



## “RECOMMEND OR NOT RECOMMEND”: TOPIC MODELING OF USER REVIEWS IN AIRLINE MARKET

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### Abstract

Understanding customers and the market in the airline industry, which has unique characteristics such as a competitive environment, diverse consumer expectations, and different service levels, is critical for marketing decision-making. Digital platforms offer valuable information sources through online reviews to companies, and it is essential to evaluate the data to better understand the customers. The study aims to discover the topics in airline user reviews from a duality perspective by recommending reviews and not-recommending reviews. Consistent with the study aim, topic modeling methodology through BERTopic (BERT (Bidirectional Encoder Representations from Transformers) transformers-model is employed to detect the topics included in Skytrax online reviews on Airlinequality.com. 33.810 user reviews from 25 airline companies are used as the study sample. Individual topics detected by topic modeling methodology are grouped into topic groups in the study. Five main topic groups (flight experience, customer service, travel class, airline mentions, and other) for recommending status user reviews, and nine main topics groups (flight experience, service experience, customer service/operations, baggage, customer expressions, region/country-based expressions, seats, transferring process and special cases) for not-recommending status user reviews are concluded in the study.

**Keywords** : Airline Marketing, User Recommendation, Online Reviews, Word of Mouth

**JEL Classification** : M31

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# “ÖNERMEK YA DA ÖNERMEMEK”: HAVAYOLU PAZARINDA KULLANICI YORUMLARININ KONU MODELLEMESİ

## Öz

*Rekabetçi bir ortam, farklı tüketici beklentileri ve farklı hizmet seviyeleri gibi kendine özgü özelliklere sahip havayolu endüstrisinde müşterileri ve pazarı anlamak, pazarlama karar alma süreçleri için kritik öneme sahiptir. Dijital platformlar, şirketlere çevrimiçi yorumlar aracılığıyla değerli bilgi kaynakları sunar ve müşterileri daha iyi anlayabilmek için verileri değerlendirmek önem arz etmektedir. Çalışma, havayolu kullanıcı değerlendirmelerindeki konuları, öneren ve önermeyen değerlendirmeler üzerinden iki yönlü bir bakış açısından keşfetmeyi amaçlamaktadır. Çalışmanın amacına uygun olarak, Airlinequality.com'daki Skytrax çevrimiçi değerlendirmelerinde yer alan konuları tespit etmek için BERTopic (BERT - Bidirectional Encoder Representations from Transformers) dönüştürücü modeli aracılığıyla konu modelleme metodolojisi kullanılmıştır. Çalışmada örneklem olarak 25 havayolu şirketine dair 33.810 kullanıcı yorumu kullanılmıştır. Konu modelleme metodolojisi ile tespit edilen tekli konular konu gruplarında gruplanmıştır. Çalışmada öneren değerlendirmelerde beş ana konu grubuna (uçuş deneyimi, müşteri hizmetleri, seyahat sınıfı, havayolu bahsetmeleri ve diğer), önermeyen değerlendirmelerde dokuz ana konu grubuna (uçuş deneyimi, hizmet deneyimi, müşteri hizmetleri / operasyonları, bagaj, müşteri ifadeleri, bölge / ülke merkezli ifadeler, koltuklar, transfer süreci ve özel durumlar) ulaşılmıştır.*

**Anahtar Kelimeler** : Havayolu Pazarlaması, Kullanıcı Önerisi, Çevrimiçi Değerlendirmeler, Ağızdan Ağıza pazarlama

**JEL Sınıflandırılması** : M31

## INTRODUCTION

The airline market is essential in today's economy due to its intense competition environment and consumer groups' different demands. Regarding its economic value, the airline market is also one of the essential items in the transportation sector. The recovery process in the airline industry also poses the potential for economics. According to IATA (2024a, 2024b), revenues in global airline industry is \$908 billion on 2023 estimatedly and the amount exceeds the 2019 value which has declined in 2020. Understanding the consumer in the airline market and developing products or making product improvements according to consumer demands has become inevitable in today's competitive world. At this stage, the concept of word of mouth, which is included in the scope of consumer behavior, offers potential for today's marketing decision-makers regarding consumer decision-making and consumers' influence on each other. The information that consumers share and airline companies in digital environments can be helpful in terms of discovering customer insights.

