



Exploring different nationality perceptions of airport service quality



Angelos Pantouvakis^{a,*}, Maria Francesca Renzi^b

^a Department of Maritime Studies, University of Piraeus, Greece

^b University of Roma Tre, Roma, Italy

ARTICLE INFO

Article history:

Received 9 February 2015

Received in revised form

19 November 2015

Accepted 18 December 2015

Available online xxx

Keywords:

Airport

Service quality

Cross-national equivalence

Nationalities

Rasch modelling

ABSTRACT

In order to attain a sustainable competitive advantage, airports should strive to enhance multicultural passenger satisfaction through the provision of high quality services. The purpose of the current study is to determine the specific service quality components that can lead to increased traveler satisfaction in an international airport environment, and to evaluate the degree to which passenger perceptions of airport facilities, as well as levels of satisfaction, vary according to different nationalities. In order to achieve this objective, this paper examines the equivalence of service quality and satisfaction measures by applying the Rasch modelling technique. Airport service quality is found to be comprised of three distinct dimensions, namely "Servicescape and Image", "Signage" and "Services" and significant differences with service quality perceptions are exhibited among travelers of different nationalities. Overall, the results highlight the need to assess scale equivalence across different nationalities.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

The continuous rise of international air traffic and the presence of fierce competition among different airports led the General Assembly of Airports Council International (ACI), to recognize that the quality of service at airports is a "vital factor in its own right" (Airports Council International, 2004). It has resulted in a call for an increased management effort towards adopting customer oriented management practices in the airport industry and initiatives to improve customer satisfaction (Arif et al., 2013). Moreover the multicultural nature of this industry, where millions of passengers coming from different nationalities and cultures interact and experience the same airport services, necessitates increased effort to be devoted towards understanding their multicultural standards and evaluations, creating appropriate physical environments, designing efficient services and finally offering satisfaction. It is further emphasized that airport facilities and airport services are the first experiences that a passenger receives upon arrival, and some scholars (e.g. Rendeiro Martín-Cejas, 2006) state that these experiences may even influence quality perceptions for the overall voyage.

Today the role of airport service quality is recognized as one of several attributes that contribute to airport attractiveness (others

include routes, scheduling, location and prices) and its importance is highly valued towards the creation of an overall customer orientation and competitive advantage in the airport industry. The need to further explore the nature of airport service quality and its components is therefore evident in the relevant transport and marketing literature (Fodness and Murray, 2007) and is considered to be relevant for airport authorities for better allocating resources and organizing their investment strategies (Liou et al., 2011). However the very nature of airport services, where many cultures and nationalities interact, further complicates passenger satisfaction measurements and airport quality evaluations, as customers from different countries of origin tend to differently evaluate the same service quality they receive (Kuo, 2007; Pantouvakis, 2013). Recent research has focused on the issue by exploring quality perception variations between different nationalities travelling on-board airlines (Lu and Ling, 2008). However multi-national quality and satisfaction measurements and comparisons are very rare inside the environment of an airport. Moreover there is a lack of unanimity among scholars regarding the quality components that can generate high passenger satisfaction at an international airport.

Drawing evidence from 911 multinational passengers departing from Fiumicino Airport in Rome, Italy (Aeroporti di Roma), this study attempts to make several contributions to the airport research agenda. First, by synthesizing the relevant literature it attempts to empirically investigate and introduce a model for measuring airport service quality. Second, this research –for the first time in airport industry– investigates airport user satisfaction

* Corresponding author.

E-mail address: angelos@pantouvakis.eu (A. Pantouvakis).

from a cross-cultural perspective diverting from taxonomies of frequent-infrequent travellers. Third, it is among the very few studies (Ganglmair-Wooliscroft and Wooliscroft, 2013) that examine cross-cultural differences in response styles by considering and measuring the equivalence of satisfaction and quality measures among passengers/airport facilities users of different nationalities. This is achieved by employing Rasch Modeling (RM) techniques in order to examine users' perceptions, independently of the instrument used to measure them, or their nationality. This way cultural differences or cross cultural equivalence, both qualitatively and quantitatively, is established prior to any further analysis to ensure that semantic meanings, and familiarity with the scale type and scale gradation, does not produce any measurement bias (Mullen, 1995).

A key final feature of our study is that we explore and compare the satisfaction and quality perceptions of airport users before and after the RM to identify and show whether this discrimination among nationalities produces meaningful and comparable results. Two sets of underlying dimensions of airport service quality (without and with RM) have been produced and potential differences in perceptions of satisfaction of group of users have been clearly identified.

The paper is divided into five sections. The next section presents a literature review on the Rasch method, airport service quality and nationalities issues. The data collection process is described in the methodology section, while the data collected are analyzed in the results and discussion section. Finally, the paper's conclusions and implications are summarized in the last section.

2. Theoretical background and research hypotheses

2.1. Airport service quality

Considering the rapidly changing nature of the airport industry, airports should place a strong emphasis on improving the service quality, or in other words the perceived level of service delivered to their passengers (Francis et al., 2003) by meeting or exceeding airport users' demands (Fodness and Murray, 2007). Service quality improvement strategies can be effective if based on an appropriate identification and selection of quality attributes to be improved (Lin et al., 2009). In this regard, airport service quality literature has attempted to highlight the complicated nature of airport services, either through the development of conceptual models that reflect the different dimensions of airport service quality (Fodness and Murray, 2007), or by focusing towards revealing the quality drivers that lead to airport users' satisfaction (Bogicevic et al., 2013). However most of the existing literature deviates from classical service quality measurement by focusing at an attribute level and by forming the passenger's perception of quality mainly from surrogates of other stakeholders' opinions. For example the works of Rhoades et al. (2000), Chen (2002) and Yeh and Kuo (2003) considered customer perceptions through the views of airport operators or consultants. On the other hand recent studies (Tsai et al., 2011; Liou et al., 2011) have tested conceptual models by taking responses from passengers of one context (Taiwan), arguing in favor of a more cultural focused examination. Finally Fodness and Murray (2007) used a sample of frequent flyers with an annual income of \$50,000 from the US to provide insight into the process of airport service quality measurement.

