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Airport service quality and passenger satisfaction: The impact of service failure on the likelihood of promoting an airport online

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ABSTRACT

Based on the analysis of 2278 online passenger ratings of airports worldwide, this study uses a standard multinomial logit model to determine the likelihood of a passenger being a promoter of an airport when a service attribute has failed, controlling for several passenger and airport characteristics. Results show that failures associated with airport staff and queueing times are most likely to reduce the probability of a passenger being a promoter of an airport. Failures associated with airport shopping and wifi service are least likely to do so. More importantly, the failure of any service attribute in this study significantly reduces the probability of a passenger being a promoter of an airport. This suggests that all parts of the airport value chain are likely to suffer when a service attribute fails. Passenger and airport characteristics included in this study do not add significant explanation to whether a passenger becomes a promoter.

1. Introduction

Airports face several challenges when serving passengers, for instance, as a result of terminal congestion, uneven demand, exposure to local disruptions and external events, the involvement of multiple staff and service providers, and fragmented passenger segments that have diverse expectations regarding service quality. Despite efforts to standardise several key processes at airports such as at check-in, bag drop, security screening, passport control and departure gates, it means that, unlike in manufacturing, where companies strive for ′zero-defect′ production, it is almost impossible to avoid defects in service delivery. Instead, service failures are inevitable at airports, and while failures with some service attributes may have little impact on overall satisfaction, the impact of others may be significant and subsequently affect behavioural intentions such as airport reuse and/or recommendation. The latter is of particular interest given the ease with which passengers can now use online review platforms to rate airports and potentially influence the decisions of other travellers or stakeholders that have an interest in the airport.

Against that backdrop, this study investigates the impact of service failure on the likelihood of promoting an airport online. It addresses two main research questions: (1) Does the failure of individual service attributes affect the likelihood of a passenger to promote an airport online? (2) Are some service attributes more important than others? Using service attributes as predictor variables and an aggregate rating of overall satisfaction as the response variable, a standard multinomial logit model is applied to determine the likelihood of a passenger being a promoter of the airport versus being passive or a detractor when a particular attribute is negatively versus positively rated – therefore determining the impact of service failure on recommendation likelihood and also examining the relative impact of individual service attributes.

This paper provides a written account of the study. Section 2 provides a review of relevant literature on service quality and service attributes at airports, performance and service failure, and the effects of passenger and airport characteristics; Section 3 describes the methodological approach taken including the data and variables, and analytical approaches that are used; Section 4 presents results of the analysis; Section 5 provides a discussion and concluding remarks on the main contributions, implications, study limitations and recommendations for future research.

2. Literature review

2.1. Service quality and service attributes at airports

Many airports have become complex and commercial businesses that

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compete at various levels (Halpern, 2018a). This includes competing for passengers that are needed to fill the aircraft of the airport's airline customers (e.g. for origin, transfer/transit or destination traffic) but also whose spending (e.g. on retail, food and drink and car parking) has become a vital source of income at airports (ACI, 2019a). At the same time, passengers are generally experiencing a greater choice of airports or modes of transport that they can use (Thelle & Sonne, 2018). They are also becoming more experienced and are demanding greater levels of service from airports, and a growing willingness to switch to alternative airports or modes of transport if they are not satisfied (Halpern & Graham, 2013). As such, service quality, which compares the difference between perceived expectations of a service and its perceived performance, can be viewed as an important source of competitive advantage for many airports (Pandy, 2016). Previous research concurs with this. For instance, ACI (2016) shows that a 1% increase in passenger satisfaction results in a 1.5% increase in non-aeronautical revenue at airports, and that the increase from passenger satisfaction is much greater than from increased passenger traffic or commercial space at airports. In addition, Prentice and Kadan (2019) find a significant positive relationship between service quality and passenger intentions to reuse airports.

Of course, some airports operate in less competitive markets than others, which means that in some cases, consumers have limited alternative options to choose from when travelling. There is always a risk that such airports might abuse their market power by paying little attention to service quality. As a result, regulators that are keen to protect consumer interests, often pay close attention to standards of service quality at airports (CAA, 2016). As do other stakeholders given the wider role that airports often have, for instance, on regional accessibility and business and social development (Halpern & Bråthen, 2011, 2012). It has also been recognised that airport services can enhance passenger experiences in relation to tourism (Wattanacharoensil, Schuckert, & Graham, 2016). For instance, in destinations that are dependent on air access, airport service quality can play a key role in forming the first and last impressions of quality in the destination (Martin-Cejas, 2006) and can contribute to destination revistiation (Hong, Choi, & Chae, 2020; Prentice & Kadan, 2019).

Service quality has therefore become a key area of interest to airports and other stakeholders, and many airports and regulators now have their own airport service quality monitoring programmes. In addition, the international airport association Airports Council International (ACI) has a well-established global benchmarking programme called Airport Service Quality (ASQ). ASQ surveys passengers to rate airports in 34 areas relating to eight service attributes (access, check-in, passport/personal identification control, security, finding your way, airport facilities, airport environment, and arrivals services) and overall satisfaction. Each year, approximately 550,000 passengers worldwide are surveyed at over 300 airports. Data is then used by airports to assess how their services are rated, compare performance with other airports, identify important aspects and track how passenger perceptions and priorities change over time (ACI, 2020b).

Airport service quality has also become a key area of interest to scholars – keen to investigate attributes of service quality and how they affect satisfaction – and there is a growing body of literature on the subject. Studies either develop their own set of service attributes, for instance, as latent constructs created from a wider set of formative indicators, or use attributes developed by other studies. Table 1 lists a selection of airport service quality studies and it can be seen that most of them develop or use airport-specific attributes rather than those of standard models such as SERVQUAL, which is a multi-item scale for measuring consumer perceptions of service quality that was developed by Parasuraman and Ziethaml (1988) and has been used, or adapted by service quality studies for other sectors of the tourism industry such as for airlines (Basfirinci & Mitra, 2015; Rezaei, Kothadiya, Tavasszy, & Kroesen, 2018), tour guiding (Urdang & Howey, 2001), wildlife safaris (Akama & Kieti, 2003), hotels (Mey, Akbar, & Fie, 2006), heritage attractions (Frochot & Hughes, 2000 who subsequently developed their own model called HISTOQUAL), and holidays (Tribe & Snaith, 1998 who subsequently developed their own model called HOLSAT).

Table 1
Passenger-related service attributes created by or used in studies on airport service quality.

Study	Service attributes
ACI (2020b)	Access, check-in, passport/personal identification control, security, finding your way, airport facilities, airport environment, arrival services
Bezerra and Gomes (2015, 2016, 2020)	Check-in, security, convenience, ambience, basic facilities, mobility, prices
Bogicevic, Yang, Cobanoglu, Bilgihan, and Bujisic (2016)	Six servicescape factors: Design, scent, functional organisation, air/lighting conditions, seating, cleanliness
Correia, Wirasinghe, and de Barros (2008)	Waiting time, processing time, walking time, walking distance, level changes, orientation/ information, space availability for passengers, space availability for cars at the curbside, number of seats
Fodness and Murray (2007); Lubbe, Douglas, and Zambellis (2011)	Function (e.g. speed of processes, wayfinding, physical layout), interaction (e.g. with service personnel), diversion (e.g. shopping and dining, leisure facilities, wifi)
Hong et al. (2020)	Interactional quality/delivery (e.g. with service personnel), physical environment/ servicescape (e.g. retail, restrooms, atmosphere – lighting/comfort/seating, temperature and humidity, scenery), outcome quality/convenience (e.g. signage, flight information, ease of carrying baggage, distance to gate)
Liou, Tang, Yeh, and Tsai (2011)	Convenience, comfort, immigration customs and quarantine, transportation, courtesy of staff, information visibility, security, price of shopping
Pandy (2016)	Access, check-in time, security, finding your way, facilities, environment, arrival services
Pantouvakis and Renzi (2016)	Servicescape and image (e.g. comfort and cleanliness), signage (including directions), services (e.g. speed of control and courtesy of service personnel)
Prentice and Kadan (2019)	Facilities (e.g. seating, airbridges, retail and dining), check-in (e.g. processes, staff, self-service kiosks), servicescape (e.g. signs, layout), ambience (e.g. cleanliness, temperature, noise, aroma)
Rhoades, Waugespack Jr, and Young (2000)	Parking, rental car services, food and beverage, restrooms, gate boarding areas, baggage claim facilities, ground transportation, retail, duty free shops, information display systems, intra-terminal transportation, special services
Trischler and Lohmann (2018)	Check-in, immigration, information, baggage, gate lounges, amenities, airbridges, security
Tsai, Hsu, and Chou (2011)	Airport facilities planning (e.g. sanitary condition of lavatory), airport circulation planning (e.g. convenience of public transport), procedural service (e.g. airport receptionist attitude), flight information service (e.g. accuracy of flight information board)
Yeh and Kuo (2003)	Comfort, processing time, convenience, courtesy of staff, information visibility, security

Note: The list includes ACI's ASQ and passenger-related studies published in academic journals since 2000 that are listed on Google Scholar, ScienceDirect or Emerald Insight when using the search term ́airport service quality ́, but the list is primarily for illustrative purposes and is therefore by no means exhaustive.

