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# Do We Scapegoat The Pandemic? Investigating The Changes in Satisfaction Drivers of Air Passengers With DWLS-SEM

**Ferhat İnce[1*], Özlem Atalık[2]**

[1*] Eskisehir Technical University, Aviation Management Department, Eskisehir, Türkiye. (ferhatince@eskisehir.edu.tr)
[1] Eskisehir Technical University, Aviation Management Department, Eskisehir, Türkiye. (oatalik@eskisehir.edu.tr)

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Corresponding Author: *Ferhat İnce*

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## Abstract

This paper aims to investigate whether there is an alteration in the drivers of air passenger satisfaction before and after COVID-19. We conducted the multigroup structural equation modelling with the diagonally weighted least squares estimation method as the variables are categorical. Lastly, we performed ANOVA to spot if there is a change in the drivers of passenger satisfaction between before and after the pandemic. The results suggest all service attributes have a significant impact on satisfaction in the pre-COVID-19 era. Even if it seems that in-flight entertainment and in-flight WiFi are not as influential as before in the post-pandemic, ANOVA results revealed the difference between the pre-pandemic and the new-normal period was not statistically significant. Accordingly, airlines should not ignore the need to improve service attributes, called premium services, and holistically improve service design. In addition, after value for money, the most important attribute for passengers is ground handling. Hence, speeding up the boarding process would return carriers in the form of more satisfied customers. To the best of our knowledge, this is the first paper employing Multigroup DWLS SEM to focus on changes in determinants of air passenger satisfaction in a holistic approach, focusing on pandemic periods.

## 1. Introduction

The airline industry has a dynamic structure and has experienced numerous transformations (Bakır et al., 2020). One of the most contemporary changes is deregulation. The Airline Deregulation Act, approved by the US Congress on October 24, 1978, (Goetz & Vowles, 2009), made markets competitive. Since competition solely based on price is not sustainable (Chang & Yeh, 2002), airlines compete for customers by offering high-quality services. A company's ability to keep its customers happy affects its competitive advantage by maintaining travelers' loyalty, which leads to a larger market share and increased profitability (Gazi et al., 2024). Delivering high-quality service to travelers is challenging and impacts an airline company's long-term success (Perçin, 2018). In this sense, airline companies are obliged to understand the requests and needs of customers (Aksoy et al., 2003). Airlines, for sure, measure passenger perception, yet sometimes they have inadequate information regarding what they truly want (Chen & Chang, 2005; Chou et al., 2011). In other words, they sometimes might have marketing myopia (Opengart et al., 2018).

The COVID-19 pandemic has posed challenges for the aviation industry since numerous nations admit domestic and international air transport connections can contribute to the spread of epidemics (Zhang et al., 2020). Apart from the economic and psychological damage rooted in COVID-19 (Choi, 2021; Imroz et al., 2023; Pappachan, 2023; Sulu et al., 2021), pronounced as a pandemic in March 2020, it changed travelers' behavior, expectations, and perceptions in terms of both airports and airlines (Lamb et al., 2020; Lin et al., 2023; Lin & Zhang, 2021; Samanci et al., 2021; Yalcin Kavus et al., 2022; Zhang et al., 2021). International Air Transport Association (IATA) stated that passengers prioritize convenience more than ever before, and therefore, digitalization and biometrics are consequential in the post-COVID-19 era (IATA, 2022). Passenger behavior is subject to continuous change due to various reasons. It has been established that navigational searches of airline customers related to flight tickets vary significantly, even within hourly periods, as reported by Koçak (2020). In another example, focusing on tweets sent to 6 Turkish air carriers, Koçak and Atalık (2019) emphasized that the theme of food and beverages lessened, and flight convenience peaked during Ramadan. Pereira et al. (2023) adopted a sentiment procedure to analyze 9745 reviews and revealed that the most crucial driver of passenger satisfaction is staff behavior in the post-COVID-19 period. Similarly, Bakır et al. (2022) conducted analyses of multiple regression and necessary conditions and demonstrated that staff is the most significant determinant of passenger satisfaction. Therefore, staff service is not just a service attribute that has attained prominence after the