Within the scope of the eWOM (electronic word of mouth) concept, consumers' recommendations / not-recommendations of a product/service to other users can be effective in other consumers' decision-making. Users can share this information with other users on various digital platforms. This study evaluates user reviews by focusing on the Airlinequality.com (Skytrax, 2024a) website from these platforms. The study aims to research the diversity of the topics included in the user reviews from two perspectives: recommended and not-recommended reviews. The duality perspective can tell the positive and negative sides of the topics, and investigating the topics individually can contribute to a better understanding of the consumers.

The study follows topic modeling methodology consistent to research aims. The traditional approach in topic modelling methodology relies on bag-of-words assumption which ignores the information coming from the ordering of the words (Alghamdi & Alfalqi, 2015). Accordingly, the contextual differences may be neglected in the traditional approach since the reviews of “I do like the product, not only the brand” and “I do not like the brand, only the brand” may be interpreted as the same meaning. This study employs transformers-based model approach which overcomes this limitation by

considering the contexts in the content and uses BERTopic (Grootendorst, 2022) methodology to extract the topics included in the text. As the airline market and industry have unique characteristics, the approach contributes to a better understanding of the users' conversation. User review in Airlinequality.com (Skytrax, 2024a) for the top 25 airline companies from Skytrax World's Top 100 Airlines 2024 list (Skytrax, 2024b) are selected as the sample of the study and used in topic modeling methodology. User reviews are split into recommended / not recommended datasets and topics are extracted for the dual-side in the study.

## I. LITERATURE REVIEW

### I.1. Electronic Word of Mouth and Online Reviews

Word of mouth, based on the idea that people influence each other by exchanging information, is an essential concept in consumer research. It is perceived a more credible source of communication than marketer's communication because of trust to peers/other people similar to consumers themselves (Allsop et al., 2007). Thanks to the digitalizing world and increasing information-sharing channels, word of mouth has transformed into electronic word of mouth. It has become one of the essential sources of information for today's consumers. Conventional word of mouth has a limited nature with social, often personal and narrow network, while electronic word of mouth can reach to a global network (Ladhari & Michaud, 2015). eWOM communication has the ability of extra ordinary diffusion speed and allows multi-directional information exchange among communication parties (Cheung & Thadani, 2012). Information exchange within the scope of eWOM has gone beyond the relationship between individuals, reaching additional dimensions such as brands to individuals and between brands, enabling multi-faceted communication. With the spread of smartphones and social media channels after the 2000s, information sharing in different types of data from different sources has begun.

In the early days, digital platforms have the form of forum websites where text-based information was shared. For example, Lee and Hu (2005) examine online e-complaints recorded on a specialized complaint forum in their study by focusin on hotel customers. Various formats have emerged over time, such as online reviews, social media posts with photos and videos, and numerical ratings/star ratings accompanying the text in online reviews. Today's consumers can share their reviews with other users and businesses through sites like TripAdvisor for tourism, Yelp for restaurants, and business and location pages on social media. Diversity of online review channels are already studied in the marketing research by several platforms such as Airbnb (Cheng & Jin, 2019; Lee et al., 2020; Xue et al., 2022), Google Maps (Lee & Yu, 2018; Mathayomchan & Taecharungroj, 2020), Amazon (Salehan & Kim, 2016) and Google Play Store (Chen et al., 2021). The diversity of online review content and the volume on digital platforms make it necessary to understand the impact of online reviews on consumers and the market.

The effects of eWOM and online reviews on consumers can be mainly attributed to information asymmetry (Manes & Tchetchik, 2018), social interaction, and brand-consumer interactions. Information asymmetry is related to one of the most basic needs regarding information usage. Accordingly, consumers want equal levels of information regarding products or services and the company/seller, and they search for information in line with this need. Social interaction is related to the social existence of consumers. Accordingly, consumers interact with their close circles and others on social media. Finally, there are various consumer issues in brand-consumer interactions, such as brand attitude, brand image (Krishnamurthy & Kumar, 2018), brand equity (Sun et al., 2021) and brand trust.