In discussing their conceptual models, authors have noted that airport quality may be decomposed into a number of discrete but different dimensions, even though every author has argued in favour of their own model. Some authors have discussed that airport service quality can be aggregated into a small number of dimensions, such as function, interaction and diversion (Fodness

and Murray, 2007) or physical environment and interaction and outcome attributes (Tsai et al., 2011), while others have argued that the complicated nature of an airport context can be captured through the use of a more extended set of quality factors. For example, Liou et al. (2011) investigated passenger perceptions of the overall landside level of airport service and extracted eight distinct dimensions of airport service quality, while Yeh and Kuo (2003) utilized six service attributes for passenger evaluation of Asia–Pacific international airports, namely comfort, processing time, convenience, courtesy of staff, information visibility and security. All research, however, tends to coincide with a number of dimensions, commonly and discretely identified by scholars, which are considered as best descriptors of airport quality.

Those dimensions are:

- The “**Servicescape**” of the airport.

In line with Bitner (1992) several authors have investigated the servicescape dimensions in an airport context and concluded that these may include airport facilities circulation planning attributes (Tsai et al., 2011) and other features such as cleanliness and lighting conditions, the congestion level and the overall ambience of the airport (Yeh and Kuo, 2003). Moreover, in their recent study, Jeon and Kim (2012) identified the constructs that constitute an international airport servicescape and argued that they include the ambient, functional, esthetic, safety, and social factors.

- The “**Signage**” or the level and quality of information and guidance available at the airport.

The availability of signs and flight displays (Liou et al., 2011) as well as the provision of clear and frequent information for flights and guidance for airport facilities (De Barros et al., 2007) are assumed to be necessary prerequisites contributing to high-perceived service quality.

- The “**Service**”

Along with the provision of an ambient environment and a proper orientation system inside and outside an airport building, the airport should be directed towards minimizing the passengers' throughput time. As the passenger is physically present in all airport operations the facilitating or frustrating way that time is spent within facilities is crucial in forming an overall service level perception. It can be related to average waiting time and crowding levels for airport facilities (Rendeiro Martín-Cejas, 2006) or to the waiting time at the airport's security screening points (Gkritza et al., 2006) and thus efficient control procedures and proper training of staff (Correia and Wirasinghe, 2007) is crucial. Apart from the time dimension, other attributes that form the passengers' perception of the speed of control procedures are the skills and quality of airport staff during daily airport control processes. The existence of certain attributes of airport staff, such as courtesy, helpfulness and competence, has been emphasized by various authors (eg. Yeh and Kuo, 2003; Liou et al., 2011). Specifically, De Barros et al. (2007) asserted that transfer passengers tend to appraise the politeness of the security check employees to a great extent.

In summary, the servicescape elements, the signage or the availability of information and guidance facilities, as well as the service or efficacy of control inspections and service provision, have been introduced as factors that can shape the overall service quality as perceived by air travelers. Moreover, in line with Lehtinen and Lehtinen (1991), this current study incorporates a fourth dimension of airport service quality representing the users' evaluations of

the airport image which has been introduced recently to the literature agenda (Ariffin and Yahaya, 2013).

- The “Image” of the airport

It is widely accepted in the literature that image refers to the “holistic” way that a company or an organization is defined in the customer’s mind. It has been linked to a global or overall impression an entity makes on the mind of others not necessarily anchored on objective data and details (Dichter, 1985). Adapting work from Fodness and Murray (2007) and in line with Ariffin and Yahaya (2013) we have introduced a battery of items including the airport users’ overall impression of several attributes such as “cleanliness”, “waiting times”, “restaurants and cafes”, “shops” and “bathrooms”.

In general, given the complexity and variety of airport services and the absence of a global consensus and sufficient empirical evidence regarding airport quality dimensions, this calls for a closer identification of passengers’ perceptions of what constitutes a high level of service quality and thus the first research hypothesis is formulated as follows:

H1. Airport service quality is a multidimensional construct consisting of four dimensions, namely “Servicescape”, “signage”, “service” and “image”

2.2. Service quality and nationalities/cultures

Almost all prior studies on airport service quality either avoid the passengers’ opinion directly (e.g. Yeh and Kuo, 2003), or they assume that the responding passengers provide their opinions/valuations of quality or satisfaction independently of the variation in other characteristics (Fodness and Murray, 2007), such as nationality or culture. The latter have been identified as a significant influence on forming opinions and as a major limitation to the generalization of results (Tsai et al., 2011). A high degree of subjectivity thus affects the results, which poses ambiguity on their validation, as the measurement of attitudes may not be independent of the characteristics of the people who answered the instrument questions or the instrument items themselves.

In the relevant marketing literature it is widely argued that different national or cultural characteristics can strongly affect the customers’ perceptions of satisfaction from the service offered (Keillor et al., 2007; Woodside et al., 2011; Pantouvakis, 2013). Specifically, in the fields of tourism and hospitality, it has been demonstrated that individual preferences and expectations (Yuksel, 2004) as well as level of satisfaction (Bowen and Clarke, 2002) can vary significantly between travelers from different countries. For example, American, Taiwanese and Japanese tourists exhibit significant variations in their satisfaction regarding the service attitude of hotel employees (Kuo, 2007). Moreover, Pantouvakis (2013) confirmed that national culture differences affect perceived satisfaction when he examined a number of hotel tourists from 10 different countries visiting the island of Crete. In the same vein, the moderating role of the cultural dimensions of uncertainty avoidance and individualism/collectivism in the relationship between service quality and tourist satisfaction was also corroborated by Sabote et al. (2012) using a sample of English and Spanish tourists.

