Journal of Air Transport Studies

Volume 3 - No 2
July 2012

Hellenic Aviation Society

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The Journal is published electronically twice a year, i.e. in January and July by the Hellenic Aviation Society (www.aviationsociety.gr). The January issue usually contains papers (subject to changes) originally presented at the Air Transport Research Society (www.atrsworld.org) Conference of the previous year(s) whereas the July issue may be occasionally dedicated to a special theme. The Journal is accessible online free-of-charge.

Journal of Air Transport Studies (JATS)

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Website: http://www.aviationsociety.gr

Volume 3, Number 2, July 2012, ISSN: 1791-6771.

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- Forsyth P. (2002a), 'Privatization and Regulation of Australian and New Zealand Airports', *Journal of Air Transport Management*, 8, 19-28.
- Papatheodorou, A. (2008) The Impact of Civil Aviation Regimes on Leisure Market. In Graham, A., Papatheodorou, A. and Forsyth, P. (ed) *Aviation and Tourism: Implications for Leisure Travel*, Aldershot: Ashgate, 49-57.
- Skycontrol (2007) *easyJet welcomes European Commission's decision to limit PSO abuse in Italy*. 23rd April. Available from: http://www.skycontrol.net/airlines/easyjet-welcomes-european-commissions-decision-to-limit-pso-abuse-in-italy/ (accessed on 22/08/2008).

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Industry Perspectives should be up to 1,000 words and provide a practitioner's point of view on contemporary developments in the air transport industry. Contributors should explicitly specify whether their views are espoused by their organization or not.

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The European Union (EU) has defined seven regions as outermost (or ultra-peripheral), of which three are located near the European mainland (the Azores, Madeira and the Canary Islands). These regions benefit from certain relaxations in EU law to promote economic development such as extended duration on tendered contracts for subsidised air transport routes subject to public service obligation. This article aims to determine the peripheral status of Norwegian municipalities hosting airports with subsidized air transport routes in order to assess whether they qualify for a similar extension of contract length. Evidently, a majority of the route areas can be classified as equally or more peripheral than the outermost regions. The method for assessment can be transferred to PSO-routes in other peripheral regions of the EU as well as for considering relaxation of other laws promoting the development of such areas.

Ten years after the implementation of the Public Service Obligations (PSO) scheme in Greece, the mechanism has not led to the desired results. Among others, the state has imposed PSOs onto a number of routes that are either of questionable social value or which could prove financially self-sustainable without the need for a PSO after appropriate consultation with key stakeholders. In this context, and given the dearth of resources during a period of severe economic recession, it is necessary for the government to reconsider the structure of the PSO programme and adjust it to the new reality in Greece. In fact, as a first step towards this direction, the present paper seeks to gather all necessary information using the tools of marketing research, to study customer satisfaction and fulfilment of passenger needs on the PSO routes from/to Thessaloniki, the second largest city in Greece. Based on the results of primary data research, the paper aims at contributing to the effective communication of the value of the PSO routes to the passengers and set the fundamentals for a subsequent undertaking of a full marketing plan on how to render such routes financially viable.

This article presents a set analysis of European airlines. The main results reveal that ARIMA models have better performance than the Holt-Winters method in time series of Revenue Passenger Kilometres in nineteen airlines members of the Association of European Airlines (AEA). Only seven airlines have been influenced by the September 11th terrorist attack, SARS and the ash crisis, while none of the analysed airlines has been influenced by the economic crisis that began in 2008. The results obtained might suggest, on the one hand that airlines can find the flexibility to meet demand, despite their difficulty to adjust capacity. On the other hand, given the heterogeneity of resources and flight destinations, the business environment does not affect the airlines in the same way or with the same intensity.

This study hypothesizes that, as a result of government's bilateral agreements and regulations that limit the impact of globalization, a set of components which constitutes the airlines' business strategies have a direct effect on airlines' revenues. The hypothesis is tested on a sample of 15 US airlines, which substantiates that three out of four suggested components have a positive significant influence on the airlines' revenues. Markets - confirms that international flights help to increase the airline revenue; Product - with a significant positive impact on revenue when the airline offers low cost flights; and Operation - flights from hubs where found to have a significant negative affect on airlines' income while point-to-point flights, characterized by low cost airlines, are more advantageous. The fourth component, Generic Competitive Advantage, was found to be a choice component; namely, an airline may succeed by being either a cost leader or a differentiator in the markets and products it is serving.

This paper discusses the question whether passengers are fully aware of the efforts taken by airlines to protect the environment and if this knowledge in turn influences potential customers in choosing a certain airline. The topic is analysed by taking the

case of Swiss International Air Lines (SWISS) passengers at Zurich Airport. It was found that these efforts are not apparent to passengers. However, passengers are interested in an airline's environmental responsibility. It was also found that the airline's action is appealing to customers. Nevertheless, price plays an important role for passengers when choosing an airline even in the case of it being more environmentally-aware. Furthermore, there is a relation between the environmental activities of an airline and the brand image. The brand of the airline is strengthened if it is engaged in environmental activities and communicates them efficiently to passengers.

Editorial

This issue of the *Journal of Air Transport Studies* includes five papers. Kjærland and Mathisen assess the peripheral status of local airports in Norway using five graded scales, namely, remoteness, insularity, size, topography/climate, and economic dependence. It is then discussed whether the regions currently receiving state aid for PSO-routes in Norway satisfy the criteria relevant for the application of five-year contracts which is restricted to outermost regions only. In another paper, Papatheodorou and Koura study customer satisfaction and fulfilment of passenger needs on the PSO routes from/to Thessaloniki, the second largest city in Greece. Customer profiles have been explored and an appropriate market segmentation exercise has been undertaken setting the fundamentals for the development of a marketing plan to make these routes financially self-sustaining.

In the following contribution, Moreno applies ARIMA models to examine RPK (revenue passenger kilometres) for nineteen European airlines. The results suggest that airlines can find the flexibility to meet demand; external shocks do not affect the airlines in the same way. Then, Aharoni and Noy examine the components of airline business strategy and find that Markets, Product and Operation have a significant influence on a sample of fifteen US airlines' revenues, while the fourth component, Generic Competitive Advantage, is found to be a choice component. Finally, using Swiss International Air Lines passengers at Zurich Airport as a case study, Wittmer and Wegelin discuss whether passengers are fully aware of the efforts made by airlines to protect the environment and if this knowledge in turn influences potential customers' choice of an airline.

May we take this opportunity to thank all our authors and referees for their support in publishing this sixth issue of the Journal. Our continuing partnership with Air Transport News in conjunction with the open access character of the journal aim at ensuring that JATS can get a significant exposure to the academic and business audience and raise its profile accordingly. Enjoy reading!

Dr Andreas Papatheodorou, Editor-in-Chief
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ASSESSING THE PERIPHERAL STATUS OF LOCAL AIRPORTS

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ABSTRACT

The European Union (EU) has defined seven regions as outermost (or ultra-peripheral), of which three are located near the European mainland (the Azores, Madeira and the Canary Islands). These regions benefit from certain relaxations in EU law to promote economic development such as extended duration on tendered contracts for subsidised air transport routes subject to public service obligation. This article aims to determine the peripheral status of Norwegian municipalities hosting airports with subsidized air transport routes in order to assess whether they qualify for a similar extension of contract length. Evidently, a majority of the route areas can be classified as equally or more peripheral than the outermost regions. The method for assessment can be transferred to PSO-routes in other peripheral regions of the EU as well as for considering relaxation of other laws promoting the development of such areas.

Keywords: public service obligation, subsidy, air transport, peripheral regions, remoteness, tendering duration

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1. INTRODUCTION

Since the establishment of common European regulations for air transport by implementation of the "third package", the air passenger transport market has been increasingly liberalized and opened up for competition (Stevens, 2004). Air transport is important for enabling small communities to develop socially and economically (e.g. Halpern and Bråthen, 2011; Smyth et al., 2012). In order to prevent small communities from losing air transport services they previously enjoyed, it was arranged for public procurement of services by the public service obligation (PSO) program (e.g. Reynolds-Feighan, 1995).

In 2008 EU adopted common rules for operations of air services in regulation[1] 1008/2008 of the European Parliament and of the Council (CEC, 2008a). The new rules consolidate and replace earlier regulations with respect to licensing, market access and fares[2]. Regulation 1008/2008 expands the duration of the contracts from three to four years, with optional five-year contracts for EU's most peripheral regions. It is argued, e.g. by the Norwegian Competition Authority (2010) that a longer contract period will reduce the uncertainty for the operators, so that more competitors will find it attractive to compete for the tendered contracts. This is considered an advantage for the economic development of these regions since authorities can choose between more bidders and select the best offer. These outermost regions of EU, also called "ultra-peripheral regions", are governed by the Treaty establishing the European Community Article 299 (EUR-LEX, 2009).

Even though not a member of the European Union (EU), Norway is committed to implementing EU law according to the European Economic Area (EEA) treaty. Consequently, all PSO-contracts for air transport routes receiving state aid are tendered on the open market and in Norway with a high level of transparency (Williams, 2005). The duration of the tendered PSO-contracts in Norway has followed the EU regulations. Traditionally, the rounds of competition have taken place every third year. In accordance with the new regulations (CEC, 2008a), the Norwegian Ministry of Transport and Communications(MTC) extended the duration to four years in the most recent tendering round starting 1st April. Additionally, the PSO-contracts for air transport in the northern part of Norway took advantage of the option of five-year duration being restricted to ultra-peripheral regions only.

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[1] A regulation is an EU decision that directly binds all member states and citizens in the whole of the EU.

[2] Council Regulations No 2407/92 of 23 July 1992 on the licensing of air carriers (CEC, 1992a), No 2408/92 of 23 July 1992 on access of Community air carriers to intra-Community air routes (CEC, 1992b), and No 2409/92 of 23 July 1992 on fares and rates for air services (CEC, 1992c) are consolidated and substantially changed in regulation No 1008/2008(CEC, 2008a).

According to Bråthen (2011), there is no unambiguous definition of remoteness for airports. Hence, there is no existing framework for assessing whether a region is sufficiently peripheral to take advantage of the relaxations of laws intended for the outermost regions only. However, factors such as peripheral location, small market, presence of mountains, insularity and generally poor infrastructure are identified as indicators of remoteness by Halpern and Bråthen (2011).

The aim of this paper is twofold. First, the criteria for being classified as outermost regions of Europe given in Article 299 of the Treaty are operationalised with reference to air transport of passengers. Second, an assessment is given whether the regions currently receiving state aid for PSO-routes in Norway satisfy the criteria relevant for application of five-year contracts granted only to regions classified as outermost. This discussion thereby addresses the arguments for introducing extended duration on contracts in northern Norway. The demonstration of assessing peripheral status is transferable to PSO-routes in other remote regions of the EU as well as for relaxation of other laws to promote the development of these regions.

Section 2 briefly presents Article 299 of the Treaty establishing the European Community regulating the outermost regions of EU and the regions that are affected by these laws. Then the criteria in Article 299 (2) of the Treaty are operationalised in Section 3 and applied on Norwegian airports and areas receiving state aid for PSO-routes in Section 4. Finally, conclusions and implications are presented in Section 5.

2. SPECIAL TREATMENT TO THE OUTERMOST REGIONS

2.1 Article 299 of the Treaty

The outermost regions may benefit from specific measures laid down in Article 299 of the Treaty establishing the European Community (EC Treaty). This article acknowledges their considerable structural disadvantages. The arguments for giving special treatment to these regions are stated in Article 299 (2) as follows:

"… taking account of the structural social and economic situation of the French overseas departments, the Azores, Madeira and the Canary Islands, which is compounded by their remoteness, insularity, small size, difficult topography and climate, economic dependence on a few products, the permanence and combination of which severely restrain their development, the Council, acting by a qualified majority on a proposal from the Commission

and after consulting the European Parliament, shall adopt specific measures aimed, in particular, at laying down the conditions of application of the present Treaty to those regions, including common policies. …" Citation from EC Treaty Article 299 (2).

Hence, according to Article 299 (2) the special characteristics of the outermost regions can be related to remoteness, insularity, small size, difficult topography and climate and economic dependence on a few products. All five dimensions influence the demand for transport of passengers by air. Hence, these are all relevant dimensions to study when aiming to compare today's outermost regions with the Norwegian regions receiving state financial aid for air transport.

Article 299 further provides for the possibility of adopting specific measures to assist the regions as long as there is an objective need to promote their economic and social development. The measure in question for this study is the possibility of using state aid to establish and maintain air transport routes to the outermost regions. State aid for scheduled air services follow regulation 1008/2008 (CEC, 2008a) where Article 16 (9) specifically states that outermost regions are allowed a five-year duration on contracts, rather than the normal contract duration of four years. The longer contract period reduces uncertainty for operators and, could thus, lead to more competition for the contracts concerned.

2.2 The Outermost Regions

The insularity, tropical climate, topography, distance from mainland Europe and proximity to less developed third countries all constitute obstacles to the development of the outermost regions of Europe (CEC, 2008b). Despite a generally high population density, they are of relatively modest demographic, economic and territorial importance for the European Union as a whole. Their difficulty in achieving economies of scale and generating profits from major investments, coupled with low wages and often very high unemployment, make these most remote regions amongst the poorest in the Union.

The Portuguese autonomous region of Azores is located in the Atlantic Ocean with a population of 246,000. Unemployment has increased the last few years from 2.5% in 2002 (CEC, 2008b) to about 11.7% in 2011 (CEC, 2012). Farming and fishing are the key industries of the Azorean economy. The distance from the local capital of Ponta Delgada to Lisbon on the mainland is 1,450 km. There are PSO-routes to nine airports within the Azores archipelago (Ponta Delgada, Horta, Corvo, Flores, Pico, Santa Maria, Terceira, São Jorge and Graciosa). The 22 PSO-routes include flights both inter-island and to the capital of Lisbon (CEC, 2009). In addition, one PSO-route regards transport to Madeira. Air transport from the main airport Nordela Airport (PDL) to Lisbon takes 2h 05min (non-stop).

The Spanish autonomous community of The Canary Islands is situated in the Atlantic Ocean at the north-west coast of Africa. The climate varies from sub-tropical vegetation to volcanic semi-deserts, with the topographical characteristics of cliffs and sand dunes. The archipelago had in 2011 a population of 2,125,000 and an unemployment rate of 29.6% (CEC, 2012) up from 11.1% in 2002 (CEC, 2008b). Tourism and tropical agriculture make up the key trades of the Canary Islands economy. The distance from the local capital of Las Palmas to Madrid on the mainland is 1,760 km. There are PSO-routes to eight airports within the Canary Islands (Gran-Canaria, Tenerife South, Tenerife North, Fuerteventura, El Hierro, Lanzarote, La Palma and La Gomera). The 13 PSO-routes only include inter-island flights (CEC, 2009). Air transport from Gran Canaria Airport (LPA) to Madrid takes 2h 40min (non-stop). Each major island in the archipelago is serviced by its own airport.

The Portuguese autonomous region of Madeira is located in the Atlantic Ocean with a population of 268,000. Unemployment has increased considerably the last few years from 2.5% in 2002 (CEC, 2008b) to 14.3% in the last quarter of 2011 (CEC, 2012). The free-zone of Madeira is a tax-privileged economic area. The service sector and tourism offer the greatest contributions to the Madeiran economy. The distance from the local capital of Funchal to Lisbon on the mainland is 965 km. There are PSO-routes to two airports within the Madeira archipelago (Funchal and Porto Santo).The PSO-routes include flights between the two islands, to the Azores and to the capital of Lisbon (CEC, 2009). Air transport from Madeira Airport (FNC) to Lisbon takes 1h 35min (non-stop).

The four French Overseas Departments defined as outermost regions are located in South America, the Caribbean Sea and the Indian Ocean. Generally, these regions have a higher unemployment rate, a longer distance to the capital and more exotic agricultural products as compared to the other outermost EU regions located in Europe.

It is clear that the outermost regions of EU are not a homogenous group. The French Overseas Departments are characterised by considerably longer distances to Europe and different economic activity than the regions located in the Atlantic Ocean. Based on their location in Europe and distance to capital, the Azores, Madeira and The Canary Islands are more suitable for comparison with the Norwegian regions receiving state aid for air transport of passengers.

2.3 The Outermost Regions and Peripheral Status

The three outermost regions located close to the European mainland have many similarities with respect to the peripheral dimensions presented in section 2.1. Generally, the Azores, Madeira and the Canaries can be related to the five dimensions of peripheral status by:

- *Remoteness*: there are few transport alternatives and long travel distances to the mainland capital (about 2h 5min flight time on average from local capital).
- *Insularity*: the regions are islands.
- *Size*: the regions have relatively high population density and supports populations of considerable size (average population per airport of about 120,000).
- *Topography and climate*: the regions are characterised by volcanic activity and mountains. Climate is subtropical with location in open sea.
- *Economy*: the regions have experienced a rapid growth in unemployment rate the last few years (increasing from an average of 5.4% in 2002 to about 18.5% in 2011). Key industries are tourism and exotic primary goods. Relaxed tax rules provide favourable conditions for businesses.

The above description forms the basis for assessing the peripheral status of the Norwegian local airports with PSO-routes. When suggesting the peripheral status of the Norwegian regions, highest weight is put on the remoteness dimension. However, two regions with the same characteristics of remoteness (i.e. distance and travel time to capital) can be given different peripheral statuses based on special cases of the other dimensions. Other things equal, characteristics such as low population, tough weather conditions and dependence on few products are considered as indicators that a region is more peripheral.

3. OPERATIONALIZATION OF ARTICLE 299

The characteristics of the outermost regions are only generally referred to in Article 299 (2) of the Treaty. There is, therefore, a need to operationalize the five dimensions of the Article in order to assess the peripheral status of the Norwegian airports and compare them to the regions currently holding the status of "outermost". Still, it is not possible to define absolute rules when assessing the dimensions and the overall assessment of peripheral status is to some degree subject to our best judgement. The assessment of each dimension of peripheral status compared to the three outermost regions of EU located in Europe is given according to a five-graded scale where:

-2 is considerably less peripheral than the current outermost regions.

-1 is less peripheral than the current outermost regions.

0 is equally peripheral as the outermost regions.

+1 is more peripheral than the current outermost regions.

+2 is considerably more peripheral than the current outermost regions.

Consequently, for each route area the five dimensions are assessed on a scale ranging from -2 (considerably less peripheral) to 2 (considerably more peripheral) where the value 0indicates that the region is equally peripheral as the outermost regions. A relevant question is at which level a variable is considerably different from another. For the metric variables it is assumed that limit values for classifying a metric variable as less and more is ±25% and considerably less and more is ±50%. For the ordinal variables special characteristics that influence air transport is included in the assessment.

Categorizations on graded scales are commonly used to assess characteristics of products and services and corresponds broadly speaking with what is usually referred to as gap analyses (e.g. Dutka, 1994). Such an ordinal scale does have its limitations with respect to econometric analysis, in that it produces non-metric data (Hair et al., 1998). It is, however, clear that grade 2 is more peripheral than grade 1. In the following analyses it is assumed that the differences between the grades are perceived by the respondents as equal, so that average values can be calculated.

3.1 The Five Dimensions

This section defines how each dimension presented in section 2.1 is operationalised to assess the peripheral status of Norwegian local airports.

<u>a. Remoteness</u>

This dimension indicates the region's degree of remoteness with regard to transport both to the closest airport connected to the main network and to Oslo Airport, Gardermoen (OSL). OSL is situated close to the capital city of Norway and is the national hub for both domestic and international flights. Remoteness could also consider characteristics of alternative transport modes, including private car and public transport, from the population centre of the local airport to the closest main airport and the national hub can be considered. Remoteness is considered the most important characteristic when assessing the peripheral status of a region and counts 40% in the overall assessment.

In the following analyses remoteness is indicated by travel time from local airport to national main airport, where lower travel time represents an advantage. When assuming average travel time between main airports in the outermost regions to mainland of 125 minutes and using the argued limit values of ±25% and ±50%, the intervals qualifying for the grades -2, -1, 0, 1 and 2 are less than 60 min., between 60 min. and 95 min., between 95 min. and 155 min. and more than 190 min., respectively.

b. Insularity

Insularity addresses the specific challenges facing population and business communities located on islands. It is measured by whether the airport and local settlement is located on an island and whether the local settlement surrounding the airport faces "island-like" challenges for any alternative transport modes (e.g. dependence on ferries over fjords). The categories qualifying for the grades -2, -1 and 0 are "Mainland", "Island-like" and "Island", respectively.

c. Size

This dimension addresses the specific challenges of small communities with regard to size and can be measured by surface area, population and traffic figures. In cases of low population, and thereby few passengers, there is often a need for state aid in order to uphold a certain minimum level of offered routes. In the following analysis population is used as indicator for size, where higher population is considered to be better. Advantages of population as measure are that it indicates travel activity and is relatively stable over time. Taking into consideration that the average population related to an airport in the outermost regions are 120,000 persons and the argued limit values, the intervals qualifying for the grades -2, -1, 0, 1 and 2 are populations of more than 180,000, between 180,000 and 150,000, between 150,000 and 90,000, between 90,000 and 60,000, and less than 60,000, respectively.

d. Topography and climate

This dimension addresses the specific challenges related to difficult topography and climate which impose problems to transport. In many cases, the topography implies that air transport is indeed the only efficient way of transport from regional settlements to the county centre or capital. With respect to Norwegian climate, problems relate to rough weather conditions along the coast and in particular the winter weather with snow and low temperatures. These problems are specifically related to the high uncertainty of alternative transport modes due to cancelling of ferry departures and closed roads over mountain passes.

Topography can be measured by the presence of mountains, sea or fjords in the region of the local airport and the problems caused by topography related to passenger transport. Climate can be measured by brief characteristics of the climate, review of temperature and its variation over the year (The Norwegian Meteorological Institute, 2009) and a description of region specific challenges caused by climate with regard to passenger transport (not just air transport). Topography and climate is classified by the characteristics presenting problems (if any) for efficient and reliable passenger transport.

It is assumed that plains impose fewer problems for transport than mountains and that inland climate impose fewer problems than coastal climate. Hence, regions categorized by either plains or inland (or both) are better off than the current outermost regions. On the other hand, the harsh winters in the northern parts of Norway are considered as disadvantages for these regions.

e. Economy

Regions depending on few products are often characterized by primary industries or cornerstone industries. The economic activity of regions with unilateral industries is more vulnerable than that of versatile economies. The characteristics of the economy can be measured by demographic indicators of the region such as unemployment, workforce participation and average gross income. [3]

[3] In 2010 Norway had an unemployment rate at about 3.1%, workforce participation at 71.9% and average gross income of 38,100 NOK per month (Statistics Norway, 2011). 1 EUR ≈ 8 NOK.

In the following analysis the unemployment rate is used as indicator for economic activity and is only measured for the municipality that hosts the local airport (Statistics Norway, 2012). The benefits of using unemployment are the consistency between regions and close correlation to economic activity in a region. A disadvantage is that it has changed considerably in a short period of time since the start of the financial crisis. A critical question is thereby how short-term fluctuations in economic activity should be related to long-term decisions on airport infrastructure. If taking the perspective that the financial crisis in Europe is a temporary phenomenon and that the economy will eventually normalize to the post crisis condition, it would be advisable to use unemployment figures dating back to the years preceding 2008. This is of course a question of debate. Moreover, with relevance to the topic of this paper being the extension of contract duration to five years, it is reasonable to assume that the pre-financial crisis situation formed the basis for the regulation (CEC, 2008). Consequently, we find it most reasonable to use the figures presented by CEC (2008) which dates back to 2002 and derives an average unemployment running at 5.4% for the three outermost regions in question. Hence, the unemployment rates qualifying for the grades -2, -1, 0, 1 and 2 are less than 2.7%, between 2.7% and 4.0%, between 4.0% and 6.7%, between 6.7% and 8.1% and more than 8.1%, respectively.

3.2 Overall Assessment

An overall assessment comprising all five dimensions can be calculated for each region in order to position the degree of peripheral characteristics of the Norwegian PSO-routes areas relative to the current outer-most regions in EU. Similar to the assessment of the five individual dimensions, the overall assessment is given according to a five-graded scale ranging the peripheral status relative to the current outermost regions from considerably less (-2) to considerably more (2). The overall assessment is a weighted average of the five dimensions where “remoteness” counts 40%, while the remaining four factors count 15% each. Remoteness is given higher weight since it can be regarded as the main peripheral indicator. The results when using equal weight for all dimensions will also be commented on. The average values are rounded to the nearest integer.