Online reviews defined as "*peer-generated product evaluations posted on company or third party websites*" (Mudambi & Schuff, 2010) are a source of information in different industries and product/service groups in consumers' search for information and decision-making. Differences in industries and physical products and services lead to challenges in understanding online reviews. Services have distinct characteristics, and they affect consumers' perception, evaluation, and transfer of information. On the business side, intangibility of service delivery makes interpretation and

measurement of service quality complex comparing to physical products (Lopez-Valpuesta & Casas-Albala, 2023). The level of influence and usage of online reviews in physical products, where product-related features, performance, and price are effective, differ from those in services, where measurability and standardization are complicated, and personal experiences play an active role instead of objective information. In service industries such as tourism, airlines, health, and education, the subjectivity of the experiences experienced by consumers can be included in online reviews shared with other users. It can be a reference source for companies in these sectors to understand consumers.

## **I.II. Electronic Word of Mouth in Airline Marketing**

As a service industry, the airline industry differs in terms of brand-consumer interaction and consumer decision-making regarding intangible and subjective experiences. Personal experiences, preferences, and perceptions of service are essential topics for airline marketing. On the consumer side, consumers are affected by the content written by other users; on the business side, consumers leaving feedback to brands through online reviews can contribute to marketing decision-making. According to Shah et al. (2020), assessing the service quality by consumers' perspective and keeping in the customer-focused approach are required for understanding the needs of consumers and the ways of satisfying consumers. Airline companies that understand consumers better and discover consumer insights from online reviews can differentiate themselves in the market, which can lead to a better position in the competitive environment.

One of the airline industry's distinguishing features is that the product offered is used in different forms and purposes. Service classes designed according to travel budgets (business, economy), passengers with different types of purposes (business, leisure), and different service levels designed according to the level of the product offered (low-cost, full-service) indicate a comprehensive consumer behavior potential in the airline market. Ostrowski et al. (1994) evaluate business and leisure travel in their study and indicate significant differences between business and leisure traveler's perceptions of service quality. In another study, Chatterjee and Mandal (2020) examine user reviews for traveler preferences and conclude varied preferences regarding travel goals, class and culture. Passengers with different expectations and traveling for different purposes experience different decision-making styles, and airline companies are working on the factors that affect consumer decision-making.

Investigation of individual criteria/themes for satisfaction, preference or service quality regarding airline context has been studied in airline literature (Brochado et al., 2019; Lucini et al., 2020) and it is essential to understand the criteria or criterion set that users care for airline marketing. Digital platforms offer many sources for user feedback and reviews. For example, the Airlinequality.com (Skytrax, 2024a) website offers value as a data source, where consumers post their reviews and can evaluate airlines based on various parameters. These parameters include seat comfort, cabin staff service, food & beverages, inflight entertainment, ground service, wifi & connectivity, value for money. Users who can evaluate these parameters with a star rating between 1 and 5 can also share their experiences as free text on the website. User reviews that mention different topics and reflect the consumer experience's individuality can be helpful in airline marketing.

## II. METHODOLOGY

Evaluation of electronic word-of-mouth concept for airline industry requires the relevant data for the sample of the study and the online reviews written by passengers are the one of the data sources for eWOM studies. The study uses the user reviews containing the information regarding recommendation status on Airlinequality.com (Skytrax, 2024a) consistent to research aims. Skytrax user reviews are already used in airline marketing literature (Song et al., 2020; Lucini et al., 2020) and the data availability poses opportunities for marketing researches. Top 25 airlines are selected for the sample of the study from the Skytrax World's Top 100 Airlines 2024 list (Skytrax, 2024b). Airlinequality.com website platform contains the user reviews for airline companies and airports and the user reviews includes the information in a detailed format such as rating scores, text reviews, score categories for different aspects and recommendation status. The study uses Python programming language (Van Rossum & Drake, 1995) on Google Colab (2024) for obtaining the data and the data collection takes place on 16.08.2024.