In a case more similar to the airport industry involving airlines, the discrepancies encountered in service evaluations among passengers from different nationalities have also received some research attention. Gilbert and Wong (2003), after collecting data from passengers departing from Hong Kong international airport, analyzed expectations regarding airline service quality. The authors formulated four distinct ethnic groups, namely North American,

West European, Chinese and Japanese and concluded that significant differences in service expectations appeared among travelers of these various nationalities. Moreover, in the context of cross-strait airlines, Taiwan travelers and Mainland China travelers differently perceived certain service attributes (Lu and Ling, 2008), whereas Sultan and Simpson Jr (2000) argued that airline service quality perceptions and expectations vary between US and European passengers. Also, Kim and Lee (2009) remarked that passengers coming from Japan, China, South Korea and America show different complaint attitudes under irregular airline circumstances that can seriously threaten the proper provision of airline services.

Although airport service quality considerations have received increased academic attention, the investigation of how different national cultures perceive and assess the various services offered in an airport setting is rather limited. To the best of authors’ knowledge, only two studies have been identified exploring this issue. Crotts and Erdmann (2000), using a sample of overseas visitors to the USA and adopting Hofstede’s (1980, 2001) national culture framework, concluded, among other things, that the respondents’ ratings of airport facilities varied significantly between the different masculinity national cultures groups. Specifically, the authors noted that more positive assessments of airport facilities were given by passengers of the low masculinity group and that the most noticeable between-group differences were reported when low to middle group respondents were compared to their high masculinity group counterparts. Also, in his study, Kozak (2001) noted that British tourists were slightly more satisfied than German tourists in terms of the availability of facilities and services at the destination airport in Mallorca.

Following the above considerations a literature gap emerges to examine nationality differences of service quality perceptions and passenger satisfaction at international airports. For the purposes of the current study, we have decided (and it is convenient) to test our instrument’s cross cultural invariance with a set of two different samples: Italians and English speaking populations (coming from the USA, UK, Canada, Australia and New Zealand). Both belong to different Hofstede clusters (Cluster 8 for English speaking and Cluster 9 for Italians). However they have rather similar masculinity profiles (to accommodate Crotts and Erdmann considerations) with no differences identified in the level of their extreme response style (ERS) (Cheung and Rensvold, 2000). This way maximum comparability in the users’ perceptions of the service between the two populations is expected. For the purposes of this study, a third sample was also formed including passengers of other nationalities (Southern America, Europe, Africa and Asia). Finally, the ability of the airport service quality dimensions to predict actual behavior (overall satisfaction of the service experience) is highly recommended in the cross-cultural literature (Smith and Reynolds, 2002).

Accordingly, the research hypotheses are formulated as follows:

H2. The airport service quality construct is invariant among Italians, English speaking and other populations.

H3. Given the same service experience there are significant differences in airport service quality perceptions between Italian and English Speaking airport users.

H4. Given the same service experience there are significant differences in airport service quality perceptions between Italian and other nationalities airport users.

H5. Given the same service experience there are significant differences in airport service quality perceptions between English Speaking and other nationalities airport users.

H6. Airport service quality dimensions effectively predict the overall satisfaction from the service experience.

3. Methodology

3.1. Item generation and questionnaire development

A structured questionnaire in English, consistent with past studies and following our literature review was developed and pretested on a group of twenty academic colleagues and fifty students in Italy, Greece and UK. Following this feedback a final questionnaire was prepared and organized in four categories, namely “Servicescape”, “Signage”, “Service” and “Image”. An Italian version was prepared from native speakers/translators bilingual in Italian and English who agreed that most passengers would understand the semantics of the items included. A back translation of this questionnaire to English was also developed and tested for both linguistic and semantic equivalence to the original. Finally a group of fifty multinational passengers in Fiumicino/Aeroporti di Roma Airport in a collaborative process was used to confirm that both versions were identical.

8 items were left and included in the “Servicescape” dimension covering different aspects of the airport’s physical environment. The “signage” and “service” categories incorporated 10 and 5 items respectively, while the “image” dimension included 9 items. Finally, 1 item was used to measure passenger overall satisfaction. Consistent with satisfaction literature that argues for the benefit of 6 – point Likert type scales (1 = strongly disagree, 6 = strongly agree) in measuring satisfaction (Narver et al., 2004), avoiding any tendency by respondents to merely select the mid-point of the scale, we decided to employ 6-point scales as well.

3.2. Data collection

The empirical study was carried out at Fiumicino/Aeroporti di Roma from April 30th to June 26th 2014. Individuals, travelling for either business or leisure, speaking Italian or English, taking any international or national flight from Rome to anywhere, were the target population. The selected passengers were seated at boarding gates or lounges in all four terminals and were approached by trained interviewers, as it was assumed that the respondents had time to conveniently answer the questions. Due to the time provided and common practice in the literature (Kuo and Jou, 2014), a convenience sampling method was adopted choosing approximately forty passengers per 24-h day for twenty five non consecutive days during a period of two months. 922 usable responses were obtained.

3.3. The Rasch method

Rasch Modeling (RM) has received limited attention in the transport and tourism literature although its usefulness is more evident in examining cross-cultural data (Salzberger, 2009; Ewing et al., 2005) and its superiority over Multi Group Analysis is well established (Steenkamp and Baumgartner, 1998). It introduces a probabilistic *logit* alternative to Guttman scaling as it specifies the probability, P_{nij} , that a person n of ability B_n is observed in category j of a rating scale applied to item i of difficulty D_i as opposed to the probability $P_{ni(j-1)}$ of being observed in category $(j-1)$ plus the item’s threshold $F_{j\theta}$

$$\log_e \left(\frac{P_{nij}}{P_{ni(j-1)}} \right) = B_n - D_i - F_j$$

RM is ideal for many Likert Scale type applications, as the rating scale structure -parameterized by F_j – is defined to be the same for all items and for every response in the data file. For every person’s ability and any items’ difficulty a Rasch model

allows summing and scoring responses, thus conceding to express them in one group regardless of different perceptions or items’ difficulty. This requires specific objectivity or invariance of items against all possible groupings of respondents (here different nationalities) (Salzberger and Sinkovics, 2006) measured as DIF (Differential Item Functioning). Finally a Rasch Model provides supporting evidence of anomalies in the data with respect to the comparative discriminating power of any item relative to all items as well as the independence of the items and it produces a linear scale of items and persons’ locations. This study introduces and examines RM for different nationalities in the airport industry whereas existing studies treat similarly all cultures and focus their efforts on explaining quality constructs by using common measurement instruments invariantly among different populations.

