	Accepted
Image → Loyalty	.819	.799	11.427 ^{***}	Accepted

Note) * $P < 0.05$, *** $P < 0.01$

Table 5. Results of hypothesis verification

As a result of hypothesis verification, all the established hypotheses were statistically significant. It was found that physical environment factors such as spatiality, freshness, aesthetics and entertainingness had a positive impact on perceived quality. Amenity was found to have a positive impact on the perception of passengers in regards to quality. It was found that those factors related to amenity such as in-flight temperature, humidity, in-flight cleanliness and in-flight light would have an impact on passengers' perception of quality as to the in-flight physical environment. Aesthetics was also found to have a positive impact on perceived quality. Factors such as a modern in-flight interior, attractive airplane appearance and in-flight color would have an impact on passengers' perception of quality. In addition, entertainingness was found to have a positive impact on perceived quality. Thus, it was possible to learn that the factors related to in-flight entertainment such as in-flight movie and music programs, in-flight reading materials, etc. had an impact on the passengers' perception of quality of the physical environment. Spatiality was found to have the largest impact on perceived quality out of the four physical environment factors. From this finding, it was possible to learn that airline passengers focused more on in-flight space such as the space between seats, passageway space and seat comfort when evaluating the physical environment.

Perceived quality was found to have a positive impact on customer satisfaction. Satisfaction also had a positive impact on image and loyalty. The degree of satisfaction would increase when passengers felt good about the in-flight physical environment. Consequently, the image of airlines would improve and also customer loyalty would increase accordingly. In addition, image was found to have a positive impact on loyalty. Those passengers having a positive image for airlines would have a higher degree of word of mouth intention and recommendation intention for airlines. Moreover, the degree of their re-purchase intention would increase for corresponding airlines.

5. Conclusion and Implication

This study analyzed the impact of physical environment factors such as spatiality, amenity, aesthetics and entertainingness on perceived quality, satisfaction, image and behavioral intentions by utilizing the structural equation model. This study leveraged this to help airlines establish marketing strategies related to the physical environment. It was found that all the hypotheses established in this study were statistically significant. The summary of the study results is as follows. First, the four in-flight physical environment factors (spatiality, amenity, aesthetics and entertainingness) would have a positive impact on perceived quality. Of those, it was found that spatial relationship between seats, between passageways and between facility components such as storage space for carry-on baggage, seat arrangement and convenience of movement in the cabin and spatiality representing seating comfort were the most important factors for perceived quality, followed by aesthetics representing the aesthetic attractiveness of the airplane, in-flight air influencing the freshness of the cabin, temperature and light, amenity of cleanliness and in-flight entertainingness including movies and music.

Second, it was found that the perceived quality of the in-flight physical environment would have a positive impact on customer satisfaction. That impact was absolute. Third, satisfaction as to the in-flight physical environment would have a positive impact on customer loyalty and image. It was also found that satisfaction had a greater impact on image than loyalty. Fourth, the image of airlines was found to have a positive impact on customer loyalty.

This study highlighted the importance of the in-flight physical environment by examining the contents such as perceived quality, satisfaction, image and customer loyalty as to the in-flight physical environment. Moreover, this study confirmed which physical environment factors would influence customer loyalty by deducting the determinants of the physical environment. As a result, it was found that the in-flight physical environment would influence perceived quality and perceived quality would have an absolute impact on satisfaction. Lastly, satisfaction would have a positive impact on customer loyalty as well as corporate image. Of those in-flight physical environment factors, spatiality and aesthetics were the most important influencing

factors for perceived quality. In contrast, amenity and entertainingness did not have a significant impact. As for entertainingness, it is believed that the recent passengers enjoy entertainment suitable for personal preference by using their personal laptops or tablet PCs rather than enjoying entertainment through the personal monitor mounted on their seat. Thus, the utilization rate thereof is low. On this account, it is imperative for airlines to maximize customer loyalty as well as customer satisfaction and corporate image by improving the quality perceived by customers through creating spacious and comfortable space between seats and in passageways, increase the storage space for carry-on baggage and also through continuous and aggressive investment in the attractiveness of the interior and exterior appearance of the airplane rather than investing on in-flight entertainment factors or freshness factors.

In particular, it would be imperative for the national large-scale airlines (Korean Air and Asiana Airlines) to have differentiated points with unique and high-class prestige strategies by satisfying the expectations and demands of customers in order to increase competitiveness against the foreign airlines and low-cost airlines that are equipped with new airplanes and offer low fares. This study has great significance because it provides the information as to the in-flight physical environment factors that have not been covered in the previous studies on in-flight services, which have focused on the services of human service and goods and because it reveals the influence of the in-flight physical environment on customer loyalty.

This study has the following limitations and problems. Thus, it is believed that there should be a follow-up study to complement these limitations and problems. First, it would be impossible to generalize the findings of this study because it only sampled 264 Koreans despite the fact that many passengers from different countries might have different preferences. On that account, it would be imperative to conduct a survey of the in-flight physical environment with more domestic and foreign passengers. Second, it would be possible to establish more useful and diverse marketing strategies if this study conducted a more detailed analysis for each class, airplane mode and route because this study conducted the survey only with passengers of economy class. Third, a majority of the survey work was conducted a certain period after the flight. Thus, it would be possible to gain higher quality survey data to allow us to have a more accurate understanding and judgment of responses if the survey was conducted in the cabin during the flight itself. Fourth, this study extracted only those factors suitable for the in-flight physical environment components based on the previous studies as to the physical environment of the leisure industry such as hotels, restaurants, etc. Therefore, it cannot be said that these questions include all the airlines in-flight physical environment factors. As a result, there were some items that had a low degree of reliability. It is necessary to include other components in addition to the diversification of questions through various researches on in-flight physical environment factors. It would be possible to establish differentiated

marketing strategies from competitors if there were many studies on the physical environment of each airline by complementing the aforementioned limitations and problems.

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