pandemic. Furthermore, Kim et al. (2024) utilized sentiment analysis and topic modeling to investigate the shift in passenger perception based on 12,522 reviews of 50 airlines. They revealed that the most significant SERVQUAL dimension in the pre-COVID-19 was reliability, while after the pandemic, it was responsiveness. Due to changes in airline schedules and an increase in refund requests during the pandemic, these findings remain consistent. Even if COVID-19 is the most influential crisis in recent years, the relatively recent studies (Biswakarma & Gnawali, 2021; Çallı & Çallı, 2023; Hassan & Salem, 2022; Sulu et al., 2021) do not propose a holistic view. To the best of our knowledge, there is no study with a holistic approach to evaluating the alteration of passenger satisfaction in the context of full-service carriers. Accordingly, this paper aims to fill this gap by investigating the variance of passenger satisfaction of worldwide full-service carriers pre and post-pandemic. Moreover, the airline service quality papers utilize several methodologies, such as PLS-SEM (Farooq et al., 2018), logistic regression (Sari & Sener, 2022), multi-criteria decision-making (Gupta, 2018), sentiment analysis (Badanik et al., 2023), and so on. On the other hand, it is the first paper employing Multigroup DWLS SEM to evaluate the passenger satisfaction of full-service carriers with a holistic perspective, to the best of our knowledge.

The rest of the paper is structured as follows. Section 2 presents the background and hypotheses. Section 3 proposes the research framework and methodology. Section 4 summarizes the findings, and Section 5 discusses the results, delivers managerial implications, states limitations, and offers suggestions for forthcoming studies.

## 2. Background and Hypotheses

### 2.1. Background

Service quality is a term expressing the meeting level of services to customers' expectations (Namukasa, 2013). When it comes to the airline industry, it is not wrong to say that service quality means offering adequate frequent routes with perfect standards. It is a fundamental factor that affects the passengers' purchasing decision (Anderson & Zeithaml, 1984). Customer satisfaction, a key dimension of airline performance (Chow, 2014), is achieved when customers purchase a product or service that meets or exceeds their needs and expectations (Jiang & Zhang, 2016). So, it is a post-decision since it is based on experiences. By providing top-notch services, airlines ensure that their customers are satisfied with their experience and are more likely to return. This not only enhances the company's brand image but also increases passengers repurchase intent (Hu et al., 2009; Law et al., 2022). In addition, airlines attempt to improve customer engagement using figurative language in their social media posts (Koçak et al., 2024).

For service organizations, it is vital to comprehend and quantify customer expectations due to financial and resource constraints. By identifying any gaps in service quality from the customer's point of view, managers can decide on cost-effective ways to bridge those gaps. Given the limited resources available, managers must prioritize the most critical gaps to allocate their resources efficiently. This decision is crucial in ensuring optimal utilization of the available resources (Geraldine & David, 2013). That's why there are numerous studies on airline service quality and passenger satisfaction (Atalık et al., 2019; Babbar & Koufteros, 2008; Badanik et al., 2023; Ban & Kim, 2019; Cunningham et al., 2004; Huang, 2023; Jeong et al., 2023; Kassir, 2024; Leon & Dixon, 2023; Liou et al., 2011; Özden et al., 2023; Park et al., 2019; Ravishankar & Christopher, 2023; Samosir et al., 2024; Song et al., 2024; Suki, 2014; Sultan & Simpson, 2000; Tiernan et al., 2008; Tsaur et al., 2002; Wang et al., 2011).

### 2.2. Hypotheses proposed

Value for money is a trade-off that specifies what benefits the customer receives in exchange for what they consent to give up (Zeithaml, 1988). It is a guiding measurement that assists air carriers in determining marketing strategies, customer satisfaction, and pricing (Dike et al., 2023). Mason (2001) stated that value for money is an exceptionally significant factor for both low-cost and network carriers. In addition, (Rajaguru, 2016) noted that value for money is essential for low-cost carriers to accomplish customer satisfaction, and the success of full-service carriers relies on both customer satisfaction and value for money. Accordingly, airlines offering services with more value for money than their opponents might attain a competitive advantage (Brochado et al., 2019). Hence, we propose the hypothesis as follows:

*H1:* Value for money positively affects passenger satisfaction.

Ground service is a part of the chain of services offered in air transportation (Chen & Chang, 2005). The service quality assessment concentrates on two main elements: in-flight service quality (also expressed as on-board service quality) and ground service quality (Alkhatib & Migdadi, 2018). Increasing the quality level of ground services yields customer satisfaction (Ban & Kim, 2019). Hence, we propose the hypothesis as follows:

*H2:* Ground services positively affect passenger satisfaction.

Ergonomics gained attention with the instantaneous development of the aviation industry (Fan et al., 2022). An empirical study focusing on business passengers revealed that seat comfort has the highest influence on value for money (Atalık et al., 2019). Airlines should prioritize seat comfort to improve service quality (Lippitt et al., 2023; Tahanisaz & Shokuhyar, 2020). Hence, we propose the hypothesis as follows:

*H3:* Seat comfort positively affects passenger satisfaction.