As a consequence of these grades, airports given the score 0 or higher may be considered located within an outermost region and should, thereby, be granted five-year tendered contracts. This classification should, however, not be used as a mandatory rule. It may, in many cases, be reasonable to follow the same tendering rules for larger regions or the country as a whole, even though airports belonging to different peripheral categories are included. The reasonability of larger regions is based on both the efficiency of administration routines at the regulator and reduced entry barriers for the airline companies.

Moreover, we will emphasize that these assessments are based on our understanding of the concept "outermost regions". Even though we argue that our criteria are reasonable and that we present our conclusions based on local knowledge of the Norwegian airports, other operationalizations of the concept and Article 299 (2) may result in different conclusions on the margin.

4. PERIPHERAL STATUS OF PSO-ROUTES IN NORWAY

4.1 Route Areas in the Norwegian Airport Network

Transport in Norway suffers from difficult topography, long distances and rural settlements. A way of meeting these infrastructure challenges was the establishment of a network of local airports with short runways starting at the end of the 1960's. Today, Norway is amongst the countries in Europe with the highest air transport dependence (Williams et al., 2007) and holds, according to the European Commission (CEC, 2009), about 20 % of all restricted PSO-routes in Europe.[4]

The state owns and operates the majority of airports in Norway through the wholly owned company Avinor. Larger airports constitute the main network with routes operated according to commercial principles, while PSO-routes are established between local airports and some of the larger airports including Oslo. Lian (2010) provides further details regarding the local airport network in Norway and the challenges related to maintaining a route network including so many small airports is discussed by Mathisen and Solvoll (2012).

In Norway, the MTC is responsible for the tendering of state aided PSO-routes in Norway. The PSO-routes are divided into route areas including one or more airports. Contract details and subsidy requirements for the active tendering contracts are presented in Table 1 for a total of 22 route areas (tendering regions).[5] It is clear from Table 1 that the total subsidy

[4] See e.g. Williams and Pagliari (2004) for details about the development of PSO routes in Europe.
[5] Information on the tendered contracts can be found in protocols made available by the Norwegian Ministry of Transport and Communication (2009, 2010a, 2010b, 2012a, 2012b).

amount exceeds NOK 600 million per year. Three route areas include more than one local airport, of which one was active from 1st April 2012 and two were initiated two years earlier.

Table 1 – Details about the Contracts for the Norwegian Route Areas

Route area	Contract	Duration	Subsidy (NOK 1000)		Carrier [a]
			Period	Annually	
Lakselv	Apr. 2012 - Apr. 2017	5 years	40,472	8,094	WF
Andenes	Apr. 2012 - Apr. 2017	5 years	59,302	11,860	WF
Harstad/Narvik	Apr. 2012 - Apr. 2017	5 years	78,012	15,602	WF
Svolvær	Temporary [b]	5 years	172,566	34,513	WF
Leknes	Temporary [b]	5 years	127,353	25,471	WF
Røst	Temporary [b]	5 years	91,034	18,207	WF
Narvik	Temporary [b]	5 years	91,813	18,363	WF
Brønnøysund	Apr. 2012 - Apr. 2017	5 years	63,552	12,710	WF
Sandnessjøen	Apr. 2012 - Apr. 2017	5 years	82,714	16,543	WF
Mo i Rana	Apr. 2012 - Apr. 2017	5 years	166,246	33,249	WF
Mosjøen	Apr. 2012 - Apr. 2017	5 years	137,998	27,600	WF
Namsos&Rørvik	Apr. 2012 - Apr. 2017	5 years	216,315	43,263	WF
Florø[c]	Apr. 2012 - Apr. 2016	4 years	0	0	WF
Førde	Apr. 2012 - Apr. 2016	4 years	56,535	14,134	WF
Sogndal	Apr. 2012 - Apr. 2016	4 years	78,320	19,580	WF
Sandane	Apr. 2012 - Apr. 2016	4 years	185,462	46,366	WF
Ørsta-Volda	Apr. 2012 - Apr. 2016	4 years	135,681	33,920	WF
Fagernes	Apr. 2012 - Apr. 2016	4 years	41,900	10,475	NF
Røros[d]	Dec. 2012 - Apr. 2016	3 years	56,000	16,800	WF
Værøy	Aug. 2011 - Aug. 2014	3 years	95,832	31,944	LT
Vadsø, Vardø, Båtsfjord, Berlevåg, Mehamn, Honningsvåg, Hammerfest	Apr. 2010 - Apr. 2013	3 years	531,411	177,137	WF
Hasvik& Sørkjosen	Apr. 2010 - Apr. 2013	3 years	60,660	20,220	WF

[a] Abbreviations: WF - Widerøe's Flyveselskap AS, NF - North Flying A/S, LT- Lufttransport AS

[b] It was revealed that the winner of the contract could not fulfil all requirements and routes are temporarily operated by WF with compensation equal to the second lowest bid.

[c] A complaint was put forward for the use of market power when WF won the contract requiring no subsidies.

[d] The contract was originally intended to start at 1st April 2012, but it was withdrawn and presented again with a new set of specifications.

For the most recent round starting 1st April 2012 a total of 12 out of the 19 route areas initiated 5 year contracts. The three route areas currently operating 3 year contracts are located in the northern part of Norway and will probably change duration to 5 year in the future. The Norwegian state, in the shape of the MTC, wishes to make applicable five-year duration on tendered contracts for regional air transport in Norway (Kjærland et al., 2009). It is assumed that a longer contract period will reduce the uncertainty for the operators, so that more competitors will find it attractive to compete for the tendered contracts. It is, however, out of scope for this study to assess whether the extended duration on contracts actually has led to better air transport services or reduced subsidy requirements.

In the last tendering round eight companies competed and two were chosen to operate route areas. Widerøes Flyveselskap AS (WF) is in a unique position with a fleet of airplanes specifically suited for the short runways in Norway. There are a limited number of planes that can operate the 799 meter runways, called Short Take Off and Landing (STOL), which is common for the local airports. Therefore, WF is usually the only bidder on these tenders. The competition increases for airports with longer runways. Finally, the helicopter route at Værøy is operated by Lufttransport AS (LT), holding a fleet of both helicopters and planes.

4.2 Comparison of Norwegian Route Areas and EU's Outermost Regions

The characteristics of the Norwegian regions according to the operationalization of the five dimensions in Section 3.1 are given in Table 2 sorted geographically from south to north. The parameters remoteness, size and economy are represented by metric values, while insularity and topography and climate are ordinal values. As explained in Section 3.1, remoteness is represented by travel time to national main airport, size by the population in the catchment area, and economy by the unemployment rate (in 2002) of the municipality hosting the airport.

For the three regions in Table 2 including more than one airport only the characteristics of the most peripheral one is presented. More specifically, Rørvik, Hasvik and Vardø are the most peripheral airports within their respective regions. All other route areas include only one airport. For each region Table 3 presents how the information in Table 2 qualifies for the grades presented in section 3.1. Furthermore, the assessments of overall peripheral status for the 22 route areas are presented in Table 3 following the model lined out in section 3.2. Regions are generally more peripheral in the northern part of the country. This can primarily be justified by increased distance and travel time to the capital. The northern regions are also characterised by a harsher climate (winter problems), fewer transport alternatives and a considerably lower population density compared to the southern regions.

Table 2 – Details about the Peripheral Dimensions for the Norwegian Route Areas

Route area	*Remoteness* [a] *(travel time)*	*Insularity*	*Size* [a] *(population)*	*Topography and Climate*	*Economy (unemployment)*
Fagernes	30	Mainland	20,000	Mountain, inland	1.2%
Florø	70	Island-like	16,000	Plains, coast	2.9%
Førde	60	Mainland	32,000	Mountain, coast	2.0%
Sogndal	45	Mainland	28,000	Mountain, inland	1.6%
Sandane	85	Mainland	28,000	Mountain, coast	1.4%
Ørsta-Volda	60	Mainland	33,000	Mountain, coast	2.6%
Røros	50	Mainland	21,000	Mountain, inland	1.9%
Namsos&Rørvik[b]	120	Island	10,000	Plains, coast, harsh winter	3.8%
Brønnøysund	130	Island-like	13,000	Plains, coast, harsh winter	3.0%
Sandnessjøen	180	Island	13,000	Mountain, coast, harsh winter	4.2%
Mo i Rana	150	Mainland	34,000	Mountain, inland, harsh winter	4.2%
Mosjøen	135	Mainland	16,000	Mountain, inland, harsh winter	2.3%
Røst	150	Island	1,000	Plains, coast, harsh winter	3.4%
Værøy	240	Island	1,000	Mountain, coast, harsh winter	7.3%
Leknes	145	Mainland	13,000	Hilly, coast, harsh winter	4.7%
Svolvær	155	Mainland	9,000	Mountain, coast, harsh winter	5.2%
Narvik	210	Mainland	23,000	Mountain, coast, harsh winter	1.9%
Harstad/Narvik	105	Mainland	50,000	Plains, coast, harsh winter	2.8%
Andenes	180	Island	5,000	Plains, coast, harsh winter	2.5%
Hasvik&Sørkjosen[b]	180	Island	1,000	Hilly, coast, harsh winter	7.5%
Lakselv	200	Mainland	7,000	Plains, inland, harsh winter	4.2%
Vadsø, Vardø, Båtsfjord, Berlevåg, Mehamn, Honningsvåg & Hammerfest [b]	275	Island	1,000	Mountains, coast, harsh winter	11.4%

[a] Rounded to nearest 5 minutes (travel time) and thousand (population).

[b] Values are reported only for the most peripheral airport within this route area.

The overall assessments in Table 3 suggests that one and six route areas are considerably less (-2) and less (-1) peripheral than the outermost regions, respectively. These regions are characterised by relatively versatile economic activity, a short distance to the main hub of OSL and access to alternative transport modes. A total of six route areas are given a peripheral status equal to the outermost regions (0). This mainly concerns airports located close to the larger towns in the northern part of Norway. Moreover, eight and one route areas are classified as more (+1) and considerably more (+2) peripheral than the outermost regions, respectively. These regions are ultra-peripheral in a European context with a location in rural areas with harsh climate and low population density. They are characterised by few transport alternatives and long travel time to the capital and possess economic activity based on primary industries (mainly fishery). However, these regions generally have a close proximity to local airports due to the distributed structure of the regional airport network (Lian et al., 2005).

It is evident from Table 3 that the whole scale from -2 to +2 is used for "Remoteness" and "Economy". According to the definition "Insularity" can only be equal or less peripheral, while size is +2 for all regions due to the low population in these route areas. The most peripheral score that can be obtained for "Topography and climate" is +1 if the region is characterised by mountains and coastal areas and is located in the northern part of the country where the winter is harsh. The overall score ranges from -2 to +2. The least peripheral route areas, Fagernes and Sogndal, have overall scores of -1.3 which should indicate the value -1. However, Fagernes is rounded to -2 due to its close proximity to the main airport of Norway, which in practice makes it an alternative airport for the population in the catchment area.

Compared to the Norwegian route areas, the outermost regions of EU located in Europe are generally characterised by:

- Higher remoteness when it comes to the lack of alternative transport modes, but not with respect to distance and travel time to the capital.
- Higher insularity because they are all islands.
- Larger both in size and population.
- Fairly similar characteristics of topography with many mountains.
- Tougher climate with respect to being located at open sea, but not with respect to low temperature and other winter climate problems.
- Fairly similar characteristics of economic activity with dependence on primary industries and tourism, but the unemployment rate is generally higher.

There are, consequently, both pros (longer travel time and lower population) and cons (more transport alternatives) for giving the impact areas of all the Norwegian airports with PSO-routes the status of outermost regions.

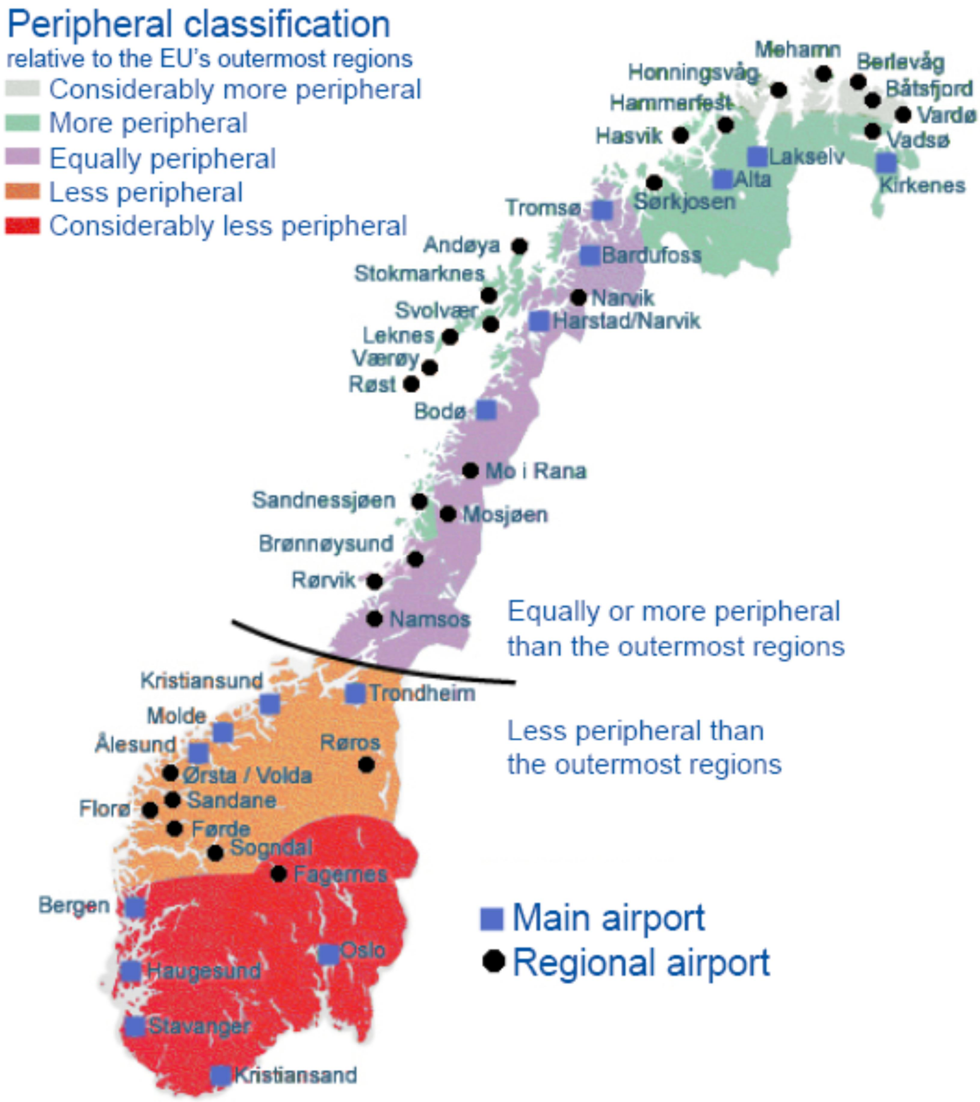
Table 3 – Assessment of Peripheral Status of Norwegian PSO-Route Areas Compared to the Outermost Regions located near the European Mainland [a]

Part of Norway	East	West	West	West	West	West	Middle	Middle	North	North	North	North	North	North	North	North	North	North	North	North	North	North
Overall assessment	-2	-1	-1	-1	-1	-1	-1	0	0	+1	0	0	+1	+1	+1	+1	0	0	+1	+1	+1	+2
Economy (15%)	-2	-1	-2	-2	-2	-2	-2	-1	-1	0	0	-2	-1	1	0	0	-2	-1	-2	1	1	2
Topography and climate (15%)	-1	-1	0	-1	0	0	-1	0	0	+1	0	0	+1	+1	+1	+1	+1	0	+1	+1	+1	+1
Size (15%)	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2	+2
Insularity (15%)	-2	-1	-2	-2	-2	-2	-2	0	-1	0	-2	-2	0	0	0	0	-2	-2	0	0	-2	0
Remoteness (40%)	-2	-1	-1	-2	-1	-1	-2	0	0	+1	1	0	+1	+1	+1	+1	+1	0	+2	+2	+2	+2
Route area	Fagernes[b]	Florø	Førde	Sogndal	Sandane	Ørsta-Volda	Røros	Namsos and Rørvik[c]	Brønnøysund	Sandnessjøen	Mo i Rana	Mosjøen	Røst	Værøy	Leknes	Svolvær	Narvik	Harstad/Narvik	Andenes	Hasvik and Sørkjosen[c]	Lakselv	Vadsø, Vardø, Båtsfjord, Berlevåg, Mehamn, Honningsvåg and Hammerfest[b]

[a] A five graded scale where -2 is considerably less, -1 is less, 0 is equal to, +1 is more and +2 is considerably more peripheral than the outermost regions located in Europe.
[b] The overall assessment is rounded to -2 due to its close proximity to the national main airport.
[c] Only the most peripheral airport within the route are is considered.

The majority of the airports are, according to Table 3, equally or more peripheral than the outermost regions. Hence, if a common rule should be implemented, it would be advisable to define all PSO-routes as peripheral to an extent similar to the comparable outermost regions. A single rule would improve handling of the tendering competitions for the regulator and simplify the procedures for the air transport companies.

Figure 1 - Peripheral Classification of the Norwegian Airports with PSO-Routes



If such a uniform rule is not possible, there are indeed patterns for the peripheral status of the areas throughout the country that can be used to separate them. It is illustrated in Figure 1 how a simple classification would distinguish on whether the airport is located in the north or not. This implies separating Middle Norway such that the route area of Namsos/Rørvik belongs to the north, while Røros belongs to the other category. The municipalities in the Northern part of Norway generally hold route areas that can be considered as equally or more peripheral than the EU's outermost regions located in Europe. Route areas in the Eastern and Western part of Norway are generally less peripheral than the EU's outermost regions. Such a two part separation suggests the introduction of five-year contracts for route areas in the four northernmost counties and four-year contracts for route areas in all other counties.

In Table 3 it is assumed that "Remoteness" is given a higher weight than the other dimensions. A simple sensitivity analysis can be performed by assuming that all dimensions are given the same weight (20%). The only change is that the most northern region including Vadsø, Vardø etc. qualifies for the overall score +1 instead of +2. Hence, the number of regions being equally or more peripheral than the current outermost regions is the same and the conclusions are unchanged. Also, the sensitivity of the results can be commented on with respect to the limit values for the metric variables defining when categories are less/more and considerably less/more. If assuming reduced values for the limits to ±10% (less/more) and ±20% (considerably less/more), the variation in overall grade increases and three regions qualify for +2. If assuming increased values for the limits to ±40% (less/more) and ±80% (considerably less/more), the variation in overall grade is reduced and more regions qualify for the grade 0. Still, the most northern region is +2. In both cases the country is split between the north being equally or more peripheral and the south being less peripheral. Hence, the conclusions appear to be relatively robust.

5. CONCLUSIONS, IMPLICATIONS AND LIMITATIONS

The European Union has defined seven regions as outermost (or ultra-peripheral) of which three are located near the European mainland (the Azores, Madeira and the Canary Islands). These regions benefit from certain relaxations in EU law, amongst other things, implying extended duration from four to five years on tendered contracts in the scheduled regional air transport industry (routes subject to Public Service Obligation (PSO)). The Norwegian transport authorities want to apply five-year contracts on PSO-routes because this would reduce uncertainty for air transport companies and thereby stimulate a higher number of bidders to participate in the tender competitions. In the most recent tendering round starting 1st April 2012, five-year contracts were introduced for the PSO-routes located in the northern part of Norway.

A framework is presented to determine the peripheral status of Norwegian municipalities hosting airports with subsidized air transport routes relative to the current outermost regions of the European Union. Using a five graded scale the peripheral status is assessed by remoteness, insularity, size, topography and climate and economic dependence which are all indicators addressed in Article 299 of the EC Treaty. It is then discussed whether the regions currently receiving state aid for PSO-routes in Norway satisfy the criteria relevant for the application of five-year contracts which is restricted to outermost regions only.

The counties in the northern part of Norway generally consist of route areas that can be considered equally peripheral to or more peripheral than the EU's outermost regions located in Europe. Route areas in the Eastern and Western part of Norway are generally less peripheral than the EU's outermost regions. A sensitivity analysis attributing different weights to the five variables comprising the overall assessment shows that this conclusion is relatively robust. Consequently, our analysis of the peripheral status of local airports supports the extended contract duration implemented in the most recent round of tendered contracts for PSO-routes in northern Norway. The most important arguments supporting the view that the route areas in northern parts of Norway satisfy the criteria for classification of outermost regions are:

- Long travel distance and long travel time from the regions to the capital city of Oslo.
- Few alternatives to air transport.
- Difficult topography and tough coastal climate with particular problems for passenger transport related to winter climate.
- Economic dependence on few products and a population with a low average income compared to the country average.

It should be specified that the rules of regulation 1008/2008 allowing five-year tendering periods in the air passenger transport industry do not include Norway. In the same way as other overseas countries and territories (OCTs) related to EU, the peripheral regions of Norway do not form part of the outermost regions, and are not given these modifications of the law. Exceptions do, however, exist granting some peripheral regions of EU such as the Åland Islands some of the same modifications of the law as the outermost regions. It is, therefore, not unjust that air transport of passengers in peripheral regions of Norway are granted some modifications of the law with respect to the duration of tendered contracts, if this is reasonable and well justified. Similar arguments can be made for other remote regions of Europe. It should, however, be emphasised that even though the adopted framework is reasonable, the valuation of each dimension is subject to our best judgement.

The possible juridical questions raised by such a modification of Commission law are not addressed in this study. Nor are the consequences of extended duration on the degree of competition. It is important to bear in mind that this article aims to provide a basis for assessing the peripheral status of the Norwegian local airports in relation to air transport of passengers. The results may differ in the cases of other services or products. Still, an approach similar to what is presented in this article should be applicable for assessment of peripheral status also with respect to relaxations of other types of regulations currently available to outermost regions only.

ACKNOWLEDGEMENTS

The project was financed by the Norwegian Ministry of Transport and Communication. We would like to thank Gisle Solvoll and the editor of this journal for valuable comments on earlier versions of this article.

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CUSTOMER SATISFACTION FROM PUBLIC SERVICE OBLIGATION (PSO) ROUTES: THESSALONIKI AS A CASE STUDY

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ABSTRACT

Ten years after the implementation of the Public Service Obligations (PSO) scheme in Greece, the mechanism has not led to the desired results. Among others, the state has imposed PSOs onto a number of routes that are either of questionable social value or which could prove financially self-sustainable without the need for a PSO after appropriate consultation with key stakeholders. In this context, and given the dearth of resources during a period of severe economic recession, it is necessary for the government to reconsider the structure of the PSO programme and adjust it to the new reality in Greece. In fact, as a first step towards this direction, the present paper seeks to gather all necessary information using the tools of marketing research, to study customer satisfaction and fulfilment of passenger needs on the PSO routes from/to Thessaloniki, the second largest city in Greece. Based on the results of primary data research, the paper aims at contributing to the effective communication of the value of the PSO routes to the passengers and set the fundamentals for a subsequent undertaking of a full marketing plan on how to render such routes financially viable.

Keywords: Public Service Obligation (PSO), passenger satisfaction, Thessaloniki, Greece

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1. INTRODUCTION

According to Article 4 of the European Council Regulation 2408/92 and the Articles 16, 17 and 18 of Regulation 1008/2008 (CEC, 1992; CEC, 2008), EU member states may impose Public Service Obligations (PSOs) on commercial air services that are financially unsustainable to support remote regions in a socioeconomic way when other forms of transport cannot ensure an adequate service (Papatheodorou, 2008; Rigas, 2009; Santana, 2009). Upon completion of the required legal procedures, a member state assigns a monopoly right to the designated air carrier to operate on the route in question occasionally by also awarding financial compensation. These lifeline air services are used in peripheral regions -such as islands- making them accessible to potential markets, and aim to economic growth, with emphasis on internal tourism (Halpern and Niskala, 2008). Without PSO routes the residents of these remote areas would remain isolated (Merkert and Williams, 2010).

