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UNDERSTANDING THE DYNAMICS OF THE QUALITY OF AIRLINE SERVICE ATTRIBUTES: SATISFIERS AND DISSATISFIERS

Abstract

This research aims to determine the relationship between the quality of airline service attributes and overall satisfaction. Although a number of relevant studies have reported a linear relationship (or symmetric effect) between the two concepts, this work suggests that attribute quality exerts heterogeneous effects on satisfaction or dissatisfaction. A total of 157,035 consumer data from online reviews have been analyzed to achieve the research objective. In accordance with Herzberg et al.'s (1959) two-factor theory, the findings of this research have determined that the quality of certain service attributes, such as cleanliness, food and beverages, and in-flight entertainment, affects the variations of positive ratings as a satisfier. Other airline service attributes, such as customer service and check-in and boarding, influence the deviations of negative ratings as a dissatisfier. Apart from airline attributes, the individual features and types of airline products have been estimated to improve the understanding of such relationships. In this regard, this study provides important implications to customer-centric marketing in an airline marketplace.

Keywords: airline industry, asymmetric effects, service quality, airline attributes, and service satisfaction.

Introduction

With expansion of the aviation market and advances in technology, the airline industry is currently more competitive than it has ever been (Spicer, 2018). Recent travelers benefit from the competitive environment where a wide selection of airline services and affordable airline fares are available. Price has been regarded as the primary competitive advantage that can motivate consumers' choices of airline services. Along with a fundamental concept of yield management that offers customers the "best fares" in the aviation industry (Kimes, 1989), most airline companies have adopted a dynamic pricing model. This condition indicates that price alone can no longer provide competitive and sustainable advantages (Chang and Yeh, 2002). In a customer-centric marketing strategy (Gurău, 2003), an airline's competitive advantages are based on service quality as perceived by customers (Cheng, Chen, and Chang, 2008). Extant studies have demonstrated that service quality is a key driver of airline choice among travelers. Constant high service quality not only acquires new customers but also retains existing customers by generating their loyalty (Dolnicar, Grabler, Grün, and Kulnig, 2011). The latter achieves successful positioning in customers' mind (Gursoy, Chen, and Kim, 2005). Thus, it is vital for airline managers to understand the mechanism of quality in airline service experiences.

A number of existing studies have investigated the quality of airline services, such as drivers in making airline choices (Espino, Martin, and Roman, 2008; Hess, Adler, and Polak, 2007), airline website quality (Elkhani, Soltani, and Jamshidi, 2014), service recovery (Cheng et al., 2008), passenger expectation (Gilbert and Wong, 2003), airline brand positioning (Gursoy et al., 2005), and attributes that comprise airline service quality (Park, 2007). Previous studies have focused essentially on the linear (or symmetric) relationship between the attributes of airline services and overall service quality and/or satisfaction. If the performance of service attributes is good, then the

overall service quality and/or satisfaction of airlines increases. However, airline services are not physically complex compared with high-tech products, but they embody an intricate synthesis of intangible services (Liou, Hsu, Yeh, and Lin, 2011). That is, airline services involve extensive interactions between service providers and customers as a chain of services; they comprise airport ground services (e.g., check-in and boarding services) and in-flight services (e.g., in-flight entertainment and catering) (Bogicevic, Yang, Bilgihan, and Bujisic, 2013; Chen and Chang, 2005). In this regard, airline service attributes, which include different features and functions, do not necessarily elicit customer satisfaction in a constant manner. Several airline service attributes may lead to satisfaction when their performance is improved. By contrast, other attributes may generate dissatisfaction when they are absent. This argument is associated with Herzberg's dual-factor theory, which suggests motivator (related to satisfaction) and hygiene (related to dissatisfaction) factors (Chan and Baum, 2007). Considering the gap in extant studies on airline services, this research aims to investigate the relationship between quality of airline services and satisfaction in an asymmetrical approach. That is, this work determines the effects of the quality of airline service attributes on positive or negative satisfaction.

In order to address the research purposes, this study analyzed more than 157,000 online consumer review data that indicated passengers' experiences regarding airline services. The result showed the asymmetrical effects of individual features and airline service attributes on the variations of positive and negative ratings as a proxy for airline service satisfaction. This research contributes to the literature on tourism in general and the airline context in particular. The relevant literature review indicates that most previous studies have proposed a monotonous relationship between service quality and service satisfaction. By contrast, the current study suggests that the quality of different airline attributes exerts varied effects on the deviations of

positive and/or negative satisfaction. The insights gained from this study also provide airline managers with important implications to develop customer-centric marketing strategies.

Literature Review

Airline Service Quality Attributes

In the early airline literature, service quality attributes are identified differently by researchers. For example, Gourdin (1988) advocated three quality attributes, namely, airfare, safety, and on-time performance. By contrast, Elliott and Roach (1993) proposed the following six criteria for assessing airline service quality on the basis of interrelationships among service attributes: food and beverage (F&B) quality, timeliness, baggage handling, seat comfort, airline check-in, and in-flight service. Subsequently, the airline service quality literature is further classified into the following five SERVQUAL dimensions: tangibility, reliability, responsiveness, assurance, and empathy (Parasuraman, Zeithaml, and Berry, 1988). Tsaur, Chang, and Yen (2002) adopted fuzzy set theory to measure airline service quality attributes, all of which are categorized into five SERVQUAL dimensions as follows: tangibility (seat comfort and cleanliness, F&B, in-flight entertainment, and crew appearance); reliability (crew professionalism, timeliness, and safety); responsiveness (courtesy and responsiveness of crew); assurance (on-time departure and arrival, foreign language command of crew, and active service offering); and empathy (customer complaint handling, convenient ticketing service, and extended in-flight service). Furthermore, by reviewing the development of Air Service Quality (AIRQUAL) scale and observing its limitations, Alotaibi (2015) adopted mixed methods and refined the AIRQUAL scale under the five SERVQUAL dimensions that were found to positively affect customer satisfaction, attitudinal loyalty, word of mouth, and repurchase intentions.