3.4. Analysis

All 922 respondents –objects of analysis- and their responding profiles including 33 variables/items were entered into the RUM2030 software package and examined for possible extreme cases or improper responses. 11 cases were identified as extreme and excluded from further analysis, leaving a usable sample of 911 respondents with 33 items. The sample was then split in four sub-samples. The three of them are the “Italians” ($n = 448$), the “English Speaking population” ($n = 183$), and the “Hold-out sample” ($n = 194$) which includes respondents from 61 Nationalities visiting the airport. The fourth sample was kept as a second testing sample including respondents ($n = 86$) that refused to state their nationality, so they were identified as “Missing”.

Differential Item Functioning (DIF) analysis was then performed to check for the presence of item bias within an item among the four different groups in the sample with the use of two-way ANOVA. Possible item bias for every one of the 33 items was examined in relation to every single respondent/person regardless of its group membership, establishing the specific objectivity or the cross-cultural equivalence among all groups in the sample. After the DIF analysis, six items were identified that are not invariant among the groups and had to be removed from further analysis. Furthermore Item Characteristic Curves (ICC) were examined against their thresholds, or in other words whether the scaling of responses presupposes the same spacing within an item (e.g. 4 as opposed to 5 in the Likert type scale should be equal to 3 as opposed to 4) or a group (the 4 should be equal in all 4 sample of populations) and always provides useful information. Following the threshold analysis and after having checked possible alternatives of item splitting another 6 items were excluded from the analysis. The remaining 21 items were included in the analysis by having invariant characteristics among items and sub-samples (cross-cultural equivalence), having excellent fitting characteristics (Item Chi-square/DF around 3.5 with Mean Location of Items at 0 and mean Location for Persons at 0.985) with all of them having standardized residuals within the range of + or – 2.5, and so thus showing high discrimination among them and partially confirming our second hypothesis.

Item difficulty identified from the RM is presented in Table 1 by expressing distances in Logits among Items whereas Fig. 1 depicts the Person-Item location distribution for every one of the sub-groups of the sample.

3.5. Group analysis and a comparison of methods

In order to reveal and present possible differences in analyzing with or without concern for the cross-cultural response equivalence a dual approach will be pursued. The first analysis is prior to

Table 1
Items' Location in Logits.

Item	Location in Logits
The efficacy of airport air-conditioning	-0.445
The ease of finding internal airport signs	-0.374
The ease of finding your check-in/drop off desk	-0.350
The ease of finding screens for video announcements	-0.266
The clarity of audio announcements	-0.185
The level of noise at the airport	-0.174
The availability of seats in the waiting areas	-0.118
I have a positive impression about the information provided at the airport	-0.116
The ease of finding external airport signs	-0.111
The clarity of internal signs	-0.087
The competence of security control employees	-0.075
The speed of security control	-0.021
The clarity of video information about flights	+0.036
The courtesy of security control employees	0.039
I have the impression that waiting times at the airport are short	0.179
I feel safe at the airport	0.180
The adequate airport lighting	0.190
The clarity of external signs	0.192
I have a positive impression of the airport's employees	0.331
The cleanliness at the airport	0.567
The ease of finding your boarding gate	0.635

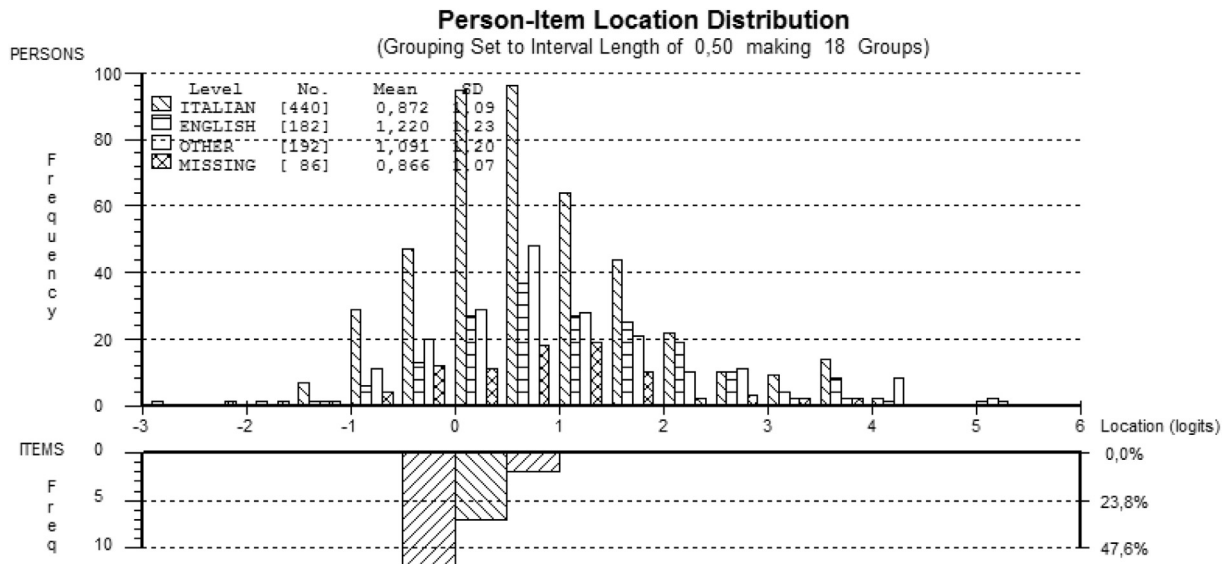


Fig. 1. Person-Item location distribution.

the Rasch analysis method, whereas the second includes results formed after the deletion of the 12 items not presenting invariance among groups, to exhibit possible measurement or semantic bias in the way the data are handled. For both approaches CFA (Confirmatory Factor Analysis) was performed to extract the underlying factors of airport service quality whereas the perception differences among respondents of different nationalities were analyzed through one-way analysis of variance (ANOVA) tests. Finally, multinomial logistic regression analysis was used to assess the passengers' overall satisfaction levels with regard to the airport service quality dimensions, which were derived after the Rasch analysis.

