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Brand perceptions of airports using social networks

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ABSTRACT

The management of social media activities by airports is an emerging issue, and existing empirical literature on the measurement of brand perception in the airport industry is lacking. Usually, the measurement of brand perception is carried out by surveys, which are costly and rapidly become outdated. This study employs a newly developed algorithm to infer brand perceptions by mining the social connections of airports. Twitter accounts of 118 airports in the world are analysed by considering three emerging attributes in the airport industry: environment, disability and luxury. The paper shows how it is possible to identify the current positions of airports in the perception of the customers.

1. Introduction

Over the last two decades, the airline industry in many countries has moved from a regulated market into a liberalised and business-oriented market in which airports compete for passengers, freight and airlines. In most countries, airports are no longer only a necessary connecting point; instead, they are a source of economic development providing a gateway to cities, states, regions, countries and cultures. In 2014, the economic impact of the aviation industry (direct, indirect, induced and tourism catalytic) on the global gross domestic product (GDP) exceeded $2.7 trillion USD; none of this would be possible without airports (Airports Council International, 2017). Moreover, the deregulation of the air transport market has increased the level of competition among airports to attract passengers and airlines. In this new environment, airport management companies are pursuing strategies focalised to improve customer experience of air travel and tourism. The airport becomes one key element in the consumer process of travel planning, after the initial decision to make the journey. This process, named the travel ecosystem (see Fig. 1), is deeply permeated by digital technologies (World Economic Forum, 2017), given their capacity to attract, gather and communicate information to and from consumers.

According to the World Economic Forum (2017), from 2016 to 2025, digitalization in aviation, travel and tourism is expected to generate, along with other effects, benefits valued at $700 billion USD for customers and a wider society through a reduced environmental footprint, improved safety and security, and cost and time savings for consumers. In particular, for customers, the personal impact is expected to be significant as travel becomes a seamless, frictionless, higher-quality experience. This new environment has led airport managers to develop new strategies, such as differentiation with branding, to gain a competitive advantage.

Competition in the airport industry assumes a complex form, exerting its main effects at three different levels (Graham, 2013): competition among groups of airports, competition among airports and competition inside airports. The second level is related to competition among airports belonging to the same catchment area. This frequently occurs in the major urban areas where there exists more than one airport. When the airports are operated as a group, the result of competition can be controversial. In fact, for airports belonging to the same catchment area, this has led to a mitigation of competition (Forsyth, 2006). However, the advantages that result from working as a group rely, on one hand, on the adoption of a coordinated development strategy, and on the other, on the reduction of costs through the sharing of resources and expertise and the positive effects due to the economies of scale. The latter level of competition concerns the wide range of airport services that can be provided by both the airport operator and an external company. redo.

Moreover, the steady increase of non-aeronautical revenues has transformed airports, in some cases, into shopping centres that serve as the catalyst for local economic development (Castillo-Manzano, 2010) where passengers' shopping motivations are often analysed (Lin and Chen, 2013). The way in which aeronautical and non-aeronautical services are offered and the related degree of competition affect an airport's competitive environment in terms of both price and service

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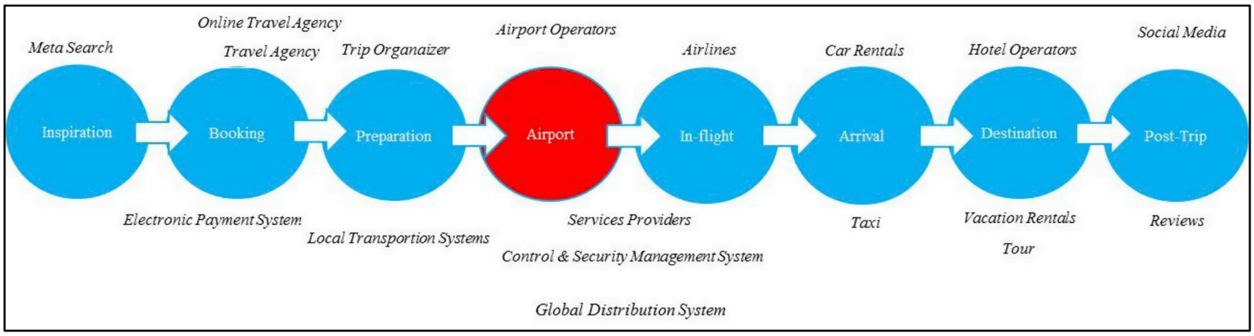

Fig. 1. Travel ecosystem.

quality (Han et al., 2012; Graham, 2013; Bracaglia et al., 2014; D'alfonso and Nastasi, 2014; Lo Storto, 2018).

Because of the increasing competition in the airport industry and the increasing importance of non-aeronautical revenues and services, marketing has increased its relevance in the airport business, and the concept of brand perception is an emerging issue (Malhi, 2014). Thus, the managers of airports should study their positions relative to their competitors. Through branding strategies, airports pursue the objective of presenting a unique and differentiated offering to stakeholders, passengers and the community (Chung et al., 2013). By branding successfully, airports can improve their competitive position and employ the brand as support for increasing the sales of related products and services. Moreover, the airport's brand represents the perception of its customers, and it is associated with the thoughts that arise whenever customers think about a particular airport. In this framework, the airport logo and name are not the airport brand, but rather should be representations of the brand (Paternoster, 2008).

The growth of social media platforms provides new opportunities for brand-related marketing researches (Plumeyer et al., 2017). The activities on these platforms come from two directions: airport companies use these channels to support activities, providing customer service and information; passengers are able to interact with airports and other people by writing online comments about their experiences in an airport. This has become a new source of data for brand image measurement, namely brand-related user-generated content (Plumeyer et al., 2017). The potential of social media in this marketing area is growing at a fast pace: in 2020, the number of web connections will be approximately 26×10^9, with a 30-fold increase as compared to the number of connections installed in 2009 (Kar, 2013).

Airports have recently started to use social media, and there has been a growing interest seen among practitioners. Halpern and Graham (2013) underlined that the main focus of airport social media appears to be on developing the airport's image and reputation by engaging directly and efficiently with its online community. Other scholars have analysed social media data of airport companies and the marketing implications of that data. Gitto and Mancuso (2017) showed how to evaluate the quality of services in some airports by employing social media and sentiment analysis. Nigam et al. (2011) examined the role of social media for engaging customers and for expanding business opportunities at airports. Using data on nine airports, the paper of Wattanacharoensil and Schuckert (2015) discussed the use of Facebook posts to gain additional information on customers' attitudes to promote products and services. Nghiêm-Phú and Suter (2018) used content analysis of online reviews of passengers to examine the attributes of a single airport and the association of those attributes with the city of Las Vegas. Lee and Yu (2018) assessed the airport service quality of airports using Google reviews. They validated their study by comparing the results obtained from Google reviews with airport service quality surveys, and they found a high correlation in the ratings for the top 100 airports.

Further studies on brand management in the airport industry are sparse. However, in one extant study, Lee and Park (2016) collected 304 questionnaires from employees of the Incheon International Airport, and they analysed the relationships among the factors of sustainable brand, social media and business performance. Also, Chung et al. (2013) determined the airport's brand value with a financial technique, considering a sample of seven international airports. The cited papers used traditional surveys and qualitative or sentiment analysis; however, they inferred customer perceptions based on a small sample of airports.