On the other hand, Halpern and Niskala (2008) argue that the PSO mechanism can act as a barrier to development for established tourism destinations, because the air carrier is granted a monopoly on the route for a certain period thus preventing the effective operation of competition. Finally, the implementation of the PSO programme could lead a carrier to supply the minimum possible level of service with small aircraft and high fares. At the same time, however, the PSOs may prove beneficial for leisure travel to remote destinations, because those air services enable tourists to visit resorts still in the exploration phase of their life cycle (Papatheodorou, 2004). Those areas that would otherwise remain relatively unknown and largely inaccessible can finally get into the tourism market.

The PSO scheme can contribute to the objectives of the European Union's cohesion policy and socioeconomic prosperity (Gordijm & van de Coevering, 2006). Eventually, the PSOs can be used as a tool for regional development, as long as these routes are financially viable. As demand for air services is negatively affected by the current economic downturn, along with the fact that income and ticket prices affect demand in PSO routes, the PSO mechanism appears to be costly (Tsekeris and Vogiatzoglou, 2011). Hence it is necessary to develop an integrated marketing strategy to promote the routes that can be viable if designed according to the passenger needs. The first step of such an exercise would be to investigate the PSO market and highlight consumer behaviour and satisfaction patterns through appropriate marketing research.

Sections 2 and 3 of the paper provide information on the PSO routes in Greece in 2012 and specifically in Thessaloniki. The methodology of the marketing research is discussed in section 4 and the results that follow describe the target group, the consumer buying behaviour, the segments of the market, the customer satisfaction level and the positioning of the PSO routes of Thessaloniki. The paper concludes with recommendations concerning how these lifeline services may become viable and financially sustainable.

2. THE GREEK PSO REALITY

Greece has adopted the Public Service Obligation (PSO) mechanism in 2001, three years after the full implementation of the Third Liberalisation Package in Greece (July 1998). Olympic Airways, the national air carrier of Greece, was the sole operator for all PSO routes, until 2009, the year that Olympic Airways became a private corporation changing its name to Olympic Air. For this time period the national air carrier was receiving a subsidy of €34,500,000 per year for operating 22 PSO routes. Since then, the PSO routes in Greece are operated by several air carriers. In 2012, 28 domestic PSO routes are imposed (European Commission, 2010; CEC, 2010) and assigned to four Greek air carriers. It is interesting to note that only three of the 28 PSO routes do not receive a financial compensation; these routes connect Thessaloniki, the second largest Greek city, and a number of peripheral airports of Greece.

Figure 1: PSO routes of Greece by type (2012)

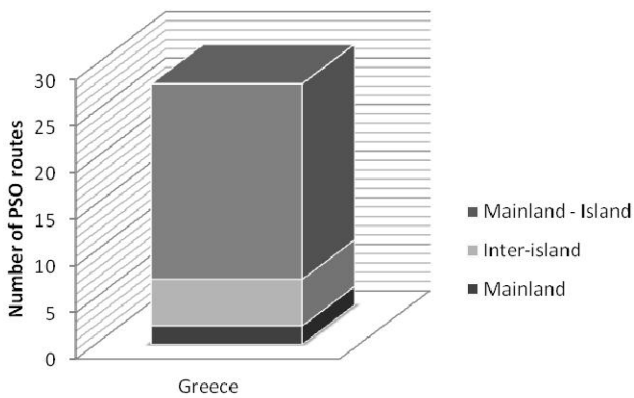

Figure 1 provides details about the types of the PSO services in Greece. There are five inter-island routes, two routes that connect domestic mainland locations while the majority of the routes (21) are designed to link the mainland and peripheral airports located in Greek islands where there are no alternative means of transport or sufficient demand. Table 1 lists the 28 domestic lifeline air services operated in 2012 in Greece by four air carriers (sorted according to the name of operating carrier).

Table 1: PSO Routes in Greece in 2012

No	PSO route	Carrier	Period
1	Athens –Skiros	Aegean Airlines	01.04.2012 - 30.03.2012
2	Athens - Sitia	Astra Airlines	01.04.2012 - 30.03.2016
3	Thessaloniki - Kalamata	Astra Airlines	01.04.2012 - 30.03.2016
4	Thessaloniki - Kerkyra (Corfu)	Astra Airlines	01.04.2012 - 30.03.2016
5	Thessaloniki - Samos	Astra Airlines	01.04.2012 - 30.03.2016
6	Thessaloniki - Chios	Astra Airlines	01.04.2012 - 30.03.2016
7	Athens - Astypalea	Olympic Air	01.04.2012 - 30.03.2016
8	Athens – Zakynthos (Zante)	Olympic Air	01.04.2012 - 30.03.2016
9	Athens - Ikaria	Olympic Air	01.04.2012 - 30.03.2016
10	Athens - Kalimnos	Olympic Air	01.04.2012 - 30.03.2016
11	Athens - Karpathos	Olympic Air	01.04.2012 - 30.03.2016
12	Athens - Kastelorizo	Olympic Air	01.04.2012 - 30.03.2016
13	Athens - Kithira	Olympic Air	01.04.2012 - 30.03.2016
14	Athens - Leros	Olympic Air	01.04.2012 - 30.03.2016
15	Athens - Milos	Olympic Air	01.04.2012 - 30.03.2016
16	Athens - Naxos	Olympic Air	01.04.2012 - 30.03.2016
17	Athens - Paros	Olympic Air	01.04.2012 - 30.03.2016
18	Athens - Skiathos	Olympic Air	01.04.2012 - 30.03.2016
19	Athens - Siros	Olympic Air	01.04.2012 - 30.03.2016
20	Rhodos - Karpathos – Kasos – Sitia	Olympic Air	01.04.2012 - 30.03.2016
21	Rhodos - Kos – Leros – Kalimnos – Astypalea	Olympic Air	01.04.2012 - 30.03.2016
22	Athens - Kastoria	Sky Express	01.07.2010 - 30.06.2014
23	Aktion - Sitia	Sky Express	01.04.2012 - 30.03.2016
24	Alexandroupoli - Sitia	Sky Express	01.04.2012 - 30.03.2016
25	Thessaloniki - Limnos – Ikaria	Sky Express	01.09.2010 - 30.08.2014
26	Thessaloniki - Skiros	Sky Express	01.04.2012 - 30.03.2016
27	Kerkyra - Aktion – Kefalonia – Zakynthos – Kithira	Sky Express	01.04.2012 - 30.03.2016
28	Limnos - Mytilini – Chios – Samos – Rhodos	Sky Express	01.04.2012 - 30.03.2016

Source: European Commission, 2010; CEC, 2010

3. THE THESSALONIKI PSO ROUTES

In winter season 2011-2012, there were six PSO routes that linked Macedonia International Airport of Thessaloniki and seven destinations in Greece (Figure 2). Five of them connected Thessaloniki and six Greek islands (Kerkyra, Limnos, Ikaria, Skiros, Chios and Samos) and one route was designed to link Thessaloniki with Kalamata, a mainland city. Aegean Airlines, a leading air carrier of Greece and also a member of Star Alliance, operated three PSO routes. The rest of the routes were operated by Sky Express, which was founded in 2005 and Astra Airlines, a new entrant from Thessaloniki. Table 2 contrasts the characteristics (air carrier, flights per week, airfare) of the routes that link Thessaloniki to Kalamata, Kerkyra, Samos and Chios according to the results of the last two PSO tenders in Greece. Further to the last tender Astra Airlines is now the single operator for these four routes and the only air carrier that does not received a financial compensation except for the Thessaloniki – Kerkyra PSO route.

Figure 2: Map of Thessaloniki PSO Routes

Table 2: Thessaloniki PSO Routes

Destination	Air Carrier		Flights/week (winter)		Airfare (€)	
	(2010-12)	(2012-16)	(2010-12)	(2012-16)	(2010-12)	(2012-16)
Kalamata	Aegean Airlines	Astra Airlines	2	2	from €39	€41.80 - €100
Kerkyra	Aegean Airlines	Astra Airlines	4	4	from €39	€54 - €88.10
Samos	Aegean Airlines	Astra Airlines	3	4	from €39	€39.60 - €90
Chios	Astra Airlines	Astra Airlines	4	4	€57.20	€37.60 –€83.60
	(2010-14)		(2010-2014)		(2010-2014)	
Skiros	Sky Express		2		€90.85	
Limnos	Sky Express		5		€73.45	
Ikaria	Sky Express		5		€84.75	

Source: Data based on information provided by Aegean Airlines, Astra Airlines, and Sky Express (2012)

Table 3 provides information about the aircraft types that were used during the winter season 2011-12. Aegean Airlines and Astra Airlines provided over 100 available seats per flight, but on the other hand Sky Express was operating the routes using an aircraft with 30 seats. Passengers that travelled to Limnos and Ikaria had to "share" the same aircraft and the available seats per flight were limited, but the operator offered five flights per week in winter.

Table 3: Aircraft Types used on Thessaloniki PSO Routes in Winter Season 2011-12

Destination	Air Carrier	Aircraft type	Available seats	Trip duration
Kalamata	Aegean Airlines	Airbus Industrie A320	168	1h 5m
Kerkyra	Aegean Airlines	Airbus Industrie A319	138	50m
Samos	Aegean Airlines	Airbus Industrie A319	138	1h 10m
Chios	Astra Airlines	British Aerospace 146-300	112	1h
Limnos	Sky Express	British Aerospace Jetstream 41	30	40m
Ikaria	Sky Express	British Aerospace Jetstream 41	30	1h 25m
Skiros	Sky Express	British Aerospace Jetstream 41	30	40m

Source: Data based on information provided by Aegean Airlines, Astra Airlines, and Sky Express (2012)

PSO routes that offer over 100 seats per flight are listed in Table 4, which provides aircraft capacity and passenger traffic information for the years 2010-12. The PSO route that links Thessaloniki to Kerkyra does not exhibit high levels of passenger traffic (as seen on Table 5 there is a daily connection by coach and ship), whereas the air service Thessaloniki – Kalamata seems to have a sufficient level of passengers per flight, but the number of flights per month is limited. On the other hand, PSOs that connect Thessaloniki to Samos and Chios have the highest passenger traffic.

Table 4 Passenger Traffic of four Thessaloniki PSO routes (2010-12)

Destination	Average number of available seats per month	Average number of flights per month	Average number of passengers per month	Average number of passengers per flight
Kalamata	1,503	11	692	63
Kerkyra	2,598	20	754	38
Samos	2,193	17	1,339	79
Chios	2,200	20	1,440	72

Source: Data based on information provided by Aegean Airlines and Astra Airlines (2012)

As seen on Table 5 there are no other alternative transport modes to connect Thessaloniki to Skiros and Ikaria. Passengers can travel to Limnos, Chios and Samos by ship once a week and the trip lasts between 8.5 and 23 hours. The cost of the one way fare starts from €24 and depends on destination, passenger type and accommodation class. Thessaloniki is linked to Kalamata by coach, three times per week. The duration of the trip is ten hours and the cost of the one way fare is €65. Kerkyra is the only island that connects to Thessaloniki every day and the cost is €40, but the passenger has to travel by coach and ship for seven hours.

Table 5: Thessaloniki PSO Routes and Alternative Transport Modes

Destination	Alternative transport mode	Routes per week	Trip duration	One way fare (€)
Kerkyra	Coach & Ship	7	7h	39.70
Kalamata	Coach	3	10h	65
Limnos	Ship	1	8.5h	24 – 60
Chios	Ship	1	19h & 35m	37 – 88
Samos	Ship	1	23h & 45m	42 – 99
Skiros	–	–	–	–
Ikaria	–	–	–	–

Source: Data based on information provided by Macedonia Intercity Bus Station and Nel Sea Lines (2012)

Table 6: Thessaloniki PSO routes and Related Airport Characteristics

	Airport Operating Hours						
Airport	Total hours per year	Winter season	Summer season	Runway dimensions (m)	Runway area (m^2)	Terminal area (m^2)	Apron area (m^2)
Kerkyra	8,760.00	3,720.00	5,040.00	2373 X 45	106785	26662	70450
Kalamata	1,785.89	664.29	1,121.61	2660 X 45	119700	2520	22100
Limnos	3,383.46	1,296.75	2,086.71	3000 X 45	135000	5600	66584
Chios	3,353.21	1,162.50	2,190.71	1500 X 30	45000	400	8000
Samos	4,618.96	1,705.00	2,913.96	2030 X 45	91350	8850	53600
Skiros	1,564.29	664.29	900.00	3000 X 30	90000	750	15000
Ikaria	1,616.43	686.43	930.00	1310 X 30	39300	1200	8000

Source: Hellenic Civil Aviation Authority; Tsekeris & Vogiatzoglou, 2011

The common feature of all PSO routes is the fact that each participating carrier has to operate into the regional airports of Greece. One of the main problems encountered at these airports is the extremely short and narrow runway (length between 700m to 1,500m – width between 25m to 40m), because of the geomorphology of the country and lack of flat field areas. In addition, some other weaknesses of the Greek regional airports are the limited operating hours, the location, the lack of necessary infrastructure and a number of service quality problems. Strong winds, poor visibility and adverse weather conditions reduce aircraft efficiency during take-off and landing. Small aircraft that operate PSO routes face bad weather conditions, electrical power losses or communication failures, and sometimes are forced to divert instead to an alternate airport (Fragoudaki et al., 2005; Papatheodorou, and

Arvanitis, 2009). Table 6 above provides information on the airports that link to Thessaloniki via PSO services. The airports of Kalamata, Limnos, Ikaria, Samos, Skiros and Chios are open for a limited number of hours during the day.

4. RESEARCH METHODOLOGY AND EMPIRICAL RESULTS

A field research was conducted to 200 passengers of the six Thessaloniki PSO routes, to the departure lounge and gates of the Macedonia International Airport of Thessaloniki from 31.01.2012 to 15.02.2012, in order to investigate the profile, the consumer buying behaviour, the satisfaction and the information level of passengers. For the purposes of the marketing research, a probability single random sampling method was used and the required data were collected by questionnaire where the questions were addressed directly and personally to respondents using a structured interview. The research instrument was a series of 26 questions, two of which were open-ended. There were five dichotomous questions and 19 multiple choice questions, three of which were multiple-response. The respondents had to answer in one hierarchical question, one frequency question and six satisfaction scales using a five point Likert item. The questionnaire was divided in two parts; the main body of the questionnaire included three subsections and focused on the characteristics of the consumer buying behaviour, the customer satisfaction and the PSO information level of passengers. The socio-demographic questions were asked at the end of the interview.

The data were edited and analysed using the SPSS statistical package. Descriptive statistics and cross tabulations (chi-square tests and non-parametric Monte Carlo tests with a 95% confidence or a 0.05 significance level) were used to estimate correlations between the variables; only statistically significant relations are reported here. P-values of Pearson Chi-Square test results (Asymp. Sig 2 sided) and Fisher's Exact test results (Monte Carlo Sig. 2 sided) under $\alpha = 0.05$ ($p < \alpha = 0.05$) were taken into consideration to reject the null hypothesis H_0 that variables are independent.

4.1 Target Group

As seen in Table 7 the target group of the Thessaloniki PSO routes consists of male and female passengers, who are aged 18 to 64 years old (99%) and have a Bachelor's degree (58%), a certificate or diploma of vocational training (7.5%) or are high school graduates (21%). Half of the passengers of these routes live on the islands that connect to Thessaloniki (Ikaria, Kerkyra, Limnos, Samos, Skiros and Chios), 40% of them live in counties of North Greece (Thessaloniki, Drama, Kavala, Kilkis, Kozani, Larisa, Serres) and 10% in Peloponnesus (Kalamata, Pilos, Pirgos).

Table 7: Demographic Characteristics of the Sample

	Gender						
		Male	Female				
Respondents		84	116				
Percentage		42%	58%				
	Age						
	<18	18-24	25-44	45-64	>64		
Respondents	1	66	87	45	1		
Percentage	0.5%	33%	43.5%	22.5%	0.5%		
	Place of residence						
	PSO islands	North Greece	Peloponnesus	Athens	Amsterdam		
Respondents	98	79	20	2	1		
Percentage	49%	39.5%	10%	1%	0.5%		
	Education						
	Elementary school	Secondary school	High school	Vocational training	Bachelor	Master	PhD
Respondents	6	6	42	15	116	12	3
Percentage	3%	3%	21%	7.5%	58%	6%	1.5%
	Profession						
	Unemployed	Public sector employee	Freelance	Private sector employee	Housekeeping	Retired	Student
Respondents	11	53	43	26	10	8	48
Percentage	5.5%	26.5%	21.5%	13%	5%	4%	24%
	Personal monthly income (€)						
	<600	600-800	800-1,200	1,200-2,400	>2,400	Do not know / Prefer not to answer	
Respondents	38	26	32	16	4	84	
Percentage	19%	13%	16%	8%	2%	42%	

PSO travellers work in the public (27%) or private sector (13%) and others own a business (22%) or are students (24%). A large number of passengers (42%) did not desire to reveal their monthly income and 48% stated that their monthly personal income is up to €1,200. Only 10% are higher income respondents (more than €1,200).

Table 8 shows that the variable "destination" (Kalamata, Kerkyra, Limnos, Ikaria, Samos, Skiros, and Chios) is affected by a number of other variables, such as profession and income of the passenger. People who work in the public sector or own a business travel primarily to Samos, Chios, Kerkyra, Limnos and Kalamata. Students travel to Kalamata, Limnos, Samos and Chios and passengers that work in the private sector or homemakers use the PSO route

Thessaloniki – Chios. People who travel to Ikaria work in public sector or in private corporations. Moreover, passengers with low monthly income (less than €600) travel primarily to Limnos and Samos and people that have a monthly income from €600 to €1,200 usually visit Chios. As seen on Table 8 the variable "destination" is also affected by a number of other variables that define consumer buying behaviour and passenger satisfaction.

Table 8: Summary of Fisher's Exact Test Results for the Variable "Destination"

Variables	Value	Monte Carlo Sig. (2 sided)	
		95% Confidence Interval	
		Lower Bound	Upper Bound
Profession	53.842	0.031	0.038
Monthly income	43.153	0.012	0.016
Buy ticket from travel agency	68.548	0.000	0.000
30% price increase	36.586	0.000	0.000
50% number of flights per week decrease	30.328	0.000	0.001
Number of flights per week	59.198	0.000	0.000
Days of flights	68.051	0.000	0.000
Hours of flights	39.513	0.003	0.006
Services level	28.379	0.029	0.036
Sense of safety during flight	61.677	0.000	0.000

4.2 Consumer Behaviour

To investigate consumer behaviour, passengers were asked about the reason for flying; most of them answered that they visited friends and family (34%), others were business travellers (27%) and some of them travelled for educational reasons (17%) or leisure (12%). Half of the passengers used the PSO routes once or twice every six months and the rest of them travelled once a month (17%) or once a year (15.5%). Only 4.5% of the respondents travel during holidays and public holidays and 2.5% of them use the PSO route once a week. Almost all passengers of PSO routes are repeat customers, because only 10% of the respondents were travelling for the first time. It is interesting to mention that 75% of the passengers travel throughout the year not focusing on certain periods.

A significant percentage of passengers (50%) of the Thessaloniki PSO routes buy their ticket from the internet - air carrier website (30%) or third party websites (20%) - and the rest of them choose travel agencies (31.5%) or book their ticket directly from the company's counters at the airport (18.5%). Passengers who travel to Limnos, Ikaria, Samos and Chios prefer to buy their ticket through travel agencies (Table 8). Consumer behaviour is also affected by the sense of safety that a passenger feels during a flight, by the cost of the ticket and the time (trip duration, flight hours). On the other hand, passengers answered that they are less affected by the quality of the services and the air carrier per se.

Passengers were also asked how they would react in case the price of the ticket would increase by 30%. Most of them answered that they would choose an alternative means of transport; however, people who travelled to Chios and employees that work in the private sector stated that they would continue to use the PSO route (Table 8). Moreover, in a hypothetical decrease in the number of flights of 50%, respondents would choose the PSO route except for the passengers who travel to Kerkyra and Limnos; these stated that they would seek another mode of transport to travel to their destination (Table 8).

4.3 Market Segmentation

A market segmentation analysis was undertaken based on the consumers' profile and buying behaviour. In particular, the market is divided into three groups according to different demographic, socioeconomic and behavioural passenger characteristics. Five variables were significantly associated ($p < 0.05$) with the main reason for using the PSO routes. The Pearson Chi Square test and the Fisher's Exact test results are summarized in Tables 9 and Table 10.

Table 9: Summary of Pearson's Chi-Square Test Results for "Travel Motive"

Variable	Value	Df	Asymp. Sig (2 sided)
Gender	26.486	4	0.000

Table 10: Summary of Fisher's Exact Test Results for "Travel Motive"

Variables	Value	Monte Carlo Sig. (2 sided) 95% Confidence Interval	
		Lower Bound	Upper Bound
Age	74.891	0.000	0.000
Education level	55.080	0.000	0.000
Profession	151.813	0.000	0.000
Monthly income	64.167	0.000	0.000
Travel frequency	45.389	0.000	0.001

The first group consists of young female and male students aged between 18 and 24 years old with university education and low income (less than €600). This group uses the PSO routes once or twice every six months, for educational reasons or to visit friends and family. The second group of male and female business travellers is aged 25 to 44 and works in the public sector or owns a business. Their monthly income is €600 to €1,200 and they travel once a month or once or twice every six months. The third group comprises male and female travellers, 25 to 64 years old, who work in the public sector or own a business. These passengers are university educated and their income is over €1,200 per month. This group travels once, twice or four times a year primarily to visit friends and family.

4.4 Consumer Satisfaction

The passengers of Thessaloniki PSO routes were asked about their opinion on the number of flights per week and the timetable (days and hours) of flights. Table 8 lists the variables (number of flights per week, days and hours of flights, services satisfaction level, sense of safety) that are related to the destination of the passengers. People who travel to Kalamata and Samos would be more satisfied if there were a larger number of flights per week and those who travel to Kalamata and Skiros would like to see the days of flights changed. The users of the Thessaloniki – Kerkyra and Thessaloniki – Samos PSO routes are satisfied neither from the days nor from the hours of the flights.

Although respondents stated that the services provided by the operator do not affect their buying behaviour, people that travelled to Limnos and Chios mentioned that they felt uncomfortable with the services provided by Sky Express and Astra Airlines. It is interesting to mention that 40% of passengers had travelled in the past (before 2009) with Olympic Airways on the same PSO routes. Almost half of them were unsatisfied by the type of the aircraft, the limited availability of tickets, the high fares, the inaccuracy, the low frequency, and low reliability exhibited by Olympic Airways in the past.

4.5. Positioning

The respondents did not seem to have a clear understanding of PSOs; 60% of them did not know the term "Public Service Obligation" although there was a number of passengers that knew and could actually define the term. Most users believe that a PSO route is an air service that has been awarded a subsidy. Only half of the passengers knew that they were travelling on a PSO route. Table 11 lists factors that have an effect on passengers' PSO awareness level. These are state of residence, destination, profession, and the personal monthly income of the passenger. Passengers who live on Limnos, Samos and Thessaloniki, work in the public sector and have a monthly income between €800 and €1,200, are better informed about the Public Service Obligation mechanism. Those who travel to Kalamata and Kerkyra could not believe that the state has imposed PSO to these routes. Passengers that travelled to Chios stated that the air carrier operated the route with a subsidy (which is not actually the case).

Table 11: Summary of Fisher's Exact Test Results
Regarding Passengers PSO Awareness

Passengers' PSO awareness level		Value	Monte Carlo Sig. (2 sided) 95% Confidence Interval	
			Lower Bound	Upper Bound
Knowledge of the PSO scheme	Residence	33.069	0.000	0.001
Passengers know that they use a PSO route	Destination	40.754	0.000	0.000
	Profession	14.752	0.023	0.029
	Monthly income	15.540	0.004	0.007
Travellers know that they use a subsidized route	Destination	30.011	0.000	0.000

5. CONCLUSIONS

This paper has undertaken a first step in developing a marketing plan for the PSO routes of Thessaloniki, aiming to contribute into making these routes self-sustaining. In 2012, while the financial crisis continues to plague Greece, it is necessary to highlight the role of the PSO mechanism and use these lifeline air services as a tool for regional development, territorial and social cohesion and socioeconomic development. By focusing on the consumer and adding value, but also by preserving the long-term interests of the society, an air carrier can create a successful plan oriented to social marketing to achieve the desired results. The current PSO scheme in Greece requires restructuring, in order to exploit the benefits of this mechanism to the maximum. Therefore, to produce personalised services that will contribute to create value for the customer, it is necessary to adapt the air services to the needs of the passengers. This will become possible after the identification of the market and the target groups, based on the understanding of the consumer behaviour and the level of passenger satisfaction.