Cabin staff should be polite, genial, friendly, willing to solve travelers' problems, and have satisfactory language mastery (Suki, 2014). Cleanliness, cabin interior, and experienced cabin crew with vocational competency offering high-quality service contribute to increasing the satisfaction of passengers (Atalay et al., 2019; Kim & Park, 2017; Namukasa, 2013). Hence, we propose the hypothesis as follows:

*H4:* Cabin staff service positively affects passenger satisfaction.

The food and beverage services are an inflight service that is one of the most influential factors affecting the perceived quality of passengers (Šebjan et al., 2017). It is especially vital for premium passengers, and the quality of this service is one of the common words in online reviews (Koçak & Atalık, 2019; Korfiatis et al., 2019). High-quality food and beverage service at a reasonable price increases customer satisfaction and loyalty by improving the value of money, especially for full-service carriers (An & Noh, 2009). Hence, we propose the hypothesis as follows:

*H5:* Food and beverages positively affect passenger satisfaction.

Misopoulos et al. (2014), analyzing 67,953 tweets shared by four airline companies, stressed that high-quality inflight entertainment results in positive sentiments of customers toward the airlines. Siering et al. (2018) stated that inflight entertainment is essential, especially for full-service carriers since both the business model of low-cost carriers and the passengers preferring low-cost carriers do not focus on this service generally. It is a considerable distinguishing service in passengers' decision to choose an airline (Lim & Lee, 2020). Hence, we propose the hypothesis as follows:

*H6:* Inflight entertainment positively affects passenger satisfaction.

In recent times, many airlines have provided in-flight WiFi services to enhance their revenue streams (Ismail & Jiang, 2019). It is another service attribute associated with the full-service carriers. (Lippitt et al., 2023) stated that airline managers proposing in-flight WiFi can attract passengers. Hence, this service might gain new customers for the company (Byun & Lee, 2016). This service is correlated with passenger satisfaction (Hong et al., 2023), provided that its connection and speed have to be at least acceptable (Gao et al., 2021). Hence, we propose the hypothesis as follows:

*H7:* Inflight WiFi positively affects passenger satisfaction.

Accordingly, the hypothesis development is illustrated in Figure 1.

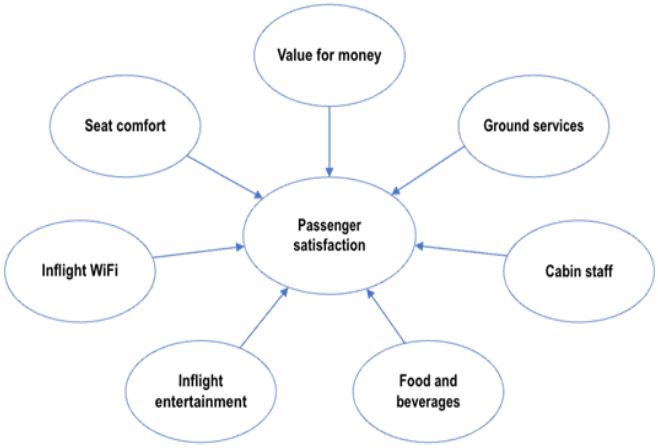
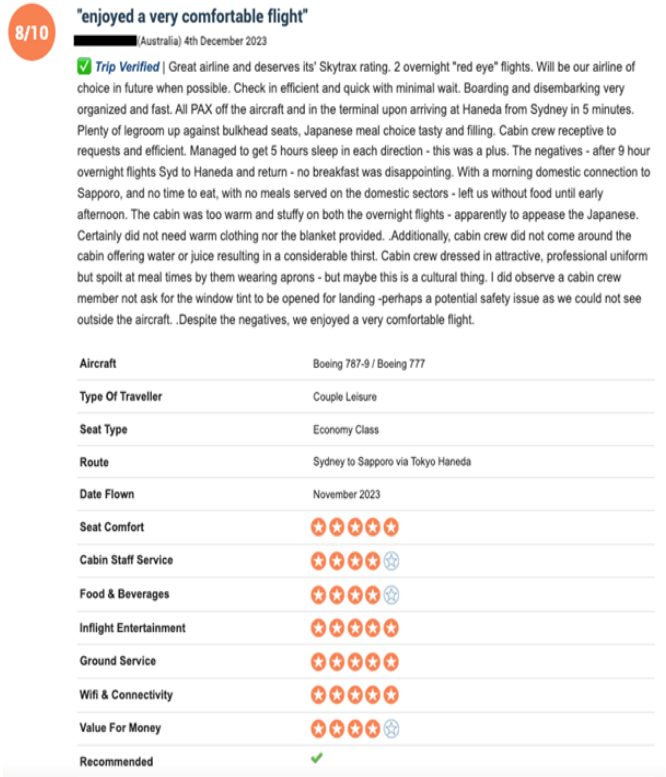