4. Results and discussion

4.1. Dimensions of airport service quality

In order to reveal the underlying dimensions of airport service quality and to verify Hypothesis 1, a series of CFA's were performed

using the Maximum Likelihood Estimation to yield the factors. For the two cases all tests were performed and Reliability, Construct and Discriminant Validities ($AVE > COR^2$) examined. Standardized loadings of all variables are significant and the majority are higher than 0.7 so to ensure convergent and construct validity. Finally all standardized residuals (differences between observed and fitted covariance terms) were less than |2.5| implying an accurate re-creation of the observed variable from the measurement model (Hair et al., 2005). Then to assess both models' validity (before (BR) and after Rasch (AR)) a set of indices has been examined including Goodness of Fit Indices like GFI and RMSEA, Incremental indices like NFI and CFI, Parsimony CFI and two comparative indices (ECVI and AIC). All indices are shown in Table 2. Results reveal that for the BR measurement model an unacceptable (or marginally acceptable) fit has been revealed with NFI 0.877 < 0.92, CFI 0.883 < 0.92, RMSEA 0.141 < 0.7 (all thresholds based on Hair et al. recommendations for the number of variables and cases). On the other hand the AR model fits the data very well with all indices exceeding the suggested cut off point of 0.92. Finally both ECVI and AIC are better for the AR

model further supporting its superiority over the BR model. Our first Hypothesis regarding the multidimensional structure of airport service quality is partially confirmed arguing in support of a more parsimonious three factor model where the “Servicescape” and “Image” dimensions are collapsed to one “ServiceImage” dimension.

However what seems of interest when comparing these two models is their factorial structure and the nature of the variables loading on every factor for every case as presented in Table 3.

- **Factor 1: “Servicescape and Image”.** The first factor, which represents both Servicescape and Image, consists of 7 items (AR) or 6 items (BR), representing almost totally different aspects of the airport’s physical environment, as well as passengers’ impressions of the various facilities. In the BR case, the results deviate from the AR results by decreasing the importance of aspects such as cleanliness, lighting and air-conditioning in favor of assistance with luggage and comfort of security control. Image elements are the same in both models.
- **Factor 2: “Signage”.** The results of both approaches show that the second factor contains four and five items respectively regarding the level and quality of information available at the airport, which are essential elements when evaluating the quality of services provided. Airport signs and electronic information displays should facilitate the easy and proper orientation of air passengers inside and outside the airport building.
- **Factor 3: “Service”.** After running both CFA’s it is clear that the third factor is addressed by three components referring to the control procedures carried out in an airport. The results indicate a swap between the speed of security control (AR) as compared to the ease of finding the boarding gate (BR). In either case, this factor emphasizes the competence, courtesy and speed of the airport staff to handle their daily control related duties effectively.

4.2. Differences in airport service quality perceptions according to passenger nationality

In order to detect different perceptions of airport service quality among the travelers of various nationalities, the groups of respondents described in Section 2.2 were analyzed. The first group includes the Italian passengers, while the second group consists of English speaking travelers. The third group contains airport users from other nationalities (holdout sample). One – way ANOVA tests were performed using the Least Significant Difference (LSD) method to explore these differences of various nationalities’ perceptions and the results are shown in Table 4.

The ANOVA results (all after the Rasch method) show that significant differences are apparent between Italian (the resident nationality) and English speaking passengers in all underlying dimensions of airport service quality, since their evaluations of certain servicescape characteristics, as well as their impressions of

the various airport facilities, vary according to their unique nationalities. Thus our third hypothesis is confirmed. On the other hand Italians seem to show similar differences (with the exception of signage) with the Hold Out (other) sample, whereas the English speaking populations and other sample present no statistically significant differences with any dimension. Thus, our fourth hypothesis is partially confirmed, while our fifth hypothesis is not supported. This finding indicates that Italians, as the resident nationality, have different opinions from both the English speaking and other nationalities, and accordingly those two groups may be merged into one category. One – way ANOVA tests were run again using the Least Significant Difference (LSD) method to gain deeper insight and to explore potential differences concerning resident versus visiting nationalities perceptions of airport service quality. The two new respondent groups are now comprised of Italians and passengers from foreign, visiting nationalities respectively. The results are shown in Table 5.

The ANOVA results revealed significant differences among Italians and other passengers in all three factors of airport service quality only when performing the analysis after the Rasch method. Italian air travelers displayed significantly lower scores in their perceptions of the service quality offered by their homeland’s airport industry regarding all the dimensions. It can be deduced from the results that Italian airport users are more likely to be stricter and more conservative in their perceptions compared to their peers from different countries of the world, who tend to more highly evaluate the quality of services offered regarding the information facilities and routine control procedures. Moreover, the results indicate that the visiting nationalities’ evaluations of the airport’s physical environment, as well as their impressions of the airport’s facilities, are more positive than those of Italian passengers. Generally, the ANOVA results confirm that passengers’ perceptions of quality can vary significantly when their national characteristics are taken into account.