The marketing research led to the classification of the Thessaloniki PSO routes market into three target groups. Each group has its own unique characteristics and motives, so the reconfiguration of the related air services should be based on the needs of every individual market segment for every single PSO route. Users of the lifeline air services travel throughout the year and price is very important for them. Passengers of the new entrants (Sky Express and Astra Airlines) are not loyal to the brand and do not feel comfortable when flying with these air carriers. The timetable of the PSO routes has to be redesigned according to passengers' needs and wants. There is a lack of adequate information about the PSO mechanism in Greece. New entrants should focus on the online ticket market, the quality of the provided services and have to focus on building strong bonds with the customers using customer relationship management and loyalty programmes. Last key to success is to inform passengers about the PSO mechanism and create a competitive positioning and finally a successful brand. Finally, a marketing plan for each single PSO route has to be developed in order to create differentiate, personalised air services that can offer true value to the passengers.

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ANALYSIS OF AIR PASSENGER TRANSPORT IN EUROPE

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ABSTRACT

This article presents a set analysis of European airlines. The main results reveal that ARIMA models have better performance than the Holt-Winters method in time series of Revenue Passenger Kilometres in nineteen airlines members of the Association of European Airlines (AEA). Only seven airlines have been influenced by the September 11th terrorist attack, SARS and the ash crisis, while none of the analysed airlines has been influenced by the economic crisis that began in 2008. The results obtained might suggest, on the one hand that airlines can find the flexibility to meet demand, despite their difficulty to adjust capacity. On the other hand, given the heterogeneity of resources and flight destinations, the business environment does not affect the airlines in the same way or with the same intensity.

Keywords: ARIMA models, impact analysis, intervention

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1. INTRODUCTION

The air transport industry in general and in Europe in particular has been under significant pressure that has influenced the activity and the efficient management of resources. Major events that have happened since the late 1990s to the present year, period covered by this investigation, were as follows (Franke & John 2011):

i) September 11th 2001 terrorist attacks in the USA. The literature on the subject has taken two distinct views (Lai and Lu 2005). One view is that the effect of September 11th was severe, widespread and immediate with airlines and tourism industry being particularly badly affected. The other view is that before September 11th, passenger traffic was already showing a downward trend, price wars were accelerating, and new competitors were taking business from legacy hub-and-spoke carriers and thus the terrorist attack only exacerbated these problems;

ii) Two important events also took place in 2002 and 2003. The appearance of low cost airlines was for instance able to win around 22 million new passengers (at a time of a slight overall market decline) and the pandemic threat of SARS in 2003;

iii) The ash crisis, due to the Icelandic Eyjafjallajökull volcano eruption in April and May 2010, which left stranded more than 1.3 million and resulted in the airspace closure of Belgium, Ireland, United Kingdom, Denmark , Estonia, Finland, Hungary, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Romania, Sweden and Switzerland;

iv) The financial crisis that began in 2008.

As discussed by Hatty and Hollmeier (2003), when demand declines, capacity cannot be adjusted immediately due to the insufficient flexibility. Load factors decrease and therefore unit costs per revenue passenger increases. In their need to fill the empty seats, airlines start market share wars with significant cuts in tickets prices (and yields).

The aim of this paper is twofold. First, we propose a mechanism based on time series models, to monitor and control the behaviour of the series of revenue per passenger (RPK in million €) in 19 European airlines on a monthly basis during the period 1999-2011. To do this we made a comparison between ARIMA and Holt-Winters models. Second, an intervention analysis is performed to estimate the effect of the above events. For this purpose, a comparative study is conducted to assess whether the intervention analysis effectively accounts for the above mentioned effects (September 11th, SARS, Ash crisis and Economics crisis) in the behaviour of the series. These objectives are relevant, since the development of predictive models and the influence of exogenous variables in the airline industry could enable managers to take into consideration some aspects and to help them make strategic decisions in relation to managing resources and capabilities.

2. DATA AND METHODOLOGY

2.1 Data

To achieve the stated objectives, we use data from the monthly series of the Association of European Airlines (AEA) in terms of Revenue Passenger Kilometres, RPK) of AEA member airlines for the period 1999/01-2011/04. We analysed 19 of the 32 airlines[1] that make up the AEA. Table 1 shows some characteristics of the airlines studied. For example, 57.8% (11 carriers) are privately owned of which nine (i.e. AF, BA, FI, IB, JP, KLM, LH, OS, OU) are 100% private. 36.8% are owned partially or fully (as in the case of TAP) by their respective state.

Table 1: Main Features of the Sample Airlines

		Traffic		Investment (mil.€)		Fleet			Ownership	
Airlines	Employ	RPK Prog.	RPK (%)	Income	EBITDA	Airbus	Boeing	Others	Public	Private
AF – A.France[1]	106933	131657	2.3	23970	-129	194	74			100
AY - Finnair	8797	15567	-6.8	1838	-124	55	7	21	72	28
BA - British A.	39610	111995	-3.2	7994	-281	103	171			100
BD – bmi[1]	4300	10325	6.2	1040	-99.7	32	1	18	50	50
CY - Cyprus A.	1226	3082	-8.8	248.9	-5.7	11			69.57	30.43
FI - Icelandair	2182	3405	-11.11	80321	1483	0	18[3]	0	0	100
IB – Iberia[3]	20671	49556	-6.2	4409	-464	109	34	0	0	100
JP - Adria A.[1]	719	1003	16.2	207.2	1.2	6	1	12		100
KL - KLM	34032	73472	-5.2	20994	-1285	12	160	55	0	100
KM – A Malta	1429[1]	2305[1]	3.3[1]	273.7[2]	-8.3[2]	12[1]			98[1]	2[1]
LG - Luxair	2282	483	2.4	378.5	1	0	4	12	48.66	51.34
LH - Lufthansa	117521	123083	-2.5	22283	96	246	132	170	0	100
MA - Malev A.	1333	3528	-13.2	351.1	-46.4	0	19	10	95	5
OK - Czech A,	4172	5813	-2.3	1078.5	-278.9	19	18	12	91.51	8.49
OS – Austrian[2]	7914[1]	16458[1]	-5.6[1]	2530.6	-312.1	21	20	60		100
OU - Croatia A	1131	1151	-5.4	183	-23	12	6		0	100
SK - SAS Sca.	17153	23241	-16.7	44918	-1311	21	108	53	52.1	47.9
TK - Turkish A	12750	38974	19.7	6881	752	97	77	0	49.12	50.88
TP - TAP Port.	6986	21076	-3.8	2239.9	47.7	55	0	16	100	0

Source: AEA and own elaboration, Notes: (1) Date 2008, (2) Date of Income and EBITDA 2007, (3) Date Boeing fleet 2006.

Considering the size of firms by the number of employees, larger airlines are LH and AF with 117,521 and 106,933 employees, respectively, while the smaller ones are JP and OU with 719 and 1,131 employees, respectively.

[1] Other companies such as Alitalia, LOT, SWISS, Brussels, etc have information from 2008, 2001, 2002, or 2003 respectively. With a considered period of 148 months results are regarded as robust.

Figure 1 (a and b) shows the growth rates path of revenue per passenger for the airlines under consideration. 'Growth rates' refer to current month compared to the same month in previous year; "RPK_TO" stands for total scheduled, that is, the sum of total international and domestic traffic (continuous line); "RPK_ET" includes all cross border/ international routes originating and terminating within Europe (including Turkey and Russia up to 55ºE), Azores, Canary Islands, Madeira, Cyprus (dashed line); "RPK_DO" stands for domestic traffic, defined as traffic carried on routes originating and terminating within the boundaries of a State by an air carrier whose principal place of business is in that State, or on routes between the State and territories belonging to it, or in the case of multinational airlines owned by partner States, traffic within each partner State should be reported as domestic and all other traffic as international (dashed line).

Figure 1a: RPK (Global, European and Domestic) Growth Rate 1999-2011

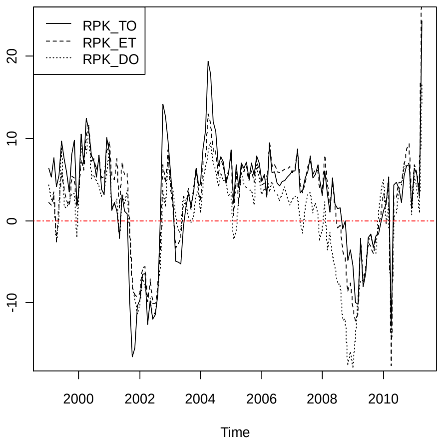
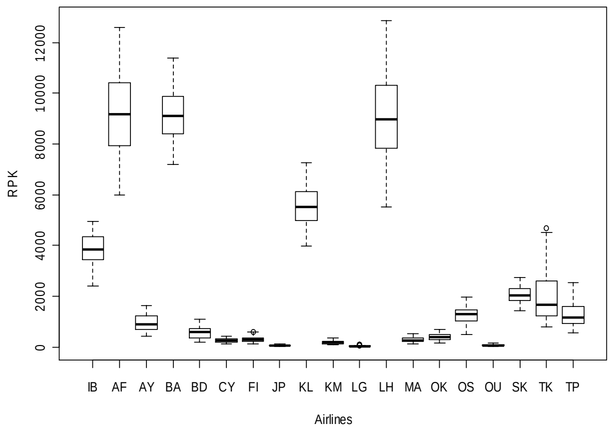


Figure 1b: RPK by Airlines boxplot



Source: AEA and own elaboration

2.2. Methodology

In this section we present the two models ARIMA forecasting and Holt-Winters (HW). As mentioned in Theodosiou (2011) ARIMA models are very popular in the literature for their robustness in modelling misspecification (Chen, 1997). For a review of time series models, see De Gooijer and Hyndman (2006). In the case of a non-seasonal *ARIMA (p,d,q),* the process is given by Athanasopoulos et al. (2011)

$$\varnothing(B)(1-B^{d})Y_t = c + \theta(B)\varepsilon_t \quad [1]$$

Where $\{\varepsilon_t\}$ is a white noise process with mean zero and variance σ^2, B is the backshift operator, and $\varnothing(z)$ and $\theta(z)$ are polynomials of orders p and q respectively, d is the number of trend differences. Y_t is the observation at time t.

The seasonal ARIMA (p,d,q) $(P;D;Q)_m$ process is given by

$$\Phi(B^m)\varnothing(B)(1-B^m)^D(1-B)^d\, Y_t = c + \Theta(B^m)\,\theta(B)\varepsilon_t \qquad [2]$$

where $\Phi(z)$ and Θ (z) polynomials of orders P and Q respectively, each containing no roots inside the unit circle.

The main task in automatic ARIMA forecasting is selecting an appropriate model order; that is, the values of p, d, q, P ,D, Q and d. We use the automatic model selection algorithm that was proposed by Hyndman and Khandakar (2008).

A second alternative when analysing time series is called classical method of decomposition (HW). In this case it is usually considered that the series can be decomposed into some or all of the following components: a) strong, b) cyclical factor, c) seasonality d) irregular component. The statistical software used in this paper is the R language (R Development Core Team, 2010 and free to download from www.r-project.org). The forecast package (Hyndman, 2010) was used for implementation of the ARIMA and Holt-Winters methods.

The application of this method is based on a theoretical model that can be expressed as:

$$Y_t = (b_0+b_1)\ E_t + \mu_t \qquad [3]$$

where b_0 is the permanent component, b_1 the slope of the line and E_t is a multiplicative seasonal factor. The method raises three smoothing equations to estimate these components:

$$S_t = \alpha \frac{Y_t}{C_{t-L}} + (1-\alpha)\ (S_{t-1}+b_{1t-1}) \quad 0<\alpha<1 \qquad [4]$$

$$b_{1t} = \beta\ (S_t+S_{t-1}) + (1-\beta)\ b_{1t-1} \quad 0<\beta<1 \qquad [5]$$

$$C_t = \gamma \frac{Y_t}{S_t} + (1-\gamma)\ C_{t-L} \quad 0<\gamma<1 \qquad [6]$$

The predictions are made using the initial values and the constant values α, β and γ. The initial values required to start the recursive calculations are L+2, L corresponding to the previous year's seasonal factors, the first observation and the level and slope of period 0.

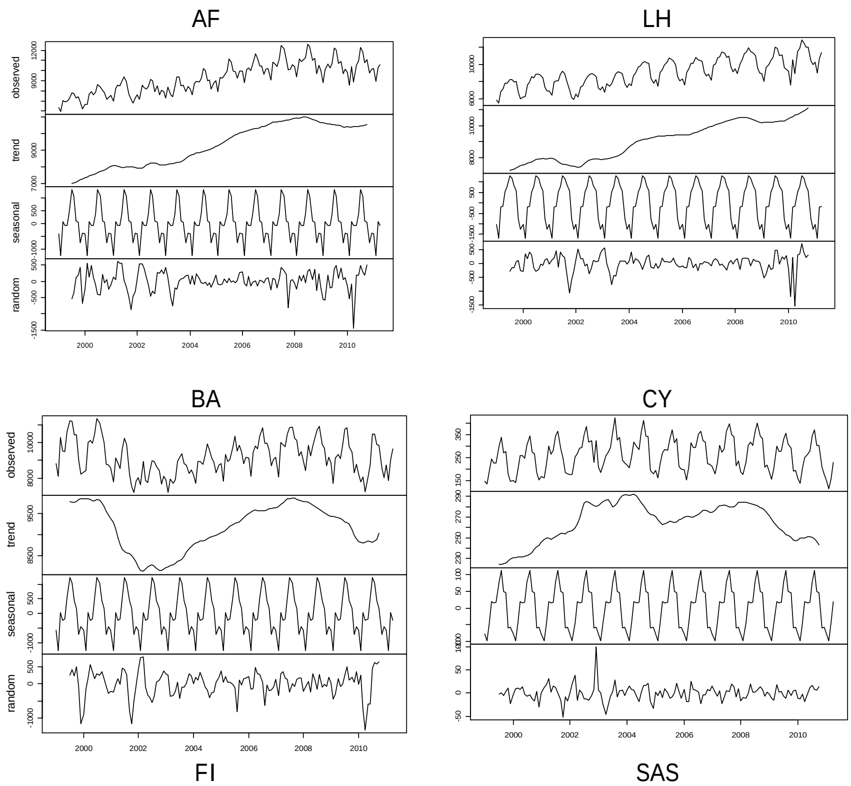
3. EMPIRICAL RESULTS

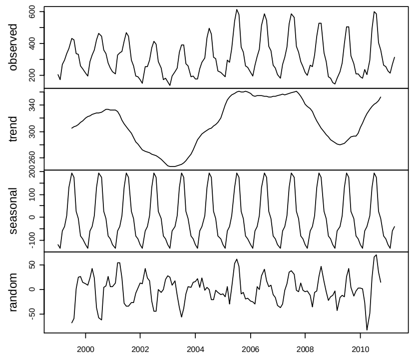
This section considers first ARIMA models for each airline; results will be compared with Holt-Winters decomposition. Second, we will analyse the influence of exogenous variables (e.g. September 11th effect, SARS, and economic crisis) in the time series. Finally, we made the predictions for year 1 from each of the series analysed.

3.1. ARIMA Models

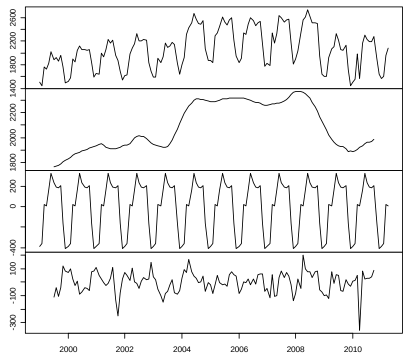
Figure 2, shows the decomposition of eight series (the rest of the graphs are available upon request). These series have three different trend patterns. The time series of AF and LH airlines, show increasing trends (like the omitted series AY, IB, KL, OU, TK and TP). The time series of the airlines BA, CY, FI, OS and SK (like the omitted MA, OK, BD and JP) show different oscillatory trends. The time series of airline KM (like LG) shows a decreasing trend. Table 2 shows selected ARIMA models with the parameter estimates and statistical tests for each airline.

Figure 2: Results from Decomposition Procedure of the Eight Time Series

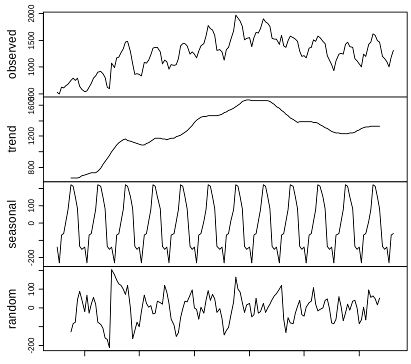


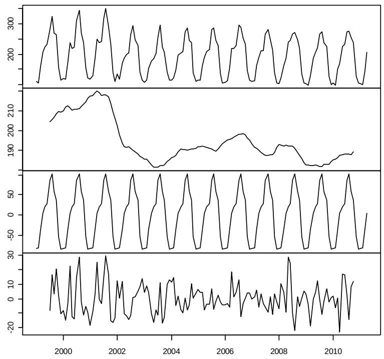


OS



KM





Source: Own elaboration

Table 2: ARIMA Models

		Coefficients									Statistical test	
Airlines	ARIMA Model	Inter.	AR(1)	AR(2)	AR(3)	AR(4)	MA(1)	MA(2)	MA(3)	MA(4)	AIC	Log. Lik
AF	$(2,1,1)\ (1,1,1)_{12}$		-1.02	-0.33			0.789				2363.6	-1177.8
AY	$(0,1,1)\ (1,1,2)_{12}$						-0.192				1815.6	-905.8
BA	$(4,1,1)\ (2,1,0)_{12}$		0.576	0.007	0.174	-0.46	-0.852				2321.8	-1154.9
BD	$(4,1,1)\ (2,1,0)_{12}$		0.889	-0.04	-0.08	-0.29	-0.712				1574.6	-781.3
CY	$(1,1,1)\ (0,1,1)_{12}$		0.277				-0.213				1583.6	-788.8
FI	$(0,1,0)\ (0,1,1)_{12}$										1680.9	-839.3
IB	$(0,1,1)\ (0,1,1)_{12}$						-0.087				2077.2	-1036.3
JP	$(0,1,0)\ (0,1,1)_{12}$										1119.4	-558.7
KL	$(0,1,4)\ (0,1,1)_{12}$						-0.386	-0.06	0.134	-0.467	2174.3	-1082.1
KM	$(1,1,2)\ (2,1,0)_{12}$		0.331				0.047	0.086			1500.4	-746.2
LG	$(1,0,2)\ (2,0,2)_{12}$	289.0	0.702				0.335	0.264			1546.3	-768.1
LH	$(0,1,1)\ (0,1,1)_{12}$						-0.036				2382.9	-1189.5
MA	$(1,1,0)\ (1,1,1)_{12}$	286.3	0.835								1569.9	-782.0
OK	$(2,1,2)\ (1,1,1)_{12}$		1.726	-0.990			-1.804	1.000			1513.6	-751.5
OS	$(0,1,0)\ (2,1,1)_{12}$										1831.6	-914.8
OU	$(0,1,1)\ (1,1,2)_{12}$						0.536				1189.1	-592.5
SK	$(0,1,1)\ (0,1,2)_{12}$						0.133				1980.2	-988.1
TK	$(0,1,1)\ (0,1,1)_{12}$						0.115				2038.5	-1017.2
TP	$(0,1,1)\ (0,1,2)_{12}$						-0.048				1948.3	-972.1

Source: own elaboration

BA (British Airways) and bmi that show the same ARIMA model (4,1,1)(2,1,0); FI (Icelandair) and JP (Adria Airways) are consistent with model (0,1,0)(0,1,1) and IB (Iberia), LH(Lufthansa), TK(Turkish Airways) with model (0,1,1)(0,1,1). The remaining airlines exhibit different modelling behaviour.

Having determined the best fit ARIMA models for each airline, the table in the Appendix shows the comparison of ARIMA and Holt-Winters models, considering the MAPE and MASE measurement errors (Athanasopoulos et al. 2011) for each of the series studied[2]. A lower value of MAPE and MASE errors shows a better performance of ARIMA models.

As mentioned in the introduction, the airline industry in general and Europe in particular has been subjected to a number of different events, which may have exercised some influence on the series analyzed. According to Lai and Lu (2005), intervention analysis goes back to the 1970s (Box and Jenkins, 1976) and a general model form is:

$$z_t = \sum_{j=0}^{m} w_j I_t^{(h+j)} + w_k S_t^{(k)} + \Psi(B) a_t \qquad [7]$$

where $Y_t = \Psi(B)a_t$ is the RPK for each airline; $I_t^{(h)}$, $I_t^{(j)}$ and $S_t^{(k)}$ are the exogenous variables included in our model. For the events of the ash crisis $I_t^{(h)} = 0$ if $t \neq h$ y $I_t^{(h)} = 1$ if $t = h$ (April and Mai 2010). For the events of September 11th and SARS[3] $I_t^{(j)}$ equal to one $t=j$ (September 2001 to December 2003) and 0 otherwise. For the economic crisis event $S_t^{(k)} = 0$, if $t < k$ (t<2008) and $S_t^{(h)} = 1$, if $t \geq k$ (t ≥ 2008).

Table 3 shows the results of ARIMA and intervention model for seven of the nineteen companies that the events of the ash crisis; terrorist attacks and SARS were significant. The impact of these events was negative in six companies, with the exception of Austrian Airlines, whose impact was positive. In no case was the effect of the economic crisis significant.

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[2] Each time series was tested for outliers prior to the implementation of the ARIMA and Holt-Winters procedure. The detection of outliers was based on the equation: $\left|\frac{Y_t - \mu_t}{\sigma_t}\right| > 2$ where μ_t and σ_t denote the mean and standard deviation of the time series Y_t, respectively.

[3] A dummy variable was considered that jointly accounts for the events of the September 11th and SARS (September 2001 to December 2003). Also, we considered in isolation the effects, but there was no difference in the results. We have compared through the measurement errors MAPE and MASE using dummy variables together or independently. The lower values of the error measures indicate that the ideal model is presented in this work. The test results are available upon request.