Gilbert and Wong (2003) examined attributes that are considered important by passengers. In doing so, they extended the five dimensions of airline service quality into seven factors by dividing tangibility into three sub-dimensions, namely, facilities, employees, and flight pattern, while replacing empathy with customization. This adjustment was implemented to clearly reflect the tangible nature of facilities (e.g., interior and seat), service employees (e.g., neat, tidy, and courteous), and flight pattern (e.g., flight schedule and frequency and global alliance partners); and to identify quality attributes (e.g., individual attention and a package that consists of flight, hotel, and rental car) involved in customized service delivery. Assurance, such as safety and service employee professionalism), is rated as a critical dimension by passengers in their study.

Service quality should be understood in terms of the different stages of the service delivery process. Grönroos (1984) proposed a service quality model that emphasizes dual dimensions, namely, technical and functional qualities. Technical quality refers to the result of service production processes associated with the instrumental performance of a service. It reflects *what* a consumer obtains as an outcome of his/her interactions with a service provider. Functional quality indicates the expressive performance of a service and focuses on the service process itself. That is, functional quality evaluates *how* a customer receives the outcome of a service (Liou et al., 2011). This argument stresses two dimensions that reflect the different stages of service delivery applied to the literature on airline services. For example, airline service is generally divided into ground and in-flight services. Ground service attributes refer to reservation, ticketing, check-in, baggage delivery, and complaint handling services (Chen and Chang, 2005; Park, 2007). By contrast, in-flight services are mostly related to employee service, physical environment, and F&B (Han and Hyun, 2017). In the hospitality and tourism literature (Han and Hyun, 2017; Ryu, Lee, and Kim,

2012), the concepts of service encounter, physical environment, and F&B are instrumental in understanding service performance.

Similarly, quality attributes in the three domains play a pivotal role in in-flight service performance. Passengers experience service interaction, such as extra attention, perceived authenticity during interaction, and competency, with flight attendants (Ali, Kim, and Ryu, 2016, Han et al., 2019) during in-flight services. The in-flight physical environment can be construed from tangible (e.g., electronic amenities, seat pocket and design, and TV screen) and intangible (e.g., temperature, noise, and air quality) attributes (Ali et al., 2016; Han, 2013; Oyewole, 2001). In-flight F&B service is one of the critical quality dimensions that differentiates an airline from its competitors (Ronalds-Hannon, 2013). For example, Korean Air serves *bibimbap*, one of the representative Korean cuisines, to attract its target market. Airlines from Muslim countries offer Halal food to entice Muslim passengers. Malaysia Airline is recognized as one of the best airlines that serve genuine Halal meal according to the rigorous Halal requirements (Halal Focus, 2011). Given that F&B quality significantly affects in-flight service performance from the perspective of passengers (Han and Hyun, 2017), airline management should have a clear understanding of F&B quality attributes. These attributes can be basically classified into two dimensions: sensory and nutrition (e.g., presentation, variety, temperature, nutrition, ingredients, and freshness) and service delivery (e.g., speed, timing, sanitary utensils, neatness, and care of servers) (Mohd Zahari, Salleh, Kamaruddin, and Kutut, 2011; Zellner, Loss, Zearfoss, and Remolina, 2014). Competition is intensifying in the airline industry, wherein customers tend to select an airline by assessing the value of each quality attribute due to the emergence of low-cost air carriers. To gain competitive advantage over their competitors, airlines should manage service quality attributes in a manner that passengers perceive as value for money (Park, 2007).

Asymmetrical Impact of Quality Attributes on Satisfaction

Quality attributes positively affect overall satisfaction (Anderson and Mittal, 2000). The hospitality and tourism literature generally focuses on linear, symmetrical effects when examining relationships between quality attributes and satisfaction (Lee, Choi, and Chiang, 2017). The high quality of airline service attributes leads to overall service satisfaction that eventually generates airline loyalty (Elkhani et al., 2014). Although linear, symmetric effects remain critical to understanding relationships, disregarding the asymmetrical effects of quality attributes on satisfaction limits insight into attributes that are more sensitive to satisfaction or dissatisfaction. For instance, agreeable in-flight temperature may not generate satisfaction among passengers because they take this attribute for granted. However, passengers become extremely dissatisfied when air-conditioning fails during a flight. That is, a particular attribute can be more sensitive to dissatisfaction than to satisfaction, while another attribute generates more satisfaction than dissatisfaction. Thus, the asymmetrical impact of quality attributes on satisfaction is interpreted as the differential effects of attributes on (dis)satisfaction, given that (dis)satisfaction reacts differently to various types of attributes (Anderson and Mittal, 2000; Mittal, Ross, and Baldasare, 1998; Oliver, 1997; Streukens and Ruyter, 2004).

The asymmetrical impact of attributes on satisfaction is evidenced when a service provider invests in the amelioration of a specific attribute, but does not obtain a corresponding gain from customer satisfaction. By contrast, another attribute induces more customer satisfaction after an identical investment is made in that attribute. Asymmetrical relationships between attributes and satisfaction are originally advocated by Herzberg et al.'s (1959) two-factor theory. According to this theory, attributes are classified into motivators and hygiene factors. The attributes referred as motivators, such as challenging work, boost job satisfaction when they are achieved. Conversely,

hygiene factors, such as job security, do not enhance job satisfaction even if they are adequately managed but they can cause job dissatisfaction when they are not provided. The concept of two-factor theory is later extended to three-factor theory, namely, dissatisfiers, hybrids, and satisfiers, in the marketing literature to further clarify the asymmetrical effects of attributes on customer satisfaction (Anderson and Mittal, 2000; Kano, 1984; Oliver, 1997; Streukens and Ruyter, 2004).

Customer expectation underlies three-factor theory; customers feel satisfied or dissatisfied, depending on a level of customer expectation. Given that expectation varies with the types of attributes, the three-factor theory is designed to identify the asymmetric impact of attributes on satisfaction. Customer expectation is also changeable over time. As individuals experience particular attributes more and more over time, their expectation towards the attributes can be adjusted. This suggests that the asymmetric impact of attributes on satisfaction can be dynamic over time. In addition, the expectation level is also adjusted by service product class. In the airline industry, the salient attributes of passenger satisfaction and dissatisfaction are differently perceived by passengers in economy or business class and full-service or low-cost carriers (Sezgen, Keith, and Mayer, 2019).