In this work, we study the brand perception of airports using social network data. In particular, we apply the approach proposed by Culotta and Cutler (2016) by analysing the social connections (that is, the followers) of airports on Twitter. This novel methodology allows overcoming the weaknesses of both the traditional approaches based on surveys and on data mining techniques applied to web pages or online posts. The surveys are costly and time-consuming and quickly become outdated. However, data mining techniques based on text analysis require external data and context customization due to the unstructured text format of the majority of web data (Li and Wu, 2010; Culotta and Cutler, 2016). The method that we apply allowed us to identify the customers' perceptions of international airports with respect to luxury, disability and environment. Two goals are reached: the first is to identify specific characteristics of the airports and/or the passengers' preferences using cluster analysis. The second is to identify the current positions of airports in the perceptions of the customers.

The remainder of this paper is organised as follows. In Section 2, we discuss the brand attributes and their relevance in the airport industry. Sections 3 and 4 describe the methodology and the data, respectively. In Section 5, the results of the study with selected comments are presented, and concluding remarks are offered in Section 6.

2. Brand attributes and their relevance for the airport industry

Determining how consumers perceive brands is crucial to the development of an effective marketing strategy. Perceptual mapping is a frequently used instrument for this aim, and it allows classification of brands according to how consumers evaluate them with respect to a set of attributes, such as eco-friendliness or luxury (Steenkamp and Van Trijp, 1997; Culotta and Cutler, 2016). In the present study, we consider three brand attributes in the airport industry: luxury, disability and environment. The attributes are not measured on a set of specific airport facilities (see Seneviratne and Martel, 1994; Correia et al., 2008; De Nicola et al., 2013 among others), but they are investigated in relation to the services provided by the airports and the multiplicity of the involved stakeholders. That is, our analysis considers how a set of services or characteristics of the airport is perceived by the passengers by considering comments on Twitter. The use of three brand attributes is arbitrary; it is not possible to consider them as exhaustively representative of all services that are provided by airports, but they do reflect some of the key characteristics of the business.

Clearly, the differences in the perceptions of attributes among passengers can be generated by their various attitudes on a specific topic, such as the degree of awareness that exists in the country, as well as the actions set by the airport management companies to influence passengers' perceptions. However, for the airport management companies, knowledge of passengers' perceptions related to these attributes can help to determine the right actions to take to improve the level of stakeholders' satisfaction (Steenkamp and Van Trijp, 1997) and to understand the positioning of the airport relative to its competitors.

2.1. Luxury

The first attribute that we considered in this study is identified by the term luxury. Luxury airport retail represents an opportunity for luxury retailers and marketers who are pursuing strategies devoted to capturing the attention and the expenditure of affluent global consumers. In fact, airport retailers may offer travel exclusive products, which are bundled in a way not available in traditional street stores (Bohl, 2016).

Furthermore, luxury travellers or airport shoppers who look for luxury goods represent a significant portion of passengers (Geuens et al., 2004; Nghiêm-Phú and Suter, 2018), and airports are increasing and diversifying the types of experiences that they offer to their customers within the terminal, expanding the role of an airport from being solely a utility for transportation services to becoming a place where customers can satisfy other needs (Wattanacharoensil et al., 2016). Thus, the luxury attribute can be considered as part of a more general management strategy, devoted to increasing shop business in the airport. In fact, it has been well discussed that there is a developing trend for an airport to be an entertainment and shopping centre in and of itself (Graham, 2013; Nghiêm-Phú and Suter, 2018).

2.2. Disability

The second attribute that we considered is disability. Here, we focus on the services related to persons with reduced mobility (PRMs) or other types of disability assistance that are provided by the airports. Over the last decades, airlines and airports have faced an increased demand from PRMs, or people with medical needs, particularly associated with ageing and obesity (Ancell and Graham, 2016). The growing number of people who are travelling for medical reasons represents another relevant trend in demand for air transport. In Europe, medical travel represented 9.4 million trips in 2011, and up to 53% of Europeans said they would travel abroad for medical treatment (IPK, 2013). For some governments, medical travel is becoming a specific target for increasing demand for tourism and a source of economic growth (Dogru and Bulut, 2017). At the global level, both governments and air transport associations have taken into consideration such new trends. In particular, the European Union (EU) regulator has transferred responsibility for PRMs from airlines to airports, which must deliver services and facilities with predetermined requisites of quality (European Commission, 2006).

Disability assistance issues in airports also involve more general problematics that are caused by the various types of needs of disabled passengers. For instance, some passengers can seek help for their disabilities in a discreet way, and to deal with this issue, some airports are adopting new procedures to identify how they can improve the airport experience for vulnerable passengers whose difficulties may not be immediately apparent (London Stansted Airport, 2018). These activities may be promoted using social media; for example, a tweet of London Stansted airport is as follows:

> *'Have you heard about our #AirportAwareness & #AutismAwareness Schemes? Find out more on travelling with #hiddendisabilities and how we can help to make your journey less stressful'.*

The importance of this topic is also recognised by the Airports Council International (ACI), which introduced Accessible Airport Awards: these awards recognize the airports that have successfully improved physical accessibility both for wheelchair users and for all persons with disabilities and PRMs (Airports Council International, 2016). Finally, Lovelock (2010) and Chang and Chen (2012) examined experiences and attitudes of travelling with mobility disabilities. Their findings support the view that a lucrative niche market can be created and that airports can improve their reputation by providing a seamless journey and ensuring appropriate assistance.

2.3. Environment

Environment is the last attribute that we considered. Aviation is a growing sector with environmental concerns linked to aircraft emissions during airport operations and noise nuisance (Grampella et al., 2017). Environmental factors and public perceptions are considered a constraint to growth for many airports, and they are likely to further constrain aviation in the future (Graham and Guyer, 1999; Upham et al., 2003; Grampella et al., 2017). Graham and Guyer (1999) discussed the trade-offs that exist among the various policies for air transport liberalisation in Europe, those devoted to environmental sustainability, and the plans for the development of additional airport capacity. Airport operators must handle a high number of complaints regarding environmental factors and noise nuisance originating from residents in their immediate neighbourhoods. However, in the last decades, the rapid growth in demand for air travel has not been coupled with technological improvements in the airport industry devoted to reducing the main negative externalities on the environment (e.g. emissions and noise). Consequently, the environmental challenge for the industry will increase, and future growth in the aviation industry will be inextricably linked to its environmental sustainability (European Aviation Safety Agency [EASA], 2016). Within this framework, the International Civil Aviation Organization (ICAO) is trying to reduce the environmental impact of aviation fuel burn through various initiatives, including those related to air traffic management. The report prepared by the EASA (2016) highlights the following trends:

- There was an increase in the number of flights by 80% from 1990 to 2014, and further growth by 45% is forecast from 2014 to 2035;
- In the areas around 45 major European airports, about 2.5 million people were exposed to noise, and this is forecast to increase by 15% from 2014 to 2035;
- The emission of pollutants has increased: carbon dioxide (CO^2) has increased by about 80%, and oxides of nitrogen (NOx) have doubled from 1990 to 2014. Attendant growth rates for the two pollutants are 45% and 43%, respectively, from 2014 to 2035.

3. Methodology: conceptual framework and algorithm

In the airport marketing literature, several data mining approaches have emerged, primarily based on text analysis of user-generated content (Halpern and Regmi, 2013; Castro and Lohmann, 2014) and sentiment analysis (Gitto and Mancuso, 2017; Lee and Yu, 2018) of customer perceptions of products or services. However, such algorithms contain several limitations: the accuracy rates of classification algorithms are variable and inadequate (Das and Chen, 2007; Culotta and Cutler, 2016), and only posts and active content-producing consumers are analysed. This means that passive users, those who follow airport brands on social media but do not produce posts after consuming them, are excluded. These passive consumers are the majority of Twitter users (Culotta and Cutler, 2016), and they have a substantial impact on brand image through their 'mere virtual presence' (Naylor et al., 2012).