Despite slight differences in terms of the attributes used in the studies in Table 1, there are also similarities in that most of them use what Fodness and Murray (2007) refer to as attributes of function (e.g. speed of processes, wayfinding, and physical layout), interaction (e.g. with service personnel) and diversion (e.g. shopping and dining, leisure facilities, and wifi). This is not too dissimilar to Caves and Pickard (2001) that distinguish between process activities that are related to passenger flows and discretionary activities that are related to what a passenger can do in their spare time.

As will be mentioned in more detail in Section 3.1, the analysis in this study is based on data obtained from Skytrax – a global quality ranking programme that allows users to rate airports according to eight service attributes – queueing times, terminal cleanliness, terminal seating, terminal signs and directions, food and beverages, airport shopping, airport wifi service, and airport staff. While this means the choice of attributes for this study is strictly limited to those that are available on Skytrax, it can be seen that they are closely related to attributes used in previous studies listed in Table 1, and in particular to those of Fondness and Murray (2007), because four of them are related to function (queueing time, terminal cleanliness, terminal seating, and terminal signs and directions), one is related to interaction (airport staff), and three are related to diversion (food and beverages, airport shopping, and airport wifi service).

2.2. Performance and service failure

Despite the importance of service quality to airports and an understanding of the attributes that contribute to it, maintaining service quality at airports is a challenge for several reasons. Prior to Covid-19, many airports were getting busier and experiencing pressure on their ability to maintain and improve standards. For instance, the world's airports served 9.1 billion passengers in 2019 (ACI, 2020a), and this was expected to more than double by 2040 based on a projected growth rate of 4.1% per annum (ACI, 2019b). Global passenger traffic at airports has declined dramatically during Covid-19, and forecasts are expected to be revised downwards. However, as traffic begins to recover, new safety and hygiene measures, including the ongoing need for social distancing, mean that airports will still experience pressure on their ability to maintain and improve standards, albeit while serving relatively fewer passengers.

Demand for airports is typically uneven (Halpern, 2011) and consequently there are often temporal variations in the delivery of service quality and how it is perceived by passengers. Airports are also exposed to local disruptions (i.e. to equipment or infrastructure, airline operations, or surface access) and external events such as adverse weather conditions that can affect service quality. Despite the use of technologies to standardise many of the key processes at airports, service encounters still often involve people who can affect how services are delivered. Also, airport operators are not the only providers of services at an airport – some are offered by partners such as airlines, handling agents, concessionaires, security companies and governmental agencies (Halpern & Graham, 2013), and different providers may have conflicting objectives and views on how service quality should be delivered. This is noted by Meyer (2017) in the context of the airport-airline relationship because he claims that airports and airlines currently operate as separate entities, resulting in alternative views of the passenger journey which is hindering industry progression in terms of service quality and innovation. Another issue is that airports cater to increasingly fragmented passenger segments (Halpern, 2018b). This makes it much harder for airports to meet the different expectations of their passengers.

As a result, service failures are inevitable. However, while service failure is well-researched in more general service management literature (e.g. see Fouroudi, Kitchen, Marvi, Akarsu, & Uddin, 2020 for a bibliometric investigation of 416 articles on service failure) and also in literature on other sectors of the tourism industry such as museums (Su & Teng, 2018), restaurants (Namkung & Jan, 2010), hotels (Lewis & McCann, 2004), and airlines (Migacz, Zou, & Petrick, 2017; Xu, Liu, & Gursoy, 2018), it has so-far received little attention in literature on airports. Instead, airport literature tends to focus on drivers of satisfaction (Table 2). The explanatory models that are used have become more diverse over time, but in general, they all show that passenger satisfaction is derived from the interplay of multiple attributes and that some attributes contribute more to satisfaction than others. However, previous studies do not take into consideration what happens to satisfaction when a service attribute fails. An exception is Bogicevic, Yang, Bilgihan, and Bujisic (2013) who identify key dissatisfiers based on service attributes that passengers typically post negative reviews about online, as well as key satisfiers that typically receive positive reviews.

Service failure refers to the inability of a service to meet customer expectations (Sparks & Fredline, 2007). According to Coye (2004), expectations may be predictive (what customers believe is likely to happen during an impending exchange) or normative (what customers believe a service provider should offer). Although these two types of expectation differ, they have a common contingency aspect because in both cases there is ideation about the outcome of an exchange. When a customer then views the exchange as being inequitable, they are likely to develop negative emotions (Richins, 1987) that subsequently affect the rating of service attributes but also overall satisfaction. This is because customers are less likely to give a positive rating when they are in a negative emotional state of mind (Isen, 1987), and they are likely to be more critical in their assessment of service quality (McColl-Kennedy & Sparks, 2003). Service failure may therefore have a major influence on satisfaction and have negative consequences for customer loyalty (Xu et al., 2018), especially given that satisfaction has been recognised as a critical antecedent of recommendation likelihood (Šerić & Praničević, 2018). This then leads onto the first research question of this study: Does the failure of individual service attributes affect the likelihood of a passenger to promote an airport online?

The online review context is of interest to this study because the internet has made it much easier for passengers to share information such as ratings of products or services. This is a form of electronic word-of-mouth that is less constrained by the social and geographic boundaries of traditional word-of-mouth where information is delivered orally and in person (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004). It therefore provides a virtual setting for sharing information to a much wider audience (Cheung & Thadani, 2010). The information shared via online review platforms is important because it can help to reduce uncertainty in travel planning, which is why travellers often rely on them when making purchasing decisions (Fang, Ye, Kucukusta, & Law, 2016; Shin, Chung, Xiang, & Koo, 2018). However, there is also a growing amount of travel-related information available online that is potentially resulting in information overload and confusion among travellers (Lu & Gursoy, 2015; Lu, Gursoy, & Lu, 2016). As a result, aggregate online ratings such as for overall satisfaction or recommendation play an important role in the decision-making of travellers (Casado-Díaz, Pérez-Naranjo, & Sellers-Rubio, 2017) and may also affect how stakeholders view a particular airport. For instance, it has been found that travellers have higher expectations of rural tourism establishments after reviewing positive recommendations (Díaz-Martín, Iglesias, Vázquez, & Ruiz, 2000) while low aggregate ratings on online review platforms dissuade future customers from choosing a restaurant (Campbell, 2015). In their sentiment analysis, Lee and Yu (2018) argue that online review platforms, in their case Google reviews, can be used as an alternative data source for assessing airport service quality, and can effectively complement and cross-validate conventional quality surveys. Su and Teng (2018) use tourist complaints on Tripadvisor as evidence for the failure of service attributes at museums, and as already mentioned in this paper, Bogicevic et al. (2013) use comments posted by travellers on Skytrax to identify key satisfiers and dissatisfiers at airports.

Given that previous studies (in Table 2) have found that some service attributes contribute more to satisfaction than others, it can also be assumed that the failure of some service attributes affects recommendation likelihood more than others. However, Kano, Nobuhiku, Fumio, and Shinichi (1984) developed a model that shows how, in addition to

Table 2
Effect of service attributes on satisfaction at airports.