The three-factor theory is developed from attractive quality theory, which encompasses five quality dimensions (Kano, 1984). Kano (1984) indicated that the five quality dimensions differently affect satisfaction and are categorized into “attractive,” “must-be,” “one-dimensional,” “indifferent,” and “reverse” qualities. Attractive qualities, such as satisfiers, refer to value-added attributes that travelers do not typically expect (Kano, 1984; Oliver, 1997). Therefore, travelers are satisfied and delighted when these attributes are provided. Given that these attributes are unexpected, travelers are not disappointed or dissatisfied even when these attributes are unavailable. Thus, attractive qualities are considered positive asymmetrical attributes. In contrast

with attractive qualities, must-be qualities, such as dissatisfiers, are regarded as basic attributes (Kano, 1984; Oliver, 1997). Travelers are likely to be dissatisfied when these attributes are not provided or fail to meet their expectations. However, they remain dissatisfied even if these attributes satisfy their expectation because they take these attributes for granted. Hence, must-be qualities are considered negative asymmetrical attributes. One-dimensional qualities, such as hybrids, represent symmetrical attributes (Kano, 1984; Oliver, 1997). That is, travelers are satisfied (dissatisfied) if these attributes are (not) supplied. Indifferent qualities are attributes that are unrelated to satisfaction or dissatisfaction regardless of whether they are available or not (Kano, 1984). Reverse qualities, as the name indicates, generate dissatisfaction if they are presented and prompt satisfaction if they are unavailable (Kano, 1984).

Disregarding asymmetrical links between attributes and satisfaction may give rise to "model misspecification and poor predictive power" (Streukens and Ruyter, 2004). In the hospitality and tourism literature, a large number of studies have examined the asymmetrical effects of attributes on satisfaction in various areas, including incentive travel (Lee et al., 2017), ski resorts (Faullant, Füller, and Matzler, 2006), restaurants (Back, 2012), and casinos (Back and Lee, 2015). Understanding the dynamic nature of the quality of airline service attributes through an asymmetrical relationship with (dis)satisfaction should be worthwhile.

Methodology

Data

We used one of the leading consumer review websites, namely, TripAdvisor, to retrieve airline review data of consumers. Compared with generic survey data that have been used largely in previous airline studies, online review data relatively include a more representative sample in

the tourism context and reflect the actual experiences of airline services. This condition suggests that data from online consumer reviews are more objective and less biased by diminishing the "laboratory effect" (Liu, Teichert, Rossi, Li, and Hu, 2017). To collect analysis data, we used Python to develop an automated crawl program and directly obtain online reviews from social media websites. Consequently, the total number of reviews collected and analyzed in this research reached 157,035. This size is reasonable for test statistical modeling because it can alleviate the overfitting problem (Park, Yang, and Wang, 2019). These data consist of the online reviews and/or ratings of 20 U.S. airlines, including Air Choice One Airline, Alaska Airline, Allegiant Airline, American Airline, Boutique Airline, Cape Airline, Elite Airline, Frontier Airline, Jetblue Airline, Jet Suite X Airline, Hawaiian Airline, Mokulele Airlines, Spirit Airline, United Airline, South West Airline, Delta, Silver Airline, Southern Airways Express, Sun Country Airline, and Tradewind Aviation.

Variables

Dependent variables: this study used two dependent variables: "negative deviations" (ND_i) and "positive deviations" (PD_i). These variables were defined by the difference between the rating of an individual for a specific trip and the mode of the overall rating for the same airline and route. The "rating" was measured on a scale from 1 to 5. Consequently, the "mode of the overall rating" had the same range. Note that we do not classify customers per se, but the outcomes of service; thus, one customer could potentially provide different outcomes of service with opposing results.

Control variables: The control variables that represent individual social media activities and types of purchased airline services were divided into two classes, labeling individual characteristics and trip attributes in the estimated model, respectively. Previous studies found that

people's activities on social media websites relate the review ratings and experiences of tourism services (Fang, Ye, Kucukusta, and Law, 2016). Review distribution varies in accordance with the types of tourism products consumed by travelers, such as economy versus upscale services or domestic versus international travels (Blal and Sturman, 2014). In terms of individual features, previous scholars investigating the context of online reviews have suggested that review helpfulness (Park & Nicolau, 2015), and revewiers' expertise (or commitment) to online review websites (Ngo-Ye & Sinha, 2014) influence the way customers score the online ratings. In addition, a study conducted by Lee, Hosanagar and Tan (2015) demonstrated the presence of information cascades in online review websites, showing previous ratings affect the current rating scores. As a result, considering number of helpful counts and level of commitment contributing the contents (e.g., uploading images) to the platform as well as the distribution of previous ratings is important to consider in the estimated model.

In terms of operationalization of the measurement, "Helpful count" is the total number of helpful votes that a reviewer has received divided by the total number of reviews written. "Photos" is the number of photos that a reviewer has posted. "Distribution of ratings" shows the proportion of ratings (out of the total contributions) that a reviewer has classified as "Excellent," "Very good," "Average," "Poor," and "Terrible." With regard to travel features, "Domestic" indicates the type of flight, i.e., domestic versus international. "Economy" is a variable that indicates if a reviewer flew in economy class.

Independent variables: Specific services, such as "seat comfort," "customer service," "cleanliness," "F&B," "legroom," in-flight entertainment," "value for money," and "check-in and boarding," are rated on a scale from 1 to 5. Table 1 presents the descriptive statistics of these variables.

[Please insert Table 1 about here]

Model development

The methodology used to analyze the determinant factors of rating (satisfaction) deviations was based on the Tobit model. Considering that the two dependent variables, namely, negative and positive deviations, are left- and right-censored, the Tobit model is appropriate because it allows us to reflect this feature (Liu & Park, 2015). The empirical range of the dependent variable PD_i that reflects "positive deviations" for individual i is [0, 4), and the range of "negative deviations" (ND_i) is (−4, 0). We include the zero deviation in the positive range under the assumption that a zero value means that the individual is not dissatisfied, thus, the individual's expectations are fulfilled (i.e., expectation = experience). Accordingly, the Tobit models for PD_i and ND_i are defined as follows:

$$PD_i = \alpha_{PD} + \sum_{k=1}^{K} \beta_{PD,k} x_{ki} + \sum_{j=1}^{J} \gamma_{PD,j} z_{ji} + \varepsilon_{PD,i}, \quad (1)$$