The research design starts with data collection of 33.810 user reviews from 25 airline companies. In the initial stage, topics and keywords are extracted using topic modeling methodology. Since the conversation includes airline and city names, they are primarily detected in the first phase and added to a stop-word lexicon for the second stage. Most occurring stopwords and national capital names and country names (Wikipedia, 2024) are also added to stopword list. Following the removal of stopwords, the user reviews are split into two parts, based on their recommended status value in the user reviews, and two datasets are created. Consistent to the nature of transformer-based language model, no additional pre-processing tasks are employed. Following the employment of topic modeling, extracted keywords and representative reviews are examined. After the individual topics are named, the individual topics are grouped into topic groups regarding the content in the final stage.

Topic modeling methodology examines the text content and aims to detect included topics in content by numerical methods. Alghamdi & Alfalqi (2015) explains the topic models as the documents are referring to mixtures of topics, while the topic concept is a probability distribution over words. Online review data contains many constructs and verbal entities, and these structures can be used to extract meaningful patterns. For example repeated patterns of "i like the airline", "i do not like the movie" can be the signal of positive or negative attitudes or expression of specific entity like "cabin staff", "wi-fi" can be signal of the specific service quality constructs. Topic modeling methodology aims to find the patterns and detect the topics included in the conversation.

The limitation of the traditional topic modelling approach which relies on bag-of-words assumption ignoring information coming from the ordering of words (Alghamdi & Alfalqi, 2015) can be problematic in the user reviews data, since the contextual details can be crucial in understanding the topics. In traditional topic modeling, documents are converted into Term-Document matrix - a representation of how many times words are included in the documents- by examining documents and counting the number of occurrence each word is seen (Barde & Bainwad, 2017). In this type of evaluation, the most common words are related to the topics, which can lead to neglecting relatively fewer common words and contexts. For example, online reviews in airline industry may have mention about disability-related reviews not so much in the reviews, or users can express the issues with varying words. In that case, emphasizing on only the occurring count may mislead the evaluation.

Word embedding is the another approach which capture the meaning of word in semantic and syntactic terms, and transformers-based approach which consider the position of the words, delineate the context and create embeddings for the words (Lopreite et al., 2024) proposes advantages for better understanding the user conversation. The study uses BERTopic methodology which uses pre-trained

transformer-based language model to generate document embedding, clusters the embedding and generates topic representations (Grootendorst, 2022). The BERT part represents the “Bidirectional Encoder Representations from Transformers (BERT)” from the Devlin et al. (2019)’s study, and the “Topic” part represents the topic modelling approach. BERTopic methodology is employed in online reviews research in several contexts including online food delivery’s service quality (Ma et al., 2024), COVID-19 and Airbnb users (Liu & Mengoni, 2023) and customer satisfaction in green restaurant (Shahhosseini & Khalili Nasr, 2024). BERTopic methodology used in this study for airline reviews in airline market context.