Study	Context	Main findings
Bezerra and Gomes (2015)	Survey of 1568 passengers at Guarulhos International Airport, Brazil using a logit model	Check-in, security, ambience, basic facilities, and prices are likely to result in higher ratings of overall satisfaction. Convenience is less likely to do so
Bezerra and Gomes (2020)	Survey of 503 passengers at Congonhas Airport, Brazil using structural equation modelling	Perceived airport service quality is a significant determinant of passenger satisfaction that also indirectly reduces complaining behaviour and increases loyalty
Bogicevic, Bujisic, Bilgihan, Yang, and Cobanoglu (2017)	Survey of 174 university alumni and 189 US residents using structural equation modelling	Positive relationship between airport self-service technologies and passenger confidence benefits and enjoyment, which results in positive effects on overall satisfaction
Bogicevic et al. (2013)	Frequency analysis of 1095 passenger comments posted on Skytrax	Key satisfiers for passengers at airports are cleanliness and a pleasant environment to spend time in, while key dissatisfiers are security check-in, confusing signage, and poor dining offer
Brida, Moreno-Izquierdo, and Zapata-Aguirre (2016)	Survey of 995 passengers at Arturo Merino Benítez International Airport, Chile using a logit model	Image, information and communications, and terminal facilities improve passenger perceptions of service quality
Del Chiappa, Martin, and Roman (2016)	Survey of 551 passengers at Olbia-Costa Smeralda Airport, Italy using fuzzy logic	Location and proximity, and cleanliness and comfort present good service quality performance at food and beverage outlets. Price acceptability and provision of entertainment do not
Gkritza, Niemeier, and Mannering (2006)	Data from an omnibus household survey of 1907 US passengers using a logit model	Waiting times at security screening points are significant determinants of passenger satisfaction
Hong et al. (2020)	Survey of 138 passengers at Incheon International Airport, South Korea using structural equation modelling	Interactional service quality/delivery and outcome quality/convenience are significant determinants of passenger satisfaction. However, physical environment quality/servicescape is not
Heung, Wong, and Qu (2000)	Survey of 630 passengers at Hong Kong International Airport, Hong Kong using gap analysis	Service quality perceptions were high for four different types of restaurant (full-service, quick service, casual dining, and Chinese). However, quick service restaurants demonstrated the weakest service quality perception
Jiang and Zhang (2016)	Survey of 715 passengers at Melboune Airport, Australia using gap and importance-performance analysis	Passengers were most satisfied with the ease of finding one's way through the terminal but large service gaps between expectation with perception of services were experienced for airport shopping and airport parking
Lubbe et al. (2011)	Survey of 100 passengers at O.R. Tambo International Airport in South Africa using importance-performance analysis	Airport personnel and passenger interaction are most important to passengers and may ultimately determine if an experience at the airport is satisfactory
Pandy (2016)	Survey of 625 passengers at Bangkok Suvarnabhumi Airport and Don Mueang Airport, Thailand using fuzzy multi-criteria decision making and importance-performance analysis	To enhance service quality, Bangkok Suvarnabhumi Airport and Don Mueang Airport need to improve on waiting time at check-in and security, ease of finding way through airport, cleanliness of washrooms, and speed of baggage delivery. Don Mueang Airport also needs to improve on vehicle parking facilities and value for money; efficiency, courtesy and helpfulness of check-in staff; waiting time, courtesy and helpfulness of staff at passport inspection; and availability of baggage carts/trolleys
Perng, Chow, and Liao (2010)	Survey of 237 passengers at Taoyuan International Airport, Taiwan using grey relational analysis	Satisfaction with retail products is higher for brand-name, utility, and low-cost products. It is lower for quality and price of cafe products
Prentice and Kadan (2019)	Survey of 373 passengers departing Australian airports using structural equation modelling	Positive relationship between airport service quality and passenger satisfaction. Airport facilities and servicescape make a unique contribution but check-in, security, and ambience do not. Airport service quality influences airport reuse and destination revisit
Sakano, Obeng, and Fuller (2016)	Data from an omnibus household survey of 344 passengers at US airports using structural equation modelling	Positive relationship and causality effect between perceived screening safety and satisfaction with security screening at US airports

Note: The list includes empirical passenger-related studies published in academic journals since 2000 that are listed on Google Scholar, ScienceDirect or Emerald Insight when using the search term áirport service quality satisfaction', but the list is primarily for illustrative purposes and is therefore by no means exhaustive.

one-dimensional and linear relationships, quality attributes and customer satisfaction may also have asymmetric and nonlinear relationships, meaning that attributes that result in satisfaction when fulfilled may not necessarily be the same as those that result in dissatisfaction when not fulfilled. This has been confirmed in several non-airport related studies such as Cadotte and Turgeon (1988), Kuo and Jou (2014), Lin et al. (2017), and Zhu, Lin, Tsai, and Wu (2010). It has also been confirmed in an airport-context by Bogicevic et al. (2013), who found that check-in, confusing signage, and poor dining offer are key dissatisfiers at airports, while cleanliness and a pleasant environment to spend time in are key satisfiers. Therefore, in the context of service failure affecting recommendation likelihood, the second research question of this study asks: Are some service attributes more important than others?

2.3. Passenger and airport characteristics

Several passenger and airport characteristics are controlled for in this study: purpose of travel, trip type, homeland airport, airport size and airport location. This is because previous studies on airport service quality and passenger satisfaction have revealed several differences that might also be observed in this study. However, the findings of previous studies tend to be inconsistent (Table 3). For instance, in terms of purpose of travel, most of the studies find that business passengers are generally less satisfied with airports than leisure passengers (Brida et al.,

Table 3
Effect of passenger characteristics on airport satisfaction.

Characteristic	Study	Effect on satisfaction
Gender (female versus male)	Bezerra and Gomes (2015)	No difference
	Jiang and Zhang (2016)	No difference
	Sakano et al. (2016)	No difference
Frequent versus less frequent flyer	Bezerra and Gomes (2015)	Less satisfied
	Jiang and Zhang (2016)	Less satisfied
	Lubbe et al. (2011)	Less satisfied
Person with versus without reduced mobility	Bezerra and Gomes (2015)	No difference
Student versus non-student	Brida et al. (2016)	Less satisfied
Age	Gkritza et al. (2006)	25–34 and 45–54 less satisfied
	Jiang and Zhang (2016)	60+ more satisfied
Race	Sakano et al. (2016)	No difference
Level of education	Jiang and Zhang (2016)	No difference
	Sakano et al. (2016)	No difference
	Gkritza et al. (2006)	Those with at most high school education was less likely to be indifferent
Level of income	Sakano et al. (2016)	No difference
	Jiang and Zhang (2016)	Lower income more satisfied
	Gkritza et al. (2006)	Higher income less satisfied
Business versus leisure passenger	Brida et al. (2016)	Less satisfied
	Jiang and Zhang (2016)	Less satisfied
	Lubbe et al. (2011)	Less satisfied
	Gkritza et al. (2006)	More satisfied
	Bezerra and Gomes (2015)	No difference
Nationality same as homeland airport	Jiang and Zhang (2016)	(Australians) More satisfied
	Bezerra and Gomes (2015)	(Brazilians) No difference
	Pantouvakis and Renzi (2016)	(Italians) Less satisfied
Gender (female versus male)	Bezerra and Gomes (2015)	No difference
	Jiang and Zhang (2016)	No difference
	Sakano et al. (2016)	No difference
Frequent versus less frequent flyer	Bezerra and Gomes (2015)	Less satisfied
	Jiang and Zhang (2016)	Less satisfied
	Lubbe et al. (2011)	Less satisfied
Person with versus without reduced mobility	Bezerra and Gomes (2015)	No difference
Student versus non-student	Brida et al. (2016)	Less satisfied
Age	Gkritza et al. (2006)	25–34 and 45–54 less satisfied
	Jiang and Zhang (2016)	60+ more satisfied
Race	Sakano et al. (2016)	No difference
Level of education	Jiang and Zhang (2016)	No difference
	Sakano et al. (2016)	No difference
	Gkritza et al. (2006)	Those with at most high school education was less likely to be indifferent
Level of income	Sakano et al. (2016)	No difference
	Jiang and Zhang (2016)	Lower income more satisfied
	Gkritza et al. (2006)	Higher income less satisfied
Business versus leisure passenger	Brida et al. (2016)	Less satisfied
	Jiang and Zhang (2016)	Less satisfied
	Lubbe et al. (2011)	Less satisfied
	Gkritza et al. (2006)	More satisfied
	Bezerra and Gomes (2015)	No difference
Nationality same as homeland airport	Jiang and Zhang (2016)	(Australians) More satisfied
	Bezerra and Gomes (2015)	(Brazilians) No difference
	Pantouvakis and Renzi (2016)	(Italians) Less satisfied

Table 3 (*continued*)

Note: The studies listed include those from Table 2 that investigated the effect of passenger characteristics on airport satisfaction, along with Pantouvakis and Renzi (2016) that specifically explores different nationality perceptions of service quality at airports.

2016; Jiang & Zhang, 2016; Lubbe et al., 2011). It is speculated that this reflects the greater expectations that they have for service quality (Jiang & Zhang, 2016) and because most airports are not providing sufficient services that they need (Brida et al., 2016). In the case of security screening at US airports, Gkritza et al. (2006) find that business passengers are more satisfied than others, which may be due to business passengers enjoying premium services such as fast-track security. In their study on the effects of service attributes and passenger characteristics on satisfaction at Guarulhos International Airport, Bezerra and Gomes (2015) find no significant difference between business and leisure passengers.

Another area with inconsistent findings is related to homeland airport. In their study of passengers at Melbourne Airport, Jiang and Zhang (2016) find that Australians are more satisfied with their homeland airport than passengers of other nationality. This is contradicted by Pantouvakis and Renzi (2016) who find that Italians departing Rome Fiumicino Airport have a lower perception of quality at their homeland airport than passengers of other nationality. In their study of overall satisfaction with Guarulhos International Airport, Bezerra and Gomes (2015) find no significant difference between Brazilians and passengers of other nationality.