$$ND_i = \alpha_{ND} + \sum_{k=1}^{K} \beta_{ND,k} x_{ki} + \sum_{j=1}^{J} \gamma_{ND,j} z_{ji} + \varepsilon_{ND,i}, \quad (2)$$

where α is a constant term, β_k is the coefficient associated with the k-th individual characteristic x_{ki} for individual i, γ_j is the coefficient associated with the j-th trip attribute z_{ji} for individual i, and ε_i is an error term that follows a normal distribution. Parameters α, β_k, and γ_j are assumed to be different in each model, and thus subscripts PD and ND indicate the model that they belong to. Note that individual characteristics (x_k) include helpful count, number photos uploaded, and distribution of previous ratings as well as types of products consumers purchased (i.e., domestic vs international flights and travel class). Trip attributes (z_j) consist of value for money, in-flight (i.e., seat comfort, customer service, cleanliness, F&B, legroom, and in-flight entertainment) and

ground service (i.e., check-in/boarding) elements. We test these differences in the empirical application.

Results

This research initially tested for collinearity and heteroskedasticity before running the models. We calculated the variance inflation factors of the former, and all of them were below 10. This result is in line with Neter et al. (1989). The Breusch–Pagan test was performed to detect the existence of heteroskedasticity for the latter ($F=683.7$; $p<0.001$). The White heteroscedasticity-consistent standard errors were used to present the parameter estimates.

Model 1 in Table 2 provides the results for positive deviations, and significant and positive effects are exerted by the following variables that describe individual characteristics (number of cities that a reviewer has visited, number of posted photos, and the percentage of "Excellent" categorization of products in a reviewer's posts) and by the following variables that reflect attributes of airline services (seat comfort, customer service, cleanliness, value for money, and check-in and boarding). The percentages "Very good," "Average," and "Poor" categorizations of products reviewed in a reviewer's posts are regarded as individual characteristics that exert a negative impact. F&B and in-flight entertainment of airline service attributes as well as domestic flight and economy class as types of airline products are determinant factors with negative effects.

Model 2 in Table 2 presents the results for negative deviations and significant and positive effects are presented by the following variables that describe individual characteristics (number of posted photos and the percentages of "Excellent," "Very good," and "Average" categorizations of products reviewed in a reviewer's posts) and by the following variables that reflect airline service attributes (seat comfort, customer service, value for money, and check-in and boarding). With regard to individual characteristics with a negative impact, we found levels 3, 4, 5, and 6; helpful

count; and percentages of "Poor" and "Terrible" categorizations of products reviewed in a reviewer's posts. For trip attributes with negative effects, the analysis identified domestic flight and economy class. Although the individual effects of these variables are relevant, the differentiated impact of the same variables on the "positive deviations" versus "negative deviations" must be observed. The levels of individual characteristics are significant and negative only in the negative deviations. Levels 0 and 1 are the baseline levels. Higher levels produce more negative reactions compared with lower levels. That is, when services are perceived to exhibit qualities that are below expectations, high levels of reviewers tend to impose strict penalties on these low-quality services. Helpful count is only significant and negative in the negative deviation model. This result indicates that a reviewer's historical posts are considered helpful in guiding him/her to give a negative rating to a service that is perceived to exhibit low quality.

[Please insert Table 2 about here]

The number of cities that a reviewer has visited exhibits a significant and positive effect on the positive deviations. The experience gained by visiting many cities appears to exert a positive effect only when a higher than expected quality is perceived. Otherwise, this variable demonstrates no effect. The number of photos that an individual has posted is significant and negative in the positive and negative deviations. However, the Wald test result indicates that the difference between both parameters is significant (Wald test=51.3; $p<0.001$), as shown in Table 3. The parameter of the positive deviations is greater (in absolute terms) than that of the negative deviations. Therefore, the negative effect of number of photos is asymmetric and depends on whether the deviations are positive or negative.

With regard to the distribution of ratings ("Excellent," "Very good," "Average," "Poor," and "Terrible"), a considerable disparity exists among the effects. Although "Excellent" exerts a positive and significant effect on the positive and negative deviations, the impact on the latter is greater than that on the former (Wald test=28.05; $p<0.001$), as indicated in Table 3. The categories "Very good" and "Average" have opposite signs; thus, they exhibit a negative influence on the positive deviations and a positive influence on the negative deviations. The category "Poor" is the only one that exerts the same effect in terms of significance and size (Wald test=0.681; $p=0.409$). The category "Terrible" has significant and negative parameters in the "negative deviation" model and insignificant ones in the "positive deviation" model (Table 3).

For airline service attributes, Table 3 shows that seat comfort is significant and positive and has similar parameters in both models (Wald test=0.896; $p<0.343$). Although customer service has positive and significant parameters in both models, its effect on the negative deviation model is considerably higher than that on the positive deviation model (Wald test=586.3; $p<0.001$). Cleanliness is positive and significant in the positive deviation model but insignificant in the negative one. F&B and in-flight entertainment have negative and significant parameters only in the positive deviation model. Value for money is significant in both models, but it is significantly higher in the negative deviation model (Wald test=792.1; $p<0.001$). The category "check-in and boarding" exerts positive and significant effects on both models, but its impact is greater on the positive deviations than on the negative deviations (Wald test=89.3; $p<0.001$). Domestic flight exhibits negative and significant effects on both deviations, but its impact is higher on the positive deviations than on the negative ones (Wald test=58.04; $p<0.001$). Economy class is negative and significant in the positive deviations but insignificant in the negative deviations.

346 [Please insert Table 3 about here]

347

348 **Conclusion**

349 Considering that the aviation market has become mature and competitive, it is critical for
350 airline companies to develop sustainable strategies. Price has been regarded as one of key drivers
351 that directly guides consumers' choice of airline services. However, price alone is insufficient to
352 be selected as a competitive advantage in a sustainable manner. This research suggests the
353 importance of understanding the mechanism of service quality in airline services (Chen and Chang,
354 2005) on the basis of a customer-centric marketing strategy (Gurău, 2003). This objective is
355 formulated because high service quality can influence satisfaction, motivate repurchasing behavior
356 (Pike, Bianchi, Kerr, and Patti, 2010), and potentially improve productivity in service firms
357 (Parasuraman, 2002). In particular, this research considers multiple service delivery stages that
358 encompass different roles and functions, such as ground and in-flight services, in the service
359 delivery process. In this regard, this work estimates the relationships between the quality of airline
360 service attributes and satisfaction by analyzing a large data set from an online consumer review
361 website. The relationship is asymmetrical; that is, the effects of quality attributes on airline service
362 satisfaction are inconsistent.