4.3. Predicting satisfaction from the airport service quality dimensions

Taking into account the categorical nature of the responses, the method of multinomial logistic regression was then selected and applied in order to examine the level of passenger overall satisfaction regarding the different dimensions of airport service quality, which were extracted before and after applying the Rasch analysis. The variable “overall satisfaction” (in a 6 – point scale) has been collapsed into a 3 – point scale and three new categories were developed, namely “Low satisfied”, “Medium or average satisfied” and “Highly satisfied”. In arithmetic terms, the relationship between overall satisfaction and airport service quality takes the form of:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3$$

where Y = overall satisfaction (dependent variable), a = constant, b₁, b₂, b₃ = coefficients and X₁, X₂, X₃ represent the three extracted factors of “Servicescape and Image”, “Signage” and “Service” respectively. This equation is designed to predict the probability of an event, and the logistic coefficients describe, with the use of a covariate, the occurrence or non-occurrence of an event (dependent variable).

The second category (“average or medium satisfied”) was used as a baseline/reference category and the summations of all variable loadings to every factor extracted before and after the Rasch analysis (Section 4.1) were used as covariates. A set of different models were then calculated for every category of “satisfied” and “non satisfied” airport users, one including all passengers and the other

Table 2
Goodness-of Fit Indices across BR and AR models.

	Before Rasch	After Rasch
NFI	0.877	0.936
CFI	0.883	0.944
PCFI	0.701	0.764
RMSEA	0.141	0.084
AIC	1237.635	703.274
ECVI	1.360	0.773
GFI	0.830	0.911

Table 3
Confirmatory Factor Analysis standardized estimates of airport service quality before (B. R.) and after the Rasch method (A. R.).

	Before Rasch (BR)	After Rasch (AR)
<i>Servicscape and image</i>		
The cleanliness at the airport		0.745
The adequate airport lighting		0.672
The efficacy of airport air-conditioning		0.608
The adequate assistance during luggage control	0.764	
The comfort of security control	0.749	
I feel safe at the airport		0.668
I have a positive impression about the level of comfort at the airport	0.778	
I have the impression that waiting times at the airport are short	0.784	0.748
I have a positive impression of the airport's employees	0.864	0.877
I have a positive impression about the information provided at the airport	0.871	0.875
<i>Signage</i>		
The clarity of external signs	0.818	0.929
The ease of finding external airport signs	0.811	0.915
The clarity of internal signs	0.880	0.732
The ease of finding internal airport signs	0.860	0.702
The ease of finding screens for video announcements		0.516
<i>Services</i>		
The speed of security control		0.608
The courtesy of security control employees	0.874	0.875
The competence of security control employees	0.895	0.900
The ease of finding the people in charge of giving information	0.639	

Table 4
ANOVA comparison of airport service quality dimensions by airport user nationality (Italians, English speaking and Holdout sample).

	Mean – group Italians	Mean – group English speaking	Mean – group Italians	Mean – group holdout sample	Mean – group English speaking	Mean – group holdout sample
“Servicscape and Image”	***		*		NS	
“Signage”	**		NS		NS	
“Services”	***		**		NS	

*, **, *** indicates Level of Significance 90%,95%,99%.

Table 5
ANOVA comparison of airport service quality by passenger nationality (Italians versus Other nationalities).

	Mean – group Italians	Mean – group – other
“Servicscape and Image”	31.9944	33.5385
Sig.	0.000	
“Signage”	22.4453	23.2042
Sig.	0.019	
“Services”	13.4877	14.5610
Sig.	0.000	

three including “Italians”, “English speaking” and “Other nationalities” travelers. This way the relative coefficients for creating satisfaction or dissatisfaction for every nationally distinct group of airport users will be calculated. Finally, and for comparison purposes, the two different approaches followed throughout this study, before and after Rasch, were estimated to allow for further analysis.

The overall model fit (goodness of fit) was estimated using the Nagelkerke's pseudo R², which compares predicted to observed probabilities with higher values indicating better fit. For every examined model, the classification matrices showed a high percentage of correctly classified cases. Finally the Exponentiated coefficients (Exp(B)) were extracted with values less or more than 0.00 reflecting a negative or positive relationship respectively.

From the examination of Table 6 we can make some interesting observations regarding the importance of airport service quality factors for the dissatisfaction and satisfaction of airport users. The first observation is that for the formation of dissatisfaction all identified variables are performing similarly among different

nationality groups. The ServImage factor presents the same negative magnitude for creating dissatisfaction to the users, however Signage is not significant (BR) and significant (AR) for English speaking populations. An interesting fact is the non-significance of the “services” dimension, meaning that services, however performed, do not significantly contribute to the dissatisfaction of passengers regardless of nationality.

Regarding the influence of service quality factors on satisfaction levels, major differences are evident both between nationalities and also before and after the application of the Rasch Method. Take for example the insignificant ServImage dimension for Italians before the RM which turns out to be significant after the RM. The opposite happens with “other people” where ServImage seemed to be of importance before but unimportant after the RM. Practitioners may well benefited from this result as they have to design different airport facilities depending on nationalities.

Finally services (speed of control) lose their importance when examined between populations. For example Italians seem to attribute great importance to services and the English do not care at all, thus indicating the different classifications following Hofstede contentions (Obedience, masculinity etc). Overall, the multinomial regression models produced results which prove that airport service quality dimensions effectively predict the overall satisfaction from the service experience and thus confirm our sixth hypothesis.

5. Conclusions

The prime objective of this paper is to measure service quality and identify its importance on user satisfaction at airports. There were two major considerations when developing the instrument

Table 6
Parameter estimates from multinomial logistic regression analysis.