There might be differences according to trip type (i.e. if the passenger is in transit or transferring versus arriving or departing the airport). In their study at Bandaranaike International Airport, de Barros, Somasundaraswaran, and Wirasinghe (2007) state that transfer passengers have different needs to those of originating and terminating passengers, and services at airports may or may not be used depending on the type of transfer, the operational configuration of the airport and the airline(s) that are used. They find that the courtesy of security check staff and quality of flight information display screens are among the most valued service attributes by transfer passengers at that airport.

Airport size is another characteristic that has been considered in previous studies. For instance, Which? (2018) surveyed 11,265 passengers that visited UK airports in 2018 and found that passenger satisfaction is on average better at smaller airports (e.g. Doncaster Sheffield, Southend, and Newcastle) versus larger ones. However, passengers are particularly dissatisfied with medium-sized airports (secondary or larger regional airports such as Luton, Stansted, and Manchester), while satisfaction with the largest airports such as Heathrow depends on which terminal the passenger has used. Service attributes contributing to low satisfaction at the medium-sized airports are poor customer service, long queues, and inadequate facilities. This could be a consequence of the greater concentration of flights with leisure and low-cost carriers at such airports, where terminals may be busier and staff-to-passenger ratios, for instance at check-in, may be lower compared to at smaller and particularly large airports that have a higher concentration of regional or full-service carriers respectively. Similarly, based on data extracted from a survey of passengers at international airports, Suárez-Alemán and Jiménez (2016) found higher perceptions of service quality at main airports compared to secondary airports.

Although not considered in previous studies, airport location is also included as a control variable in this study, to implicitly consider the issue of airport competition because service failure might have a greater impact on the recommendation of airports in world regions such as Europe, where competition between airports is arguably more intense compared to in other world regions, at least for point-to-point services.

3. Methodology

3.1. Data and variables

As mentioned in Section 2.1, the analysis in this study is based on data obtained from online review platform Skytrax, which is often used by companies as proof of quality (Rhoades, 2018). In their analysis of previous studies that have used Skytrax, Punel, Al Hajj Hassan, and Ermagun (2019) conclude that Skytrax rankings are reliable and well-established. In addition to airline, seat, and lounge reviews, Skytrax publishes passenger reviews of airports. The platform has been used as a source of data by previous studies, for instance, on sentiment analysis of airport reviews by Bogicevic et al. (2013) and Gitto and Mancuso (2017), and in an airline context by Xu et al. (2018).

On Skytrax, reviewers have the option to complete 20 entries relating to their review: their name, trip verification (by attaching an e-ticket or boarding pass), email address, country of residence, name of the airport being reviewed, date of trip, trip type (departure only, arrival only, arrival and departure, or transit), a maximum 3500 character review, overall satisfaction rating (on a scale of one to ten), rating of eight service attributes (queueing times, terminal cleanliness, terminal seating, terminal signs and directions, food and beverages, airport shopping, airport wifi service, and airport staff) (on a scale of one to five), whether they would recommend the airport (yes or no), purpose of travel (business, family leisure, couple leisure, or solo leisure), and whether they would like to add photos of their visit. Reviews are submitted in English. Skytrax then moderates the review and conducts an IP address check and may request further verification of authenticity before publishing the review.

Data collection took place prior to Covid-19 and included 4188 reviews that had been submitted over a 12-month period. As the aim of this study is to establish the structural link between variables of interest, the dataset was examined for missing values where at least one of the eight service attributes are not rated. This could be, for instance, because the passenger did not experience the attribute and it was therefore not relevant to their review. Reviews with missing values were eliminated, resulting in a sample of 2278 reviews.

Given the focus of this study, the analysis required using variables measured on an objective scale. Ten variables were used in the analysis. Initially, two variables, namely the overall satisfaction rating (SATIS) and whether the passenger would recommend the airport (RECO) were considered as potential dependent variables. The eight service attributes were used as predictor variables. The predictor variables are labeled as follows: queueing times (QT), terminal cleanliness (TCL), terminal seating (TS), terminal signs and directions (TSD), food and beverages (FB), airport shopping (SHP), airport wifi service (WF), and airport staff (STF).

3.2. Selecting a relevant dependent variable

Since there are two potential dependent variables (SATIS and RECO), it was necessary to select one that is most appropriate for examining the relative impact of each service attribute. Thus, structural equation modelling (SEM) was used to investigate linkages between all eight attributes, overall satisfaction, and passenger's recommendation of the airport (Fig. 1). The decision to use SEM was based on two reasons. Firstly, SEM allows simultaneous estimation of the effect of service attributes on overall satisfaction and passenger's recommendation of the airport. This way, it is possible to efficiently assess direct and indirect effects of service attributes and hence decide the most relevant dependent variable to use in the subsequent analysis. Secondly, since satisfaction with service attributes is measured by indicators, conducting SEM effectively accounts for measurement errors, and hence quality of the estimation.

The analysis was conducted by partial least squares structural equation modelling (PLS-SEM) using statistical software SmartPLS 3. Since passenger's recommendation of the airport is a dichotomous variable (yes/no), estimating the structural model through PLS-SEM is appropriate because its underlying design calculates *p* values via nonparametric techniques that do not assume that any variables in the model meet parametric conditions such as univariate and multivariate unimodality and normality (Hair, Hult, Ringle, & Sarstedt, 2017). The model was then assessed by checking collinearity, path coefficients, R^2 values, and predictive relevance. In line with Henseler, Hubona, and Ray (2016), the model was estimated using 5000 bootstrap re-samples and Table 4 presents the results.

As shown in Table 4, the Stone-Gaisser's (Q^2) values are above zero indicating predictive relevance of the model. The adjusted R^2 of 0.816 and 0.737 together with the SRMR value being way below the recommended criterion of SRMR<0.08, suggest that the estimated structural model describes the data well. As such, there was no need to consider alternative model specifications. The relevance of the eight service attributes was assessed by checking the significance of their direct and indirect effects on overall satisfaction and passenger's recommendation of the airport. The results in Table 4 show that each attribute significantly affects overall satisfaction and that overall satisfaction strongly predicts passenger's recommendation of the airport – the latter supports the claim that overall satisfaction is a critical antecedent of recommendation likelihood (Šerić & Praničević, 2018). The direct effects of service attributes on passenger's recommendation of the airport are not significant with the exception of airport staff and terminal seating which manifest weak direct effects. However, the indirect effect of each attribute on passenger's recommendation of the airport is significant. Based on a typology of mediations and non-mediations provided by Zhao, Lynch, and Chen (2010), this suggests that the relationship between the eight service attributes, overall satisfaction and passenger's recommendation of the airport exhibits indirect only mediation since their indirect effects on recommendation are significant while almost all their direct effects are not. Overall, the results of the structural model analysis substantiate the theoretical relevance of the eight service attributes and show that overall satisfaction is the most appropriate dependent variable to use when examining the relative impact of them.

3.3. Operationalisation of the dependent and independent variables

According to Heskett, Jones, Loveman, Sasser, and Schlesinger (2008), a five-point rating of customer satisfaction can be classified into two main categories, zone of non-affection (score of one to three) and zone of affection (score of four to five). Conceivably, a service attribute will fall under the zone of non-affection if it fails to meet customer's expectations while being rated into the zone of affection means the service attribute has met or exceeded customer's expectations. Considering the definition of service failure presented in Section 2.2 as the inability of a service to meet customer's expectations, a service attribute designated in the zone of non-affection is equivalent to service failure. With this reasoning, the study operationalises service failure as a categorical variable by classifying the rating of individual service attributes into two categories: (1) Service failure, which is equivalent to the zone of non-affection (score of one to three); (2) Service success, which is equivalent to the zone of affection (score of four to five).

Since the preceding analysis shows that overall satisfaction fully mediates the effect of service attributes on passengers' recommendation of an airport, the assessment of the effect of service failure conducted in this study uses overall satisfaction as the dependent variable. Thus, the estimated model includes the eight service attributes as predictor variables while the overall satisfaction rating is treated as the response variable. Considering that online reviews play a significant role in influencing prospective customers, this study operationalises the overall