Table 3: Summary of ARIMA and Intervention Model for Seven Airlines

	AY - Finnair (0,1,1) $(1,1,2)_{12}$		BA - British A. $(4,1,1)$ $(2,1,0)_{12}$		BD - bmi $(4,1,1)$ $(2,1,0)_{12}$		FI - Icelandair $(0,1,0)$ $(0,1,1)_{12}$	
Economic crisis	54.74(0.06)		-232.72 (-0.52)		-39.76*(0.4)		-34(0.04)	
Ash crisis	-262.7(-3.91)	***	-971.89*(-1.87)	*	-69.07*(-3.04)	***	-114(-2.63)	***
Sep11 & SARS	-11.54(-0.03)		-744.05(-3.17)	***	-12.95(-0.17)		-4.5(-0.03)	
AR(1)	-		0.56(7.89)	***	0.88(8.16)	***	-	
AR(2)	-		0.01(0.17)		-0.02(-0.22)		-	
AR(3)	-		0.17(1.53)		-0.09(-0.91)		-	
AR(4)	-		-0.47(-5.47)	***	-0.28(-2.84)	***	-	
MA(1)	-0.176(-3.48)	***	-1.09*(-17.96)	***	-0.70(-8.34)	***	-	
MA(2)	-		-				-	
MA(3)	-		-				-	
MA(4)	-		-				-	
Chi2	27.52	***	702.61	***	523.17	***	6.92	***
Log Lik	-900.28		-1150.26		-778.29		-836.75	

	KL - KLM (0,1,4) $(0,1,1)_{12}$		OS - Austrian $(0,1,0)$ $(2,1,1)_{12}$		SK - SAS $(0,1,1)$ $(0,1,2)_{12}$	
Economic crisis	60.91(0.16)		-4.99(-0.03)		112.19(0.08)	
Ash crisis	-508(-2.01)	***	-11.64(-0.1)		-307.85(-2.63)	***
Sep11 & SARS	-225.99(-0.86)		265.27(8.1)	***	-31.27(-0.15)	
AR(1)	-		0.09(0.97)		0.15(1.79)	*
AR(2)	-		0.24(3.02)	***		
AR(3)	-		0.24(2.63)	***		
AR(4)	-		-0.23*(-2.9)	***		
MA(1)	-0.61(-5.99)	***				
MA(2)	-0.09(-0.93)					
MA(3)	0.11(1.09)					
MA(4)	-0.62(-6.45)	***				
Chi2	200.73	***	94.98	***	12.22	***
Log Lik	-1079.42		-896.22		-985.60	

Source: own elaboration

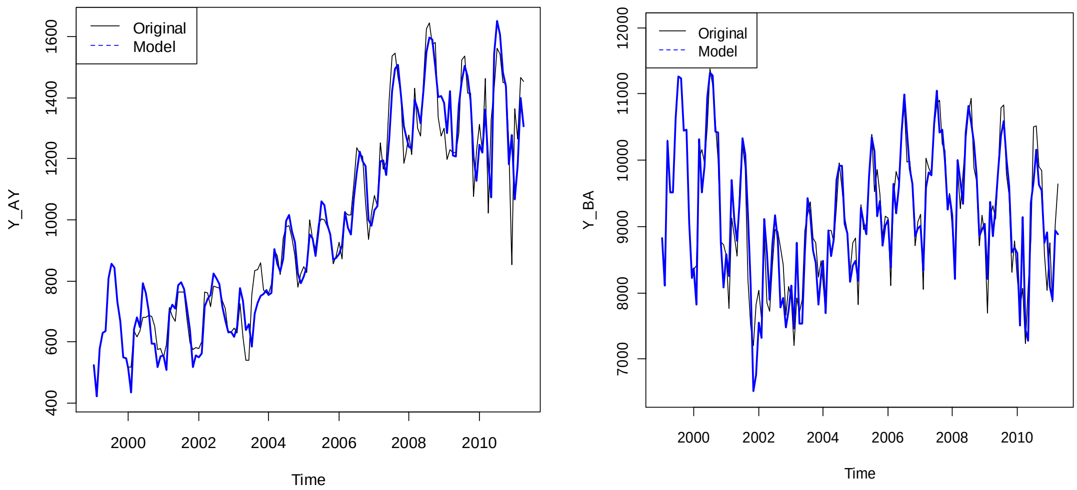
*Significance level 0.05, **significance level 0.01, ***significance level 0.001

The time plot for AY (Finnair) and BA (British Airways) RPK reveal an upward and downward trend respectively along with seasonality patterns.

Figure 3: The Time Series AY and BA with original values and the intervention model

AY: Finnair

BA: British Airways



Source: own elaboration

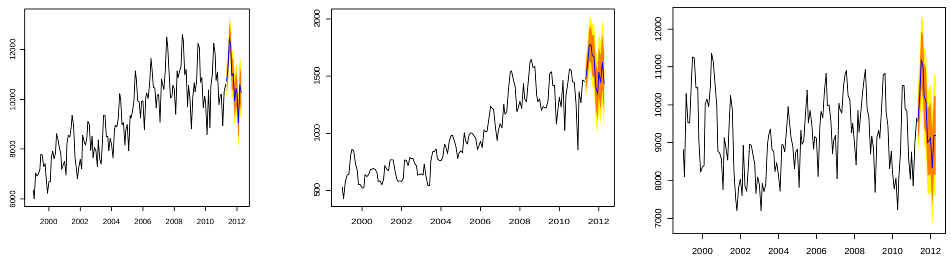
Finally, Figure 4 shows the predictions (omitted airlines bmi, JP and TK) with confidence intervals in red and yellow to 80 and 95 per cent respectively with a time horizon of one year (May 2011 - April 2012).

Figure 4: Prediction Models

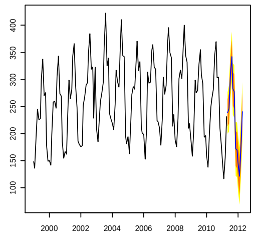
AF: ARIMA (2,1,1)(1,1,1)

AY: ARIMA(0,1,1)(1,1,2)

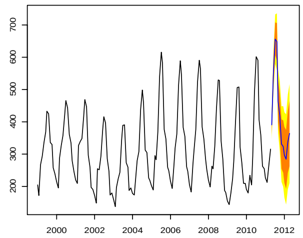
BA: ARIMA(4,1,1)(2,1,0)



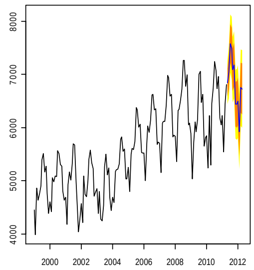
CY: ARIMA(1,1,1)(0,1,1)



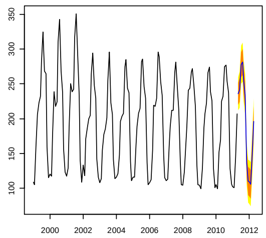
FI: ARIMA(0,1,0)(0,1,1)



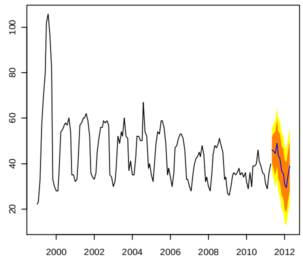
KL: ARIMA(0,1,4)(0,1,1)



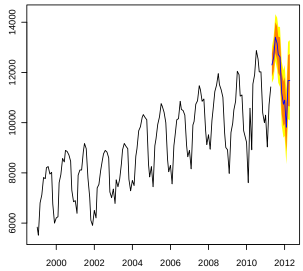
KM: ARIMA(1,1,2)(2,1,0)



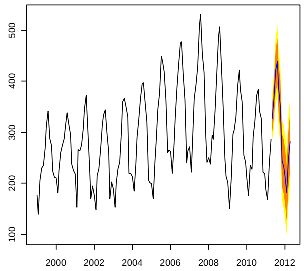
LG: ARIMA(1,0,2)(2,0,2)



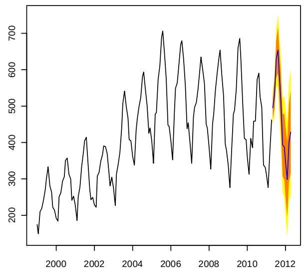
LH: ARIMA(0,1,1)(0,1,1)



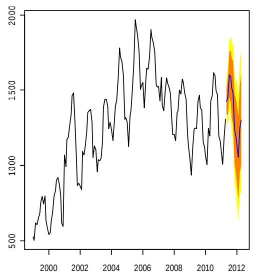
MA: ARIMA(1,1,0)(1,1,1)



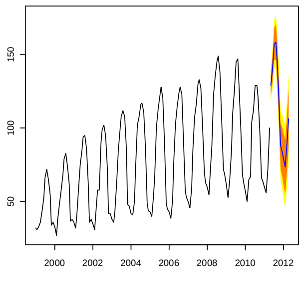
OK: ARIMA(2,1,2)(1,1,1)



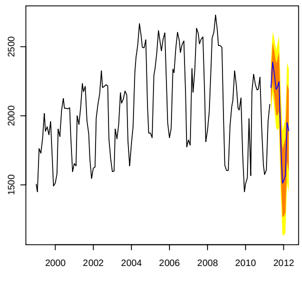
OS: ARIMA(0,1,0)(2,1,1)



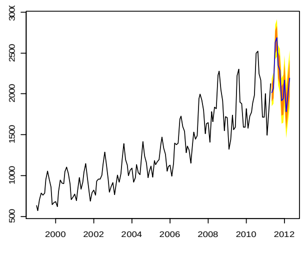
OU: ARIMA(0,1,1)(1,1,2)



SK: ARIMA(0,1,1)(0,1,2)



TP: ARIMA(0,1,1)(0,1,2)



Source: own elaboration

4. CONCLUSION

Understanding the evolution of demand, Revenue Passenger Kilometres is a strategic factor in the management of resources and capacity for decision-making. The time series analysis as performed in this paper can contribute to the scenario approach to carry out a proper strategic planning exercise. The main results reveal that ARIMA models have allowed us to a good performance of time series of Revenue Passenger Kilometres in nineteen airlines. The events occurred over the period analysed have not had the same impact on airlines. Only seven carriers have been influenced by the terrorist attack, SARS and the ash crisis, while none of the analysed airlines has been influenced by the economic crisis.

The results obtained might suggest, on one hand that airlines, despite their difficulty to adjust capacity, can find the flexibility to meet demand. This result is in line with Pearce (2012). On the other hand, given the heterogeneity of resources and flight destinations, the environmental events do not affect them the same way or with the same intensity. In this sense, authors like Ghobrial and Irvin (2004) mention that the events surrounding the aviation industry are dynamic and can indeed affect the different components of the industry. While the recent empirical literature focuses on the efficient management of the airlines, there are still many factors that need to be considered, which have recently been addressed in the 2010 Hamburg Aviation Conference (financial crisis, business strategies and risks, regulatory reform and innovation). Finally, it seems advisable to continue research into the effects of different events on European airlines, particularly those arising from the economic crisis.

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Appendix - Comparison of the ARIMA and Holt-Winters Models

Airlines	Model Type	MAPE	MASE
AF - Air France	Box-Jenkins	2.64	0.39
	HoltWinters	37.92	5.69
AY - Finnair	Box-Jenkins	5.47	0.67
	HoltWinters	39.28	4.92
BA - British Airways	Box-Jenkins	3.26	0.49
	HoltWinters	37.99	5.94
BD - bmi	Box-Jenkins	4.48	0.51
	HoltWinters	38.44	4.6
CY - Cyprus Airways	Box-Jenkins	5.2	0.27
	HoltWinters	46.17	2.6
FI - Icelandair	Box-Jenkins	5.2	0.27
	HoltWinters	46.17	2.6
IB - Iberia	Box-Jenkins	4.56	0.42
	HoltWinters	40.91	4.15
JP - Adria Airways	Box-Jenkins	5.98	0.46
	HoltWinters	42.58	3.38
KL - KLM	Box-Jenkins	2.43	0.4
	HoltWinters	37.71	6.3
KM - Air Malta	Box-Jenkins	3.94	0.22
	HoltWinters	46.15	2.69
LG - Luxair	Box-Jenkins	7.25	0.6
	HoltWinters	41.22	3.41
LH - Lufthansa	Box-Jenkins	2.58	0.39
	HoltWinters	38.14	5.86
MA - Malev Hunagrian A.	Box-Jenkins	5.64	0.38
	HoltWinters	44.73	3.09
OK - Czech Airlines	Box-Jenkins	3.85	0.34
	HoltWinters	41.68	3.63
OS - Austrian	Box-Jenkins	2.89	0.41
	HoltWinters	38.82	5.19
OU - Croatia Airlines	Box-Jenkins	5.03	0.28
	HoltWinters	45.95	2.73
SK - SAS Scandinavian A.	Box-Jenkins	3.07	0.41
	HoltWinters	38.7	5.34
TK - Turkish Airlines	Box-Jenkins	4.56	0.42
	HoltWinters	40.91	4.15
TP - TAP Portugal	Box-Jenkins	4.27	0.41
	HoltWinters	41.2	3.82

Source: Own elaboration

THE COMPONENTS OF AIRLINE BUSINESS STRATEGY AND THEIR IMPACT ON REVENUES

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ABSTRACT

This study hypothesizes that, as a result of government's bilateral agreements and regulations that limit the impact of globalization, a set of components which constitutes the airlines' business strategies have a direct affect on airlines' revenues. The hypothesis is tested on a sample of 15 US airlines, which substantiates that three out of four suggested components have a positive significant influence on the airlines' revenues. *Markets* - confirms that international flights help to increase the airline revenue; *Product* - with a significant positive impact on revenue when the airline offers low cost flights; and *Operation* - flights from hubs where found to have a significant negative affect on airlines' income while point-to-point flights, characterized by low cost airlines, are more advantageous. The fourth component, *Generic Competitive Advantage,* was found to be a choice component; namely, an airline may succeed by being either a cost leader or a differentiator in the markets and products it is serving.

Key words: Airlines strategy, business strategy components, revenues

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1. INTRODUCTION

Air transportation is characterized by network attributes, high fixed costs, highly unstable demand, need for great expertise and emphasis on safety. Airline revenues are: a) seasonal (more persons take vacations in the summer); b) cyclical – affected by the rate of growth of GDP and by political events; c) volatile - influenced strongly and immediately by exogenous events, e.g. recessions, wars, or terrorist attacks. When demand slackens, the industry must limit capacity. Yet its structure encourages over-capacity. Several characteristics of the airline industry are decisive to any attempt to deal with the components of airlines' strategy.

First, airlines offer a standard service, common to all suppliers; thus, it is hard to identify or build customer loyalty. Second, the industry is mature and requires very large turnover and therefore a mass market to be profitable. Therefore, it is a perfect candidate for consolidation to a global oligopoly structure with a few global operators, a number of regional carriers, and low-cost carriers on high-density lines. A global carrier would enjoy significant economies of density and of network and spread risks across world markets, However, arcane webs of international agreements by governments around the world, led by the United States, prevents the airline industry from consolidating and restructuring like other mature industries. Instead, despite much rhetoric of free trade, air transportation was the one sector unanimously agreed to be excluded from the Uruguay Round agenda. Inward FDI in airlines have been constrained by ownership requirements in bilateral Air Service Agreements (ASAs) that thwarted mergers and acquisitions across state lines. No one government is willing to allow unfettered international air operations, free from national (or Federal) controls. IATA called in 2003 for changes in what it termed “the three pillars of stagnation”: the bilateral system, national ownership rules and the attitude of competition authorities. Yet all carriers remain subject to highly restrictive controls on cross-border competition, financing or investment. These carriers cannot create the globally owned network they want, or to acquire foreign airlines. Governments are remarkably consistent in defending and supporting their nation’s “loss leaders,” often enduring tremendous financial burdens (Thomas 2011). Since cross-border mergers and acquisitions were not possible, airlines have turned instead to various forms of alliances and code-sharing agreements.

Third, air travel demand has shown a steady, long-term growth but with a high degree of volatility as regards both profit and demand. Thus, the operating revenues of all US airlines in 2010 (USD $130,503M), was almost equal to that of 2000 (USD $130,248M), but with a peak of USD $186,087M in 2008 and a low of USD $107,124M in 2002 (RITA, 2011). This volatility is a direct result of the nature of the demand for passenger air travel, which is a derived need for business trips, vacations or visiting relatives; of course, airline business also includes mail and freight transportation – that are affected by the business cycle. We posit that each airline orchestrates a strategy designed to match the supply of air services with the hard-to-predict demand, taking into account regulatory and other environmental restrictions. Airlines enabled globalisation and more openness of international trade. They themselves, however, are subject to a regime that prevents the creation of global airlines. This regime also reduced the likelihood of inward FDI of airlines. The international regime distorts competition, allowing weak carriers to linger and airports – to compete on an arcane network. However, as long as the regulatory framework- and specifically the nationality clause - will not change, airline strategies will be based on that political reality.

In this paper, we identify the components of business strategy specifically relevant for airlines within the present restricting regulatory environment, and investigate the impact of these components on airline revenues. We will start with a literature review that assesses the contributions made so far by studies on the subject of airline strategy as well as the special characteristics of the airline industry. This will help us choose the components of airlines' business strategy for testing their impact on airlines' revenues. The hypothesis will be tested empirically on a sample of 15 US airlines. A discussion of the results will follow by conclusions, limitations and suggestions for future research.

2. LITERATURE REVIEW

One of the most important factors affecting the markets of the airline industry is globalization, which is restricted by the regime under which they operate. This political regime prevents the airline industry from consolidating globally and restructuring (Aharoni, 2003). Indeed, airlines are globalizers but cannot globalize – at least not by acquiring foreign airlines (Aharoni, 2002). As pointed out by Oum, Yu, and Zhang, 2001:

> "*Domestic deregulation and liberalization have been progressing at an uneven pace across countries, and liberalization of the international markets has yet to overcome numerous obstacles. Air carriers, on the other hand, need to build up an extensive global network to realize economies of scope and density and to meet consumer demands."* (Oum, Yu, and Zhang, 2001)

Clearly, airlines cannot create a global network. The alternative chosen was agreements on code sharing (e.g. Ramon-Rodriguez, Moreno-Izquierdo and Perles-Ribes, 2011). To be sure, the environment in which airlines operate has changed within the United States and the European Union, while the impact of globalization was restricted. The U.S. deregulated air freight (1977) and passengers' flights (1978) so that some flag carriers were privatized. Since 1988, the EU adopted several measures designed to extend to the aviation sector both the freedom to provide services and the Community competition rules. Pricing was freed from the regulation of ASAs between countries and full cabotage (the right to pick up traffic in a destination country and fly it to another destination in that country) was allowed throughout the EU among member-states since 1997. The reform creates one European Common Aviation Area (ECAA) of 15 states but only in respect to intra-ECAA service. It transformed intra-Community air service from international to domestic but did not change the rules outside EU nor did it allow access to non- Community airlines (Council regulation 2407/92).

Airline deregulation in the US and in the European Union has enabled the emergence of low-cost airlines. This new competitive environment has stimulated researchers to re-analyze the airline industry and suggest strategies for handling the competition between either full service legacy airlines opposite low-cost airlines or vies versa (Cobb, 2005; Forgas et al. 2010; Jarach, Zerbin and Miniero, 2009; Morrell, 2005; O'Connell and Williams, 2005).

Graf (2005) tested the feasibility of having a low-cost operation side by side with a full service operation, and found it to be incompatible. A detailed analysis of the failure of Delta-Light, a subsidiary of Delta Airlines, to compete with Southwest Airlines reached the conclusion that side by side low-cost and full service is not feasible because of the large gap in culture needed for those two type of services (Porter, 1996). Other studies reached similar results regarding the feasibility of the idea of an airline within an airline (Morrell, 2005). In a recent article, Lin (2012) finds that hub carriers may have excessive incentive to adopt an "Airlines-within-Airline" strategy from a welfare viewpoint, especially, when low-cost rivals exist. Some airlines like Qantas found the solution in a two-airline strategy, using two brand names, the full service Qantas and the low-fare Jetstar.

A comprehensive analysis of competition between network carriers and low-cost carriers, with concluding remarks on the outcome of this battle is presented by O'Connell (2004). His survey reveals that there are differences between passengers travelling on a low-cost carrier and those travelling on a full-service airline. His conclusions support the study undertaken by Proussaloglou and Koppleman (1995) on the demand for air carrier services that found implicit tradeoffs between the cost and service attributes of each fare class, the schedule delay corresponding to each flight, and the patterns of frequent-flyer membership.

The way some airlines circumvented the regulatory restrictions on globalization was by joining an alliance or building code-sharing agreements (e.g. Ramon-Rodriguez, Moreno-Izquierdo and Perles-Ribes, 2011). Several additional studies (Albers, Heuermann and Koch, 2010; Evans, 2001; Franke, 2004; Graf, 2005; Ringbeck, Starr and Manning, 2010; Vaara, Kleymann and Seristö, 2004) examine the advantages and disadvantages of joining an alliance or having a code-sharing agreement (see also Aharoni, 2002 and 2003). None of these published researches deal specifically with the general concept of airline comprehensive strategy or of strategy components.

As to airline strategy in general we found the first reference in an article entitled "Airline Competition in Deregulated Markets: Theory, Firm Strategy, and Public Policy", written by Levine (1987). However his classification of strategy refers to functional strategies rather then the comprehensive business strategy.

The next explicit reference to airline strategy was made by Sorenson (1990). His research focused only on generic competitive advantage and suggested three possible advantages for airlines; namely, cost leadership, area monopoly and service differentiation. Other possible components of strategy were ignored. In 2003, Hätty and Hollmeier suggested flexibilization (flexible stabilization), as a strategy to manage the cyclical nature of the airline industry.

Kemp and Dwyer (2003) refer to the components of airlines' mission statements suggested by Pearce and David (1987); unlike Pearce and David, whose research was based on a sample out of Fortune 500 and thus on a variety of industries, Kemp and Dwyer related solely to airlines. They analyzed the types and number of components they found for each of the 50 airlines in their sample, but did not examine the impact of any of these components on airlines' revenues. Since the publication of Pearce and David's 1987 article, the subject of strategic management has developed significantly. Most of the mission statement components they mentioned are now considered to be the building blocks of business strategy (Abell, 2006; Collis and Rukstad, 2008; Hambric and Fredrickson, 2001).

Another way of looking at airline strategy is via key success factors, airline cost structure and revenues of the industry. The most elaborate study on this subject is that of Seristö and Vepsuinen (1997). They conclude that fleet structure is one of the three key factors which affect indirect operating costs. The fleet structure has two facets: the strong affect of utilizing aircrafts from different manufacturers, which results in higher complexity of maintenance (procedures, spare parts and crew certifications) and operation (pilot training and certification), and a weaker affect of the variety of aircraft types from the same manufacturer.

The research studies summarized above analyze different aspects of airline strategies and globalization. None of them, however, examine the connection between the components of strategy and airlines' revenues. Our research aims to close this gap.

2. RESEARCH HYPOTHESIS

Based on the components of strategy suggested by previous research (Abell, 2006; Collis and Rukstad 2008; Hambric and Fredrickson, 2001), the findings of Kemp and Dwyer (2003) regarding the number of mission statements that include each component and the cost and revenues structure of airline operation (e.g. Seristö and Vepsuinen, 1997), we derived the following components of an airline business strategy:

- *Markets* - Serving only the national market or also the international market
- *Product* - Full service, low-cost, or regional
- *Generic competitive advantage* – Cost leader or differentiator
- *Quantitative Objectives* – The goals the strategy is designed to achieve.
- *Operation* - Hub and spoke system or Point-to-point flights

The rationale behind choosing these components is as follows:

- *Markets* - National only or international

An important component of airline's strategy is the scope of operations – specifically are operations restricted nationally or include global operations.

- *Product* - Full service, low-cost, or regional

As articulated by O'Connell and Williams (2005): "*Direct competition between full service airlines and no-frills carriers is intensifying across the world. U.S. and European full service* *airlines have lost a significant proportion of their passengers to low-cost carriers"*. Indeed a major strategic decision of airlines is which product they will provide.

- *Generic competitive advantage* – Cost leader or differentiator

The generic competitive advantage (GCA) is the cornerstone of any strategy (Porter, 1980). In general, airlines offer three separate products; namely, *low-cost*, *legacy full service*, and *regional*, this does not imply that low-cost is a "cost leader" and full service is a "differentiator". Any airline in each market/product may be successful either as cost leader or differentiator (Kling and Smith 1995). The strategic change of Aer Lingus is an example of this concept; they converted their strategy from a cost leader in the legacy airlines market to a differentiator in the low-cost market (Harrington, Lawton and Rajwani, 2005).

- *Quantitative Objectives*

This represents the aspiration of the firm for "survival and success", the importance of LRQG as a decisive part of the firm's business strategy is extensively elaborated in Aharoni and Noy (2009).

- *Operation* – Hub & Spoke or Point-to-point

Southwest Airlines was the first to look at airline operation "outside the box" of the conventional Hub & Spoke concept, which is considered more cost-efficient (Vasigh, Tacker and Fleming, 2008), and set up their operations offering point-to-point service. Over the years, point-to-point operations became a significant feature of low-cost airlines, while the legacy airlines kept their Hub & Spoke operations, and some of them adopted a dual-hub operational method. The adoption of a single hub, multi-hub or point-to-point operation has remained one of airlines' most important strategic decisions.

Having established the list of components, we test the influence of those components and the airline's revenue. The research hypothesis to be tested is that the components of an airline's business strategy have a direct affect on its revenues. We hypothesize that business strategy components have a direct affect on revenue. The one exception is *generic competitive advantage.* This component requires that a choice be made between two distinct alternatives - *cost leader* or *differentiator*. Either of these alternatives can cause low or high revenues: Each choice entails a designated variety of attributes with a fit among them. If the right fit is achieved, the airline would enjoy better revenues. If not - the revenues will accordingly be mediocre.