363 This study has important theoretical and practical implications. In terms of academic
364 contributions, a number of tourism researchers have focused on a linear relationship (or a
365 symmetrical effect) between the two concepts even though they have investigated service quality
366 and/or satisfaction in airline services (Liou et al., 2011; Pakdil and Aydin, 2007). The likelihood
367 of overall satisfaction increases as consumers positively perceive service attributes. By contrast,
368 the current study identifies the asymmetrical effects of service attribute quality on airline

satisfaction. That is, airline attributes exhibit heterogeneous influences on service satisfaction and play different roles as satisfiers (i.e., cleanliness, F&B, and in-flight entertainment) or dissatisfiers (i.e., customer service and check-in and boarding).

In particular, F&B (i.e., catering service) and in-flight entertainment are principal elements that affect the deviations of positive ratings (satisfaction), but they are insignificant in explaining the variations of negative ratings (dissatisfaction). The type of product labeled as economy class is more sensitive to the influence variations of positive ratings (satisfier) than to the deviations of negative ratings (dissatisfier). Level of travel experience, as one of the individual characteristics, plays an important role in affecting the variation of positive ratings (satisfier). By contrast, level of expertise, contributions to social media, customer service, and value for money in airline service attributes are identified as important factors that lead to variations of negative ratings than those of positive ratings (dissatisfier). Figure 1 summarizes the satisfier and dissatisfier according to different magnitude. Although certain attributes generate the same directional influences on rating variations, their magnitudes significantly differ.

[Please insert Figure 1 about here]

This result indicates that the current research validated the applicability of Herzberg's dual-factor theory to the airline context in general and to online consumer reviews in particular. Along with three-factor theory (Kano, 1984), this work identified airline attributes that can be categorized into a hybrid category, such as *seat comfort* and *legroom*. That is, the presence and quality of seat comfort and legroom attributes do not affect rating deviations or exhibit symmetrical effects.

In terms of methodological implications, this study analyzed more than 157,000 customer data of online reviews collected from a tourism social media website. A number of previous studies

392 that utilized online consumer reviews attempted to understand the elements that affect vote for
393 "helpfulness" and/or "usefulness" of the reviews themselves (Park and Nicolau, 2015; Lee, Law,
394 and Murphy, 2011). Importantly, however, this study used tourism "big data" to confirm consumer
395 behavior theory and effectively understand airline service quality, which had been mostly assessed
396 using survey methods. Accordingly, this work can be a good example to benchmark for future
397 researchers who are interested in tourism big data.

398 With regard to practical implications, the findings of this research are beneficial for airline
399 managers to develop customer-centric marketing strategies. Considering that airline service is a
400 chain of service delivery, airline managers are suggested to manage a sequence of moments from
401 ground to in-flight services (Chen and Chang, 2005) and discern which attributes offered to
402 customers play the roles of satisfier, dissatisfier, or hybrid. Airline managers are advised to
403 prioritize certain attributes, namely, customer service, price (value for money), and check-in and
404 boarding, to provide high service quality to consumers. Otherwise, airline passengers may be
405 easily dissatisfied if those attributes are unsatisfactorily performed. For example, offering training
406 program to frontline customer services (e.g., ticket reservation staff, check-in and gate agents, and
407 cabin crew) is of importance for them to obtain useful knowledge, skills and attitude toward the
408 service delivery. The finding also suggests the importance of yield management implementing
409 dynamic pricing based on understanding of customer values (Kimes, 1994). Even though these
410 three attributes (i.e., customer service, value for money, and check-in and boarding) have been
411 estimated as both satisfier and dissatisfier, the airline service providers should develop operational
412 strategies to improve the standard of service quality for those elements. For instance, based on the
413 result revealing cleanliness as a strong satisfier, it is important for airline companies to stress the
414 importance of hygiene issues. Accordingly, the development of strategic standards in cleanliness

415 to assess seat areas, tables, carpets, cabin panels and aircraft washrooms is strongly suggested for
416 sustainable management.

417 Considering individual characteristics, airline managers should distinguish the different
418 levels of consumer experience between social media usage and number of visited destinations.
419 Travelers who are active in social media are more sensitive to indicating negative experiences,
420 while people who have frequently traveled to other places are more likely to be responsive to
421 expressing positive experiences. Thus, it is recommended for airline managers to develop
422 customized marketing strategies for travelers between social media users and travel experts. With
423 the current pandemic going on, while the essential results of this article are expected to hold, two
424 caveats are worth considering in both in-flight and ground services. First, cleanliness was found
425 to be positive and significant in the positive deviation model but insignificant in the negative one.
426 This means that this attribute is regarded as a satisfier, a motivator and an attractive factor.
427 However, as cleanliness has been claimed to be one of the main ways of protection against Covid-
428 19, this attribute is very likely to become a dissatisfier (rather than a satisfier), a hygiene factor
429 (rather than a motivator) and a must-be factor (rather than an attractive factor). Hence, passengers
430 will expect high standards of in-flight cleanliness. Consequently, as a relevant managerial action,
431 not only should airlines put extra emphasis on raising and maintaining high levels on this attribute
432 but also they must communicate that they are investing in ameliorating this service and reaching
433 those high standards expected by passengers.

434 Second, check-in and boarding was found positive and significant effects on both models,
435 with an impact greater on the positive deviations than on the negative deviations. Needless to say,
436 check-in and boarding—and particularly the time invested in this ground service—has been
437 traditionally considered a critical determinant of satisfaction. In normal situations, the time a

passenger invests waiting in line is defined from a marketing viewpoint as a non-monetary cost because of the potential "physical effort", and "emotional stress" for that matter, that people may undergo before boarding (Ahmadi, 2019). In atypical situations like today's context, this "emotional stress" can be even more acute. This would qualify our results in that the check-in and boarding must have a greater impact on the negative deviations than the one found in our empirical application. Again, as an additional crucial managerial action, management of waiting lines should be a priority. It is important to recall that for airline companies, having planes that are not active in the air implies "leaving money on the table"—on the ground, in this case—thus, they try to stay at the airport the least possible time (according to Notomista et al. (2016), the estimated cost during turnarounds is $30 per minute). This means that, in a context wherein social distancing is a requirement, airlines must devise new strategies to speed up boarding (because of their financial implications) and to relieve passengers' emotional stress (because of their safety concerns).