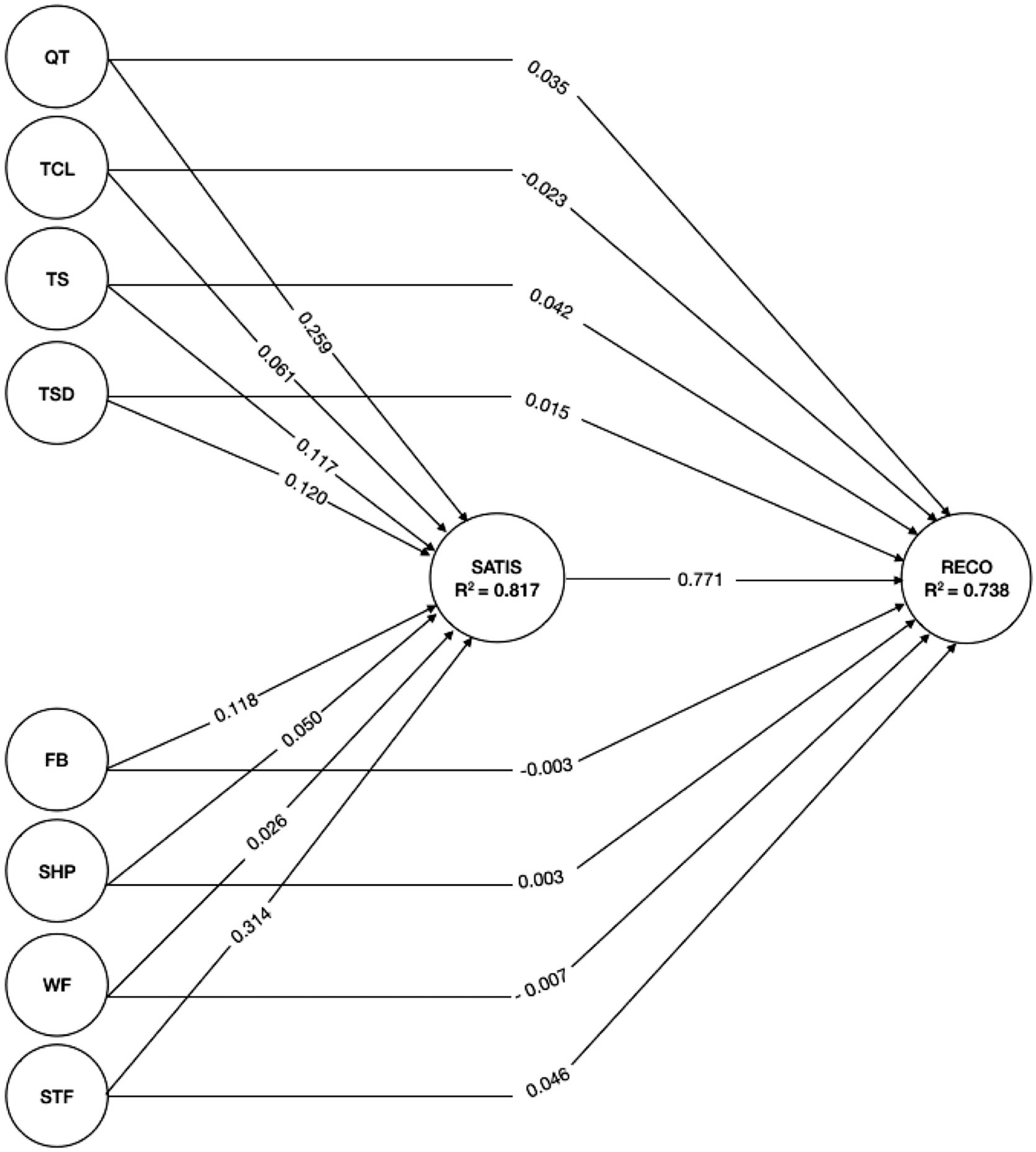

Fig. 1. Structural model.

satisfaction rating given by reviewers as a proxy Net Promoter Score (NPS). Introduced by Reichheld (2003), NPS is widely used, for instance, by more than two thirds of Fortune 1000 companies, to gauge the loyalty of their customer relationships and acts as a predictor of business growth (Kaplan, 2016). It is also widely used by airports of all sizes. The decision to use the overall satisfaction rating as a proxy to NPS is because previous studies have illustrated a strong correlation between the two measures (e.g. see Eger & Mičík, 2017). Following the NPS classification, the overall satisfaction rating was divided into three categories: (1) Promoters (score of nine to ten); (2) Passives (score of seven to eight); (3) Detractors (score of one to six). Promoters are loyal enthusiasts who will keep using the airport and refer others, thus promoting growth. Passives are satisfied with the airport, and while many of them may recommend the airport, they are generally less enthusiastic than promoters are, and are more vulnerable to competitive offerings. Detractors are not particularly satisfied with the airport and may damage the image of the airport and hinder growth through negative word-of-mouth.

Having determined the dependent and independent variables, this study addresses the research questions introduced in Section 1 and 2 of this paper by investigating the likelihood of a passenger being a promoter of an airport when a particular service attribute fails, and the relative importance of service attributes to see if any have a greater effect than others. The next section presents the analysis.

3.4. Analysis of the effect of service failure

To determine the effect of service failure, this study uses a standard multinomial logit model to compute the probability of a passenger being passive or a promoter given that a particular service attribute fails while all other factors are kept constant. As observed by Bezerra and Gomes (2015), probability models have been scarcely used within an airport service quality context despite the obvious advantages of using them when dealing with ordinal scales, and in cases where data does not satisfy the desired nature of the analysis. Notable exceptions that do use probabilistic models but with a different focus to this study include Bezerra and Gomes (2015), Brida et al. (2016), and Gkritza et al. (2006).

Two reasons guided the choice of using a multinomial logit model versus alternatives such as ordered logit or probit models. Firstly, operationalisation of the dependent and independent variables in this study required transformation: a five-point rating of service attributes

Table 4
Results of the structural model estimation.

Variables	Direct effects Coefficient	t statistic	p value	Indirect effects Coefficient	t statistic	p value
QT - > RECO	0.035	1.532	0.126[ns]	0.091	5.797	0.000***
TCL - > RECO	−0.023	1.159	0.247 [ns]	0.200	12.247	0.000***
TS - > RECO	0.042	1.823	0.068*	0.038	2.535	0.011**
TSD - > RECO	0.015	0.740	0.460 [ns]	0.242	13.185	0.000***
FB - > RECO	−0.003	0.117	0.907 [ns]	0.047	3.409	0.001***
SHP - > RECO	0.003	0.136	0.892 [ns]	0.090	5.624	0.000***
WF - > RECO	−0.007	0.391	0.696 [ns]	0.092	6.962	0.000***
STF - > RECO	0.046	1.805	0.071*	0.020	1.833	0.067*
STF - > SATIS	0.314	15.662	0.000***			
QT - > SATIS	0.259	14.012	0.000***			
TCL - > SATIS	0.061	3.470	0.001***			
TS - > SATIS	0.117	5.791	0.000***			
TSD - > SATIS	0.120	7.108	0.000***			
FB - > SATIS	0.118	6.021	0.000***			
SHP - > SATIS	0.050	2.554	0.011**			
WF - > SATIS	0.026	1.850	0.064*			
STF - > SATIS	0.314	15.662	0.000***			
	SATIS	RECO				
R^2	0.817	0.738				
R^2 Adjusted	0.816	0.737				
Q^2	0.799	0.719				
SRMR	0.000					
N	2278					

Note: *** significant at $p \leq .01$; ** significant at $p \leq .05$; * significant at $p \leq .10$; [ns] not significant.

into zone of non-affection (score of one to three) and zone of affection (score of four to five), and a ten-point rating of overall satisfaction into detractors (score of one to six), passives (score of seven to eight), and promoters (score of nine to ten). While the categories (whose selection is based on extant literature), appear to be ordinal in nature, the underlying pattern was changed in the sense that the distance from one to three (zone of non-affection) is not the same as the distance from four to five (zone of affection). Likewise, the distance from one to six (detractors) is not the same as the distance from seven to eight (passives) or nine to ten (promoters). Ordered logit and probit models are strongly based on the assumption of proportional odds and when this assumption is not fulfilled, the multinomial logit model is recommended (Osborne, 2015, 2017). Considering unequal distances, it is clear that applying an ordered logit or probit model would not be appropriate. Secondly, apart from data structure considerations, researchers must choose modelling approaches that allow them to answer their research questions. The research questions addressed in this study are: (1) Does the failure of individual service attributes affect the likelihood of a passenger to promote an airport online? (2) Are some service attributes more important than others? A multinomial logit model is suitable for these questions as it allows an estimation to be made of the likelihood that a passenger falls into the promoter category given the experience they had at an airport. Likewise, it allows an estimation to be made of the relative importance of the service attributes. For similar applications of the multinomial logit model, see Odeck and Kjerkreit (2010).