3. SAMPLE AND DATA CHARACTERISTICS

We tested our hypothesis using data from 15 U.S. airlines in the years 2005 to 2009, collected from 10-K annual reports submitted to the Security and Exchange Commission by the airlines, the annual Chairman's letter to the stockholders, and data published by the Research and Innovative Technology Administration (RITA, 2011) of the Bureau of Transportation Statistics. (Appendix A). The arguments for choosing this sample are as follows:

- U.S. airlines only: By using data on airlines from only one country, we eliminate the influence of different legal and regulatory environments on strategy, and ensure that all the airlines in the sample operate under the same legal and regulatory rules.
- Only 15 airlines: RITA statistics include the details needed for our research for only 15 airlines that have operating revenues of USD $20M or over. These 15 airlines account for 62.5% of all U.S. airline revenues in the years 2005 to 2009.

The chosen time period ranges from 2005 to 2009 - between 2001 and 2005, the U.S. experienced a period of turbulence, which made any analysis unreliable. Airlines lost USD $30 billion, and implemented wage cuts of over USD $15 billion. In addition, 100,000 employees were laid off because of the September 11, 2001 terrorist attack on air transport (Bamber et al. 2009). This event was followed by an unprecedented four-day shutdown of the airline system, and a prolonged period of low demand, due to economic recession, heightened security restrictions, the SARS (Severe Acute Respiratory Syndrome) outbreak in South China in 2002, concern over the invasions of Afghanistan and Iraq, and rising fuel costs. This "perfect storm" of events led to the additional loss of nearly $5 billion during 2001 to 2005 (US Air Transport Association 2006 in Goetz and Vowles, 2009). The upper limit of the chosen period – 2009 – is the year in which the last annual reports for all airlines were available.

To test our hypothesis, we carried out an OLS regression in which the natural logarithm of total revenues in the years 2005 to 2009 was the dependent variable. We chose revenues as the dependent variable and not profits for two reasons – first the typical US large corporation seeks to maximize its total revenue rather than its profits (Baumal, 1958; Amihud and Kamin, 1979). Second, revenues are straightforward, reliable data with a common base for all airlines and are not affected by differences in accounting concepts.

The explanatory strategy component variables are; *markets, products, technology, generic competitive advantage* and, *operation.* Unfortunately, none of the airlines in the sample published any *Quantitative Objectives*; hence, this explanatory variable was eliminated. To control for non-strategic attributes that might influence total airline revenues (Seristö and VepsUinen, 1997; Doganis, 2010), we recorded the following:

Technology: The choice of the variety of manufacturers and aircraft types operated by the airline.

Membership in an airline alliance and\or code-sharing agreement: The decision to join an alliance or code-sharing agreement, which is a way to globalize bypassing regulatory restrictions, may have an influence on the airline's revenue by widening the network of destinations offered to their passengers.

Hub dominance: An airline which is a major user of an airport may have an advantage, such as getting the best time slots for take-off and landing and, as such, may dominate the traffic from that airport. This corresponds to Sorenson's (1990) "area monopoly" competitive advantage.

Revenue structure: Airline revenue is generated, on one hand, by the carrying of passengers and, on the other hand, by the carrying of freight and mail. Trying to serve both markets has an affect on schedules, aircraft configuration, and airport choice. Furthermore, one airline may stress first class service, while another chooses to stress economy. Such a decision would affect the choice of routes as well as other operating variables.

Operating as a connecting regional carrier for major airlines: Some airlines choose to be regional carriers; this means most of their revenues are generated by receiving regional traffic from major airlines.

Operating provider: Some of the major full service airlines are willing to offer their passengers access to as many regional airports as possible, but do not provide this service themselves because of operational complexities. Thus, they enter into agreements with regional airlines to provide their passengers with this service.

4. RESULTS

To test our hypothesis and assess the relative impact of each of the suggested strategy components on airline revenue, we calculated the following three regressions. The first one uses only the following strategy components:

$$TR_j = a_1MLC_j + a_2MFS_j + a_3DR_j + a_4OPH_j + A_5GCAD_j \quad (1)$$

The second regression includes the strategy components as well as the control variables:

$$TR_j = a_1DR_j + a_2MLC_j + a_3MFS_j + a_4OPH_j + A_5GCAD_j + A_6AC_j + $$
$$+ a_7A_j + a_8AP_j + a_9PR_j + a_{10}CC_j + a_{11}CP_j + \varepsilon_j \quad (2)$$

The third regression includes only the control variables

$$TR_j = A_1AC_j + a_2A_j + a_3AP_j + a_4PR_j + a_5CC_j + a_6CP_j + \varepsilon_j \quad (3)$$

Where:

Dependent variable

- TRj = the natural logarithm of the total operating revenues for the period from 2005 to 2009, j= 1 to 15 for the 15 airlines in the sample

Explanatory Variables

- DRj: % of revenues from domestic flights out of total revenues average for the period of 2005 to 2009;
- MLCj: a dummy variable equal to 1 when airline j competes in the low-cost market and 0 otherwise;
- MFSj: a dummy variable equal to 1 when airline j competes in the full service market and 0 otherwise;
- RGSj: a dummy variable equal to 1 when airline j is a regional service airline, and 0 otherwise; included in the regression constant;
- OPHj: % of the airline's flights from the 2 major hubs average for the period of 2005 to 2009;
- GCADj (generic competitive advantage): a dummy variable equal to 1 when airline j is a differentiator, otherwise (a cost leader) equals 0.

Control variables

- ACj (Aircraft index): $(\text{number of manufacturers})^2$ + (Number of types of AC) averaged for the period of 2005 to 2009.
- Aj: a dummy variable equal to 1 when airline j is a member of an alliance or code-sharing agreement, and 0 otherwise.

- APj: % of airline j's flights from its major hubs out of total flights to the airport; average for the period of 2005 to 2009.
- PRj: % of airline j's revenues from passengers out of total revenues, average for the period of 2005 to 2009. Two airlines did not have this data.
- CCj: a dummy variable equal to 1 when airline j is a connecting carrier, and 0 other-wise.
- CPj: a dummy variable equal to 1 when airline j is a connecting provider, and 0 otherwise.
- ε_j: an error term satisfying the regression requirements.

The regression results are presented in Table 1

Table 1: Regression Coefficients of Strategy Component

Strategy component	Variable	Equation 1	Equation 2	Equation 3
Low-cost market	MLC	.696* (.273)	1.083 (.560)	
Full service market	MFS	.126 (.333)	#	
% Revenue from Domestic market	DR	-.077*** (.011)	-.097 (.038)	
% flights from hubs	OPH	-.052*** (.010)	-.054 (.023)	
Generic competitive Advantage	GCAD	.301 (.286)	.612 (.357)	
Aircraft index	AC		.090 (.079)	-.072 (.862)
Member of an Alliance	A		.932 (.728)	-.312 (.197)
Airport dominance	AP		.003 (.016)	.490** (.010)
% revenue from Passengers	PR		.015 (.044)	-.326 (.037)
Connecting carrier	CC		-.886 (1.020)	-.326 (1.033)
Connecting provider	CP		-.145 (.522)	.383 (.416)
	R_{adj}^2	.910	.896	.835
	ANOVA F	29.258***	11.306	14.926**

excluded from the regression

The dependent variable is the natural logarithm of the total operating revenue 2005 to 2009. All variables are defined following the regression equation above. Standard errors are in parenthesis. ***, **, * denote significance at 0.1%, 1% and 5%. Appendix B presents the Pearson correlation between all possible pairs of variables including the control variables. The results show that the correlation among any pair of the three variables found significant in the following regression analysis - namely, MLC (Low-cost market), DR (% of Revenues from domestic market) and OPH (% of flights from hubs) - is low and insignificant.

Variance Inflation Factor (VIF) tests for multicollinearity among the independent variables in Equations 1,2&3 for all regression variables was carried out. Following Neter et al. (1983), who suggest that a VIF level below 10 indicates the absence of multicollinearity problems, the results of these tests indicate no multicollinearity problem in the regression analysis, none of the independent variables has a VIF value exceeding 3.6. The White- consistent standard errors was calculated by an SPSS Generalized Linear models using the robust covariance matrix with maximum likelihood estimation. The omnibus test was significant (Likelihood-ratio chi-square (df=7)=36.68, p<.01), indicating that the model as a whole predicted natural log of revenue better than the intercept-only model. These results are consistent with similar results obtained from ordinary OLS regression.

5. DISCUSSION

The empirical results substantiate our hypothesis: three out of four suggested strategy components directly affected airline revenues. Flights abroad and reduced dependence on flights from hubs are very highly significant (0.1% or less), while being active in the low-cost market (vis-à-vis the full service market), are also significant (5% or less) in increasing the operating revenue of the airlines (with R_{adj}^2 of .910). As expected, the fourth component – *generic competitive advantage* - did not have any direct affect on revenues; each choice, cost leader or differentiator, entails a designated variety of attributes - if the right fit is achieved, the airline displays better revenues (Kling and Smith 1995).

The importance of flights abroad to airline revenues is clearly recognized by the legacy airlines (MFS), income of those airlines are significantly negatively correlated ($-.807^{**}$) to the percent of domestic flights (DR). We also find that the average percent of revenues from flights abroad for all US airlines, perhaps as a result of deregulation and liberalization of international flights, increased from 2005 to 2009 by 21.6% (from 12.5% to 15.2%). Full service airlines have a lower percentage of local flights (they are negatively correlated with percentage of local flights). Part of this finding might result from the transfer of a portion of their national regional flights to regional connecting providers (there is a significant positive correlation between full service airlines and connection providers). On the other hand, there is a significant positive correlation between the percent of domestic flights to membership in an alliance or code-sharing agreement, as U.S. airlines provide local flights for foreign airlines; however, this activity may not offset the influence of using regional connecting airlines. Another possible reason for this result is that US airlines having code-sharing agreement are the largest airline in the sample, (except for Southwest Airlines, whose operating revenues is of the same magnitude, but is a low-cost carrier and has no international flights outside of the U.S.), and providing international flights offered them a venue from which they could grow and develop.

Some airlines still perceive their industry as a split between low-cost airlines, which essentially compete for cost advantages, and legacy carriers, competing on differentiation-based strategies. Other airlines perceive the industry as having two separate markets in which an airline may choose to be either a differentiator or cost leader. JetBlue for example, a low-cost airline, has adopted a differentiator strategy:

> "*JetBlue Airways exists to provide superior service in every aspect of our customer's air travel experience*" (http://www.jetblue.com/about/).

On the other hand, US Air, a full service airline chose to be a cost leader, as stated in their 10-K 2011 filing with the SEC:

> "*We have often elected to match discount or promotional fares initiated by other air carriers in certain markets in order to compete in those markets*".

Aer Lingus, as mentioned above, changed their strategy from that of cost leader in the full service market to differentiator in the low-cost market.

The result of our present research confirms the intuition that by choosing to operate in the low-cost market, the airline gets a significant positive impact on operating revenues, regardless of their Generic Competitive Advantage. As expected, the aircraft index is significantly negatively correlated to low-cost airlines, meaning that a low-cost airline uses less manufacturers/types of aircrafts.

Although the subject of alliances and code-sharing agreements which are substitute for direct globalization, has attracted the attention of academic research, this component, which was a control variable in the regression analysis (Equation 2 and 3), is not significant as regards its impact on airline revenues, as some of them had no agreements at all (e.g. AirTran, Southwest or Hawaiian), and others have regional connecting airlines (e.g. American, Continental, Delta, United) in addition to their alliance and code-sharing agreements.

The question of airline globalization, which is a decisive element in the future development of this industry, may be summed-up by the following quote:

> "*When it comes to globalization, the airline industry is wrapped in a paradox. For those who view the industry primarily from a passenger seat, the industry is one of the great drivers of globalization..... Yet, despite these truths, the industry itself remains remarkably local in its focus and approach—and has been so since its inception. Governments around the world, led by the United States, have been remarkably consistent in defending and supporting their nation's "loss leaders," often enduring tremendous financial burdens."* (Thomas, 2011).

6. CONCLUSION, LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

We argue that all four suggested components of airline strategy should be the construct of any airline strategy:

- *Markets* - Serving only the national market or also the international market.
- *Product* -Full service, low-cost, or regional
- *Operation* -Hub and Spoke system, or Point-to-point flights
- *Generic Competitive Advantage* – Cost leader or differentiator

The first three components were found to have a significant influence on the airlines' operating revenues. The last one, although – for reasons explained above –was not found to be significant, should also be included as part of any airline strategy. Generic Competitive Advantage is the cornerstone of any strategy (Porter, 1980) and is one of the optional strategy components. Again, an airline may succeed being either a cost leader or a differentiator.

The airline industry is facing diminishing profitability as stated in IATA press release (6.6.2011):

> *"The International Air Transport Association (IATA) further downgraded its 2011 airline industry profit forecast to $4 billion. This would be a 54% fall compared with the $8.6 billion profit forecast in March and a 78% drop compared with the $18 billion net profit (revised from $16 billion) recorded in 2010. On expected revenues of $598 billion, a $4 billion profit equates to a 0.7% margin"*;

Thus the future of the airline industry lies in lifting the present national restrictions on globalization and consolidation of the industry to a global oligopoly structure with a few global operators, a number of regional carriers, and low-cost carriers on high-density lines.

There are a number of limitations to our study, which might also provide direction for further research:

a) The research sample consists of U.S. airlines only, in order to eliminate the influence of different legal, regulatory and environmental issues, and the restrictions on global cross-ownership of airlines (Aharoni, 2003). This limitation suggests carrying out a more comprehensive study covering airlines from different countries.
b) The present study considered the airline industry as one market in which being a low-cost airline is an advantage. Further research should try to analyze the industry, distinguishing separately between the low-cost market and the full service market. The strategy components for these apparent two separate markets might be different.
c) Our research took into account the % income of passenger service out of the total income. Although fright revenue might have different strategy components while the optimum revenue and profit might come from the right mix of both services. This is one more suggestion for further research.
d) Another limitation of our research which might suggest further research might be that we did not make a distinction between passenger service classes – economy, business or first class. Some airlines like EOS, MaxJet, SilverJet or MGM Grand Air tried to operate as "business class only" airlines. They were grand experiments that just never took off. Two airlines - Singapore Airlines and British Airways operate some flights as "Business Class only". Other airlines like Lufthansa, KLM and Swiss -- contract with a company called PrivatAir to operate all-business-class service on several routes. BA owns OpenSkies doing the same. (Hobica 2011).

Beside the specific suggestions for further research, the dynamic global airline business is presenting a continuous stream of subjects for the academic and practitioners' research.

ACKNOWLEDGEMENTS

We thank Yuval Kalish from Tel Aviv University for insightful assistance in the statistical analysis. All remaining errors are of course ours.

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Appendix A: Data Characteristics

Airline	Total Revenue M$	Markets[1]	% of Hub flights	Air Craft Index	Generic Comp. Advantage[2]	Alliance membership[3]	Hub Dominanace[4]	Revenue Structure[5]	Connecting[6] airline
AirTran Airways	10,546	1	16.5	3.0	2	2	17.2	96.1	2
Atlantic South West	6,178	1	44.2	12.5	2	2	28.0	98.9	1
Frontier Airline	5,910	1	49.8	4.0	1	2	16.0	86.5	3
JetBlue Airways	13,586	2	29.3	6.0	2	1	27.8	93.2	3
Southwest airline	47,904	2	11.6	4.0	1	2	73.8	93.7	3
Alaska Airlines	14,406	2	37.4	7.8	2	2	34.2	83.5	3
American airlines	109,577	2	33.6	14.9	1	1	54.7	79.3	2
Continental airlines	65,522	2	47.8	11.7	2	1	38.6	73.2	2
Delta Air Line	91,710	2	37.1	18.1	2	1	40.0	67.8	2
United Airlines	93,283	2	34.0	11.7	2	1	22.8	72.8	2
US Airways	47,845	3	21.0	18.0	1	1	26.3	65.6	2
Hawaiian	5,085	3	46.8	3.0	2	2	33.3	89.9	3
SkyWest	9,257	3	22.3	12.5	2	2	54.2	98.9	1
Comair	5,837	1	29.2	6.6	2	2	48.3	NA	1
American Eagle	9,792	1	34.6	19.1	2	1	29.4	NA	1

[1]Markets 1=LC 2=LFS 3=Regional, [2] Generic Competitive Advantage 1=Cost leader 2=Differentiator, [3]Member of an alliance and/or code share agreements 1=yes 2=no, [4]Hub dominance % of flights in the hub out of total flights, [5]Revenue structure % of revenue from passengers out of total revenue, NA=not available, [6] Connecting airline 1=connecting carrier 2=connecting provider 3=none

Appendix B: Pearson Correlations Matrix among Variables

		MLC	MFC	A	AC	GCAD	DR	CC	CP	PR	HUB	AIRPORT
MLC	Pearson Correlation	1	-.564*	.262	-.659**	-.318	.433	-.364	-.185	.459	-.105	-.092
	Sig. (2-tailed)		.029	.346	.008	.248	.107	.183	.510	.115	.709	.743
	N	15	15	15	15	15	15	15	15	13	15	15
MFS	Pearson Correlation	-.564*	1	-.464	.328	-.040	-.807**	-.564*	.600*	-.815**	.198	-.055
	Sig. (2-tailed)	.029		.081	.233	.887	.000	.029	.018	.001	.479	.845
	N	15	15	15	15	15	15	15	15	13	15	15
A	Pearson Correlation	.262	-.464	1	-.665**	.040	.706**	.262	-.600*	.755**	.063	.111
	Sig. (2-tailed)	.346	.081		.007	.887	.003	.346	.018	.003	.824	.694
	N	15	15	15	15	15	15	15	15	13	15	15
AC	Pearson Correlation	-.659**	.328	-.665**	1	.021	-.486	.289	.401	-.643*	-.151	.057
	Sig. (2-tailed)	.008	.233	.007		.940	.066	.296	.138	.018	.591	.840
	N	15	15	15	15	15	15	15	15	13	15	15
GCAD	Pearson Correlation	-.318	-.040	.040	.021	1	.165	.364	-.123	.194	.326	-.262
	Sig. (2-tailed)	.248	.887	.887	.940		.557	.183	.662	.526	.236	.346
	N	15	15	15	15	15	15	15	15	13	15	15
DR	Pearson Correlation	.433	-.807**	.706**	-.486	.165	1	.477	-.805**	.842**	-.185	-.008
	Sig. (2-tailed)	.107	.000	.003	.066	.557		.072	.000	.000	.509	.979
	N	15	15	15	15	15	15	15	15	13	15	15
CC	Pearson Correlation	-.364	-.564*	.262	.289	.364	.477	1	-.492	.539	-.118	.155
	Sig. (2-tailed)	.183	.029	.346	.296	.183	.072		.062	.057	.675	.582
	N	15	15	15	15	15	15	15	15	13	15	15
CP	Pearson Correlation	-.185	.600*	-.600*	.401	-.123	-.805**	-.492	1	-.716**	.083	-.148
	Sig. (2-tailed)	.510	.018	.018	.138	.662	.000	.062		.006	.769	.598
	N	15	15	15	15	15	15	15	15	13	15	15

PR	Pearson Correlation	.459	-.815**	.755**	-.643*	.194	.842**	.539	-.716**	1	-.035	.128
	Sig. (2-tailed)	.115	.001	.003	.018	.526	.000	.057	.006		.910	.678
	N	13	13	13	13	13	13	13	13	13	13	13
HUB	Pearson Correlation	-.105	.198	.063	-.151	.326	-.185	-.118	.083	-.035	1	-.625*
	Sig. (2-tailed)	.709	.479	.824	.591	.236	.509	.675	.769	.910		.013
	N	15	15	15	15	15	15	15	15	13	15	15
AIRPORT	Pearson Correlation	-.092	-.055	.111	.057	-.262	-.008	.155	-.148	.128	-.625*	1
	Sig. (2-tailed)	.743	.845	.694	.840	.346	.979	.582	.598	.678	.013	
	N	15	15	15	15	15	15	15	15	13	15	15

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

INFLUENCE OF AIRLINES' ENVIRONMENTAL ACTIVITIES ON PASSENGERS

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ABSTRACT

This paper discusses the question whether passengers are fully aware of the efforts taken by airlines to protect the environment and if this knowledge in turn influences potential customers in choosing a certain airline. The topic is analysed by taking the case of Swiss International Air Lines (SWISS) passengers at Zurich Airport. It was found that these efforts are not apparent to passengers. However, passengers are interested in an airline's environmental responsibility. It was also found that the airline's action is appealing to customers. Nevertheless, price plays an important role for passengers when choosing an airline even in the case of it being more environmentally-aware. Furthermore, there is a relation between the environmental activities of an airline and the brand image. The brand of the airline is strengthened if it is engaged in environmental activities and communicates them efficiently to passengers.

Keywords: Customer value, airlines, environment, emissions, attitude, brand value

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1. INTRODUCTION

Climate change is one of the most serious problems the world faces today. The aviation industry has been in the spotlight for its contribution to global warming. Yet this has not brought the demand for air travel to a halt. The rising demand has been met by governments imposing regulations and international organizations issuing recommendations. Airlines have adapted to this eco-minded trend. Passengers are given the opportunity to offset their CO_2 emissions. Furthermore, airlines have engaged in corporate environmental responsibility to reduce their impact on global warming. This begs the question whether passengers are fully aware of the efforts taken by airlines to protect the environment and if this knowledge influences potential customers in choosing a certain airline.

This paper addresses the subject of customer perception and the impact of environmental activities by airlines on the airlines' image and the resulting value for air travellers. Furthermore, the research examines whether airline passengers accept the increase in price for environmental protection activities by airlines and whether airlines can even enhance their brand value by protecting the environment and communicating it.

Hence, the underlying research with Swiss International Air Lines travellers at Zurich Airport answers the following general research questions:

- Are airline customers attracted by measures taken by an airline for protecting the environment?
- Do measures of an airline for protecting the environment have a positive influence on the brand image of the airline?

2. LITERATURE REVIEW

2.1 Industry Measures for Protecting the Environment

In the past years airlines have improved the efficiency of their aircrafts and operations but the overall emissions of airlines have still been growing (IATA 2009). IATA (2009) has addressed this issue by coming up with a four pillar strategy consisting of measures taken in four areas (technology, infrastructure, operations, economy) which have been agreed on by all IATA members. The goal of these measures is to achieve carbon neutral growth by 2020. In order to measure the achievements, IATA has set three targets to be met (improving fuel efficiency by 25% by 2020, operating with 10% biofuel by 2017, reducing CO_2 emissions by

50% until 2050). From a technological perspective airlines can meet the targets by buying new and more efficient aircrafts with new engines and by using bio fuels. In the area of infrastructure and operations airlines can improve by flying direct routes, following economical flight procedures and reducing the weight of the aircrafts by optimizing the fuel weight and reduce other items carried. From an economic perspective there are market based instruments (Mankiw & Taylor, 2006) such as the Pigouvian tax and emission trading scheme (ETS). The ETS was introduced in the beginning of 2012 and as a result has generated total emission cost of, for example in the case of Lufthansa, of EUR 251.3 million and is expected to increase to EUR 345.1 million until the year 2020 (Vespermann & Wittmer, 2010). Furthermore, there are voluntary climate care contributions or higher fares which include climate care contributions. The economic measures (excluding the voluntary climate care contribution) have an impact on airlines' costs. This enters into the question of whether a value for passengers can be created for which they are willing to pay more.

2.2 Passengers' Environmental Sensitivity in an Economic Crisis

In the light of the economic crisis, one might not expect the issue of environmental protection to be a top priority. The economic crisis has shattered the confidence of many consumers in the economic systems. However, governments and the private sector are reflecting on their decisions taken in the past and deciding on the best way to approach the future challenges awaiting them. The public has taken great interest and concern in the matter as it has left no one untouched. Therefore society, in general, also seems to reflect on their values and moral standards and is speaking up. Voices have been raised and opinions have been stated on different ways to move forward. For instance, the automobile industry has slumped leaving the tax payers to bail out the industry in countries, such as the United States (US). Due to this fact, governments have requested more environmentally friendly cars (The Economist,19 May 2009) Hence climate change and which measures can be taken to protect the environment have been brought back to the table.