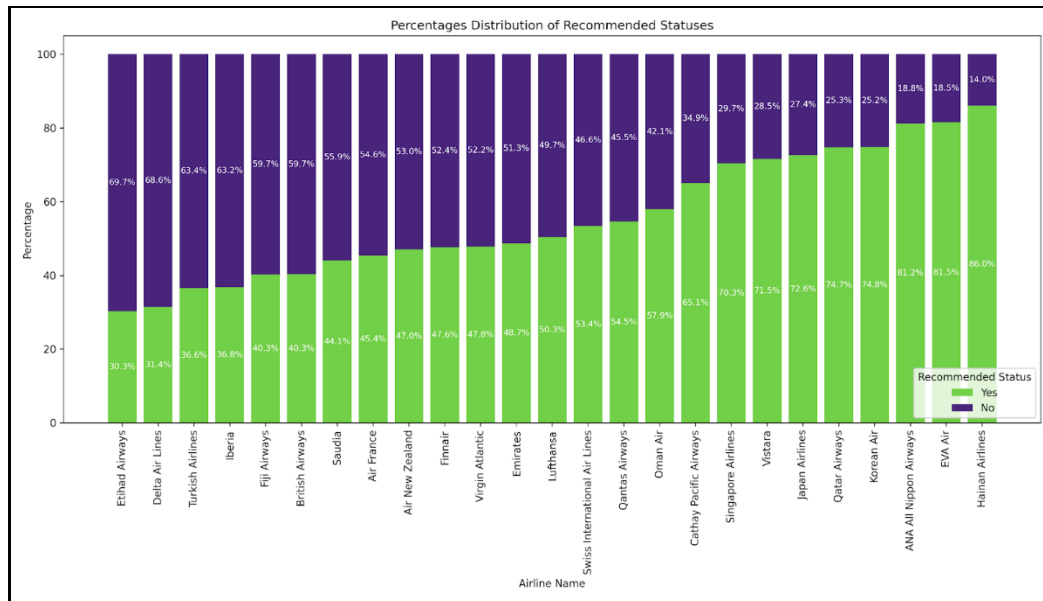
### III. FINDINGS AND DISCUSSION

Airline company review pages containing user reviews are used as a source of information in the data retrieval process, and all reviews are retrieved for the study. Twenty-five airline company names and review counts for them are presented in Table 1.

**Table 1. Study Sample Set**

Airline	Review	Airline	Review
ANA All Nippon Airways	590	Japan Airlines	423
Air France	1378	Korean Air	579
Air New Zealand	864	Lufthansa	2493
British Airways	3841	Oman Air	485
Cathay Pacific Airways	1451	Qantas Airways	1916
Delta Air Lines	3057	Qatar Airways	2470
EVA Air	647	Saudia	454
Emirates	2387	Singapore Airlines	1598
Etihad Airways	1792	Swiss International Air Lines	1077
Fiji Airways	318	Turkish Airlines	2616
Finnair	922	Virgin Atlantic	856
Hainan Airlines	408	Vistara	274
Iberia	914	Total	33810

Table 1 presents various amounts of reviews in the sample set, and since some companies have few reviews, no additional minimum/maximum filter is implemented in the dataset. A total of 33.810 user reviews are retrieved for the sample of the study in the first stage. A total of 33.810 reviews consist of 17.076 (50.505%) recommending reviews and 16.734 (49.494%) not recommending reviews. The distribution of recommended/not recommended statuses for airlines in the sample is presented in Figure 1.



**Figure 1. Distribution of Recommendation Status Among Airline Companies**

Figure 1 presents the various percentage distributions of recommendation/not recommendation statuses for airline companies. Although the overall ratio of recommendation/not recommendation equals 50.505/49.494, the individual ratios have differences among the airline companies. Etihad Airways (30.3%), Delta AirLines (31.4%), Turkish Airlines (36.6%) and Iberia (36.8%) are the airlines that have recommended ratios below 40%; while ANA All Nippon Airways (81.2%), EVA Air (81.5%) and Hainan Airlines (86.0%) are the airlines that have more than 80% recommended ratios.

In the second stage, the datasets are split into two datasets regarding their recommendation statuses, and the topic modeling methodology is implemented for two datasets. After naming individual topics, they are grouped into topic groups and presented in Tables 2 and 3.

**Table 2. Recommended Review Set Topics**

Topic Group	Topic	Topic Group	Topic
Flight Experience	Family Travel	Travel Class	Business Class
	Food / Meal / Menu		Economy Class
	Full Experience Process	Airline Mentions	Airline Comparison / Mention
	Overall Experience		Korean Air Highlight
	Seat Experience		Vistara Highlight
	Wheelchair Assistance	Other	Chinese Highlight
Customer Service	Customer Service		
	Staff Service / Crew		

Table 2 indicates the topic groups for the recommended-status reviews and shows the low-diversity level for the reviews. Flight experience topic group is consistent to Airlinequality.com (Skytrax, 2024a) review category ratings and it includes general topics like overall experience, seat experience, full experience process. In addition, the topic groups contains relatively specific concerns

like “food / meal / menu”, “seat experience”, “family travel” and “wheelchair assistance”. In addition, the travel classes in airline market are included in Table 2 in travel class topic group and through the “business class” and “economy class” topics. Reviews regarding customer service are also included in Table 2 by “customer service” and “staff service / crew” topics. Table 2 also contains specific highlights / mentions regarding Korean Air and Vistara airline companies and users also talk about airline comparison / mention in the user reviews. Finally, “Chinese highlight” topic signal the language-related aspect.