**Figure 1.** Hypothesis development.

## 3. Research Flow and Methodology

### 3.1. Research flow

The rapid development of digitalization brings forward user-generated content (UGC). UGC, which can be visual or text-based, refers to the ability of regular people to freely share their thoughts and feelings on any topic rather than professionals (Naab & Sehl, 2017). There are various UGC platforms, such as Instagram, X (Twitter), Facebook, YouTube, TripAdvisor, Snapchat, Skytrax, and Yelp (Flecha-Ortíz et al., 2021; Garner & Kim, 2022; A. J. Kim & Johnson, 2016; Rauchfleisch et al., 2017; Roma & Aloini, 2019; Samir et al., 2023; Smith et al., 2023). This paper utilizes Skytrax as a database. Skytrax, established in 1989, is a leading organization in rating airlines, airports, and lounges (Skytrax, 2022). In addition, it is accepted as a reliable source providing UGC regarding the services mentioned above (Kwon et al., 2021). Furthermore, Skytrax is widely utilized as a database in satisfaction and service quality studies (Anitsal et al., 2019; Bin Taliah & Zervopoulos, 2023; Pholsook et al., 2024; Shadiyar et al., 2020). Figure 2 depicts an airline review shared in Skytrax.


8/10

"enjoyed a very comfortable flight"

[redacted] (Australia) 4th December 2023

✅ Trip Verified | Great airline and deserves its' Skytrax rating. 2 overnight "red eye" flights. Will be our airline of choice in future when possible. Check in efficient and quick with minimal wait. Boarding and disembarking very organized and fast. All PAX off the aircraft and in the terminal upon arriving at Haneda from Sydney in 5 minutes. Plenty of legroom up against bulkhead seats, Japanese meal choice tasty and filling. Cabin crew receptive to requests and efficient. Managed to get 5 hours sleep in each direction - this was a plus. The negatives - after 9 hour overnight flights Syd to Haneda and return - no breakfast was disappointing. With a morning domestic connection to Sapporo, and no time to eat, with no meals served on the domestic sectors - left us without food until early afternoon. The cabin was too warm and stuffy on both the overnight flights - apparently to appease the Japanese. Certainly did not need warm clothing nor the blanket provided. .Additionally, cabin crew did not come around the cabin offering water or juice resulting in a considerable thirst. Cabin crew dressed in attractive, professional uniform but spoilt at meal times by them wearing aprons - but maybe this is a cultural thing. I did observe a cabin crew member not ask for the window tint to be opened for landing -perhaps a potential safety issue as we could not see outside the aircraft. .Despite the negatives, we enjoyed a very comfortable flight.

| | |
|---|---|
| Aircraft | Boeing 787-9 / Boeing 777 |
| Type Of Traveller | Couple Leisure |
| Seat Type | Economy Class |
| Route | Sydney to Sapporo via Tokyo Haneda |
| Date Flown | November 2023 |
| Seat Comfort | ★★★★★ |
| Cabin Staff Service | ★★★★☆ |
| Food & Beverages | ★★★★☆ |
| Inflight Entertainment | ★★★★★ |
| Ground Service | ★★★★★ |
| Wifi & Connectivity | ★★★★★ |
| Value For Money | ★★★★☆ |
| Recommended | ✔ |

**Figure 2.** Review example.

The reviews include recommendations (yes or no), service attributes, traveler's type (business, family, couple, and solo), and nationality. Figure 3 represents the research flow. Initially, we examined Skytrax to determine the decision-making units. Skytrax shows 150 full-service carriers for ten regions. Second, we researched the number of reviews belonging to all operators by region and proceeded with the top five carriers. It is noteworthy to remember that Russia, CIS & Central Asia region has four air carriers. Third, we scraped all reviews regardless of date by employing the Chrome extension of Web Scraper. The raw dataset consists of 49 airlines with 42934 reviews. Fourth, we arrange the period as pre-pandemic and post-pandemic. The reviews until December 31, 2019, are considered the pre-pandemic period, and those beginning from January 1, 2022, are considered the post-pandemic period. Fifth, we cleaned up the reviews with missing values and noticed that the post-pandemic period has 44 airlines. Therefore, we excluded the four carriers (Air Caraibes, Air Moldova, Belavia Belarusian Airlines, Cayman Airways, and South African Airways) from the pre-pandemic period. Accordingly, the final dataset has 44 airlines with 13635 reviews. The 44 relevant airlines are presented in the Appendix. Sixth, following (Dike et al., 2023), we divided the variables into two clusters: displeased (scores of 1-3) and pleased (scores of 4-5) for service attributes, and unsatisfied (scores of 1-6) and satisfied (scores of 7-10) for overall satisfaction. Ultimately, we binarized all groups: displeased and unsatisfied as 0 (reference level), pleased and satisfied as 1. The underlying reason for binarizing values is that the DWLS estimation method works with categorical variables. Dichotomous variables are preferred instead of polychotomous to ease the interpretation of the findings.