The main idea of the algorithm is to look at the online communities around a brand and a topic of interest and to measure similarity among those communities. The underlying hypothesis is that brand perceptions are reflected in the brand's followership (Cutler and Culotta, 2017). For instance, if we wanted to analyse the perceived luxury of two brands (brands X and Y), we could start by identifying the followers of these brands in a social medium (e.g. Twitter, Facebook, etc.). Then, we could find a sample of followers that represent interest in luxury, such as followers of Tiffany or Louis Vuitton. Finally, we could measure the similarity between the community of analysed brands and the community of luxury.

We used the social medium Twitter for our analysis for several reasons. First, it is popular: it had about 330 million monthly active users in 2017 (Statista, 2018). Second, it is used extensively by companies for social media marketing activities, including the development of brand image (Kim and Ko, 2012). Third, the Twitter connections are freely available, and, by using the open API platform,[1] it is possible to extract them.

The algorithm starts by considering an attribute of a product, for example luxury, and then it collects Twitter accounts that are representative of such an attribute: the exemplars. The list of exemplars can be constructed manually, or using the automated process described in Culotta and Cutler (2016). They suggested querying the Twitter lists feature, using a keyword of the topic of interest: in the above example, we can search 'luxury' among the lists. The Twitter lists contain a set of accounts created by users to organise the accounts they follow into topic lists. Users also give a label and a description to their lists. The exemplar accounts (E_i) are selected if they appear on at least two of the top 50 lists. In order to improve the efficiency of the selected exemplars for this study, we manually checked the top 50 lists, deleting those that were irrelevant. Moreover, we checked that the brand accounts were not included in the exemplar set.

When the exemplar set of the attribute of interest was constituted, the followers (F_{Ei}) of each exemplar were then collected. Similarly, the followers (F_{Ai}) of each airport account were collected, yielding a second list of accounts. The Twitter search API can be used for this purpose, but it has several limitations on the number of followers that can be extracted.[2] Many accounts are very popular, and they have millions of followers on Twitter; for this reason, Culotta and Cutler (2016) suggested collecting up to 50,000 followers for each exemplar and up to 500,000 followers for each brand (airport account).

The similarity between two sets (F_{Ai} and F_{Ei}) can be computed using standard network similarity metrics. In this study, we used a weighted average Jaccard index, which has shown better performance than other similarity indexes (Culotta and Cutler, 2016). This index is labelled as the social perception score (SPS), and for the airport account A_i and the set of exemplars E, it is computed as:

$$SPS(A_i, E) = \sqrt{\frac{\sum_{E_i \in E} \frac{1}{|F_{Ei}|} \frac{|F_{Ai} \cap F_{Ei}|}{|F_{Ai} \cup F_{Ei}|}}{\sum_{E_i \in E} \frac{1}{|F_{Ei}|}}}. \quad (1)$$

The basic Jaccard index is the ratio between the number of followers who follow both accounts (that is users who follow both the airport account and the exemplar) and the total number of unique followers (users who follow either the airport account or the exemplar). The index was computed for all the exemplars $E_i \in E$, and a weighted average was taken. The weights were equal to the inverse of the follower count of the exemplars because the exemplars with fewer followers were considered more representative of the attribute.[3] Finally, the square root was taken to reduce the skew of the resulting distribution. We developed code in R language (https://cran.r-project.org/), to obtain the data from the Twitter search API and to compute the SPSs. The developed code made use of R libraries, such as rtweet (https://cran.r-project.org/web/packages/rtweet/index.html), httr (https://cran.r-project.org/web/packages/httr/index.html) and RCurl (https://cran.r-project.org/web/packages/RCurl/index.html).

The SPS of a single airport does not have an absolute meaning, but by comparing the results of several airports, we can obtain their positioning and ranking. Culotta and Cutler (2016) provided evidence of the usefulness and correctness of the algorithm described in this section by comparing the results of the analysis of Twitter data with those obtained from a traditional survey of over 200 brands.

4. Data

The sample of airports was derived in the following way. From ACI, we took the list of the world's busiest airports by passenger traffic in 2016 (Airports Council International, 2018). From Skytrax, we extracted the list of the 100 best airports in terms of customer satisfaction (Skytrax, 2018). Finally, we considered the list of the top 100 most followed airports on Twitter (Twitter Counter, 2018).

Starting with these lists, we retrieved and checked the official Twitter account of each airport. For some airports, we did not find an official account, and they were excluded from the analysis. Some Twitter accounts referred to an airport company that manages more airports,[4] and these were also excluded to avoid misleading findings. Moreover, we also checked if the accounts were active with at least 100 tweets and at least 1000 followers. The final sample was composed of 118 airports in 46 countries, and it is described in Table A1 of the Appendix.

The lists of accounts that are considered as exemplars were selected by applying the algorithm discussed in Section 3. Table 1 shows the number of exemplars for each attribute. The analysis was conducted during July, August and September of 2017.

5. Empirical results

The SPSs for each airport are presented in Table A1 of the Appendix. According to the methodology discussed in Section 3, the SPSs allow comparison of the results of different airports with respect to the same attribute. In other words, it is not possible to determine if an airport performs better on luxury than on environment because the SPS of luxury is higher, but it is possible to draw conclusions on its performance with respect to the other airports in a specific attribute. Hence, it is possible to have different ranks of the airports according to the selected attributes: luxury, disability and environment.

In the following, we analyse the SPSs in order to: a) identify specific characteristics of the airports by employing the aggregative k-means clustering method and using, as grouping variables, the three attributes: luxury, disability and environment (Section 5.1); and b) identify the current positions of the airports in the perception of the customers (Section 5.2).

5.1. Cluster analysis

Fig. 2 depicts the dendrogram, and the degree of stability of the five clusters individuated through the k-means algorithm is reported in Table 2.

In order to assess the stability of the clusters individuated through the k-means algorithm, we adopted the procedure proposed by Henning (2007). The procedure is based on the similarity between sets (Jaccard index) and on the bootstrapping resampling technique. Generally, a valid stable cluster should yield a mean similarity index of 0.75 or more. The results shown in Table 2, determined by employing 100 resampling runs, indicate that the five clusters were stable. In other words, each of the five clusters did not disappear easily if the data set

[1] The reader unfamiliar with Twitter API can visit https://developer.twitter.com/en/docs.html for details.

[2] In 2017, this limit was 300,000 followers/hour.

[3] The rationale is that popular accounts lead a signal of the attribute that is diluted.

[4] For instance, this is the case of Swedavia which manages 10 Swedish airports.

Table 1
Number of exemplars by attribute.

Attribute	number of exemplars	example accounts
Environment	74	@WWF, @Greenpeace
Luxury	138	@Bulgariofficial, @luxury_travel
Disability	232	@WHOdisability, @WhatDisability

was changed in non-essential ways.

The cluster composition by airports is reported in Table 3, the distribution of airports by cluster and by macro-area is shown in Table 4 and the descriptive statistics are reported in Table 5.

The cluster analysis revealed the airports having similar attributes, so that the airports in the same cluster have similar characteristics. Most of the airports of the same country or of the same International Air Transport Association (IATA) area were in the same cluster. This evidence suggests that the passengers' preferences are similar in the same area.

5.1.1. Cluster analysis: cluster 1

Cluster 1 is composed of airports in which passengers pay the greatest attention to luxury with an average value of 0.041 against 0.010 and 0.015 for disability and environment, respectively. Most of the airports in this cluster are located in Europe (Tables 3 and 4), but

Table 2
Analysis of stability of clusters: Jaccard index.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Jaccard index	0.823	0.908	0.748	0.854	0.779

also include Abu Dhabi (Africa and the Middle East) and Singapore (Asia Pacific). This cluster includes a subset of city airports (Frankfurt, Changi, London Heathrow, Munich and Zurich) that appeared among the 10 best airports in the world in the 2017 Skytrax ranking (Skytrax, 2018). Cluster 1 does not include airports located in Latin and North America.