Table 2 presents the positive side of the study and Table 3 focuses on the negativity side of the study by presenting the individual topics and topic groups for not-recommending user reviews.

**Table 3. Not-Recommended Review Set Topics**

Topic Group	Topic	Topic
Flight experience	Cabin Crew	Meal / Food
	Cabin Temperature	Upper Class Experience
	Electronics & Devices in Flight	Vegetarian & Gluten Free Meal
	Food & Beverages	Water Request
	Travel with Baby	Wheelchair service
	Inflight experience	
Service Experience	Cancellation & Refund	Flight Delays
	Connection Flights	Ground Operations
	Downgrading of Travel Class	Travel Classes
Customer Service / Operations	Accommodation	Customer Service
	Cancellation	Staff and Communication
	Cancellation & Refund	
Baggage	Cabin Baggage	Luggage Extra Pay / Customer Service
	Customer Service	Luggage Guitar / Instrument Damage
	Lost Luggage/Baggage	Luggage Weight
Customer Expressions	Comparing Airlines	Negative Expression
Region/Country-Based Expressions	China-Related	Russia-Related
Seats	Paid Seat / Seat Reservation	Seat Comfort
	Seat Allocation	
Transferring Process	Luggage	Transferring Process
Special Cases	Cancellation and Refund at Covid19 Period	Mask Enforcement to Children

The main finding of Table 3, which includes topics related to not-recommended user reviews, is related to the diversity of user comments. Compared to the positive part, more topic groups were reached. When topic groups are evaluated, the topics can be evaluated by three main groups: i) general consumer experience, ii) specific consumer topics, and iii) cultural and special cases.



The first part -general consumer experience- is similar to existing rating categories on [airlinequality.com](http://airlinequality.com) and recommended-side, but differs in terms of diversity. Flight experience topic group with nine individual topics, service experience topic group with six individual topics, and customer service / operations topic groups with five individual topics represent the vast diversity of topics in negative side of user reviews. In the negative side, individual topics in the flight experience regarding specified topics such as cabin temperature, upper class experience, vegetarian & gluten free meal, and water request are included in the reviews and they signal different aspects of users.

The second part -specific consumer topics- introduces topics that can be included as a sub-component in traditional rating categories. For example, baggage topic group can be identified as a ground service sub-component in traditional reviews, while it is represented as a topic group consisting of six individual topics in this study. "Cabin baggage", "Luggage extra pay / customer service", and "Lost luggage / baggage" highlights the different aspects in the topic group. "Transferring process" topic group with individual topics of "luggage" and "transferring process" also contain the similar perspective.

The last part - culture and special cases - represents the novelty of the study findings, as it contains consumer information regarding different aspects. There are "China-related" and "Russia-related" conversation taking place in user reviews which represents the global side of airline market which can contribute to regional and global airline marketing. The special cases are also included in user reviews through the topics of "cancellation and refund at Covid19 Period", and "mask enforcement to children". Detection of special cases topics can help to understand customers in detail and contribute to understand the details further the main issues.

#### IV. CONCLUSION

The study sets out to assess the underlying topics in airline users' reviews in terms of recommendation and not recommendation aspects and it employs topic modeling methodology to discover the topics in the dataset of 33.810 user reviews for 25 airline companies. Following the detection of raw topics, the main topics and the topics groups are concluded in the study, which leads to five main topic groups (flight experience, customer service, travel class, airline mentions, and other) for recommending status user reviews and nine main topics groups (flight experience, service experience, customer service/operations, baggage, customer expressions, region/country-based expressions, seats, transferring process and special cases) for not-recommending status user reviews.

The study confirms and advances the eWOM (Hennig-Thurau et al., 2004) theory and Servqual (Parasuraman et al., 1988) concepts through the finding included in recommended/not-recommended as topic groups and individual topics in airline market. Firstly, the study presents the balanced ratio of recommendation in top 25 airline company user reviews which confirms the positive and negative side of user reviews. Then, the study confirms the effect of Servqual attributes to the eWOM in terms of tangibles (seat experience, food / meal / menu, baggage), reliability (flight delays, cancellation & refunds), responsiveness (customer service, staff and communication), assurance (staff service / crew) and empathy (staff service / crew). For the recommendation / not recommendation side, this study extends Park et al.'s (2020) study which examines airline service attributes through satisfiers and dissatisfiers. Park et al. (2020) conclude cleanliness, food and beverages, and inflight entertainment as satisfiers; while they conclude customer service and check-in and boarding as dissatisfiers. This study adds more detailed evaluation for the positive and the negative sides.