This work has limitations. The analyzed data contains only airlines in the U.S. Future researchers must explore diverse international markets to enhance result generalizability. The literature on service quality has highlighted the importance of situational factors that reflect service characteristics (Ennew and Binks, 1996). Thus, future research should consider the types of service, such as international versus domestic routes and full service versus low-cost airlines. In terms of online consumer review data, this study primarily estimated the numerical data of consumer ratings. Also, future researchers must investigate textual review data, which will potentially offer detailed and valuable insights (Park and Kim, 2017). In the context of Covid-19, some future research avenues can be pointed out: i) analyzing the reviews and ratings to detect the variations in the importance given to in-flight and ground attributes before and after Covid-19; and ii) examining

460 the new systems that airlines may implement (e.g. High-efficiency particulate air (HEPA) filter
461 for the cabin) and the passengers' perceptions of these "new" attributes.
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References

Ahmadi, Arash. "Thai Airways: key influencing factors on customers' word of mouth." International Journal of Quality & Reliability Management 36, no. 1 (2019): 40-57.

Ali, Faizan, Woo Gon Kim, and Kisang Ryu. "The effect of physical environment on passenger delight and satisfaction: Moderating effect of national identity." *Tourism Management* 57 (2016): 213-224.

Alotaibi, M.M. (2015). *Evaluation of "AIRQUAL" scale for measuring airline service quality and its effects on customer satisfaction and loyalty.* Unpublished Doctoral Dissertation, Cranfield University, United Kingdom.

Anderson, Eugene W., and Vikas Mittal. "Strengthening the satisfaction-profit chain." *Journal of Service Research* 3, no. 2 (2000): 107-120.

Back, Ki-Joon. "Impact-range performance analysis and asymmetry analysis for improving quality of Korean food attributes." *International Journal of Hospitality Management* 31, no. 2 (2012): 535-543.

Back, Ki-Joon, and Choong-Ki Lee. "Determining the attributes of casino customer satisfaction: Applying impact-range performance and asymmetry analyses." *Journal of Travel & Tourism Marketing* 32, no. 6 (2015): 747-760.

Blal, Inès, and Michael C. Sturman. "The differential effects of the quality and quantity of online reviews on hotel room sales." *Cornell Hospitality Quarterly* 55, no. 4 (2014): 365-375.

Bogicevic, Vanja, Wan Yang, Anil Bilgihan, and Milos Bujisic. "Airport service quality drivers of passenger satisfaction." *Tourism Review* 68, no. 4 (2013): 3-18.

Chan, Jennifer Kim Lian, and Tom Baum. "Determination of Satisfiers and Dissatisfiers Using Herzberg's Motivator and Hygiene Factor Theory: An Exploratory Study." *Tourism Culture & Communication* 7, no. 2 (2007): 117-131.

Chang, Yu-Hern, and Chung-Hsing Yeh. "A survey analysis of service quality for domestic airlines." *European Journal of Operational Research* 139, no. 1 (2002): 166-177.

Chen, Fang-Yuan, and Yu-Hern Chang. "Examining airline service quality from a process perspective." *Journal of Air Transport Management* 11, no. 2 (2005): 79-87.

Cheng, Jao-Hong, Fang-Yuan Chen, and Yu-Hern Chang. "Airline relationship quality: An examination of Taiwanese passengers." *Tourism Management* 29, no. 3 (2008): 487-499.

Dolnicar, Sara, Klaus Grabler, Bettina Grün, and Anna Kulnig. "Key drivers of airline loyalty." *Tourism Management* 32, no. 5 (2011): 1020-1026.

Elkhani, Naeimeh, Sheida Soltani, and Mir Hadi Moazen Jamshidi. "Examining a hybrid model for e-satisfaction and e-loyalty to e-ticketing on airline websites." *Journal of Air Transport Management* 37 (2014): 36-44.

Elliott, Kevin M., and David W. Roach. "Service quality in the airline industry: are carriers getting an unbiased evaluation from consumers?." *Journal of Professional Services Marketing* 9, no. 2 (1993): 71-82.

Ennew, C.T. and Binks, M.R., 1996. The Impact of Service Quality and Service Characteristics on Customer Retention: Small Businesses and their Banks in the UK 1. *British Journal of Management*, *7*(3), pp.219-230.

Espino, Raquel, Juan Carlos Martín, and Concepción Román. "Analyzing the effect of preference heterogeneity on willingness to pay for improving service quality in an airline choice context." *Transportation Research Part E: Logistics and Transportation Review* 44, no. 4 (2008): 593-606.

Gilbert, David, and Robin KC Wong. "Passenger expectations and airline services: a Hong Kong based study." *Tourism Management* 24, no. 5 (2003): 519-532.

Gourdin, Kent N. "Bringing quality back to commercial air travel." *Transportation Journal* (1988): 23-29.

Grönroos, Christian. "A service quality model and its marketing implications." *European Journal of Marketing* 18, no. 4 (1984): 36-44.

Gurău, Călin. "Tailoring e-service quality through CRM." *Managing Service Quality: An International Journal* 13, no. 6 (2003): 520-531.

Gursoy, Dogan, Ming-Hsiang Chen, and Hyun Jeong Kim. "The US airlines relative positioning based on attributes of service quality." *Tourism Management* 26, no. 1 (2005): 57-67.

Fang, Bin, Qiang Ye, Deniz Kucukusta, and Rob Law. "Analysis of the perceived value of online tourism reviews: Influence of readability and reviewer characteristics." *Tourism Management* 52 (2016): 498-506.

Faullant, R., Matzler, K. and Füller, J., 2008. The impact of satisfaction and image on loyalty: the case of Alpine ski resorts. *Managing Service Quality: An International Journal*, *18*(2), pp.163-178.