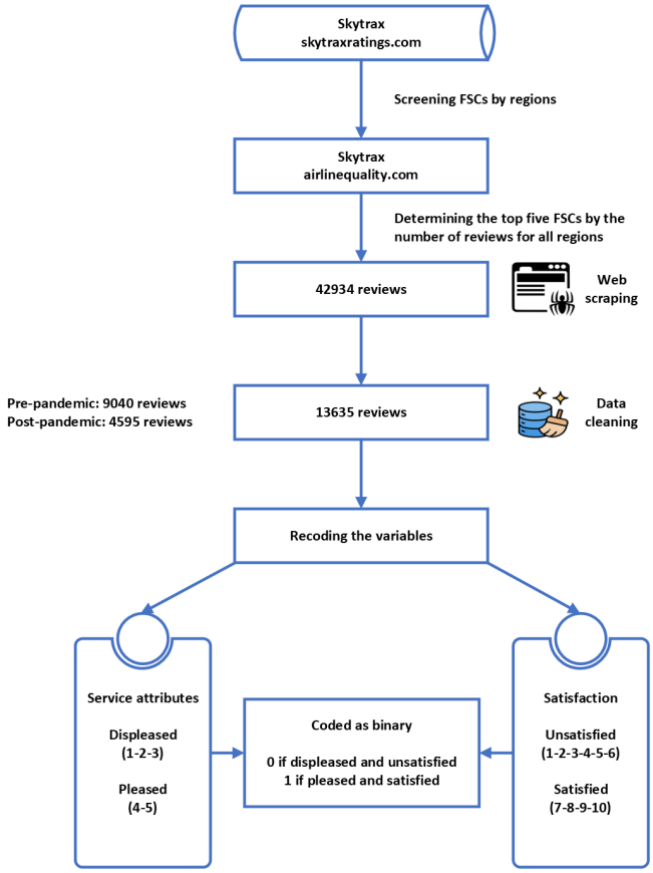



**Figure 3.** Research flow.

### 3.1. Methodology

This study employs structural equation modeling (SEM). SEM, which has a confirmatory procedure, allows academics to concurrently estimate and model complicated associations among multivariate endogenous and exogenous variables (Byrne, 2016; Hair et al., 2022). There are some assumptions of SEM. First, researchers should have adequate sample size ($N$). As a rule of thumb, $N$ should at least be ten times the number of variables (Tanaka, 1987). There is, however, no consensus regarding this issue. Academics have proposed several rules about sufficient $N$, such as 50 observations for each variable or at least 100 (Muthén & Muthén, 2002). Shi et al. (2019) stated that RMSEA (Root Mean-Square Error of Approximation), TLI (Tucker-Lewis Index), and CFI (Comparative Fit Index) might worsen if the $N$ is low. On the other hand, (Shi et al., 2018) stressed that the observed variable number ($x$) is the most significant driver of the model's size effect and proposed that a high number of $x$ (e.g., equal to or higher than 60) causes Type I errors, even if the higher $N$ (e.g., 2000). Therefore, the authors suggested that the $N$ should be at least equal to or higher than $\chi^2$ (chi-square). Additionally, data should have a normality distribution (Kline, 2023). Moreover, the theoretical background regarding the analysis is necessary.

Besides the assumptions, goodness-of-fit indices must be presented. Although there is no consensus on which goodness-of-fit indices should be reported (Marcoulides et al., 2020), RMSEA and CFI are widely reported global fit measurements (Lai & Green, 2016). As incremental fit indices, CFI and TLI values should be greater than 0.90 or 0.95. The absolute fit indices, RMSEA and SRMR (Standardized Root Mean-Square Residual) should be lower or equal to 0.05 (J. Wang & Wang, 2020; Whittaker & Schumacker, 2022). Besides, $\chi^2$ is also reported in studies, yet it should be noted that it produces unreliable values when $N$ is large (Y. Fan et al., 2016).

The maximum likelihood (ML) is the most common estimation method in SEM and is utilized for continuous variables (J. Wang & Wang, 2020). On the other hand, the DWLS (diagonally weighted least squares) estimation method is recommended when studying categorical data with less than five categories (Kline, 2023). Additionally, (Whittaker & Schumacker, 2022) suggested that categorical endogenous variables should have less than four categories. DWLS produces estimates with fewer standard errors, has fewer restrictive assumptions than ML, yields more accurate results even with small samples than WLS (weighted least squares), and is not as sensitive to normality distribution as ML (Josephy et al., 2016; Koğar & Yilmaz Koğar, 2015; Mîndrilă, 2010). In accordance with the purpose of the paper, we utilized Multigroup SEM with the DWLS estimation procedure. Moreover, we conducted ANOVA to specify whether a statistically significant difference exists regarding passenger satisfaction between the pre-pandemic and post-pandemic periods. The analyses are conducted by Lavaan package in R (Rosseel, 2012). The normality and collinearity check is conducted by jamovi (The jamovi project, 2023).