The study also confirms the [Airlinequality.com](http://Airlinequality.com) (Skytrax, 2024a) reviews star rating categories (seat comfort, cabin staff service, food & beverages, inflight entertainment, ground service, wifi & connectivity, value for money) generally by presenting the topics such as seat experience, seat comfort, staff service / crew, meal / food, electronics & devices in flight, ground operations and travel class. However, the finding of the study is not limited to star rating categories of [Airlinequality.com](http://Airlinequality.com). The study elaborates different aspects of the airline passengers' reviews through the individual topics like connection flights, accommodation, cabin baggage, paid seat / seat reservation, special cases and region/country-based expressions. Categorical ratings express the main groups of consumer expressions

but they are limited to main content categories. The review text and the interpretation of the text through topic modeling can signal the various aspects of the passengers which can contribute to better marketing decision-making.

Following topic modeling methodology through transformers-based model on airline marketing by online reviews data contributes to airline marketing literature in two aspects: i) the study examines the recommendation/not recommendation aspect in detail which goes further from the pre-defined rating categories, ii) the study extends the methodological approach to a novel approach -transformers-based model which considers the contextual aspect. In the first aspect, the previous studies examine the airline marketing through Skytrax reviews in various contexts. For example, Punel et al. (2019) evaluate travel experience and the service quality concepts across the globe by examining ten geographical regions, while Song et al. (2020) examine flight-delay context with sentiment analysis. In another study, Bunchongchit and Wattanacharoensil (2021) focus on the passenger types aspect while they employ PLS-SEM and sentiment analysis methodologies together. This study focuses on recommendation aspect in eWOM literature specifically and contributes to the literature by revealing the topics included in recommended and not-recommended side. In the second aspect, the study contributes to topic modelling approach which is already utilised in the previous studies in airline marketing literature. Korfiatis et al. (2019) employ structural topic modeling for service quality context and Lucini et al. (2020) use latent dirichlet allocation model for detecting the topics in dimensions of satisfaction. This study contributes to the literature by employing transformers-based topic modeling approach in airline marketing research.

In today's competitive marketing world, businesses that understand their consumers and produce solutions for their demands gain an advantage. For the managerial implication side, evaluating the customers with specific aspects, such as which topics lead to satisfaction/dissatisfaction and which topics signal a recommendation to other users or not recommending, is one of the sources for customer insights. These customer insights can be the starting point for new marketing communication messages and can be the base for marketing campaigns and better customer relationships. The dual perspective of the study presents useful information for understanding the consumers. As a result of the study, while the diversity of topics on the positive side is relatively less, a comprehensive diversity of topics is concluded on the opposing side. This result emphasizes the potential of a detailed understanding of the situations where consumers do not recommend airline companies. The second managerial implication relates to joint and separate topics on the positive and negative sides. While the topics like "flight experience," "customer service," and "travel class" are included on the both sides; on the negative side topics such as "baggage," "transferring processes," and "special cases" are included. Detection of specific topics can be a precursor to better understanding consumers and producing better services. Evaluation of the online available data through reviews and feedbacks proposes significant potential for airline companies and contributes to industrial applications. Airline companies can use the finding of the study to understand the consumers better and topic modeling approach poses potential for understanding the airline market.

The study focuses on the top airline companies announced by Skytrax (2024a) and do not employ the contextual details such as airline types, user types and regional differences. This limitation can be extended in the new studies by examining the recommendation/not recommendation topic in the new contexts. In addition, the study only focuses on the content side of the user reviews by employing topic modelling. Future studies can extend the methodological approach by implementing sentiment analysis (Canbolat & Pınarbasi, 2022) approach individually or integrated with topic modelling. The last limitation refers to the sample type as the study focuses on Skytrax Airlinequality.com reviews. Future studies can examine other user-generated content such as social media posts for understanding the airline market.

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