Halal Focus (2011, November). Are airline meals labeled Muslim meals really halal. Retrieved October 7, 2019 from https://halalfocus.net/are-airline-meals-labeled-muslim-meals-really-halal/

Han, Heesup, Changsup Shim, Won Seok Lee, and Wansoo Kim. “Product performance and its role in airline image generation and customer retention processes: Gender difference.” *Journal of Travel & Tourism Marketing* 36, no. 4 (2019): 536-548.

Han, Heesup, and Sunghyup Sean Hyun. "Impact of hotel-restaurant image and quality of physical-environment, service, and food on satisfaction and intention." *International Journal of Hospitality Management* 63 (2017): 82-92.

Han, Heesup. "Effects of in-flight ambience and space/function on air travelers' decision to select a low-cost airline." *Tourism Management* 37 (2013): 125-135.

Herzberg, F., B. Mausner, B, and B. Snyderman. 1959. *The Motivation to Work.* John Wiley: New York.

Hess, Stephane, Thomas Adler, and John W. Polak. "Modelling airport and airline choice behaviour with the use of stated preference survey data." *Transportation Research Part E: Logistics and Transportation Review* 43, no. 3 (2007): 221-233.

Kano, Noriaki. "Attractive quality and must-be quality." *Hinshitsu (Quality, The Journal of Japanese Society for Quality Control)* 14 (1984): 39-48.

Kimes, Sheryl E. "The basics of yield management." *Cornell Hotel and Restaurant Administration Quarterly* 30, no. 3 (1989): 14-19.

Kimes, Sheryl E. "Perceived fairness of yield management: Applying yield-management principles to rate structures is complicated by what consumers perceive as unfair practices." *Cornell Hotel and Restaurant Administration Quarterly* 35, no. 1 (1994): 22-29.

Lee, Hee “Andy, Rob Law, and Jamie Murphy. "Helpful reviewers in TripAdvisor, an online travel community." *Journal of Travel & Tourism Marketing* 28, no. 7 (2011): 675-688.

Lee, Jin-Soo, Youngjoon Choi, and Chia-Hao Chiang. "Exploring the dynamic effect of multi-quality attributes on overall satisfaction: The case of incentive events." *International Journal of Hospitality Management* 64 (2017): 51-61.

Lee, Young-Jin, Kartik Hosanagar, and Yong Tan. "Do I follow my friends or the crowd? Information cascades in online movie ratings." *Management Science* 61, no. 9 (2015): 2241-2258.

Liou, James JH, Chao-Che Hsu, Wen-Chien Yeh, and Rong-Ho Lin. "Using a modified grey relation method for improving airline service quality." *Tourism Management* 32, no. 6 (2011): 1381-1388.

Liu, Yong, Thorsten Teichert, Matti Rossi, Hongxiu Li, and Feng Hu. "Big data for big insights: Investigating language-specific drivers of hotel satisfaction with 412,784 user-generated reviews." *Tourism Management* 59 (2017): 554-563.

Liu, Zhiwei, and Sangwon Park. "What makes a useful online review? Implication for travel product websites." *Tourism Management* 47 (2015): 140-151.

Mittal, Vikas, William T. Ross Jr, and Patrick M. Baldasare. "The asymmetric impact of negative and positive attribute-level performance on overall satisfaction and repurchase intentions." *Journal of Marketing* 62, no. 1 (1998): 33-47.

Ngo-Ye, Thomas L., and Atish P. Sinha. "The influence of reviewer engagement characteristics on online review helpfulness: A text regression model." *Decision Support Systems* 61 (2014): 47-58.

Notomista, Gennaro, Mario Selvaggio, Fiorentina Sbrizzi, Gabriella Di Maio, Stanislao Grazioso, and Michael Botsch. "A fast airplane boarding strategy using online seat assignment based on passenger classification." *Journal of Air Transport Management* 53 (2016): 140-149.

Oliver, R. L. "Satisfaction: a behavioral perspective on the customer." (1997) McGraw-Hill: New York.

Oyewole, Philemon. "FLYSAT: an index of consumer satisfaction with service offering in the airline industry." *Journal of Travel & Tourism Marketing* 10, no. 4 (2001): 1-31.

Pakdil, Fatma, and Özlem Aydın. "Expectations and perceptions in airline services: An analysis using weighted SERVQUAL scores." *Journal of Air Transport Management* 13, no. 4 (2007): 229-237.

Parasuraman, Arun. "Service quality and productivity: a synergistic perspective." *Managing Service Quality: An International Journal* 12, no. 1 (2002): 6-9.

Parasuraman, Ananthanarayanan, Valarie A. Zeithaml, and Leonard L. Berry. "Servqual: A multiple-item scale for measuring consumer perc." *Journal of Retailing* 64, no. 1 (1988): 12-40.

Park, Jin-Woo. "Passenger perceptions of service quality: Korean and Australian case studies." *Journal of Air Transport Management* 13, no. 4 (2007): 238-242.

589 Park, Sangwon, and Dae-Young Kim. "Assessing language discrepancies between travelers and
590 online travel recommendation systems: Application of the Jaccard distance score to web
591 data mining." *Technological Forecasting and Social Change* 123 (2017): 381-388.

592 Park, Sangwon, and Juan L. Nicolau. "Asymmetric effects of online consumer reviews." *Annals*
593 *of Tourism Research* 50 (2015): 67-83.

594 Park, Sangwon, Yang Yang, and Mingshu Wang. "Travel distance and hotel service satisfaction:
595 An inverted U-shaped relationship." *International Journal of Hospitality Management*76
596 (2019): 261-270.

597 Pike, Steven, Constanza Bianchi, Gayle Kerr, and Charles Patti. "Consumer-based brand equity
598 for Australia as a long-haul tourism destination in an emerging market." *International*
599 *Marketing Review* 27, no. 4 (2010): 434-449.

600 Ronalds-Hannon, E. 2013. "Free Peanuts on Airplanes Started out as a Marketing Ploy." *Quartz*
601 Retrieved on June 20, 2019 from https://qz.com/112310/free-peanuts-on-airplanes-started-out-
602 as-a-marketing-ploy/

603 Ryu, Kisang, Hye-Rin Lee, and Woo Gon Kim. "The influence of the quality of the physical
604 environment, food, and service on restaurant image, customer perceived value, customer
605 satisfaction, and behavioral intentions." *International Journal of Contemporary*
606 *Hospitality Management* 24, no. 2 (2012): 200-223.