The following model specification is used in this study:

$$P_{ij} = \frac{e^{\eta_{ij}}}{\sum_j e^{\eta_{ij}}} \quad (1)$$

$$\eta_{ij} = ßA_{ij} + \mathcal{E}_{ij} \quad (2)$$

In eq. (1), Pij stands for the probability that the evaluation of an airport by passenger *i* falls under one of the j NPS categories (detractor, passive, promoter). In eq. (2), η_{ij} stands for the passenger's designation of an airport to one of the j NPS categories, A_{ij} represents a particular service attribute, ß stands for the parameters to be estimated while Ɛij represents unknown factors that could potentially affect passenger's designation of an airport to one of the j NPS categories. Thus, eq. (3) is estimated:

$$\eta_{ij} = ß_1 QT + ß_2 TCl + ß_3 TS + ß_4 TSD + ß_5 FB + ß_6 HP + ß_7 WF + ß_8 STF + \mathcal{E}_{ij} \quad (3)$$

The probability that a passenger assigns the airport to other rating categories rather than the reference category is then computed using log-odds ratios. In this study, detractor is used as the reference category, and thus the log-odds ratios are used to compute the probability that a passenger becomes a promoter or passive rather than a detractor, when a given service attribute is rated as failed, other factors being equal. The log-odds ratios are computed using eq. (4).

$$\text{In}\left[\frac{P_{ij}}{P_{im}}\right] = \eta_{ij} + \eta_{im} = ß\left[A_{ij} - A_{im}\right] \quad (4)$$

The most important consideration with NPS is the effect of word-of-mouth because this is critical to new customers (Mecredy, Wright, & Feetham, 2018). Given that such word-of mouth effect is attained when a customer is a promoter, then it is fair to say that the relative importance of airport service attributes is determined by their impact on turning passengers into promoters. With this logic in mind, the values of $P_{(prom)}$ are assessed to check the relative importance of the service attributes.

3.5. Control variables

Considering the findings of previous studies discussed in Section 2.3, several passenger and airport characteristics are included as control variables. These are purpose of travel (business versus leisure), type of trip (transit versus departing and/or arriving), homeland airport (yes, country of residence of the reviewer is the same as the airport being reviewed versus no, country of residence is different to that of the airport), airport location (Africa, Asia-Pacific, Europe, Latin America/ Caribbean, Middle East, North America), and airport size according to total passenger movements at the airport (small airports that served less than five million passengers, medium-sized airports that served five to less than 25 million, and large airports that served 25 million or more). Airport traffic data was sourced from ACI's Annual World Airport Traffic Dataset.

4. Findings

4.1. Descriptive statistics

Descriptive statistics for key variables are provided in Tables 5 and 6. Most of the reviews are by leisure versus business passengers, passengers departing and/or arriving versus transiting at the airport, and passengers at non-homeland versus homeland airports. All categories of airport location and size are represented although there is a clear dominance of reviews for airports located in Europe, and for larger or medium-sized airports. On average, passengers are fairly neutral or dissatisfied with their experience of service attributes (with means of 2.37 to 2.91 on a five-point scale, with one being least satisfied and five being most satisfied). This is also reflected by the higher proportion of service failure. The average overall satisfaction rating of 3.85 (on a scale of one to ten, with one being least satisfied and ten being most satisfied) further emphasises the general level of dissatisfaction with airports. Three-quarters of reviews are categorised as detractors and only 13% as promoters.

4.2. Model estimation

Model estimation results are shown in Table 7. Nagelkerke's rho-squared (Nagelkerke, 1991) is used to evaluate model fit, which at 74.9% for the model without controls and 75.3% for the model with controls, suggests that a high proportion of the variation in the response variable is explained by the predictor variables. Probabilities for each predictor variable are reported in Table 7. These probabilities quantify the likelihood of a reviewer being passive ($P_{(pass)}$) or a promoter ($P_{(prom)}$) when they have experienced service failure with a particular attribute.

For the model without control variables, results show that when a passenger has experienced failure with any of the eight service attributes then the probability of that passenger being a promoter becomes significantly small, ranging from 0.033 for airport staff to 0.154 for airport shopping. For all eight service attributes, results show a relative increase in the probability of the passenger being passive versus promoting, but the probabilities remain significantly low. The values of $P_{(prom)}$ are plotted in Fig. 2 to illustrate the relative importance of the service attributes. It is clear that airport staff has the highest impact on turning passengers into promoters followed by queueing times. The other attributes have more or less the same impact.

Results for the model with control variables show that leisure passengers are more likely to be passives compared to business passengers, however, when it comes to promoters, there is no significant difference between them. Purpose of travel and homeland airport do not have significant effects. Passengers at Latin American/Caribbean airports are less likely to be passives compared to those at European airports. Differences between all other airport regions and Europe are not significant, and there is no significant difference between regions regarding the probability of a passenger being a promoter. Passengers at medium-sized airports are less likely to be promoters compared to passengers at small airports, and there is no significant difference between passengers at large airports and those at small airports. Despite the noted effects, results of the Likelihood Ratio test (Table 8) show that, in general, the control variables do not add significant explanation to whether a passenger is passive or a promoter versus a detractor.

Table 5
Descriptive statistics for control variables.

Control variable	Frequency	Percent
Purpose of travel	2278	100
-Leisure	1759	77.2
-Business	519	22.8
Trip type	2278	100
-Arrival and/or departure	1984	87.1
-Transit	294	12.9
Homeland airport	2278	100
-No	1370	60.1
-Yes	908	39.9
Airport location	2278	100
-Africa	67	2.9
-Asia Pacific	476	20.9
-Europe	1261	55.4
-Latin America/Caribbean	40	1.8
-Middle East	151	6.6
-North America	283	12.4
Size of airport	2275	100
-Small	298	13.1
-Medium	827	36.4
-Large	1150	50.5

Table 6
Descriptive statistics for predictor and response variables (N2278).

Predictor variables	Mean	Std. Error	Std. Dev.	Service failure (%)	Service success (%)	
Queueing times (QT)	2.37	0.032	1.521	72.2	27.8	
Terminal cleanliness (TCL)	2.91	0.030	1.454	61.5	38.5	
Terminal seating (TS)	2.43	0.030	1.429	74.0	26.0	
Terminal signs and directions (TSD)	2.89	0.031	1.459	62.0	38.0	
Food and beverages (FB)	2.44	0.029	1.368	75.4	24.6	
Airport shopping (SHP)	2.49	0.029	1.371	74.2	25.8	
Airport wifi service (WF)	2.60	0.031	1.495	69.0	31.0	
Airport staff (STF)	2.43	0.031	1.496	71.1	28.9	
Response variable	**Mean**	**Std. Error**	**Std. Dev.**	**Detractors (%)**	**Passives (%)**	**Promoters (%)**
Overall satisfaction (SATIS)	3.85	0.064	3.077	74.9	12.0	13.0

5. Discussion and conclusion

5.1. Contributions and implications

The relationship between airport service quality and passenger satisfaction is attracting increased attention from scholars, airports and other stakeholders. By addressing the issue of service failure, this study makes a unique contribution to airport service quality literature, that to-date, has largely overlooked the issue of service failure. In addition, this study investigates service failure at airports within the context of behavioural intention to recommend online, which is important given the potential role that online ratings have on the decisions of others.

The methodological approach used is this study provides several contributions. Firstly, using a structural model analysis, it substantiates the theoretical relevance of using pre-determined service attributes on Skytrax (queueing times, terminal cleanliness, terminal seating, terminal signs and directions, food and beverages, airport shopping, airport wifi service, and airport staff) as a measure of airport service quality. Secondly, and in support of Šerić and Praničević (2018), it shows that satisfaction affects recommendation likelihood.

The study then addresses two main research questions. Regarding question one (does the failure of individual service attributes affect the

Table 7
Model estimation.

Model 1 (without control variables)

	Passives (pass)			Promoters (prom)		
	Coefficient	Sig.	$P_{(pass)}$	Coefficient	Sig.	$P_{(prom)}$
QT	−1.120	0.000***	0.232	−2.528	0.000***	0.057
TCL	−1.153	0.000***	0.218	−2.025	0.000***	0.091
TS	−0.770	0.000***	0.273	−1.460	0.000***	0.137
TSD	−1.604	0.000***	0.149	−1.912	0.000***	0.110
FB	−0.816	0.001***	0.274	−1.772	0.000***	0.105
SHP	−0.099	0.679[ns]	0.444	- 0.959	0.003***	0.154
WF	−0.119	0.547 [ns]	0.400	−1.101	0.000***	0.150
STF	−1.556	0.000***	0.169	−3.202	0.000***	0.033
Intercept	2.218	0.000***		3.709	0.000***	

Cox and Snell rho-squared (ρ^2): 0.577
Nagelkerke rho-squared (ρ^2): 0.749
McFadden rho-squared (ρ^2): 0.585
Number of observations: 2278
- 2 log-likelihood: 553.031***

Model 2 (with control variables)