5.1.2. Cluster analysis: cluster 2

The airports in this cluster are located in all the five IATA macro-areas, but they exhibit some common characteristics. In particular, cluster 2 is characterised by the lowest average levels of the three attributes: luxury, disability and environment. Except for the Hong Kong airport, the units in this group are placed after the 40th position in the Skytrax world airport awards ranking (Skytrax, 2018). In this cluster, there are all the airports located in Latin America, the Russian airports and a group of European airports that performs very poorly according SPSs.

For Hong Kong, the result might appear counterintuitive, but it is the only Chinese airport that we considered because the others do not

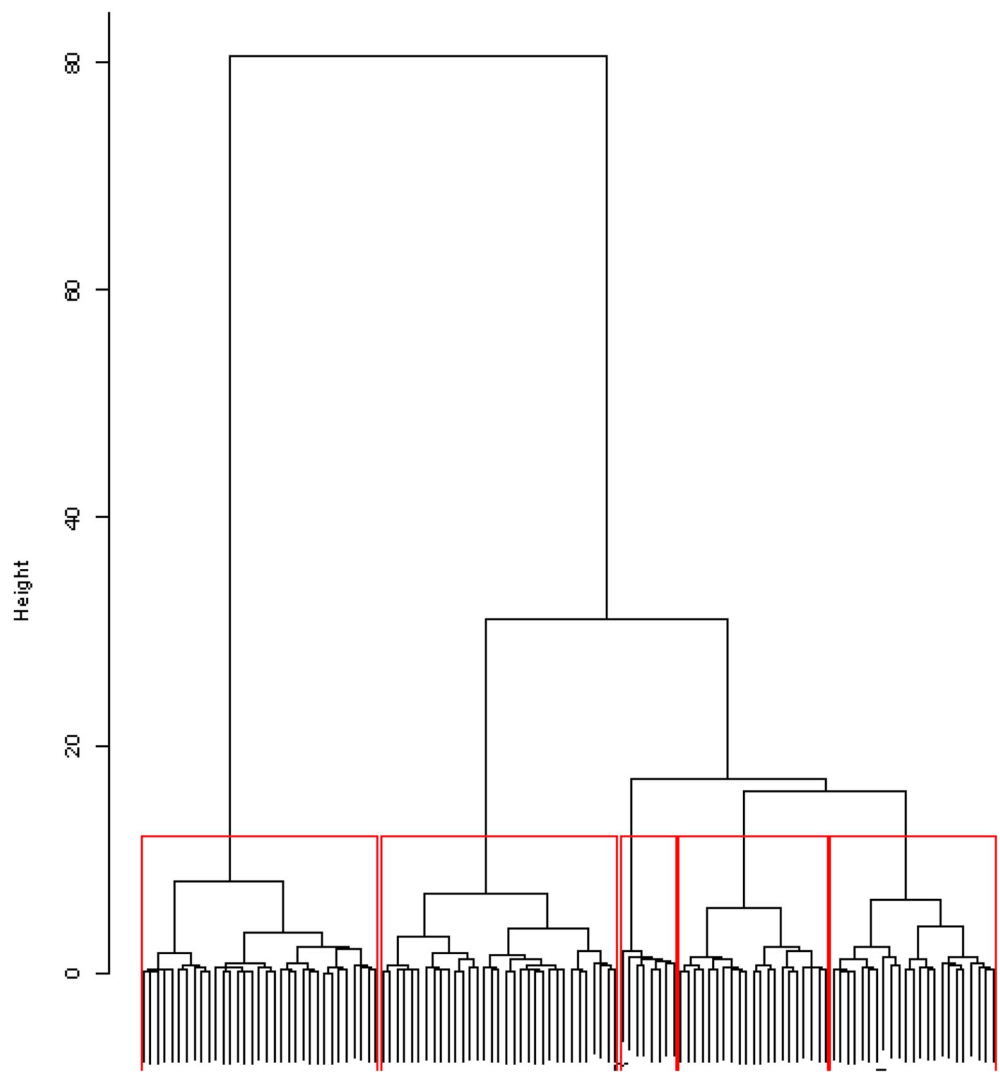

Fig. 2. Dendogram of the five clusters.

Table 3
Composition of clusters.

	Airport Code(country, city, airport name)
Cluster 1	BRU(Belgium, Brussels, Brussel), HEL(Finland, Helsinki, Helsinki), CDG(France, Paris, Charles de Gaulle), NCE(France, Nice, Nice Côte d'Azur), FRA(Germany, Frankfurt, Frankfurt), HAM(Germany, Hamburg, Hamburg), MUC(Germany, Munich, Munich), SIN(Singapore, Singapore, Singapore Changi), ZRH(Switzerland, Zurich, Zurich), AUH(UAE, Abu Dhabi, Abu Dhabi), ABZ(UK, Aberdeen, Aberdeen), BHX(UK, Birmingham, Birmingham), EDI(UK, Edinburgh, Edinburgh), GLA(UK, Glasgow, Glasgow), LCY(UK, London, London City), LGW(UK, London, Gatwick), LHR(UK, London, Heathrow), LTN(UK, London, Luton), MAN(UK, Manchester, Manchester), SOU(UK, Southampton, Southampton), STN(UK, London, Stansted)
Cluster 2	GRU(Brasil, São Paulo, Guarulhos), HKG(China, Hong Kong, Hong Kong), BOG(Colombia, Bogotà, El Dorado), GYE(Ecuador, Guayaquil, José Joaquín de Olmedo), UIO(Ecuador, Quito, Mariscal Sucre International), LIL(France, Lille, Lille), LYS(France, Lyon, Saint-Exupéry), MPL(France, Montpellier, Méditerranée), DTM (Germany, Dortmund, Dortmund), DUS(Germany, Dusseldorf, Dusseldorf), BLR(India, Bangalore, Kempegowda), HYD(India, Hyderabad, Rajiv Gandhi), CJK (Indonesia, Jabodetabek, Soekarno-Hatta), BLQ(Italy, Bologna, Guglielmo Marconi), NKM(Japan, Nagoya, Chubu Centrair), AMM(Jordan, Amman, Queen Alia), MLA(Malta, Valleta, Malta), MEX(Mexico, Mexico City, Mexico City), BLB(Panama, Panama, Tocumen), MNL(Philippines, Manila, Ninoy Aquino), KTW(Poland, Katowice, Katowice), WAW(Poland, Warsaw, Chopin), DOH(Qatar, Doha, Hamad), DME(Russia, Moscow, Domodedovo), KZN(Russia, Kazan, Kazan), LED(Russia, Saint Petersburg, Pulkovo), SVO(Russia, Moscow, Sheremetyevo), VKO(Russia, Moscow, Vnukovo), MED(Saudi Arabia, Medina, Medina), ICN(South Korea, Seoul, Incheon), GVA(Switzerland, Geneva, Geneva), SAW(Turkey, Instanbul, Sabiha Gökçen), CCS(Venezuela, Caracas,Maiquetía Simón Bolívar)
Cluster 3	BAH(Bahrain, Manama, Bahrain), YUL(Canada, Montreal, Pierre Elliott Trudeau), YHZ(Canada, Halifax, Stanfield), PRG(Czech Republic, Prague, Prague), CPH (Denmark, Copenhagen, Copenhagen), TLS(France, Toulouse, Blagnac), STR(Germany, Stuttgart, Stuttgart), ATH(Greece, Athens, Elefetherios Venezilos), BUD (Hungary, Budapest, Ferenc Liszt), KEF(Iceland, Reykjavík, Keflavik), BOM(India, Mumbai, Maharashtra Chhatrapati Shivaji), DEL(India, Delhi, Delhi), ORK(Ireland, Cork, Cork), DUB(Ireland, Dublin, Dublin), NOC(Ireland, Connacht, West Airport Knock), SNN(Ireland, Limerick, Shannon), KUL(Malaysia, Kuala Lumpur, Kuala Lumpur), EIN(Netherlands, Eindhoven, Eindhoven), AMS(Netherlands, Amsterdam, Schiphol), AKL, New Zeland, Auckland, Auckland), CHC(New Zeland, Christchurch, Christchurch), OSL(Norway, Oslo, Oslo), KRK(Poland, Kraków, John Paul II), CPT(South Africa, Cape Town, Cape Town), DUR(South Africa, Durban, King Shaka), JNB(South Africa, Johannesburg, O. R. Tambo), BCN(Spain, Barcelona, El Prat), ARN(Sweden, Stockholm, Arlanda), IST(Turkey, Instanbul, Atatürk), DXB(UAE, Dubai, Dubai), NCL(UK, Newcastle, Newcastle), CAE(US, Columbia, Columbia), ITH(US, Ithaca, Tompkins)
Cluster 4	YYZ(Canada, Mississauga, Toronto), YVR(Canada, Vancouver, Vancouver), ATL(US, Atlanta, Hartsfield–Jackson), BOS(US, Boston, Logan), CAK(US, Green, Akron-Canton), CLT(US, Charlotte, Douglas), CVG(US, Cincinnati, Northern Kentucky), DEN(US, Denver, Denver), DFW(US, Dallas, Dallas Fort Worth), DTW(US, Detroit, Metropolitan Wayne County), EWR(US, Newark, Liberty), ORD(US, Chicago, O'Hare), LAX(US, Los Angeles, Los Angeles), SFO(US, San Francisco, San Francisco), IAH (US, Houston, George Bush), MIA(US Miami, Miami), JFK(US, New York, JFK), LAS(US, Las Vegas, McCarran), MCO(US, Orlando, Orlando), MSP(US, St. Paul, Minneapolis/St Paul), PHX(US, Phoenix, Sky Harbor), RDU(US, Morisville, Raleigh-Durham), SEA(US, Seattle, Seattle-Tacoma)
Cluster 5	ADL(Australia, Adelaide, Adelaide), BNE(Australia, Brisbane, Brisbane), OOL(Australia, Queensland, Gold Cost), MEL(Australia, Melbourne, Melbourne), PER (Australia, Perth, Perth), SYD(Australia, Sydney, Sydney), BRS(UK, Bristol, Bristol), LBA(UK, Leeds, Leeds Bradford)