## 4. Results

This section provides the determinants of satisfaction derived from the DWLS estimation method. The values of skewness, kurtosis, Variance Inflation Factor (VIF), and tolerance are presented in Table 1. Accordingly, the data has a normal distribution since the skewness and kurtosis are lower than 2 and 7, respectively (Finney & DiStefano, 2013). In addition, there is no multicollinearity risk since the VIF < 5 and tolerance > 0.2 (Bagheri et al., 2012; Handoyo et al., 2023).

**Table 1.** Normality and collinearity check

| Predictors | Skewness | Kurtosis | VIF | Tolerance |
|---|---|---|---|---|
| Seat comfort | 0.805 | -1.35 | 2.58 | 0.39 |
| Cabin staff | 0.521 | -1.73 | 2.34 | 0.43 |
| Food and beverages | 0.956 | -1.09 | 2.56 | 0.39 |
| Inflight entertainment | 0.708 | -1.50 | 2.38 | 0.42 |
| Ground services | 0.924 | -1.15 | 2.32 | 0.43 |
| Inflight WiFi | 1.21 | -0.533 | 1.88 | 0.53 |
| Value for money | 0.980 | -1.04 | 3.11 | 0.32 |

In order to spot the alteration in passenger satisfaction between COVID-19 periods, we proposed two models: the free model (i.e., no equal constraint of intercepts) and the strict model (i.e., equal constraint of intercepts). The results of relevant models are displayed in Table 2. Instead of $\chi^2$, we report Bentler's CFI, which yields more accurate results since it is a standardized index for $N$ (Bentler, 1990). Based on the goodness-of-fit indices, it is clear that the model is fit (CFI= 1.000; TLI= 1.000; RMSEA= 0.000; SRMR= 0.000). The results of the free model indicate that all service attributes have a statistically significant impact on overall passenger satisfaction in the pre-pandemic era, in line with the literature (Atalay et al., 2019; Ban & Kim, 2019; Brochado et al., 2019; Hong et al., 2023; Šebjan et al., 2017; Siering et al., 2018; Tahanisaz & Shokuhyar, 2020). Value for money, stressed by

Rajaguru (2016) as an indispensable factor for airlines to survive, has the highest impact, based on the coefficients. It is followed by ground services with 0.933 coefficients. Disruptions in the ground services or lack of staff could also lead to delays in the flight (Pamplona & Alves, 2020).

**Table 2.** Results of the free and strict model

| Model | Period | Predictors | Estimate | Std. error | p |
|---|---|---|---|---|---|
| FREE MODEL | Pre-pandemic | Seat comfort | 0.581 | 0.059 | 0.000 |
| | | Cabin staff | 0.897 | 0.061 | 0.000 |
| | | Food and beverages | 0.449 | 0.063 | 0.000 |
| | | Inflight entertainment | 0.345 | 0.062 | 0.000 |
| | | Ground services | 0.933 | 0.057 | 0.000 |
| | | Inflight WiFi | 0.151 | 0.063 | 0.015 |
| | | Value for money | 1.618 | 0.058 | 0.000 |
| | Post-pandemic | Seat comfort | 0.645 | 0.106 | 0.000 |
| | | Cabin staff | 0.666 | 0.105 | 0.000 |
| | | Food and beverages | 0.445 | 0.112 | 0.000 |
| | | Inflight entertainment | 0.205 | 0.114 | 0.071 |
| | | Ground services | 1.013 | 0.100 | 0.000 |
| | | Inflight WiFi | 0.180 | 0.116 | 0.122 |
| | | Value for money | 1.688 | 0.107 | 0.000 |
| STRICT MODEL | Pre-pandemic | Seat comfort | 0.590 | 0.051 | 0.000 |
| | | Cabin staff | 0.828 | 0.053 | 0.000 |
| | | Food and beverages | 0.443 | 0.054 | 0.000 |
| | | Inflight entertainment | 0.309 | 0.054 | 0.000 |
| | | Ground services | 0.944 | 0.049 | 0.000 |
| | | Inflight WiFi | 0.157 | 0.055 | 0.004 |
| | | Value for money | 1.619 | 0.053 | 0.000 |
| | Post-pandemic | Seat comfort | 0.590 | 0.051 | 0.000 |
| | | Cabin staff | 0.828 | 0.053 | 0.000 |
| | | Food and beverages | 0.443 | 0.054 | 0.000 |
| | | Inflight entertainment | 0.309 | 0.054 | 0.000 |
| | | Ground services | 0.944 | 0.049 | 0.000 |
| | | Inflight WiFi | 0.157 | 0.055 | 0.004 |
| | | Value for money | 1.619 | 0.053 | 0.000 |