However, the willingness of passengers to pay for an environmentally-aware airline is doomed by the state of economy. Due to the current economic crisis the environmental sensitivity of passengers may be questioned. The Environmental Kuznets Curve (EKC) can be drawn on to explain to relation between the state of economy and the willingness of passengers to make a contribution to the environment. This curve derives from the Kuznets Curves (1955) which describes the "distributional inequality to per capita income" (Vogel, 1999). The EKC is an "inverted-U-shape curve" which depicts the correlation of per capita income and environmental pollution (Bretschger & Pittel, 2007, Dinda, 2004). Kuznets (1955) argues that at the beginning a small economy has a minimal impact on the environment. As the economy prospers, so does the impact on the environment. However, this may not mean that the economy is affluent enough to tackle the environmental problems and basic needs may come first. As the income per capita grows further, the environmental impact decreases. The reduction can be put down to stricter governmental regulations, newer and more sustainable technologies, but also more information and awareness from the population in general (Bretschger & Pittel, 2007, Dinda, 2004).

Narrowing the theory down to the individual traveller in the current economic crisis protecting the environment may not come first on the list of priorities. Although Switzerland and the surrounding European nations are counted among the advanced economies the current state of economy has shifted the desires of individuals back to more basic needs. This piece of information will also be taken into consideration when analysing the findings of the empirical contribution of this paper.

2.3 Customers' Attraction and Brand Image via Corporate Environmental Responsibility (CER)

CER builds on the corporate identity (CI) of a company which is the company's self-perception whereas the corporate image is how the outside perceives the firm (Birkigt & Stadler, 2002). CER is a "long-term action which makes the environment a core element of corporate strategy" (Esty & Winston, 2006). The communication of CER must be visible and comprehensible for the customer if the image of the company should be influenced by CER. Therefore an airline must provide its potential passengers with sufficient visible and accessible information. In doing so, customers may see the airline's CER as attractive and it may influence their buying behaviour. Environmental activities by an airline can then become an influential factor when passengers evaluate their options in a flight ticket buying process (Anholt, 2007, Kreuzpaintner, 2003, Morgan & Pritchard, 2000). In the long term the information about environmental care activities by an airline can positively influence the brand image which further attracts customers and increases the financial performance (Klassen & McLaughlin 1996).

Piñeiro et al. (2006) define customer attraction "as the company's ability to retain customers through interesting products, attractive brands, a strong reputation, customer service and/or particular corporate activities" (p. 136). Therefore they make reference to brand value and reputation. As part of the decision-making process motivation is the trigger to contemplate a purchase whereas consumer value is the evaluation of the purchase decision taken. "[...] [Motivation] occurs when a need is aroused that the consumer wishes to satisfy" (Solomon, 2007, p. 118). Therefore in the case of air travel, motivation could be a holiday or business trip leading the passenger to book a flight. Consumer value, on the other hand, is the net benefit in his or her eye between having the flight ticket and what he or she had to give up to purchase it, such as time or money (Bieger, et al. 2007). Furthermore, Brodie et al. (2009) point out that consumer value in the case of a service, such as air travel, is shaped by the person's brand and company image, and, on the other hand, his or her trust in the employees and the company. Consequently, the brand personality of an airline may have an influence on the consumer's perception and thus on his or her decision-making process. Additionally, as air travel is a service, the way in which the employees perceive their airline and thus bring the brand message across can also play a role in persuading a person to choose their airline.

Furthermore, it is a fact that airline passengers are highly price sensitive (Gebel, 2004; Bieger et al. 2007). For instance, even though environmental consciousness is held high in many countries only a small number of travellers make a climate care contribution when flying (Läubli, 2009). Wagner (2003) argues "that attitudes or concern can only be considered a reliable variable for the prediction and explanation of behaviour if attitudes are issue specific". Thus climate change may generally concern passengers but as this attitude is not issue-specific towards 'environmentally friendly transportation' it does not influence their consumer behaviour in this case (Wagner, 2003). On the other hand, a study on environmental issues and marketing activities found that people who express greater conviction in their feelings regarding environmentally responsible behaviours such as recycling show greater consistency between attitudes and behavioural intentions (Solomon, 2007, Esty & Winston, 2006).

PricewaterHouseCoopers (PwC) support that a company's brand has increased in significance. According to a survey conducted in 2005 by PwC a company's brand value can account to nearly half of a firm's actual value. Furthermore, it was stated that a company's success is highly dependent of its brand value (PwC, 2006). "Reputation can be regarded as reflecting intangible organizational capital, which is founded on, and mediated by the concept of trust respect and social capital" (Aula & Mantere, 2008). Therefore, a company's reputation plays a vital role in making a company's brand identity consistent with the brand image the consumers hold. Companies thus place more importance on retaining a good reputation. The reputation cannot be controlled by a company alone but is shaped in the interaction with the public. Therefore communication is a vital tool for a company to build up a good reputation. In this sense branding has gained in importance over the past years. There has been a change of mind in the way products are approached – from a world where actual things matter to world where the brand matters (Kreuzpaintner, 2003).

To conclude, brand image is an essential value driver for airlines to retain customers and adding value to their company. For an environmentally responsible airline reputation is vital to turn its brand image into an actual operational environmental value driver.

3. EMPIRICAL CONTRIBUTION

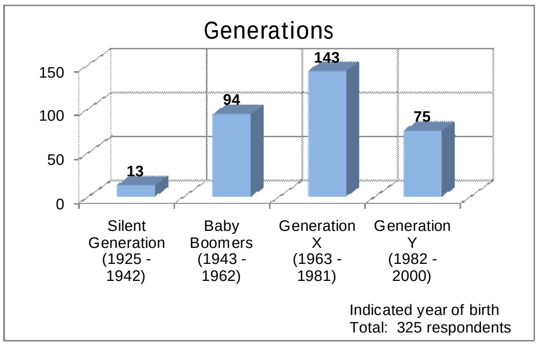
Literature research has outlined measures and opportunities the airline industry has at hand to face environmental challenges by reducing its impact and by strengthening its image. The primary data collection, in a first step, involved gaining a deeper insight into how marketing experts from different airlines see the matter of customer attractiveness in connection with an airline's CER. A questionnaire (Appendix 1) was laid out with eight open questions concerning the main issues addressed in the literature review.

In a second step, the gained information was drawn in order to establish a questionnaire for airline passengers (Appendix 2), thereby also approaching the problem from the consumer's perspective. The gained knowledge from the expert interviews and the literature was used to find evaluation factors to include in the passengers survey from a practical and academic perspective. The passenger survey was carried out at Zurich Airport in April 2009 with passengers waiting at the gate to board a SWISS flight. A total of 327 passengers participated in the survey. As 13.47 million passengers fly with SWISS every year the sample size is not representative in its size. Nevertheless, the data analysis and findings are intended to give an impression of the general view passengers may hold on the measures an airline takes to protect the environment.

The data has been analysed in a first step by looking at Frequencies to provide an overview of the sample.

Figure 1: Demographic Information of the Participants

Year of birth	From 1929 to 2000	
Gender	Female:	48%
	Male:	52%
Country of residence	Switzerland:	36%
	Germany:	13%
	UK:	18%
	US:	5%



The demographic information shows, that passengers of all ages, both genders, and different countries participated in the survey. To give an impression of the age pattern of the participants they were put into categories of generations.

Table 1: Air Travel Behaviour of Respondents

Number of flights per year	Min. once per week Min. once per month Min. once every half year Min. once per year Less than once per year	2% 24% 40% 21% 13%
Class	Business Economy	8% 92%
Reason of air travel	Business Personal	28% 72%

The overview of the participants' air travel behaviour shows that most passengers who took part in the survey fly more than once a year and more often for personal reasons in Economy Class. The ratio between Business Class and Economy Class in the passenger survey results in 8 % Business and 92 % Economy Class. A reason why the number of business travellers is low could be the fact that the survey was conducted at the gate and many Business Class passengers stayed at the business lounge right until boarding started. Of the 27 passengers flying business class 17 flew for a personal reason and 10 for business reason.

To answer the questions whether a customer perceives an airline as environmentally-aware, and whether this is also a factor of motivation to choose this airline a cognitive approach was taken. “Cognitive refers to understanding and learning. It addresses the question of how understanding occurs, and how in turn understanding affects behaviour” (Wagner, 2003).

Therefore, in the given case, the cognitive approach helps to determine which attributes of an environmentally-aware airline passengers are aware of and understand. Furthermore, it also examines whether, by knowing and understanding that an airline is environmentally aware, a passenger's consumer behaviour is influenced. A possible cognitive approach to evaluate this is through the Fishbein Model. This model examines the relation between the beliefs and expectations towards a specific object. The main equation of the Fishbein Model is stated below (Fishbein & Ajzen, 1975):

$$A_o = \sum_{i=1}^{n} b_i e_i$$

A_o = "attitude towards a specific object"

i = "attribute"

n = "number of beliefs"

b_i = "belief i about this specific object o "

e_i = "evaluation of attribute i " (Fishbein & Ajzen, 1975, p. 29)

The Fishbein Model analyses the attitude towards a specific object by multiplying the number of beliefs a person holds on a specific object times the persons evaluation of the attributes. It belongs to the group of expectancy-value models which are based on the belief that an individual's attitude towards a given object depends on the value attached to attributes of the object or its consequences, each weighted by the subjective probability that the object is associated with these attributes or consequences (Kruglanski & Stroebe, 2005). Hence, it looks at the subjective belief and attitude of each passenger towards this specific effort and by this will be able to shed light on how visible the environmental efforts are for the passengers and how appealing they are for him or her. Furthermore, it addresses the difference between issue-specific attitudes and general attitudes. Attitudes can be general or specific. In the case of this research it is the latter. A specific attitude is defined as a learned association in memory between an object and a positive or negative evaluation of that object, and attitude strength is equivalent to the strength of this association (Ajzen & Fishbein, 2005). Therefore a passenger's attitude towards an environmentally-aware airline is shaped by knowledge he has gained about this object over the past.

In addition, it should also be noted that how environmentally-aware an airline is perceived by passengers is based on emotional factors. For this reason, the cognitive approach of the Fishbein Model was seen as the most suitable option to analyse the passengers' belief and attitude towards how environmentally-friendly an airline is. The correlation coefficient, as the most straight forward way to make an analysis, on the other hand, will only be calculated between questions in which passengers could answer on the same scale but always with an eye on the overall picture by drawing up a cross-tabulation diagram. As only weak correlation could be drawn out of the analysis of the questionnaire the Fishbein Model in turn also supported or disconfirmed certain statements.

4. ANALYSIS AND FINDINGS

To draw a picture of how attractive an environmentally responsible airline really is for potential customers, four attributes were examined. Questions 4 to 11 (see Appendix 2) in the passenger survey where drawn up according to the Fishbein Model. The questions cover four attributes of the measures taken by an airline in general to protect the environment: Environmental protection, the possibility to make climate care contribution, modern fleet, efforts made to reduce noise emission. Therefore the four attributes make reference to IATA's four pillar strategy looking at the airline's strategy, technology, operations, and economic measures. Even though aircraft noise does not fit specifically into any of these four measures it was added as SWISS makes a strong effort in reducing noise emission. Two questions form a unit: One question concerning the belief of the passenger towards the attribute and the following question determining how appealing this attribute is for the passenger. The passenger can choose between answering with 'yes' or 'no' in the first case and 'very much' or 'not at all' in the latter, on a scale from +3 (being the best score) to -3 (being the worst score).

Table 2: Equations of Attribute Scores

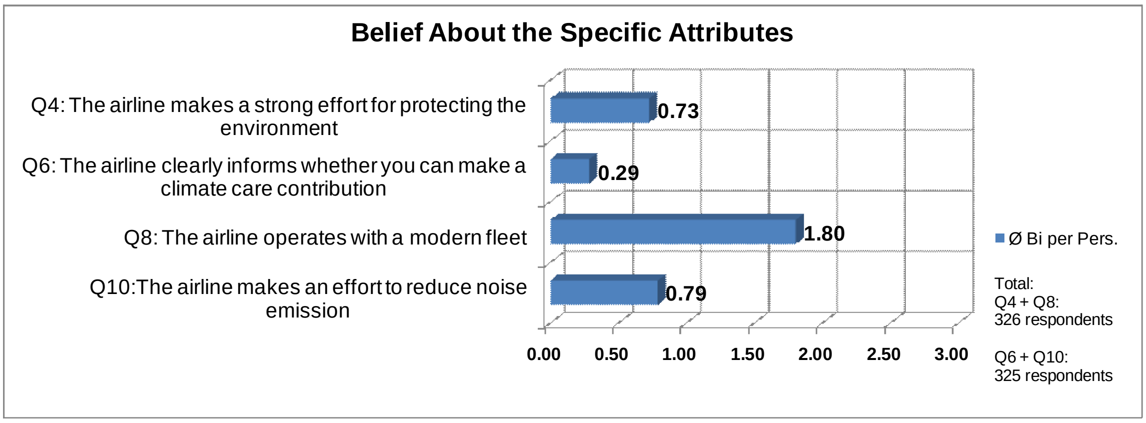
Attributes of environmentally-aware airline	**Belief about specific attribute**		**Evaluation of attribute**		**Attitude score**	
	Bi	Ø Bi per Pers	Ei	Ø Ei per Pers	Bi x Ei	Ø Bi x Ei per Pers.
Protecting the environment	236.00	0.73	595.00	1.83	140'420.00	1.33
Giving opportunity to make a climate care contribution	93.00	0.29	268.00	0.82	24'924.00	0.23
Operating with a modern fleet	586.00	1.80	731.00	2.25	428'366.00	4.06
Making an effort to reduce noise emission	257.00	0.79	631.00	1.94	162'167.00	1.53
SUM	1'172.00	3.60	2'225.00	6.84	755'877.00	**7.15**

The beliefs about the four specific attributes (questions 4, 6, 8, 10 in the questionnaire in appendix 2) were determined by calculating the mean of them (=Ø B_i per Pers.). For the same attributes (questions 5, 7, 9, 11 in the questionnaire in Appendix 2) it was determined whether they are appealing for passengers by calculating the mean (=Ø E_i per Pers.). The attitude score, determining the passengers' attitudes towards environmental management specifically, was then calculated by multiplying B_i with E_i. As the passenger could answer questions on a scale from -3 to +3 the attitude score could achieve on average a maximum of +9 points and a minimum of -9. The sum of all mean for all four attributes could therefore range from a maximum of +36 and a minimum of -36. In the following the mean belief score (=Ø B_i per Pers.), the mean evaluation score (=Ø E_i per Pers.), and the mean attitude score (=Ø B_i x E_i per Pers.) will be looked at in detail. As seen in table 2, the respondents evaluated the four attributes overall positively. None of the four attributes was granted the maximum of +3 points. However, three out of four attributes have achieved a particularly high mean score. In the following the mean scores of the four different attributes will be elaborated on in detail.

4.1 Belief Scores

The belief scores show whether passengers believe that SWISS makes an effort to protect the environment. As figure 2 illustrates overall the participants of the survey acknowledged the fact that the airline has taken some measure to protect the environment.

Figure 2: Belief about SWISS' Environmental Awareness by Passengers

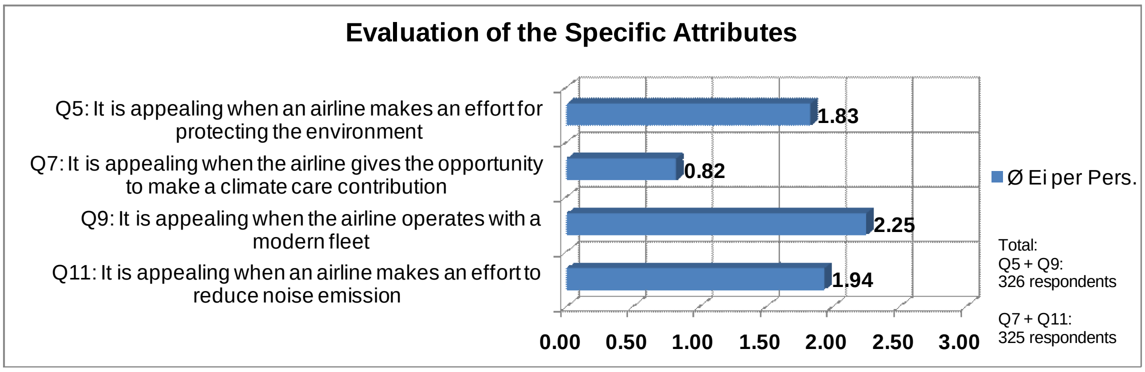


The majority of participants in the survey knew (and believed) that SWISS operates with a modern fleet. The mean of this attribute is, with 1.80 points, the highest of all four. As the standard deviation is 1.06 this result can be evaluated as overall positive, since the majority of all passengers answered this question with a positive score. This positive result may partly be put down to the fact that SWISS' new A330-300 took off for the first time during the data collection period. This event received wide media coverage. The PR approach of SWISS in this matter might have had an influence on this attribute's evaluation. Furthermore, passengers might associate a modern fleet with higher quality and safety standards in the first place. The other three attributes were all granted lower scores on average. As the standard deviation in all three cases is high the low mean may be put down to a high number of passengers answering these questions with a negative score or with 0 points.

4.2 Evaluation Scores (Appealing)

The evaluation whether attributes are appealing or not shows if specific environmental protection activities by SWISS appeal to its passengers. Figure 3 illustrates that overall the measures of the airline are appealing to the respondents. Firstly, an airline operating with a modern fleet was evaluated the most positively. The mean score of 2.25 points implies that passengers find an airline that operates with a modern fleet very appealing. A modern fleet also may be perceived as safe and providing a high quality standard. Thus this specific attribute does not only benefit the environment but also the passengers. This may have had an influence on how passengers valued their answer to this attribute.

Figure 3: Evaluation of Environmental Measurements by SWISS Passengers



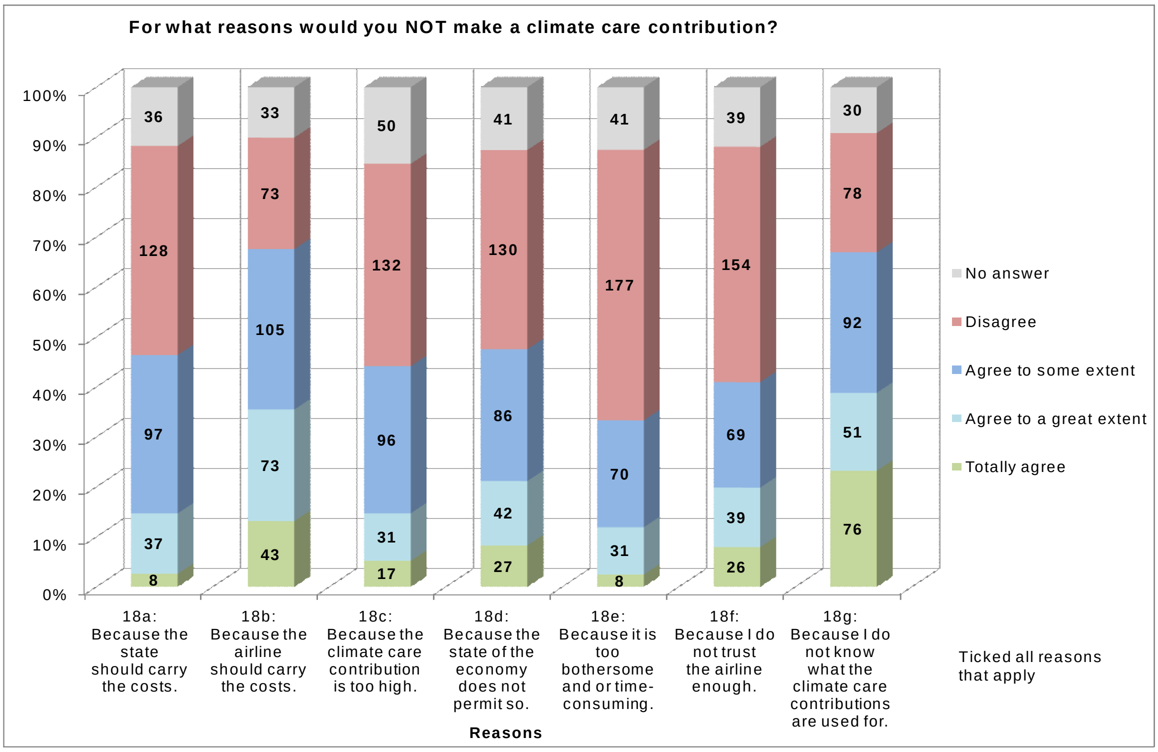
Secondly, the appeal of an airline's efforts to reduce noise emission has been rated with a mean of 1.94 points. Therefore, the participants of the survey found efforts to reduce noise emission important, however, not as important as an airline that operates with a modern fleet. In addition, no clear difference in the evaluation of noise emission reduction efforts could be assessed between people living near to Zurich airport and people living further away (including the ones from other countries then Switzerland). Focusing only on the evaluation of this attribute by Swiss participants it can be said that most granted this attribute with 2 to 3 points. However, when looking at the mean value of Swiss participants it is slightly lower (1.86) than the mean value of all participants of the survey (1.94). Interestingly, the Swiss participants found this specific attribute somewhat less appealing than all participants on average. This begs the question whether the Swiss participants are less bothered about noise emissions or if the noise reduction efforts at Zurich Airport are so effective that this attribute is perceived as part of a standard which is unquestionably expected.

Thirdly, the efforts of an airline for protecting the environment received a mean score of 1.83 points. Even though this attribute has not achieved the highest mean value it is seen as appealing by a majority of the respondents. Of 325 passengers evaluating this attribute only 18 rated it with a negative score and 23 with 0. Thus, an airline's CER is appealing to air travellers.

Fourthly, an airline giving its passengers the opportunity to make a climate care contribution was the attribute which achieved the lowest mean score, with 0.82 points. Whether an airline giving their passengers the possibility to offset their CO_2 emission should be seen as appealing or not was met with mixed answers. The wide-ranging attitudes towards this attribute can be noted in the high standard deviation of 1.70. The wide spread of the answers may be due to the fact that, as opposed to the other three attributes, making a climate care contribution requires for the passenger to take on a proactive role. Aula and Mantere (2008) argue that airlines giving their passengers the possibility to offset their CO_2 emissions are outsourcing their reputation. Or in other words, it is a burden off the airlines shoulders to establish a good reputation - and one for the passengers to take on. Nonetheless, as the positive answers of 201 passengers outweigh the 125 which weighted this attribute with 0 or a negative score it may still be seen appealing for passengers.

The proactive role of passengers in protecting the environment was analysed in seven given reasons (Figure 4), where passengers could decide whether they 'totally agree', 'agree to a great extent', 'agree to some extent' or 'disagree'. It is illustrated that 142 passengers agree at least to some extent that the state should carry the cost. The ratio of those passengers who agree to some extent or another that the state should carry the cost and those who disagree on this point is 142 to 128. This pattern of answering is repeated in the reason that the airline should carry the costs. A total of 221 passengers agree at least to some extent, outnumbering the 73 passengers that disagree on this point. The correlation coefficient (appendix 3) of the two reasons is 0.380. Therefore this indicates that there is a tendency of passengers believing that either the state or the airline should carry the cost of their CO_2 emissions – but not they themselves. Furthermore, answers make it evident that price matters. 144 participants of the survey agree at least to some extent that the climate care contribution is too high and 155 passengers are not willing to offset their CO_2emissions because the current state of the economy does not permit them to do so. The correlation coefficient (Appendix 3) of these two reasons is 0.440. Therefore, once again pointing out that price presents a sticking point for passengers to take up a proactive role in protecting the environment.