607 Sezgen, E., Keith Mason, and Robert Mayer. "Voice of airline passenger: a text mining approach
608 to understand customer satisfaction." *Journal of Air Transport Management* 77, (2019):
609 65-74.

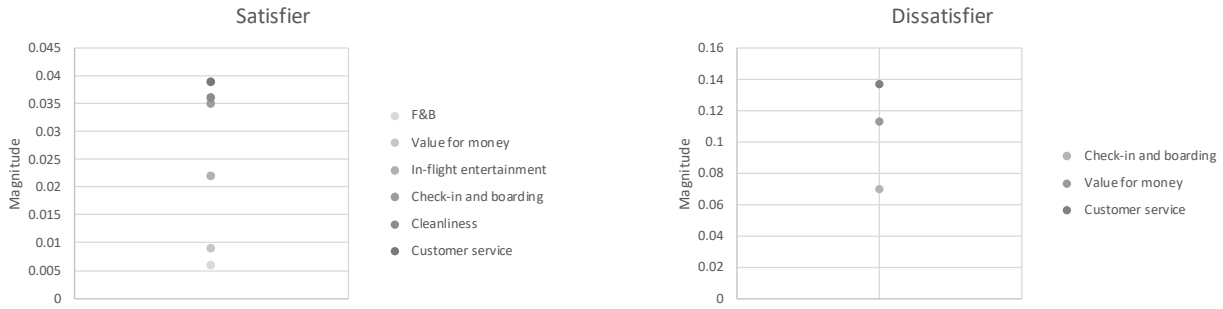
610 Spicer, R. (2018). Driven by competition, the airline industry is taking off. *Aviationpros*
611 retrieved on July 20, 2019 from
612 https://www.aviationpros.com/airlines/article/12419680/driven-by-competition-the-airline-
613 industry-is-taking-off

614 Streukens, Sandra, and Ko De Ruyter. "Reconsidering nonlinearity and asymmetry in customer
615 satisfaction and loyalty models: An empirical study in three retail service
616 settings." *Marketing Letters* 15, no. 2-3 (2004): 99-111.

617 Tsaur, Sheng-Hshiung, Te-Yi Chang, and Chang-Hua Yen. "The evaluation of airline service
618 quality by fuzzy MCDM." *Tourism Management* 23, no. 2 (2002): 107-115.

619 Zahari, Mohd N. K. Salleh, M. S. Y. Kamaruddin, and M. Z. Kutut. "In-flight meals, passengers'
620 level of satisfaction and re-flying intention." *World Academy of Science, Engineering and*
621 *Technology* 60, no. 12 (2011): 1353-1360.

622 Zellner, Debra A., Christopher R. Loss, Jonathan Zearfoss, and Sergio Remolina. "It tastes as good
623 as it looks! The effect of food presentation on liking for the flavor of food." *Appetite* 77
624 (2014): 31-35.
625



Note: Magnitude refers to absolute values of coefficients obtained from the Tobit regression.

Figure 1. Summary of satisfier and dissatisfier

632 **Table 1. Descriptive statistics**

Variable	Mean/Proportion	Std. error
Overall rating	3.68	1.36
Individual characteristics		
Number of obtained helpful votes	39.96	169.4
Length of time since joining *TripAdvisor*	5.37	3.47
Number of uploaded photos	146.8	1783
Excellent (distribution of past reviews)	46.07%	–
Very good (distribution of past reviews)	25.39%	–
Average (distribution of past reviews)	9.83%	–
Poor (distribution of past reviews)	3.51%	–
Terrible (distribution of past reviews)	2.73%	–
Airline service attributes		
Seat comfort	3.44	1.16
Customer service	3.81	1.40
Cleanliness	3.95	1.05
F&B	3.30	1.23
Legroom	3.48	1.18
In-flight entertainment	3.20	1.43
Value for money	3.62	1.31
Check-in and boarding	3.92	1.27
Domestic	69.52%	–
Economy	85.14%	–

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637 **Table 2. Determinant factors for rating deviations**

	Model 1: Positive rating deviations		Model 2: Negative rating deviations	
Variable	**Coefficient**	**Std. error**	**Coefficient**	**Std. error**
Individual characteristics				
Helpful count	0.028	0.031	−0.042	0.010
Photos	−1E−02[a]	0.000	−6E−01[a]	6E−03
Excellent	0.266[a]	0.056	0.180[a]	0.020
Very good	−0.119	0.085	0.543[a]	0.028
Average	0.530[a]	0.171	0.494[a]	0.049
Poor	0.313	0.296	−0.024	0.077
Terrible	−2.860[a]	0.326	−1.625[a]	0.073
Airline service attributes				
Seat comfort	−0.034	0.025	0.038[a]	0.008
Customer service	0.155[a]	0.020	0.174[a]	0.005
Cleanliness	0.120[a]	0.023	0.004	0.006
F&B	−0.179[a]	0.018	0.002	0.006
Legroom	0.103[a]	0.023	0.013[b]	0.007
In-flight entertainment	−0.254[a]	0.014	0.007	0.004
Value for money	0.134[a]	0.020	0.149[a]	0.006
Check-in and boarding	0.154[a]	0.019	0.106[a]	0.005
Domestic	−0.312[a]	0.030	−0.080[a]	0.010
Economy	−0.617[a]	0.040	0.007	0.015
Constant	−2.476[a]	0.096	−3.412	0.028
Maximum likelihood	−62716.48		−27098.86	

638 [a]=p<0.01; [b]=p<0.05

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641 **Table 3. Comparison between the parameters of Models 1 and 2 (Wald test)**

Variable	Wald test	p-value
Individual characteristics		
Helpful count	5.004	0.0253
Photos	9.290	0.0023
Excellent	2.426	0.119
Very good	61.287	0.0000
Average	0.042	0.836
Poor	1.295	0.255
Terrible	14.324	0.0002
Trip attributes		
Seat comfort	8.244	0.0041
Customer service	0.923	0.336
Cleanliness	24.790	0.0000
F&B	106.37	0.0000
Legroom	15.039	0.0001
In-flight entertainment	355.54	0.0000
Value for money	0.506	0.476
Check-in and boarding	6.196	0.0128
Domestic	58.484	0.0000
Economy	241.48	0.0000

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