Delays, bringing additional costs, influence customer satisfaction adversely (Song et al., 2024; Wesonga et al., 2014). Air travelers also attach importance to seat comfort and cabin staff services, as stressed by Tansitpong (2020). Consistent with (Chatterjee & Mandal, 2020), inflight entertainment and food & beverages are significant drivers of satisfaction, whereas not as much as cabin staff and seat comfort. Even if inflight WiFi services have gained prominence over the years because of digitalization (Suprapto & Oetama, 2023), the results revealed that it has a significant but the lowest impact on satisfaction. The underlying reason for this issue might be the unstable connection or insufficient speed, which disappoints passengers, as stressed by Gao et al. (2021). In brief, the order of importance of service attributes is value for money, ground services, cabin staff, seat comfort, food & beverages, inflight entertainment, and inflight WiFi. This ranking has not changed in the new-normal period, based on the findings belonging to the post-pandemic era of the free model. However, it seems there are some changes. To illustrate, the coefficients of value for money, ground services, and seat comfort boosted, while that of cabin staff and food & beverages diminished. On the other hand, inflight WiFi has no statistically significant effect on satisfaction. Besides, inflight entertainment is still statistically significant, yet at the significance level of 10% rather than 5%. The results of ANOVA revealed that the difference between passenger satisfaction between the eras of pre-pandemic and post-pandemic is not statistically significant, stochastic ($\chi^2(7) = 6.677, p: 0.435$).

## 5. Discussion and Conclusion

### 5.1. Synopsis of findings

The success of any firm relies on its ability to understand customers' perceived quality of goods or services. Failure to comprehend customer expectations can lead to severe consequences, such as reduced profitability and customer dissatisfaction (Bakır et al., 2019). As a demand-driven industry, aviation is experiencing rapid growth (Gürçam, 2022). Accordingly, air carriers are looking for new ways to maximize their lifespan in an intensely competitive environment. To this end, they strive to develop service designs that exceed or at least meet the passenger expectations for both retaining current customers and attracting new ones (Lucini et al., 2020; Park et al., 2019).

The results presented in Table 2 indicate that all predictors are significant determinants of passenger satisfaction. So, all hypotheses are supported by the aggregated model. Thus, our findings are consistent with the literature (An & Noh, 2009; Atalık et al., 2019; Hong et al., 2023; Kim & Park, 2017; Siering et al., 2018). It is an anticipated consequence that passengers prioritize value for money as the primary driver of satisfaction, in line with Rajaguru (2016). Value for money is also a pivotal driver of the recommendation intention of passengers, regardless of the business model (Fu, 2023), and also contributes to the brand image of airlines (Baumeister et al., 2022). IATA (2022) stressed that 65% of passengers grumbled about complex processes and recommended the dissemination of digital technology to speed up travel. On the other hand, inflight WiFi has the lowest impact on satisfaction in the pre-pandemic period and is not a powerful driver of satisfaction in the post-pandemic. The underlying reason for this finding might be the increasing concerns regarding hygiene and safety (Afaq et al., 2023; Bakır et al., 2022; Ma et al., 2022). Even if COVID-19 restricts social life, passengers do not compromise on the perceived quality of primary service attributes (such as seat comfort, cabin staff, food and beverage, ground services, and value for money). The sentiment and topic modeling procedure adopted by Srinivas & Ramachandiran (2023) revealed that cabin and ground staff is the largest topic (40%) in passenger reviews for the period August 2017-September 2019. Similar research conducted by Sulu et al. (2021) revealed that staff is one of the most important themes during the pandemic. In accordance, our results point out cabin and ground staff services remain a compulsory attribute for passengers after the pandemic.

On the other hand, the results of ANOVA suggest that the difference between pre-pandemic and post-pandemic is not statistically significant. This finding should not be misapprehended. What we want to stress here is to emphasize that the pandemic is the cause of any behavioral change of any passenger, even without conducting a comparative analysis. This study does not assert that there is no difference in the facets influencing any traveler's purchasing behavior after the pandemic. However, the results of this study, which was designed with a holistic approach by collecting data from airlines in each region and questioning whether there is a statistical difference in the determinants of satisfaction between the periods, do not hesitate to point out that the pandemic has been scapegoated in terms of passenger satisfaction.