Variables	All BR	Italians BR	English speaking BR	Other BR	All AR	IT AR	English speaking BR	Other AR
Dissatisfied passengers								
ServImage	0.841***	0.8***	0.89*	0.829***	0.847***	0.841***	0.873*	0.831***
Signage	0.878***	0.915*	NS	0.819**	0.894***	0.907***	0.876*	0.870**
Services	NS	NS	NS	NS	NS	NS	NS	NS
Satisfied passengers								
Servimage	1.166***	NS	1.480***	1.381**	1.198***	1.163***	1.488***	NS
Signage	1.200***	1.153*	NS	1.71***	1.149***	1.102*	NS	1.441***
Services	1.142*	1.459***	NS	0.685*	NS	1.309**	NS	NS
Pseudo R2	0.476	0.508	0.505	0.574	0.482	0.504	0.507	0.542
Prediction	64.5%	66.7%	63.4%	68.6%	64.7%	65.1%	63.9%	71.1%

that have never or only marginally been addressed in the airport sector industry to the best of authors' knowledge. The first is linked to the multi national status of the airport users/passengers that differently perceive and assess the level of service offered to them. The second, somewhat related to the first, is the impact of the response styles and the limited time that targeted multi national respondents have to answer questions. The first consideration calls for an extensive evaluation of cross-cultural equivalence among respondents, whereas the second necessitates short, reliable and valid measures that should capture the essence and the richness of the users' satisfaction.

In order to achieve the objective of measuring airport service quality, the present study synthesized the relevant literature, and by using the Rasch Modeling (RM) technique concluded that the service quality provided in an airport multi national context can be best described by three distinct, independent and invariant dimensions, namely "Servicescape and Image", "Signage" and "Service". CFA applied before and after RM revealed that the data lacked structural comparability between populations that affected factor structure and loadings. For example prior to RM cleanliness, lighting and air-conditioning seem to be substituted by luggage assistance and comfort. As a result, while it seems possible to describe airport service quality with common dimensions, there is not a common profile of the variable loadings and hence diverse explanations or suggestions of elaborate Servicescapes are produced.

This study also provides evidence that satisfaction or dissatisfaction perceptions of passengers vary according to their nationalities. Specifically, it is argued that Italian air travelers tend to under-value the service quality provided to them by their homeland's airport compared to their foreign counterparts.

The multinomial regression models produced results which prove that the three factors of airport service quality all have a positive and significant association with the dependent variable "Satisfaction". The presence of the dimension of "Servicescape and Image" seems to play the most decisive role in satisfying passengers, whereas its absence seems a major cause of their dissatisfaction. Following that the "service" dimension of airport service quality presents interesting characteristics since it seems that it does not contribute to the dissatisfaction of users in any case and for every nationality. Only Italians seem to allocate importance to this element, thus making it clear that almost in every case users do not recognize the courtesy and competence of airport staff and time spent in control procedures as critical to their satisfaction or dissatisfaction. Finally the "signage" dimension of quality plays an important positive role overall, however English speaking populations do not significantly value it when forming their overall satisfaction views.

A final contribution of this study is the presentation and comparison of the satisfaction results before and after the application of the Rasch Methodology. The BR findings support that Italians do

not, and other nationalities do, significantly value the "Servicescape and Image" elements of airport service quality, whereas the AR analysis completely reverses this finding, arguing in favor of a significant influence of Servicescape and Image on Italians satisfaction perceptions and a non significant one for other nationalities.

To sum up, the current study reveals that the measurement of service quality and satisfaction issues should not be based on common instruments, which treat invariantly people of different populations/nationalities. Moreover, it provides useful insights regarding the way passengers evaluate airport service quality and highlights the importance of taking into consideration national differences when assessing travelers' evaluation of airport services.

6. Limitations and suggestions for further research

As with any other work in the complex multinational marketing research realm, this work has certain limitations that provide avenues for further research. Regarding the data collection the use of personal interviews and questionnaires of two –Italian and English–languages limits the data points, thus introducing a sampling bias. A further issue emanates from the selection of the groups as well. Although both groups belong to different Hofstede clusters, the theoretical foundations for such a choice still needs further exploitation. Future research may duplicate research in different settings and for different cultures thus moving away from convenience samples. Finally the role of potential moderators, such as the exact service provision setting or the mood of the passengers, when evaluating the service is needed to enrich our current understanding of variations.

References

- ACI, 2004. The social and economic impact of airports in Europe. ACI-Europe and York Aviation.
- Arif, M., Gupta, A., Williams, A., 2013. Customer service in the aviation industry—an exploratory analysis of UAE airports. *J. Air Transp. Manag.* 32, 1–7.
- Ariffin, A.A.M., Yahaya, M.F., 2013. The relationship between airport image, national identity and passengers delight: a case study of the Malaysian low cost carrier terminal (LCCT). *J. Air Transp. Manag.* 31, 33–36.
- Bitner, M.J., 1992. Servicescapes: the impact of physical surroundings on customers and employees. *J. Mark.* 56, 57–71.
- Bogicevic, V., Yang, W., Bilgihan, A., Bujisic, M., 2013. Airport service quality drivers of passenger satisfaction. *Tour. Rev.* 68 (4), 3–18.
- Bowen, D., Clarke, J., 2002. Reflections on tourist satisfaction research: past, present and future. *J. Vacat. Mark.* 8 (4), 297–308.
- Chen, H.L., 2002. Benchmarking and quality improvement: a quality benchmarking deployment approach. *Int. J. Qual. Reliab. Manag.* 19 (6), 757–773.
- Cheung, G.W., Rensvold, R.B., 2000. Assessing extreme and acquiescence response sets in cross-cultural research using structural equations modeling. *J. Cross Cult. Psychol.* 31 (2), 187–212.
- Correia, A.R., Wirasinghe, S.C., 2007. Development of level of service standards for airport facilities: application to São Paulo international airport. *J. Air Transp. Manag.* 13, 97–103.
- Crotts, J.C., Erdmann, R., 2000. Does national culture influence consumers' evaluation of travel services? A test of Hofstede's model of cross-cultural differences. *Manag. Serv. Qual.* 10 (6), 410–419.
- Dichter, E., 1985. What's in an image. *J. Consum. Mark.* 2 (1), 75–81.