Table 4
Airport distribution by cluster and geographic area.

	Africa and Middle East	Asia Pacific	Europe	Latin America	North America
cluster 1	1	1	19	0	0
cluster 2	3	7	16	5	2
cluster 3	5	5	19	0	4
cluster 4	0	0	0	0	23
cluster 5	0	6	2	0	0

have an English Twitter account. However, this result may reflect an errata positioning of the airport, or it may be due to the limited use of Twitter by Chinese passengers. All these aspects seem clearly captured by the proposed methodology.

5.1.3. Cluster analysis: cluster 3

Cluster 3 is characterised by the average values of the three attributes close to the averages of the total sample. That is, the airports in this group are in the centre, indicating that, even though they do not have major problems, they do not represent excellence. This makes it difficult for them to differentiate themselves from the other airports on the basis of the attributes studied. It is highly probable that these airports do not extensively use social media in their marketing activities and may look for other ways to communicate with passengers and airlines.

5.1.4. Cluster analysis: cluster 4

Cluster 4 is characterised by the highest average value of the environmental attribute. The airports in this cluster are all located in the US and include two Canadian airports. The results confirm the attention given by the US institutions to air transport environmental issues and the connected level of involvement of the main stakeholders. Hence, these results underline the great attention given to environmental topics by US passengers.

The best performer in this group and in our analysis for the environmental attribute is San Francisco International Airport. The managers of this airport are involved in sustainability programs to

Table 5
Descriptive statistics by cluster.

cluster	attribute	N	mean	sd	median	min	max	skew	kurtosis
1	Lux	21	0.0407	0.0033	0.0404	0.0360	0.0476	0.5090	−0.9556
	Dis	21	0.0104	0.0024	0.0100	0.0068	0.0142	0.2777	−1.3399
	Env	21	0.0151	0.0014	0.0151	0.0125	0.0181	−0.0090	−0.7488
2	Lux	33	0.0165	0.0041	0.0163	0.0069	0.0247	−0.2398	−0.1735
	Dis	33	0.0040	0.0017	0.0035	0.0012	0.0080	0.5239	−0.5326
	Env	33	0.0068	0.0020	0.0071	0.0026	0.0113	−0.0813	−0.5691
3	Lux	33	0.0273	0.0037	0.0271	0.0170	0.0335	−0.5671	0.4020
	Dis	33	0.00843	0.0023	0.0083	0.0042	0.01276	0.2432	−0.8172
	Env	33	0.0125	0.0018	0.0125	0.0085	0.01689	−0.0324	−0.2222
4	Lux	23	0.0356	0.0065	0.0364	0.0240	0.0486	0.0225	−0.9597
	Dis	23	0.0111	0.0013	0.0110	0.0080	0.01382	−0.2032	−0.4085
	Env	23	0.0221	0.0027	0.0224	0.0178	0.03024	0.7425	0.8341
5	Lux	8	0.0281	0.0058	0.0282	0.0177	0.03616	−0.3222	−1.0131
	Dis	8	0.0176	0.0015	0.0177	0.0151	0.0196	−0.1407	−1.4270
	Env	8	0.0141	0.0022	0.0141	0.0105	0.0169	−0.1353	−1.5267

improve airport operations by reducing energy consumption, waste, water use, emissions and so on (San Francisco International Airport, 2018).

5.1.5. Cluster analysis: cluster 5

In cluster 5, there are only eight airports. They are all the Australian airports, with the addition of two UK airports. This cluster is characterised by the highest average value for the disability attribute. This finding implies that the Australian airports appear to pay the highest level of attention to this attribute.

The best performer according to the disability attribute is Adelaide Airport. This airport offers a premium service for passengers who need a medical assistance, and, according to their website, it is *'the first of its kind and will positively transform the travel experience for customers who require assistance and reassurance when travelling'* (Medical Travel Companion, 2018).

5.2. Airport relative positioning

With the SPSs, it is possible to obtain the relative position of the airports based on consumers' perceptions. Several scatterplots based on selected attributes and/or different groups of airports are possible. In this section, we want to underline the importance and the usefulness of the proposed approach, but we limit the discussion to UK airports. The analysis could be easily repeated with a different sample: for example, we also report the positioning of US airports in the Appendix (Fig. A1).

The results of UK airports are reported in Fig. 3; the scores are standardised with respect to the total sample. This visualization helps managers understand how they are positioned in respect to their competitors according to the passengers' perceptions.