### 5.2. Managerial Implications

The aviation industry has quite a dynamic structure. The air carriers have realized that competition based on price does not necessarily bring a competitive advantage. Accordingly, airlines are continuously competing with each other in terms of attracting more and more passengers. Airlines, , need to know which service attributes passengers value most and which ones have room for improvement. In this context, the concept of user-generated content (UGC), which has gained importance with the rapid development of technology in eliminating marketing myopia, stands out (Halliday, 2016; Vollrath & Villegas, 2022). Social media applications, various blogs, and countless forums where consumers share their experiences influence potential customers' purchasing decisions to such an extent that influencing customers has shifted from companies to consumers (Mendes-Filho et al., 2018; O'Hern & Kahle, 2013). In other words, UGC is a free marketing service for companies through word of mouth (Albuquerque et al., 2012; Bronstein & Aharony, 2009).

This study utilizes UGC, an indispensable source for businesses to spot the aspects that require improvement and puts forward that passengers did not consider two service attributes, in-flight entertainment, and WiFi, as much in the post-pandemic period as in the pre-pandemic period. Based on these findings, it should not be assumed that people do not value premium services such as in-flight entertainment and WiFi as much after the pandemic period when social life came to a standstill. ANOVA results reveal that the difference between the two periods is stochastic (i.e., random). Even if the value for money is still the highest contributor to satisfaction, it is crucial to remember that price without service quality is not enough to increase repurchase intention and customer loyalty (Chonsalasin et al., 2022; Mikulić et al., 2017; Vlachos & Lin, 2014). Therefore, airlines should persist in enhancing all service attributes. In addition, based on the regression coefficients of service attributes, ground handling is the second-best determinant of customer satisfaction. Although it is not emphasized as much as other service attributes in airline service quality literature, this finding is consistent with Ban & Kim (2019), who stated that ground handling quality improves customer satisfaction. Passengers might hold airline companies responsible for delays, even if they are not caused by the carrier. Minimizing the disruptions in the ground handling process or working with ground handling companies that have proven their service quality may return to the airline company as increased passenger satisfaction.

### 5.3. Limitations and future research suggestions

As with all articles, this paper has some limitations. First, the dataset consists of full-service carriers from different regions. In this sense, following Punel et al. (2019), investigating whether there are cross-cultural differences in passenger satisfaction through the lens of comparative periods in future studies can provide beneficial information to the airline industry and raise new research questions. In addition, we chose Skytrax as the database, which is easy to scrape thanks to its static link structure. On the other hand, the number of reviews on Skytrax is lower than on TripAdvisor. If possible, researchers can choose TripAdvisor, which has a much higher number of reviews but has a dynamic link structure, and bring to light the gray areas that this study cannot illuminate. Besides, it is also noteworthy to remember that satisfaction is a complex phenomenon because of the dynamic structure of the industry and the subjective nature of people, and therefore, this paper asserts that more studies related to the scope are required. Moreover, comparing the results obtained from different methodologies that have not been employed before might yield methodological advancement. Lastly, academics can adopt a similar procedure for comparing airline business models, customer types, or cabin classes without losing the context of the pandemic eras.

## Ethical approval

Not applicable.

## Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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## Appendix

**Table A.1.** Regions and airlines

| Region | Airline |
|---|---|
| Africa | Ethiopian Airlines |
| | Royal Air Maroc |
| | Egyptair |
| | Kenya Airways |
| Asia | Thai Airways |
| | Singapore Airlines |
| | Air India |
| | Cathay Pacific Airways |
| | Malaysia Airlines |
| Australia/Pacific | Qantas Airways |
| | Air New Zealand |
| | Virgin Australia |
| | Air Tahiti Nui |
| | Fiji Airways |
| Central America & Caribbean | Bahamasair |
| | Caribbean Airlines |
| | Copa Airlines |
| China | China Southern Airlines |
| | Hainan Airlines |
| | Air China |
| | China Eastern Airlines |
| | Xiamen Airlines |
| Europe | Lufthansa |
| | Turkish Airlines |
| | British Airways |
| | KLM Royal Dutch Airlines |
| | TAP Portugal |
| Middle East | Emirates |
| | Etihad Airways |
| | Oman Air |
| | Qatar Airways |
| | Saudi Arabian Airlines |
| North America | Delta Air Lines |
| | Air Canada |
| | American Airlines |
| | JetBlue Airways |
| | United Airlines |
| Russia, CIS & Central Asia | Air Astana |
| | Azerbaijan Airlines |
| South America | Azul Brazilian Airlines |
| | Boliviana de Aviación |
| | Aerolineas Argentinas |
| | LATAM Airlines |
| | Avianca |