	Passives (pass)			Promoters (prom)		
	Coefficient	Sig.	$P_{(pass)}$	Coefficient	Sig.	$P_{(prom)}$
QT	−1.106	0.000***	0.235	−2.536	0.000***	0.056
TCL	−1.104	0.000***	0.225	−1.950	0.000***	0.097
TS	−0.729	0.000***	0.281	−1.449	0.000***	0.137
TSD	−1.640	0.000***	0.145	−1.947	0.000***	0.107
FB	−0.832	0.001***	0.272	−1.794	0.000***	0.104
SHP	0.062	0.802[ns]	0.437	−0.996	0.003***	0.152
WF	−0.146	0.463[ns]	0.397	−1.171	0.000***	0.143
STF	−1.583	0.000***	0.165	−3.207	0.000***	0.032
Purpose of travel[a]						
-Leisure	0.423	0.070*	0.381	0.393	0.194[ns]	0.370
Trip type[b]						
-Transit	−0.081	0.807[ns]	0.267	0.426	0.307[ns]	0.443
Homeland airport[c]						
-Yes	−0.153	0.444[ns]	0.300	−0.001	0.997[ns]	0.350
Airport location[d]						
-Africa	−0.552	0.482[ns]	0.201	0.251	0.816[ns]	0.449
-Asia-Pacific	0.355	0.133[ns]	0.392	0.192	0.539[ns]	0.333
-North America	0.298	0.322[ns]	0.406	−0.033	0.940[ns]	0.292
-L.Am/Carib.	−1.428	0.080**	0.128	−0.459	0.610[ns]	0.338
-Middle East	0.057	0.887[ns]	0.351	−0.039	0.938[ns]	0.318
Airport size[e]						
-Medium	−0.463	0.122[ns]	0.297	−0.717	0.081*	0.231
-Large	−0.473	0.114[ns]	0.278	−0.487	0.226[ns]	0.275
Intercept	2.261	0.000***		3.851	0.000***	

Cox and Snell rho-squared (ρ^2): 0.581
Nagelkerke rho-squared (ρ^2): 0.753
McFadden rho-squared (ρ^2): 0.590
Number of observations: 2278
- 2 log-likelihood: 1152.744***

Notes
1. *** significant at $p \leq .01$; ** significant at $p \leq .05$; * significant at $p \leq .10$; [ns] not significant.
2. $P_{(pass)}$: Probability that the passenger is passive rather than a detractor (other factors remaining constant) when a particular attribute is evaluated as a service failure.
3. $P_{(prom)}$: Probability that the passenger is a promoter rather than a detractor (other factors remaining constant) when a particular attribute is evaluated as a service failure.
Reference categories for control variables: [a] Business, [b] arrival and/or departure, [c] no, [d] Europe, [e] small

likelihood of a passenger to promote an airport online?), the findings show that failure of any of the individual service attributes negatively affects the likelihood of promoting an airport online. This suggests that all parts of the airport value chain – that is all partners involved in delivering service quality at airports – are likely to suffer the consequences of a poor aggregate rating online when a service attribute provided by the airport operator or any of its partners fails. In terms of managerial implications, it means that airports and their partners should collaborate and compete collectively rather than focusing on personal gains (i.e. benefits or advantages that relate to a particular actor rather than to the entire value chain). This is because if one actor in the airport value chain opts to act opportunistically, for instance, by providing a lower quality of service to passengers, their behaviour is likely to hurt the entire value chain. This is consistent with Albers, Koch, and Ruff (2005) who note that major strategic benefits are normally reaped by cooperating in primary activities in airport value chains.

The finding that failure of any of the individual service attributes negatively affects the likelihood of promoting an airport online also has theoretical implications because it partly contradicts growing calls from scholars and management consultants for a more outcome-based approach to service quality measurement (e.g. see Boudreau et al., 2016; Graham, 2018; Wattanacharoensil et al., 2016; Wattanacharoensil, Schuckert, Graham, & Dean, 2017). The outcome-based approach has a greater focus on the overall airport experience because

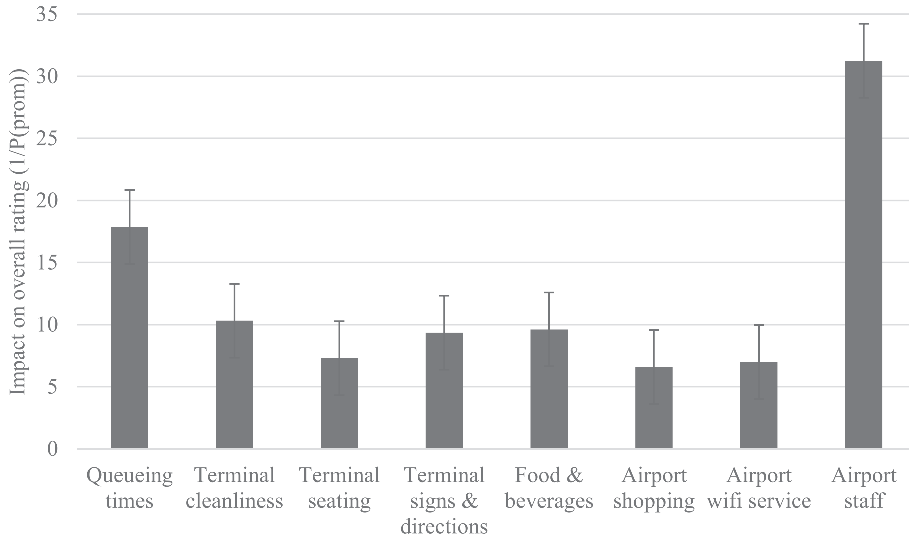

Fig. 2. Relative magnitude of the impact of service attributes on turning passengers into promoters.

Table 8
Likelihood Ratio tests.

	Model fitting criteria	Likelihood Ratio tests		
Effect	−2 log likelihood of reduced model	Chi-square	df	Sig.
Intercept	1152.744	0.000	0	
QT	1225.448	72.704	2	0.000***
TCL	1183.507	30.762	2	0.000***
TS	1175.982	23.238	2	0.000***
TSD	1213.345	60.600	2	0.000***
FB	1183.308	30.564	2	0.000***
SHP	1167.051	14.307	2	0.001***
WF	1172.662	19.918	2	0.000***
STF	1259.022	106.278	2	0.000***
Trip type	1156.163	3.418	2	0.181^{ns}
Purpose of travel	1154.989	2.244	2	0.326^{ns}
Homeland airport	1153.628	0.884	2	0.643^{ns}
Airport location	1161.749	9.005	10	0.532^{ns}
Airport size	1156.993	4.249	4	0.373^{ns}

Note: *** significant at $p \leq .01$; ** significant at $p \leq .05$; * significant at $p \leq .10$; ^{ns} not significant.

it measures the net impression of all experiences a passenger has at an airport rather than measuring individual service attributes. Similarly, Ingram (2014) explains how airports have traditionally focused on measuring attributes separately, for instance, where different departments are responsible for different attributes, and that while that approach may help to improve the performance of individual attributes, he argues that it does not necessarily improve the passenger's overall satisfaction with the airport. However, as shown in the findings of the studies in Table 2, improvements in the performance of individual service attributes have been found to affect overall satisfaction, and the findings of this study show that the failure of individual service attributes also affects overall satisfaction. This means that in addition to seeking improvements in the performance of individual service attributes, airports also need to avoid, or effectively recover from, service failures.

Leading on from this, regarding question two (are some service attributes more important than others?), the findings show that service failures associated with airport staff and queueing times have the greatest negative effects on the likelihood of promoting an airport online, while failures associated with airport shopping and wifi service have the weakest negative effects. The most important failures to avoid are therefore related to what Fondness and Murray (2007) call interaction (i.e. airport staff) and function (i.e. queuing times) attributes versus diversion attributes that relate to discretionary activities passengers can do in their spare time (i.e. airport shopping and wifi service). In addition, it is interesting to note that several studies in Table 2 found that airport staff (Hong et al., 2020; Lubbe et al., 2011; Pandy, 2016) and queuing times (Gkritza et al., 2006; Pandy, 2016) are drivers of satisfaction. This means they are likely to be what Kano et al. (1984) calls one-dimensional quality attributes that improve customer satisfaction when fulfilled and reduce customer satisfaction when not fulfilled – possibly being linear in that performance has an incremental effect on satisfaction. This has implications for airport managers because in order to improve their satisfaction ratings and the likelihood that a passenger will promote their airport online, it is important to not only perform well in terms of airport staff and queuing times but also to avoid situations where airport staff and queueing times fail to meet passenger expectations.

The finding regarding airport staff emphasises the importance of front-line employees in service encounters at airports, and therefore has management implications, for instance, in terms of the need for customer service training for staff. However, the focus should not only be on how to deliver good customer service but also on the causes of service failure and the process of service recovery – the measures taken by a firm to address the complaining customers' perception of service failure (Gronroos, 1990). This is because, as with any business, it is unlikely that airports can eliminate service failure altogether, but they can work to better understand and avoid it and learn how to respond effectively if it does happen. According to the service recovery paradox that is sometimes debated in literature (e.g. see Gohary, Hamzelu, & Pourazizi, 2016), customers exposed to effective responses to service failure may be more satisfied than if the failure had not occurred in the first place. Regardless of whether this is true or not, service recovery is likely to play a key role in reducing the negative effects of service failure. A challenge for airports is that the staff delivering services to passengers are rarely direct employees of the airport. Instead, they will be the staff of airlines, handling agents, concessionaires, security companies and governmental agencies. Where possible, airports should therefore seek to introduce or strengthen standards and service level agreements in tenders and subsequent contracts that they have with their partners, including criteria relating specifically to staff qualifications, commitments to staff training, and social and labour policies.