Considering only the UK airports, the best performers on the luxury attribute are London Stansted and Glasgow, which use both social media and their websites to propose a range of luxury products for sale. This is an example of a posted tweet by the Glasgow airport:

> *'Achieve "no make-up make-up" look and enhance your natural beauty with the Neo Nude collection: for skin, cheeks and lips, embodying the signature Armani glow. Available now at World Duty Free'.*

And this is an example of a London Stansted Airport tweet:

> *'Calling all Urban Decay Cosmetics #Naked lovers! The #NEW Naked Cherry palette has dropped in @WorldDutyFree with 12 pink hues perfect for your Autumn-Winter travels'.*

Leeds airport is the best performer according to the disability attribute. In fact, during the period of our analysis, there were some social media activities generated by this airport concerning this issue. In fact, it was named 'good' for disability assistance by UK Civil Aviation Authority (Leeds Bradford Airport (2017), and there were some tweets on improved services in the airport for people with disabilities. For instance, a tweet of the account 'Asperger Blog' was:

> *'Leeds Bradford #Airport works with disability groups - Wharfedale Observer:* http://fat.ly/Lm2k' *[23 June 2017].*

6. Discussions and conclusion

In the current paper, we adopted Culotta and Cutler's (2016) method to measure airport brand perception by employing social media. The findings of this study have theoretical and practical implications. Theoretically, we found evidence supporting that passengers present different perceptions of the attributes of the airports.

This is the first attempt to determine the relative positions of airports in the perception of customers using only social media data. In particular, SPSs were obtained from social connections of airports, and from a practical point of view, the proposed methodology allowed overcoming both traditional approaches based on surveys and techniques based on text mining in terms of time, cost and scalability. The SPSs can be computed quickly and allow the managers to determine the consequences of their marketing activities or general strategies. For instance, an airport that is involved in the promotion of shopping activities in the airport is expected to perform better on the luxury attribute. Moreover, the analysis conducted here can be repeated over time, allowing cheaper monitoring of marketing activities.

Using cluster analysis, we grouped the airports according to the SPSs. In most cases, the obtained clusters were homogenous with the IATA area, and each cluster was characterised by different levels of the three attributes. The proposed approach is based on the passengers' attitude towards a specific topic and not on physical characteristics of airports. In other words, we can assert that the passengers of the airports in cluster 1 show greater attention to the topics related to luxury than those in clusters 2 and 3 do. Consequently, we can state that the

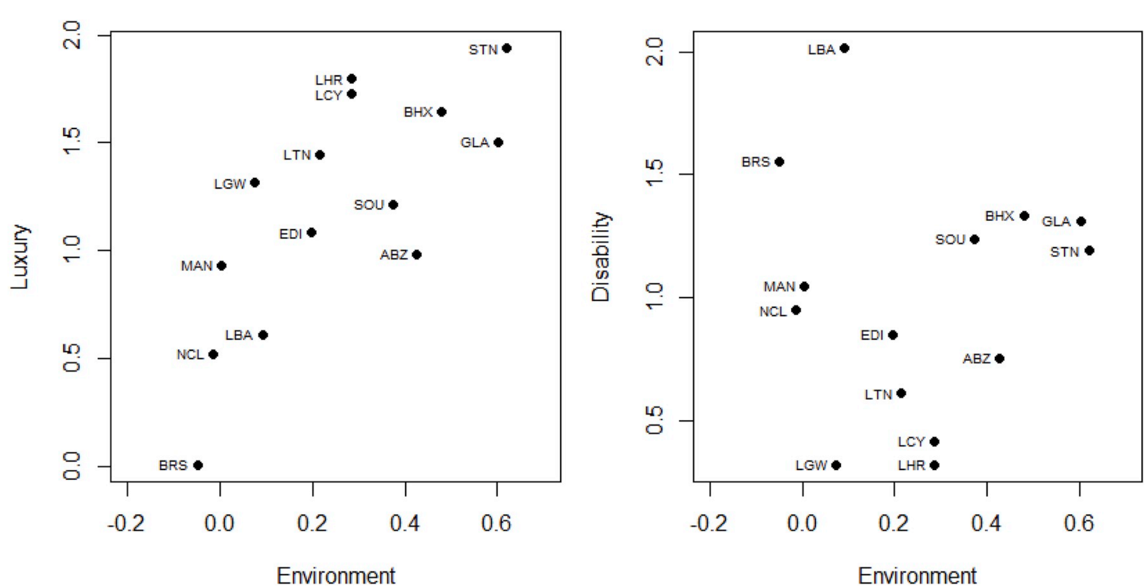

Fig. 3. UK airport relative positioning. *Note:* ABZ = Aberdeen, BHX = Birmingham, BRS = Bristol, EDI = Edinburgh, GLA = Glasgow, LBA = Leeds, LCY = London City, LGW = London Gatwick, LHR = London Heathrow, LTN = London Luton, MAN = Manchester, NCL = Newcastle, SOU = Southampton, STN = London Stansted.

attribute ‘luxury’ is more critical for the airport companies in cluster 1, and managers should carefully consider this particular factor in their strategies.

Geographic location explains most of the clusters. This means that the preferences of passengers can be explained by macro-areas. This is a double result: the first consequence is that the preferences of airports' followers in the same area are more similar to those of other areas. Although it may seem a common result, this is not the case. In fact, if the connections between airports’ followers and exemplars would be meaningless, as well as the SPSs, it would be difficult to obtain this result. This is because, when we applied the cluster analysis to the SPSs, the macro-areas were not predetermined. A second important result is the further confirmation of the validity of the applied methodology.

The results obtained in cluster 4 confirm the positive effects that policies adopted by airports and by public and private entities in the US have produced on the level of customers’ awareness of environmental topics related to airport operations. In fact, since 1994, in the US and Canada, the Airports Council International-North America (ACI-NA) has collaborated with international, federal and local communities, as well as manufacturers and airlines, to discuss environmental issues. Since 1997, the ACI-NA has granted Environmental Achievement Awards to the airports that demonstrate the environmental benefits of their projects and the innovative approach, effective implementation, applicability and cost-effectiveness of these projects (ACI-NA, 2017).

Managers of the airports are using websites and social media to promote their commercial activities, such as shopping and food and beverage sales. With the methodology discussed in this paper, the managers have the ability to monitor the results of their marketing activities even if the passengers do not post tweets or comments. They can also check the positioning of their airport in relation to their competitors.

Despite its contributions to the tourism economics literature, this study does have some limitations. First, the analysis has been conducted only on three attributes, even if they are of growing importance for the industry: disability, environment and luxury. Second, we use only one social medium, Twitter, for a limited time period. Social media activities by the airports during the period of analysis may have influenced the results. Hence, further attempts to increase the number of attributes and/or to monitor their evolution over time can be the subject of further study.

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APPENDIX. TABLES

Table A.1
List of airports and SPS results.