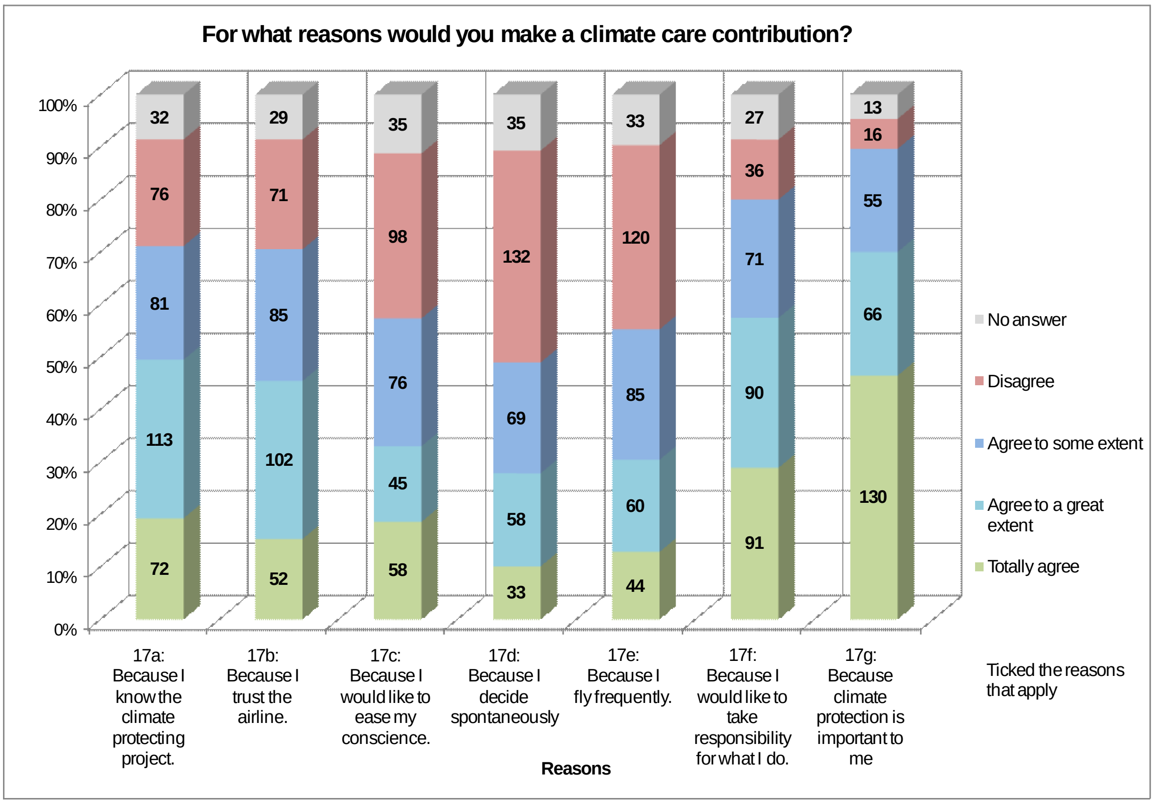
Figure 4: Reasons for Not Making a Climate Care Contribution



Information combined with trust is a further issue worth mentioning. Passengers agree that they do not make a climate care contribution because of the lack of information on the subject. There is a weak correlation (Appendix 3) of 0.385 among passengers that do not make a climate contribution because they do not trust the airline and others. This may imply a tendency of passengers believing that if they do not know for what their climate care contribution is used for, they do not want to trust the airline with their contribution. In studying the result one should bear in mind that of the total 327 respondents only 12 had made a climate care contribution for their flight. Therefore, reasons given in this question illustrate which measures may be needed to be taken for passengers to make a climate care contribution in the future.

As figure 5 illustrates, the importance passengers put into environmental protection is high. 130 passengers ‘totally agree’ that climate protection is important to them and another 91 passengers 'totally agree' that they would like to take responsibility. Most passengers agree to some extent or another with these reasons. Only 16 do not agree that climate protection is important for them and 36 passengers do not want to take responsibility. The correlation (Appendix 3) between these two reasons, 17f and 17g, is 0.467, thereby indicating that high number of the respondents feel climate protection to be important to them and would thus like to take responsibility. At this stage, one might ask why passengers therefore have not offset their CO_2 emissions for the present flight. The answer to this question may be found in the pattern of answers to reasons 17a and 17b. 266 passengers agree at least to some extent that they would make a climate care contribution because they know the climate protecting project. Or more precisely put, in context with the answers to the other questions: 266 passengers would offset their CO_2 emissions if they knew what they would contribute to. Furthermore, 239 passengers agree at least to some extent that they would make a climate care contribution if they trust the airline. Thereby, once again, the importance of trustworthiness in connection with environmental management is brought up. There is a weak correlation (appendix 3) between the reasons 17a and 17b of 0.307. Thus there was a weak tendency of passengers answering in the same way to these two reasons.

Figure 5: Reasons for Making a Climate Care Contribution

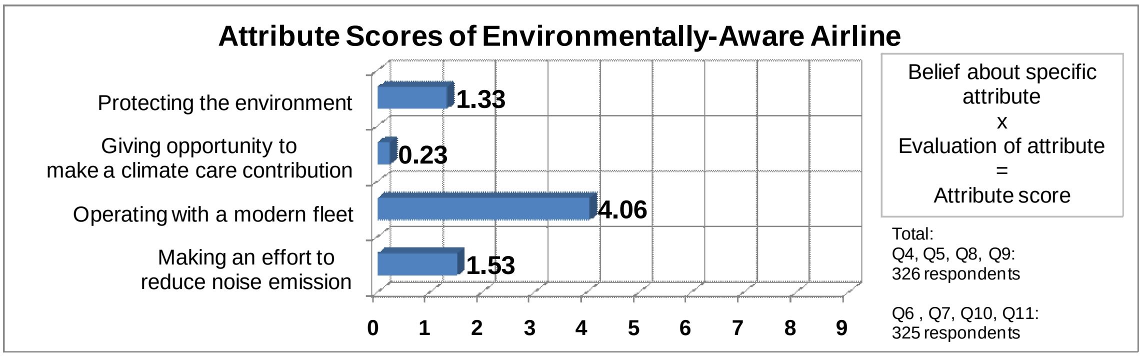


Although passengers do not take a proactive role in protecting the environment at present there is a genuine interest in the topic. Price and the lack of perceived credible information seem to be the main issues for passengers not taking a more proactive role in protecting the environment.

4.3 Passengers' Attitude towards Environmental Protection

The following attribute scores will shed light on passengers' attitudes towards SWISS' environmental management.

Figure 6: Attitude of Passengers towards an Environmentally-Aware Airline



The attribute scores could range from -9 to +9. Yet as Figure 6 illustrates, all four attribute scores are positive. Thus the overall attitude towards the airlines' environmental management is a positive one. Most positively, the attitude towards operating with a modern fleet must be noted. The high attribute score of 4.06 points can be put down to both the very positive evaluation and belief of this attribute. The attitude towards the other three attributes, however, have all lost ground compared to their evaluation about whether they are appealing or not. Why passengers look upon these attributes less favourably than when evaluated generally is due to the fact that their beliefs are lower. The level of commitment on the airline's part to the four attributes which passengers would find appealing is higher than what they believe is undertaken in these fields by the airline. Thus, the effect of the passengers' relatively low awareness about the airline's measurements to protect the environment becomes evident.

4.4 Impact on Brand Image

There are passengers who are attracted by an environmentally-aware airline and will also expect to be so in the future therefore supporting the concept of an airline engaging in CER. Whether environmental protection activities have an impact on the brand image is dealt with by Esty and Winston (2006) who point out that a brand may be enhanced through CER if it is perceived as truthful. Other terms in the selection which could, in any case, imply truthfulness where: authentic, competent, integrity, sincere, and trustworthy. These terms could indicate potential for an airline to be perceived as environmentally-aware in the passenger's perspective. Yet only a small number of 47 passengers brought the term trustworthy in connection with the airline. Moreover, further terms on which a true environmental-friendly brand could be built on: competent, sincere, authentic, and integrity, were thought of by 63, 11, 7, and 5 passengers, respectively. Strong terms, on the other hand, where punctuality (92), security (112), clean (105), and friendly (106). These terms rather imply that service quality is most important. Furthermore, quality was ticked 86 times which supports this analysis. Research has shown that an airline's service quality is strongly correlated with its brand image (Brodie, et al., 2009), which supports the finding of SWISS having a strong brand identity.

The question raised is whether passengers' attitude towards SWISS' brand identity has an influence on them taking on a proactive role in protecting the environment. In their study on the influence of attitudes on behaviour Ajzen and Fishbein (2005) established that general attitudes fail to determine a specific behaviour. However, Wagner (2003) expects that "strong motivations regarding environmental issues can provoke issue specific, environmentally orientated behaviour". In essence, the airline's brand identity fits with the brand image passengers hold of the airline. However, there is a shortcoming of trustworthiness which is important to build an environmentally friendly brand on. Hence terms may have been chosen which are more visible and imply a clear functional value for the customer when flying. This begs the questions whether an airline engaging in CER is indeed attractive for potential customers or if it is of no relevance what so ever.

5. CONCLUSIONS

This research has elaborated on the concept of airlines engaging in CER to reduce their impact on global warming. The findings of the survey showed that passengers are not fully aware of efforts taken by airlines to protect the environment. The airline is an important source of information on the topic of aviation and the environment. Measures an airline takes for protecting the environment are appealing for passengers, who show interest in an airline's environmental responsibility. Putting the findings into perspective, the activities SWISS takes for protecting the environment are not apparent for passengers but they are generally seen as appealing. However, potential passengers may not be swayed to choose a more environmentally responsible airline when price gets in their way. Yet, an airline's efforts to protect the environment may, nevertheless, have a positive influence on their consumer behaviour. Furthermore, there is a relation between a strong brand and the perceived CER of an airline.

Therefore, customers' awareness of an airline's corporate environmental responsibility will indeed be influenced by measures an airline takes for protecting the environment, but with reservations. Firstly, awareness alone will not suffice to attract a customer. Rather, the level of knowledge needs to be raised. Secondly, the price of air travel seems to be ranked higher than the environmental responsibility of an airline.

To conclude, the airline industry faces a broad set of challenges. Yet it is using its best endeavours in leading the industry into a more sustainable future. However, the general notion of society still seems to be that eco-mindedness is not the industry's strong suit. There is a shift in society's way of thinking about environmentally responsible companies though. However, in order to fill the void between what passengers believe an airline does to protect the environment and what level they would find appealing, the industry as a whole needs to attend to the problem.

ACKNOWLEDGEMENTS

This paper was written on the basis of data which were collected at Zurich airport and supported by Swiss International Airlines, myclimate and Zurich Airport.

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APPENDICES

A1. QUALITATIVE EXPERT SURVEY QUESTIONS

1. With which five expressions would you describe your airline's brand?
2. How is the aspect of sustainability embedded in your airline's corporate strategy?
3. Which measurements for protecting the environment are the most visible for your potential passengers (e. g. environmental projects, sponsorship, awards)?
4. Which measurements for protecting the environment are, in your point of view, the most effective to enhance the brand value of your airline?
5. Are cut backs made in investments to protect the environment due to the current economic situation?
6. Have trends in corporate environmental management influenced your airline's competitiveness?
7. Why does your airline mainly take measurements to protect the environment: to attract more potential customers, to enhance your airline's brand identity or to safe costs?
8. Many of the major airlines have an environmental management system. Where would you see the significant differences between your airline and other major airlines?

A2. QUANTITATIVE AIRLINE PASSENGER SURVEY

Dear Passenger,

Thank you for participating in this survey. There will be no advertising nor will anything be sold in this questionnaire. The data collected will be used purely for scientific purposes in the context of a Bachelor Thesis. The questionnaire is anonymous and all information will be treated as confidential. It will take at most 10 minutes to complete this questionnaire. Please answer all the questions.

The term "your airline" refers to the airline you are about to fly with.

Questions Concerning the Perception of an Airline in General

1. Which airline are you flying with today?

   ……………………………………………………………………………………………

2. Which terms do you think of in connection with "your airline"?
   (3 ticks at most possible)

❑ Authentic
❑ Clean
❑ Competent
❑ Efficient
❑ Environmentally-aware
❑ Friendly
❑ Inexpensive
❑ Integrity
❑ Punctual
❑ Quality
❑ Sincere
❑ Security
❑ Service
❑ Team-orientated
❑ Trustworthy

Questions Concerning the Measurements Taken by an Airline in General to Protect the Environment

3. Do you believe an airline which takes measurements to protect the environment will influence your consumer behavior in the future?

❑ Strongly agree ❑ Agree to a great extent ❑ Agree to some extent ❑ Disagree

❑ Do not know

		+3	+2	+1	0	-1	-2	-3	
4. Do you believe that "your airline" makes a special effort to protect the environment?	Yes	❑	❑	❑	❑	❑	❑	❑	No
5. How appealing is it to you when an airline makes an effort to protect the environment?	Very much	❑	❑	❑	❑	❑	❑	❑	Not at all

		+3	+2	+1	0	-1	-2	-3	
6. Do you believe that "your airline" clearly informs whether you can make a climate care contribution?	Yes	❑	❑	❑	❑	❑	❑	❑	No
7. How appealing is it to you when an airline gives you the opportunity to make a climate care contribution?	Very much	❑	❑	❑	❑	❑	❑	❑	Not at all

		+3	+2	+1	0	-1	-2	-3	
8. Do you believe that "your airline" operates with a modern fleet?	Yes	❑	❑	❑	❑	❑	❑	❑	No
9. How appealing is it to you when an airline operates with a modern fleet?	Very much	❑	❑	❑	❑	❑	❑	❑	Not at all

		+3	+2	+1	0	-1	-2	-3	
10. Do you believe that "your airline" makes a strong effort to reduce noise emission?	Yes	❑	❑	❑	❑	❑	❑	❑	No
11. How appealing is it to you when an airline makes an effort to reduce noise emission?	Very much	❑	❑	❑	❑	❑	❑	❑	Not at all

Questions Concerning the Climate Protection of an Airline

12. Which of the listed airlines, do you believe, gives its passengers the possibility to support a climate protecting project?

	Yes	No	Do not know
Air Berlin	❑	❑	❑
Air France / KLM	❑	❑	❑
British Airways	❑	❑	❑
Continental Air Lines	❑	❑	❑
Easy Jet	❑	❑	❑
Emirates	❑	❑	❑
Lufthansa	❑	❑	❑
Swiss	❑	❑	❑
Singapore Airlines	❑	❑	❑

13. Please indicate where you got to know of these climate protecting project(s). (Tick all that apply, if no answer then continue with the next question)

❑ Airline Website	❑ News	❑ Radio
❑ Friends	❑ Online Travel Agency	❑ Travel Agency

❑ Magazine ❑ Newspaper ❑ TV
❑ Other:
………...

14. Did you make a climate care contribution for this flight?

❑ Yes
❑ No
Continue with question 16
❑ Do not know
Continue with question 16

15. If yes, how did you find the price for the climate care contribution?

❑ Too high ❑ Too low ❑ Reasonable

16. What do you believe are climate care contributions used for?
(Tick all that apply, if no answer then continue with the next question)

❑ All or a part of the contributions will be invested in climate protecting projects.
❑ The airline uses the contributions for emission reduction measurements of their fleet.
❑ An environmental organization invests the contributions according to how they see suitable.
❑ Other:...………………………………………………………………………………………………

17. For which reasons would you make a climate care contribution?

	Totally agree	Agree to a great extent	Agree to some extent	Disagree
Because I know the climate protecting project.	❑	❑	❑	❑
Because I trust the airline.	❑	❑	❑	❑
Because I would like to ease my conscience.	❑	❑	❑	❑
Because I decide spontaneously.	❑	❑	❑	❑
Because I fly frequently.	❑	❑	❑	❑
Because I would like to take responsibility for what I do.	❑	❑	❑	❑
Because climate protection is important to me.	❑	❑	❑	❑
Other:………………………………………………………...	❑	❑	❑	❑

18. For which reasons would you NOT make a climate care contribution?

	Totally agree	Agree to a great extent	Agree to some extent	Disagree
Because the state should carry the costs.	❑	❑	❑	❑
Because the airline should carry the costs.	❑	❑	❑	❑
Because the climate care contribution is too high.	❑	❑	❑	❑

Because the state of the economy does not permit so.	❑	❑	❑	❑
Because it is too bothersome and / or time-consuming.	❑	❑	❑	❑
Because I do not trust the airline enough.	❑	❑	❑	❑
Because I do not know what the climate care contributions are used for.	❑	❑	❑	❑
Other:……………………………………………………..	❑	❑	❑	❑

Demographic Questions

19. How often do you fly on average per year? A return flight counts as one flight.

❑ Min. once per week ❑ Min. once every half year ❑ Less than once per year
❑ Min. once per month ❑ Min. once per year

20. Do you often (= ca. ¾ of all flights) fly with the same airline?

❑ Yes ❑ No

21. Please specify the flight distance of your flight today.

❑ Short-haul flight (Within Europe) ❑ Long-haul flight (Intercontinental)

22. Is your flight a transfer flight?

❑ Yes ❑ No

23. What is the reason for your air travel?

❑ Business ❑ Personal

24. Which class will you be flying today?

❑ Economy ❑ Business ❑ First Class

25. In which country and in which town / village is your current place of residence?

Country:……………………………………………………………………………………..
Town / Village:…………………………………………………………………………..

26. Please indicate your gender by ticking the correct box.

❑ Male ❑ Female

27. Please write down your year of birth.

………………………………

Thank you for taking time to answer this questionnaire. Have a safe flight!

A3. CORRELATIONS

Correlations																	
		Q3	Q17a	Q17b	Q17c	Q17d	Q17e	Q17f	Q17g	Q18a	Q18b	Q18c	Q18d	Q18e	Q18f	Q18g	Q5
Q3	Pearson Correlation	1	-.005	.103	.158**	-.042	.127*	.283**	.255**	-.050	-.035	-.178**	-.058	-.150**	-.059	-.124*	.387**
	Sig. (2-tailed)		.926	.064	.004	.448	.022	.000	.000	.364	.523	.001	.293	.007	.289	.026	.000
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17a	Pearson Correlation	-.005	1	.307**	.215**	.208**	.088	.215**	.212**	-.025	.093	.182**	.079	.109*	.143**	.112*	.085
	Sig. (2-tailed)	.926		.000	.000	.000	.114	.000	.000	.651	.095	.001	.153	.049	.010	.042	.125
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17b	Pearson Correlation	.103	.307**	1	.257**	.240**	.185**	.262**	.259**	.043	.023	.135*	.066	.126*	-.053	-.133*	.210**
	Sig. (2-tailed)	.064	.000		.000	.000	.001	.000	.000	.434	.682	.014	.235	.022	.339	.016	.000
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17c	Pearson Correlation	.158**	.215**	.257**	1	.238**	.190**	.394**	.270**	.087	.128*	.094	.141*	.135*	.166**	.047	.245**
	Sig. (2-tailed)	.004	.000	.000		.000	.001	.000	.000	.117	.020	.090	.011	.015	.003	.393	.000
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17d	Pearson Correlation	-.042	.208**	.240**	.238**	1	.183**	.121*	.115*	.123*	.092	.110*	.068	.209**	.106	.107	.043
	Sig. (2-tailed)	.448	.000	.000	.000		.001	.028	.037	.026	.096	.047	.219	.000	.056	.053	.436
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17e	Pearson Correlation	.127*	.088	.185**	.190**	.183**	1	.219**	.021	.060	.035	.134*	.119*	.123*	.103	-.080	.119*
	Sig. (2-tailed)	.022	.114	.001	.001	.001		.000	.711	.278	.533	.016	.032	.026	.063	.147	.032
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17f	Pearson Correlation	.283**	.215**	.262**	.394**	.121*	.219**	1	.467**	.055	.073	.065	.112*	.018	.058	-.054	.243**
	Sig. (2-tailed)	.000	.000	.000	.000	.028	.000		.000	.324	.186	.244	.043	.741	.294	.331	.000
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q17g	Pearson Correlation	.255**	.212**	.259**	.270**	.115*	.021	.467**	1	.012	-.036	-.063	.025	-.041	.060	-.064	.343**
	Sig. (2-tailed)	.000	.000	.000	.000	.037	.711	.000		.830	.512	.253	.657	.457	.277	.246	.000
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325

Q18a	Pearson Correlation	-.050	-.025	.043	.087	.123*	.060	.055	.012	1	.380**	.256**	.209**	.176**	.010	.007	.074
	Sig. (2-tailed)	.364	.651	.434	.117	.026	.278	.324	.830		.000	.000	.000	.001	.860	.900	.182
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q18b	Pearson Correlation	-.035	.093	.023	.128*	.092	.035	.073	-.036	.380**	1	.276**	.176**	.191**	.170**	.131*	-.034
	Sig. (2-tailed)	.523	.095	.682	.020	.096	.533	.186	.512	.000		.000	.001	.001	.002	.018	.541
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q18c	Pearson Correlation	-.178**	.182**	.135*	.094	.110*	.134*	.065	-.063	.256**	.276**	1	.440**	.456**	.171**	.191**	-.068
	Sig. (2-tailed)	.001	.001	.014	.090	.047	.016	.244	.253	.000	.000		.000	.000	.002	.001	.221
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q18d	Pearson Correlation	-.058	.079	.066	.141*	.068	.119*	.112*	.025	.209**	.176**	.440**	1	.321**	.176**	.124*	.080
	Sig. (2-tailed)	.293	.153	.235	.011	.219	.032	.043	.657	.000	.001	.000		.000	.001	.025	.152
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q18e	Pearson Correlation	-.150**	.109*	.126*	.135*	.209**	.123*	.018	-.041	.176**	.191**	.456**	.321**	1	.316**	.165**	-.089
	Sig. (2-tailed)	.007	.049	.022	.015	.000	.026	.741	.457	.001	.001	.000	.000		.000	.003	.111
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q18f	Pearson Correlation	-.059	.143**	-.053	.166**	.106	.103	.058	.060	.010	.170**	.171**	.176**	.316**	1	.385**	-.036
	Sig. (2-tailed)	.289	.010	.339	.003	.056	.063	.294	.277	.860	.002	.002	.001	.000		.000	.521
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q18g	Pearson Correlation	-.124*	.112*	-.133*	.047	.107	-.080	-.054	-.064	.007	.131*	.191**	.124*	.165**	.385**	1	-.217**
	Sig. (2-tailed)	.026	.042	.016	.393	.053	.147	.331	.246	.900	.018	.001	.025	.003	.000		.000
	N	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	325
Q5	Pearson Correlation	.387**	.085	.210**	.245**	.043	.119*	.243**	.343**	.074	-.034	-.068	.080	-.089	-.036	-.217**	1
	Sig. (2-tailed)	.000	.125	.000	.000	.436	.032	.000	.000	.182	.541	.221	.152	.111	.521	.000	
	N	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlations						
		Q3	Q5	Q7	Q9	Q11
Q3	Pearson Correlation	1	.387**	.352**	.044	.252**
	Sig. (2-tailed)		.000	.000	.430	.000
	N	327	325	326	325	326
Q5	Pearson Correlation	.387**	1	.362**	.097	.360**
	Sig. (2-tailed)	.000		.000	.081	.000
	N	325	325	325	324	325
Q7	Pearson Correlation	.352**	.362**	1	.173**	.300**
	Sig. (2-tailed)	.000	.000		.002	.000
	N	326	325	326	325	326
Q9	Pearson Correlation	.044	.097	.173**	1	.255**
	Sig. (2-tailed)	.430	.081	.002		.000
	N	325	324	325	325	325
Q11	Pearson Correlation	.252**	.360**	.300**	.255**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	326	325	326	325	326

Correlations						
		Q4	Q6	Q8	Q10	Q3
Q4	Pearson Correlation	1	.425**	.332**	.457**	.134*
	Sig. (2-tailed)		.000	.000	.000	.016
	N	324	324	323	324	324
Q6	Pearson Correlation	.425**	1	.234**	.323**	.233**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	324	326	325	326	326
Q8	Pearson Correlation	.332**	.234**	1	.307**	.060
	Sig. (2-tailed)	.000	.000		.000	.285
	N	323	325	325	325	325
Q10	Pearson Correlation	.457**	.323**	.307**	1	.138*
	Sig. (2-tailed)	.000	.000	.000		.013
	N	324	326	325	326	326
Q3	Pearson Correlation	.134*	.233**	.060	.138*	1
	Sig. (2-tailed)	.016	.000	.285	.013	
	N	324	326	325	326	327
**. Correlation is significant at the 0.01 level (2-tailed).						
*. Correlation is significant at the 0.05 level (2-tailed).						