- de Barros, A.G., Somasundaraswaran, A.K., Wirasinghe, S.C., 2007. Evaluation of level of service for transfer passengers at airports. *J. Air Transp. Manag.* 13, 293–298.
- Ewing, M.T., Salzberger, T., Sinkovics, R.R., 2005. An alternate approach to assessing cross-cultural measurement equivalence in advertising research. *J. Advert.* 34 (1), 17–36.
- Fodness, D., Murray, B., 2007. Passengers' expectations of airport service quality. *J. Serv. Mark.* 21 (7), 492–506.
- Francis, G.A.J., Humphreys, I., Fry, J., 2003. An international survey of the nature and prevalence of quality management systems in airports. *TQM Bus. Excell.* 14 (7), 819–829.
- Ganglmair-Wooliscroft, A., Wooliscroft, B., 2013. A cross-cultural application of the affective response to consumption scale: investigating US-American and Austrian passengers on long-haul flights. *J. Bus. Res.* 66 (6), 765–770.
- Gilbert, D., Wong, R.K., 2003. Passenger expectations and airline services: a Hong Kong based study. *Tour. Manag.* 24 (5), 519–532.
- Gkritza, K., Niemeier, D., Mannering, F., 2006. Airport security screening and changing passenger satisfaction: an exploratory assessment. *J. Air Transp. Manag.* 12, 213–219.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., Tatham, R.L., 2005. *Multivariate Data Analysis*, sixth ed. Pearson Prentice Hall, Upper Saddle River, NJ.
- Hofstede, G., 1980. *Cultural Consequences*. Sage, Beverly Hills, CA.
- Hofstede, G., 2001. *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations across Nations*, second ed. Sage, London.
- Jeon, S., Kim, M.S., 2012. The effect of the servicescape on customers' behavioral intentions in an international airport service environment. *Serv. Bus.* 6 (3), 279–295.
- Kozak, M., 2001. Comparative assessment of tourist satisfaction with destinations across two nationalities. *Tour. Manag.* 22 (4), 391–401.
- Keillor, B.D., Lewison, D., Hult, G.T.M., Hauser, W., 2007. The service encounter in a multinational context. *J. Serv. Mark.* 21, 451–461.
- Kim, Y.K., Lee, H.R., 2009. Passenger complaints under irregular airline conditions—cross-cultural study. *J. Air Transp. Manag.* 15, 350–353.
- Kuo, C.M., 2007. The importance of hotel employee service attitude and the satisfaction of international tourists. *Serv. Ind. J.* 27 (8), 1073–1085.
- Kuo, C.W., Jou, R.C., 2014. Asymmetric response model for evaluating airline service quality: an empirical study in cross-strait direct flights. *Transp. Res. Part A Policy Pract.* 62, 63–70.
- Lehtinen, U., Lehtinen, J.R., 1991. Two approaches to service quality dimensions. *Serv. Ind. J.* 11 (3), 287–303.
- Lin, S.P., Chan, Y.H., Tsai, M.C., 2009. A transformation function corresponding to IPA and gap analysis. *Total Qual. Manag.* 20 (8), 829–846.
- Liou, J.J., Tang, C.H., Yeh, W.C., Tsai, C.Y., 2011. A decision rules approach for improvement of airport service quality. *Expert Syst. Appl.* 38, 13723–13730.
- Lu, J.L., Ling, F.I., 2008. Cross-cultural perspectives regarding service quality and satisfaction in Chinese cross-strait airlines. *J. Air Transp. Manag.* 14, 16–19.
- Mullen, M.R., 1995. Diagnosing measurement equivalence in cross-national research. *J. Int. Bus. Stud.* 573–596.
- Narver, J.C., Slater, S.F., MacLachlan, D.L., 2004. Responsive and proactive market orientation and New-Product Success*. *J. Prod. Innov. Manag.* 21 (5), 334–347.
- Pantouvakis, A., 2013. The moderating role of nationality on the satisfaction loyalty link: evidence from the tourism industry. *Total Qual. Manag. Bus. Excell.* 24 (9–10), 1174–1187.
- Rendeiro Martín-Cejas, R., 2006. Tourism service quality begins at the airport. *Tour. Manag.* 27 (5), 874–877.
- Rhoades, D.L., Waguespack Jr., B., Young, S., 2000. Developing a quality index for US airports. *Manag. Serv. Qual. An Int. J.* 10 (4), 257–262.
- Sabiote, C.M., Frías, D.M., Castañeda, J.A., 2012. Culture as a moderator of the relationship between service quality and the tourist's satisfaction with different distribution channels. *J. Travel & Tour. Mark.* 29 (8), 760–778.
- Salzberger, T., 2009. *Measurement in Marketing Research: an Alternative Framework*. Edward Elgar, Cheltenham, England.
- Salzberger, T., Sinkovics, R.R., 2006. Reconsidering the problem of data equivalence in international marketing research: contrasting approaches based on CFA and the Rasch model for measurement. *Int. Mark. Rev.* 23 (4), 390–417.
- Smith, A.M., Reynolds, N.L., 2002. Measuring cross-cultural service quality: a framework for assessment. *Int. Mark. Rev.* 19 (5), 450–481.
- Steenkamp, J.B.E., Baumgartner, H., 1998. Assessing measurement invariance in cross-national consumer research. *J. Consumer Res.* 25 (1), 78–107.
- Sultan, F., Simpson Jr., M.C., 2000. International service variants: airline passenger expectations and perceptions of service quality. *J. Serv. Mark.* 14 (3), 188–216.
- Tsai, W.H., Hsu, W., Chou, W.C., 2011. A gap analysis model for improving airport service quality. *Total Qual. Manag. Bus. Excell.* 22 (10), 1025–1040.
- Woodside, A.G., Hsu, S.-Y., Marshall, R., 2011. General theory of cultures' consequences on international tourism behavior. *J. Bus. Res.* 64 (8), 785–799.
- Yeh, C.H., Kuo, Y.L., 2003. Evaluating passenger services of Asia-Pacific international airports. *Transp. Res. Part E Logist. Transp. Rev.* 39 (1), 35–48.
- Yuksel, A., 2004. Shopping experience evaluation: a case of domestic and international visitors. *Tour. Manag.* 25, 751–759.