Airport	IATA code	City	Country	IATA area	N. of followers	Luxury	Disability	Environment
Bahrain	BAH	Manama	Bahrain	Africa Mid. E.	5986	0.03	0.0093	0.0134
Queen Alia	AMM	Amman	Jordan	Africa Mid. E.	112584	0.0163	0.0031	0.0068
Hamad	DOH	Doha	Qatar	Africa Mid. E.	82492	0.021	0.0041	0.0087
Medina	MED	Medina	SaudiArabia	Africa Mid. E.	15996	0.0159	0.0051	0.01
Cape Town	CPT	Cape Town	SouthAfrica	Africa Mid. E.	9972	0.0316	0.0083	0.0145
King Shaka	DUR	Durban	SouthAfrica	Africa Mid. E.	5725	0.0223	0.0093	0.0138
O. R. Tambo	JNB	Johannesburg	SouthAfrica	Africa Mid. E.	18967	0.0278	0.0062	0.012
Abu Dhabi	AUH	Abu Dhabi	UAE	Africa Mid. E.	49416	0.0424	0.0079	0.0151
Dubai	DXB	Dubai	UAE	Africa Mid. E.	398027	0.0282	0.0042	0.0092
Adelaide	ADL	Adelaide	Australia	Asia Pacific	5473	0.0234	0.0196	0.0144
Brisbane	BNE	Brisbane	Australia	Asia Pacific	21156	0.0293	0.018	0.0169
Melbourne	MEL	Melbourne	Australia	Asia Pacific	17881	0.0282	0.0174	0.0154
Gold Cost	OOL	Queensland	Australia	Asia Pacific	6168	0.0279	0.0181	0.0119
Perth	PER	Perth	Australia	Asia Pacific	4745	0.0177	0.0161	0.0106
Sydney	SYD	Sydney	Australia	Asia Pacific	20692	0.0362	0.0195	0.017
Hong Kong	HKG	Hong Kong	China	Asia Pacific	49288	0.0195	0.0036	0.0071
Kempegowda Bengaluru	BLR	Bangalore	India	Asia Pacific	6540	0.0182	0.0054	0.0113
Chhatrapati Shivaji	BOM	Mumbai	India	Asia Pacific	19594	0.0271	0.0058	0.0132
Delhi	DEL	Delhi	India	Asia Pacific	54620	0.0301	0.0056	0.0134
Rajiv Gandhi	HYD	Hyderabad	India	Asia Pacific	51020	0.0125	0.0027	0.006
Soekarno-Hatta	CJK	Jabodetabek	Indonesia	Asia Pacific	58574	0.0081	0.0012	0.0039
Chubu	NKM	Nagoya	Japan	Asia Pacific	198222	0.0069	0.0017	0.0026
Kuala Lumpur	KUL	Kuala Lumpur	Malaysia	Asia Pacific	83040	0.0303	0.0057	0.0136
Auckland	AKL	Auckland	NewZeland	Asia Pacific	4739	0.0252	0.0112	0.0114
Christchurch	CHC	Christchurch	NewZeland	Asia Pacific	7109	0.0254	0.0128	0.0169
Ninoy Aquino	MNL	Manila	Philippines	Asia Pacific	46475	0.0133	0.0029	0.0079
Changi	SIN	Singapore	Singapore	Asia Pacific	65653	0.0399	0.0074	0.0141
Incheon	ICN	Seoul	SouthKorea	Asia Pacific	60779	0.0101	0.0024	0.0041
Brussels	BRU	Brussels	Belgium	Europe	61661	0.038	0.0089	0.0181
Prague	PRG	Prague	CzechRepublic	Europe	1643	0.0277	0.0058	0.0099
Copenhagen	CPH	Copenhagen	Denmark	Europe	9485	0.0261	0.0078	0.0122
Helsinki	HEL	Helsinki	Finland	Europe	47677	0.0382	0.0088	0.0158
Charles de Gaulle	CDG	Paris	France	Europe	44737	0.0412	0.008	0.016
Lille	LIL	Lille	France	Europe	3942	0.0177	0.0058	0.0096
Saint-Exupéry	LYS	Lyon	France	Europe	8554	0.0247	0.0057	0.0083
Méditerranée	MPL	Montpellier	France	Europe	4131	0.0189	0.0047	0.007
Côte d'Azur	NCE	Nice	France	Europe	5983	0.0407	0.0068	0.0125
Blagnac	TLS	Toulouse	France	Europe	9070	0.0268	0.0073	0.0111
Dortmund	DTM	Dortmund	Germany	Europe	3640	0.0187	0.0069	0.0063

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Table A.1 (*continued*)

Airport	IATA code	City	Country	IATA area	N. of followers	Luxury	Disability	Environment
Dusseldorf	DUS	Dusseldorf	Germany	Europe	1751	0.0153	0.008	0.0074
Frankfurt	FRA	Frankfurt	Germany	Europe	39521	0.0381	0.0081	0.0158
Hamburg	HAM	Hamburg	Germany	Europe	18719	0.036	0.0094	0.016
Munich	MUC	Munich	Germany	Europe	18994	0.0376	0.0088	0.0134
Stuttgart	STR	Stuttgart	Germany	Europe	6841	0.0249	0.0077	0.0101
Elefetherios Venezilos	ATH	Athens	Greece	Europe	4196	0.0284	0.0068	0.0119
Ferenc Liszt	BUD	Budapest	Hungary	Europe	4680	0.0271	0.0093	0.0116
Keflavik	KEF	Reykjavík	Iceland	Europe	5126	0.028	0.0113	0.0122
Dublin	DUB	Dublin	Ireland	Europe	231101	0.0297	0.0074	0.0117
West Knock	NOC	Connacht	Ireland	Europe	14418	0.027	0.0105	0.0125
Cork	ORK	Cork	Ireland	Europe	24363	0.0313	0.0099	0.0139
Shannon	SNN	Limerick	Ireland	Europe	17744	0.0318	0.0122	0.0139
Guglielmo Marconi	BLQ	Bologna	Italy	Europe	12847	0.0232	0.0053	0.0084
Malta	MLA	Valleta	Malta	Europe	1622	0.0193	0.0061	0.0048
Schiphol	AMS	Amsterdam	Netherlands	Europe	74173	0.0262	0.0062	0.0117
Eindhoven	EIN	Eindhoven	Netherlands	Europe	7508	0.0243	0.0083	0.0086
Oslo	OSL	Oslo	Norway	Europe	17559	0.0314	0.0073	0.0139
John Paul II	KRK	Kraków	Poland	Europe	10795	0.024	0.0085	0.01
Katowice	KTW	Katowice	Poland	Europe	6561	0.0193	0.0072	0.008
Chopin	WAW	Warsaw	Poland	Europe	222217	0.0142	0.0032	0.0054
Domodedovo	DME	Moscow	Russia	Europe	5032	0.0135	0.0034	0.0048
Kazan	KZN	Kazan	Russia	Europe	4295	0.0144	0.0021	0.0032
Pulkovo	LED	Saint Petersburg	Russia	Europe	10256	0.0157	0.0044	0.0067
Sheremetyevo	SVO	Moscow	Russia	Europe	27198	0.019	0.0033	0.0071
Vnukovo	VKO	Moscow	Russia	Europe	15273	0.0198	0.0041	0.0077
El Prat	BCN	Barcelona	Spain	Europe	74884	0.0257	0.0048	0.0107
Arlanda	ARN	Stockholm	Sweden	Europe	14015	0.0335	0.0085	0.0137
Geneva	GVA	Geneva	Switzerland	Europe	2884	0.0238	0.0043	0.0074
Zurich	ZRH	Zurich	Switzerland	Europe	15361	0.0369	0.01	0.0129
Atatürk	IST	Instanbul	Turkey	Europe	13301	0.0297	0.0084	0.0134
Sabiha Gökçen	SAW	Instanbul	Turkey	Europe	24160	0.0181	0.0028	0.0068
Aberdeen	ABZ	Aberdeen	UK	Europe	47233	0.0381	0.0118	0.0158
Birmingham	BHX	Birmingham	UK	Europe	58415	0.0447	0.0142	0.0161
Bristol	BRS	Bristol	UK	Europe	16775	0.0284	0.0151	0.0131
Edinburgh	EDI	Edinburgh	UK	Europe	89681	0.0391	0.0122	0.0145
Glasgow	GLA	Glasgow	UK	Europe	61307	0.0433	0.0141	0.0168
Leeds	LBA	Leeds	UK	Europe	32117	0.0344	0.017	0.0139
City	LCY	London	UK	Europe	182914	0.0455	0.0104	0.015
Gatwick	LGW	London	UK	Europe	322564	0.0414	0.01	0.0138
Heathrow	LHR	London	UK	Europe	448029	0.0462	0.01	0.015
Luton	LTN	London	UK	Europe	116247	0.0427	0.0112	0.0146
Manchester	MAN	Manchester	UK	Europe	252225	0.0376	0.013	0.0134
Newcastle	NCL	Newcastle	UK	Europe	67911	0.0335	0.0126	0.0133
Southampton	SOU	Southampton	UK	Europe	36829	0.0404	0.0138	0.0155
Stansted	STN	London	UK	Europe	61997	0.0476	0.0136	0.0169
Guarulhos	GRU	São Paulo	Brasil	Latin America	9181	0.0158	0.005	0.0098
El Dorado	BOG	Bogotà	Colombia	Latin America	62577	0.0171	0.0031	0.0074
José Joaquín de Olmedo	GYE	Guayaquil	Ecuador	Latin America	4729	0.0139	0.0022	0.0049
Mariscal Sucre	UIO	Quito	Ecuador	Latin America	52611	0.0151	0.0029	0.0074
Maiquetía Simón Bolívar	CCS	Caracas	Venezuela	Latin America	187927	0.0106	0.0016	0.0042
Stanfield	YHZ	Halifax	Canada	North America	22604	0.02	0.0097	0.0113
Pierre Elliott Trudeau	YUL	Montreal	Canada	North America	3330	0.024	0.0083	0.0137
Vancouver	YVR	Vancouver	Canada	North America	54165	0.0412	0.0138	0.0209
Pearson	YYZ	Mississauga	Canada	North America	46664	0.0334	0.0129	0.0178
Mexico City	MEX	Mexico City	Mexico	North America	77120	0.0182	0.0029	0.009
Tocumen	BLB	Panama	Panama	North America	13259	0.015	0.0035	0.0058
Hartsfield–Jackson	ATL	Atlanta	US	North America	39731	0.0406	0.0122	0.0234
Logan	BOS	Boston	US	North America	44575	0.039	0.0113	0.0233
Metropolitan	CAE	Columbia	US	North America	3357	0.017	0.0087	0.0158
Akron-Canton	CAK	Green	US	North America	13325	0.0311	0.0119	0.02
Douglas	CLT	Charlotte	US	North America	14763	0.0267	0.0102	0.0188
Cincinnati	CVG	Cincinnati	US	North America	12612	0.0325	0.013	0.0225
Denver	DEN	Denver	US	North America	43952	0.0284	0.0095	0.0229
Fort Worth	DFW	Dallas	US	North America	45667	0.0404	0.0108	0.0225
Metropolitan Wayne	DTW	Detroit	US	North America	13234	0.0364	0.0125	0.0206
Newark Liberty	EWR	Newark	US	North America	5686	0.024	0.009	0.0183
George Bush	IAH	Houston	US	North America	18939	0.0378	0.0105	0.024
Tompkins	ITH	Ithaca	US	North America	1512	0.0254	0.0125	0.0139
JFK	JFK	New York	US	North America	8676	0.0283	0.008	0.0188
McCarran	LAS	Las Vegas	US	North America	19477	0.0391	0.0116	0.0205
Los Angeles	LAX	Los Angeles	US	North America	102739	0.0486	0.0099	0.0231
Orlando	MCO	Orlando	US	North America	21756	0.0314	0.0109	0.0206
Miami	MIA	Miami	US	North America	25241	0.0451	0.012	0.0249
Minneapolis/St Paul	MSP	St. Paul	US	North America	21078	0.035	0.0113	0.0218