There might also be opportunities for standardisation by using technologies to replace passenger interactions with staff at the airport, for instance, with greater levels of automation for key processes, or the use of augmented reality or artificial intelligence for customer service functions, although care will need to be taken because not all passengers are interested in using technologies at airports (Halpern, Mwesiumo, Suau-Sanchez, Budd, & Bråthen, 2021). However, technologies can be introduced for those that want to use them – freeing up staff to pay greater attention to those that prefer a more ʹhumanʹ service.

With regards to queueing times, it is important for airports to focus on flow monitoring and management solutions to better understand how passengers move through the airport and how to predict and manage waiting times, for instance, through the provision of better information for passengers or a more efficient deployment of resources (e.g. see Chiti, Fantacci, & Rizzo, 2018). Solutions such as the International Air Transport Association's One ID concept offer opportunities to reduce queue times and streamline the airport journey for passengers with document-free processes based on identity management and biometric recognition (see IATA, 2021). However, the composite nature of airport services means that One ID and any other initiatives to reduce queueing times at airports, or to improve service encounters with staff, need to be coordinated in association with key partners at airports and/or incorporated into service level agreements that airports may have with them.

It is important to note that this study was conducted prior to Covid-19 and it would be interesting to know how passengers prioritise service attributes in an ongoing or post-pandemic situation. For instance, it is quite feasible that service failure relating to terminal cleanliness, which was included as a service attribute in this study and found to have a significant negative effect on likelihood to promote when failed, would have a much greater negative effect if failed during the pandemic. Airports have already responded to this by installing hand sanitisers and introducing enhanced cleaning procedures, which at several more advanced airports, includes the use of sterilising robots to disinfect airport facilities; ultraviolet lights (that are effective at killing virus particles) to clean security trays, handrails on travellators and escalators, touchscreens, and other surfaces; air cleansing heating and air conditioning systems; and walk-through corridors that spray airport users to disinfect them, their clothes and any baggage. In addition to terminal cleanliness, airports have introduced measures to comply with rules on the use of face masks and social distancing, and the failure of airports and their partners to enforce such rules may have a significant effect on how passengers rate them. In line with these considerations, ACI added new questions to its ASQ survey from 2020 that relate specifically to Covid-19. The questions are on the efficiency of safety and hygiene measures, the clarity of signage and instructions to inform about safety and hygiene measures, and the deployment of staff to ensure effective implementation of, and compliance with safety and hygiene measures (ACI, 2020c).

Previous studies have noted the effect of passenger or airport characteristics on satisfaction, which is why several control variables were included in this study (purpose of travel, type of trip, homeland airport, airport location, and airport size). Despite noting some effects of the control variables in this study, in general, none of them are found to add significant explanation to the relationship between service failure and satisfaction at airports. From a management perspective, this means that airport operators and their partners should treat passengers equally when seeking to avoid service failure because, although the expectations of different passengers at different airports may vary, the outcomes of service failure in terms of the likelihood to recommend the airport are expected to be similar – at least according to the passenger and airport characteristics included in this study.

5.2. Study limitations and future research

Despite the useful insights offered by this study, it is important to note several limitations. Firstly, the analysis uses online ratings to capture passenger intentions. However, it does not capture consequent passenger behaviour as there is no way of knowing if service failure affects future use of the airport. Previous studies have found that airport service quality is significantly related to airport reuse (Hong et al., 2020; Prentice & Kadan, 2019), so it would be interesting to know if service failure has an opposite effect on airport reuse. However, this can be difficult to measure because some passengers may travel so infrequently that they do not use the airport again even if they are defined as being a promoter. Alternatively, some may continue to use the airport despite being defined as a detractor or they may express discontent as detractors due to the fact that they have few alternative options. This links to the debate on airport competition, and whether or not passengers have sufficient alternative options to choose from (e.g. see Thelle & Sonne, 2018 and Wiltshire, 2018 for opposing views on this). Availability of alternative options would therefore be a useful variable to include in future studies on airport service quality, for instance, to investigate if ratings from passengers that have choice vary from those without choice, although it is worth noting that in this study, there was no significant difference according to airport location, which was included as a control variable to implicitly consider the issue of airport competition.

Secondly, as a result of collecting data from online reviews posted on Skytrax, this study uses pre-determined service attributes rather than developing its own, and although the service attributes are similar to those used in other airport service quality studies (as shown in Table 1), and have been assessed for their theoretical relevance in this study, it does limit the range of attributes that are included. The range of passenger characteristics is also limited (for instance, compared to those listed in Table 3), and cognitive processes of passengers (e.g. see del Bosque & San Martín, 2008) are not captured in the analysis. As a specific example, passengers may form expectations regarding service quality based on experiences with their local or most frequently used airport, so although this study includes homeland airport as a control variable, it may have been more meaningful to use a control variable for local or most frequently used airport instead.

Thirdly, Skytrax ratings are submitted voluntarily. The voluntary nature of such platforms self-selects customers with strong opinions – typically with more negative ratings – and can therefore result in an underreporting bias (Han & Anderson, 2020). Indeed, average overall satisfaction in this study was 3.85 (on a scale of one to ten, with one being least satisfied and ten being most satisfied). Also, 75% of respondents were detractors (with a satisfaction rating of one to six). Only 12% were passives (rating of seven to eight) and 13% were promoters (rating of nine to ten). Despite underreporting bias, there was a sufficient number of responses in each category for the analysis, but readers should of course note that, overall, responses were skewed in a negative direction. Interestingly, in their study of hotel reviews on Tripadvisor, Han and Anderson (2020) find that customer familiarity with the platform reduces underreporting bias. However, it was not possible to investigate this in the current study.

Fourthly, the analysis in this study is based only on the passenger ratings on Skytrax. Passengers also enter comments. It was beyond the remit of this study to also analyse the comments. However, these could potentially be used to validate the ratings. For instance, to examine the extent to which promoters that rate an airport with a score of nine or ten are more inclined to praise or commend the airport in their comments compared to passives that rate an airport with a score of seven or eight, and detractors with a score of one to six. Similarly, to examine the extent to which detractors post negative comments compared to passives and promoters. This study does find a link between overall satisfaction and likelihood to recommend based on ratings, but it could be useful for future research to investigate the link between ratings and comments that are posted.

More specifically regarding future research, a number of avenues are worth pursuing. Firstly, there is a need to better understand the role that service recovery can play in reducing the negative effects of service failure at airports, and its potential ability to make passengers more satisfied than if the failure had not occurred in the first place. Service recovery has been covered extensively by service management literature (e.g. see Van Vaerenbergh, Varga, De Keyser, & Orsingher, 2019 for a conceptualisation and discussion of directions for future research on the topic), but it has scarcely received attention from airport-specific literature.

Secondly, there is very little research addressing issues related to airport value chains. This is a surprise given that all parts of the airport value chain are likely to suffer when a service attribute fails. It is therefore a significant area for future research, for instance, regarding the potentially conflicting objectives and operational needs of different partners, opportunistic tendencies and subsequent conflicts, and the effectiveness of different forms of relational governance that can be used (see Mwesiumo & Halpern, 2016, 2017 for suggested areas of research on such topics). Furthermore, in light of the results of this study suggesting that failure of any individual service attribute affects overall satisfaction, it would be interesting for future research to consider the extent to which passengers view airport services holistically rather than individually, including whether or not they distinguish between different service providers at airports.

Thirdly, with respect to customer evaluations of bundled services, as is the case for the airport passenger journey (that consists of multiple stages such as check-in, bag drop, security screening, dwell time, passport control, departure gate, baggage reclaim, immigration, and customs), an interesting avenue for future research is related to the well-known serial position effect theory that was introduced by Murdock (1962). The theory suggests that people remember the first and last items in a series better than they remember the items in the middle. It would therefore be interesting to see if this affects how passengers rate service quality and satisfaction at airports. For instance, does the failure of a service attribute at the start or end of a passenger journey through the airport have a greater negative effect on overall satisfaction compared to a service failure that occurs mid-way through the journey? The relationship between service failure and serial position affect theory has also been recognised as an interesting area for research by Mwesiumo and Halpern (2018), albeit in a package holiday context.

A similar avenue for future research is to investigate if there are certain points during the airport journey that are more valued to passengers than others. For instance, there is the so-called ́golden hour ́ at airports where passengers have completed the necessary controls and are free to experience the airport's facilities, for instance, to eat, drink, shop and relax. Service failure that reduces that golden hour may result in dissatisfaction with the airport. However, if service failure occurs but does not affect the golden hour, passengers may not rate the airport so poorly. Related aspects have been researched previously. For instance, Bezerra and Gomes (2015) investigate the impact on satisfaction of arriving early to the airport on the basis that early arrival reduces stress. However, this is arguably an area of research that warrants more attention.

Declaration of Competing Interest

None.

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