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Table A.1 (*continued*)

Airport	IATA code	City	Country	IATA area	N. of followers	Luxury	Disability	Environment
O'Hare	ORD	Chicago	US	North America	31735	0.0399	0.011	0.023
Sky Harbor	PHX	Phoenix	US	North America	21762	0.0337	0.0108	0.0251
Raleigh-Durham	RDU	Raleigh	US	North America	12940	0.0258	0.0098	0.0217
Tacoma	SEA	Seattle	US	North America	17451	0.037	0.0111	0.0255
San Francisco	SFO	San Francisco	US	North America	36031	0.0453	0.0118	0.0302

Table A.2
SPS results and descriptive statistics by area.

Area	Number (%)	Variable	mean	sd	median	min	max	skew	kurtosis
Africa Mid. E.	9 (7.63)	Luxury	0.0262	0.0084	0.0278	0.0159	0.0424	0.4317	−0.9041
		Disability	0.0064	0.0024	0.0062	0.0031	0.0093	−0.004	−1.8548
		Environ.	0.0115	0.0029	0.012	0.0068	0.0151	−0.215	−1.6808
Asia Pacific	19 (16.10)	Luxury	0.0226	0.0094	0.0252	0.0069	0.0399	−0.100	−1.1006
		Disability	0.0093	0.0068	0.0058	0.0012	0.0196	0.3482	−1.6475
		Environ.	0.0111	0.0046	0.0119	0.0026	0.017	−0.447	−1.1858
Europe	56 (47.46)	Luxury	0.0298	0.0095	0.0284	0.0135	0.0476	0.055	−1.1276
		Disability	0.0084	0.0034	0.0082	0.0021	0.017	0.3007	−0.5133
		Environ.	0.0116	0.0037	0.0124	0.0032	0.0181	−0.392	−0.9077
Latin Amer.	5 (4.24)	Luxury	0.0145	0.0025	0.0151	0.0106	0.0171	−0.526	−1.4917
		Disability	0.003	0.0013	0.0029	0.0016	0.005	0.5211	−1.4575
		Environ	0.0067	0.0022	0.0074	0.0042	0.0098	0.1176	−1.879
North Amer	29 (24.58)	Luxury	0.0324	0.0089	0.0334	0.015	0.0486	−0.218	−0.9396
		Disability	0.0104	0.0025	0.0109	0.0029	0.0138	−1.557	2.4754
		Environ	0.02	0.0053	0.0209	0.0058	0.0302	−0.868	0.5241
Total sample	118 (100%)	Luxury	0.0284	0.0099	0.0281	0.0069	0.0486	−0.001	−0.9045
		Disability	0.0087	0.0041	0.0086	0.0012	0.0196	0.3386	−0.2717
		Environ.	0.0134	0.0057	0.0134	0.0026	0.0302	0.4065	−0.2665

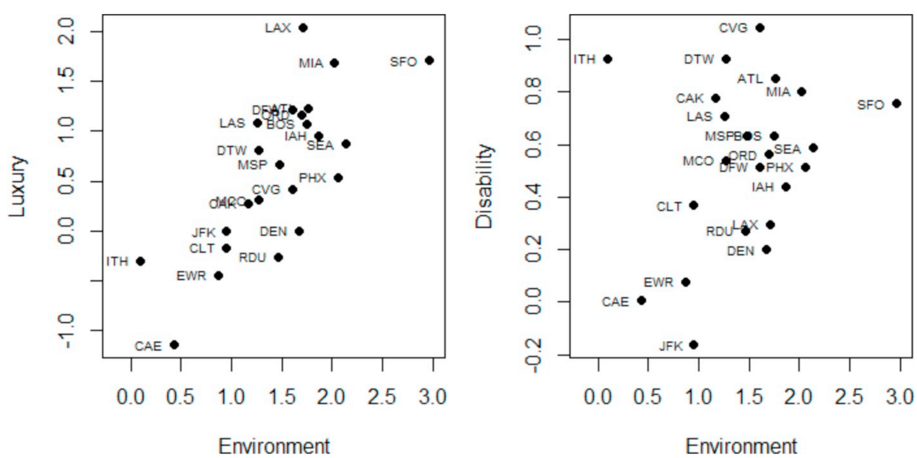

Figure A.1. US airport relative positioning.

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