Analysis of airport business models

Case study of Europe

(Extended abstract)

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Abstract: The airport industry suffered great changes in recent decades. The airport had only a basic function, which was to serve as a platform for aircraft landing and take-off, allowing the transfer of passengers and goods between two points. Recently it turned into a complex system with complementary services in its terminals and surrounding areas. The liberalization of the aviation market allowed the airlines to choose their routes and their markets, motivating greater competition amongst airports.

This dissertation aims to study the airport industry in Europe. Thus, the proposal of Osterwalder and Pigneur's business model was adopted, since it explains the way in which companies operate. The business model was built on the basis of variables, from which data could, subsequently, be collected for a sample of 40 airports. These airports were classified and grouped by means of statistical techniques and with the results it was possible to define the currently existent business models in Europe. The statistical techniques used were factor analysis and cluster analysis.

The results obtained made it possible to define five different business models, characterize the existing similarities and differences and which airports follow these models. It was also possible, by means of the statistical techniques used, to identify the airport industry business models referred to in the existing literature and their connection to the airport categories: primary hub, secondary hub, business airport and low-cost airport.

Keywords: Airport business model, Airport case studies, Osterwalder's business model canvas

1.   INTRODUCTION

The aviation market was initially regulated by inflexible rules that prevented competition between airlines and between airports. This lack of competition resulted in high production costs and low efficiency of available resources. The liberalization and privatization of these agents changed the aviation industry. The airports have become complex systems, due to the growing concern of managers in maximizing available resources and creating additional revenue. Thus, new agents and services in airport terminals and surrounding areas emerged. In the business world there is, currently, an attempt to find a model to explain the operations of a company. These models are known as "business models". The growing interest in these models comes coupled with the potential that they present to improve the performance of a company and gain a competitive advantage over other companies. The main objective of this dissertation is to analyze the business models of a sample of European airports in order to understand the similarities and differences between these models and whether it is possible to form groups of airports that follow the same type of business model. The analysis is performed by using statistical techniques.

2.   BUSINESS MODELS

The concept of business model is not consensual in existing literature (Morris, et al., 2003; Gassmann, et al., s.d.; Johnson, et al., 2008). The diversity of existing

definitions complicates the determination of its nature and leads to a confusion in terminology. Magretta (2002) states that this term is often confused with the term strategy. Moris (2003) also mentions this fact and adds other terms used as alternatives to business models: business concept, revenue model and economic model. However, the definitions used by the authors studied are similar, differing in the proposal presented to define the business models.

In this dissertation the definition and proposal of Osterwalder and Pigneur's business model was adopted. For these authors, the business model definition is: "A business model describes the rationale of how an organization creates, delivers and captures value." (Osterwalder & Pigneur, 2011, p. 14).

2.1. PROPOSALS OF BUSINESS MODELS

Depending on the proposal, there may be a different understanding of the company operation system, so it is essential to use the same methodology in the analysis and comparison of several models. Table 1 shows the components of the business model proposals that were studied. There is consensus in four components that must be used to describe the model: value propositions, customer segments, activities/resources, and profit formula.

The description of a business model should be simple, relevant, and intuitively understandable, but without oversimplifying the complexity of the operations of the company (Osterwalder & Pigneur, 2011). In this way, a proposal not only presents the components to describe the business model, but also a structure to, not only understand the existence and the importance of the connections among the various components, but also to facilitate the visualization of the business model.

2.2. OSTERWALDER AND PIGNEUR'S BUSINESS MODEL

This approach states that the model must be easily described to facilitate its understanding and discussion. Thus, Osterwalder and Pigneur (2011) create a canvas structure with nine blocks that characterize the company. The blocks are the following: value propositions, customer segments, key activities, key resources, cost structure, revenue streams, channels, customer relationships and key partners. The structure of this proposal and the arrangement of the components can be observed in Figure 1.

The central block – value proposition – describes the products and services that create customer value. The value created by the company solves a problem or suppresses an existing need, and can be quantitative or qualitative. An element that can contribute to the creation of a quantitative value is the price, that is, the offer of similar values to other companies, but with a smaller price associated, thus satisfying an existing need of the customers, who appreciate that factor. On the other hand, the performance is an element that contributes to a qualitative value.

On the right side of the central block, one can observe the customer segments that define the different groups of people or organizations that a company reaches and serves, the channels that describe how the company connects customers in order to give

Table 1 - Business model proposals

| Autor	Similar Components	Different Components	Nº of Components
Morris, et al. (2003)	Value propositions; Customer segments; Activities/ Resources; Profit formula	Market positioning; Investment model	6
Gassmann, et al. (s.d.)	Value propositions ("the What?"); Customer segments ("the Who?"); Activities/Resources ("the how?"); Profit formula ("Valor")		4
Johnson, et al. (2008)	Customer value proposition; Key activities; Key resources; Profit formula		4
Osterwalder & Pigneur (2011)	Value propositions; Customer segments; Key Activities; Key Resources; Cost structure; Revenue streams	Channels; Customer relationships; Key Partners	9
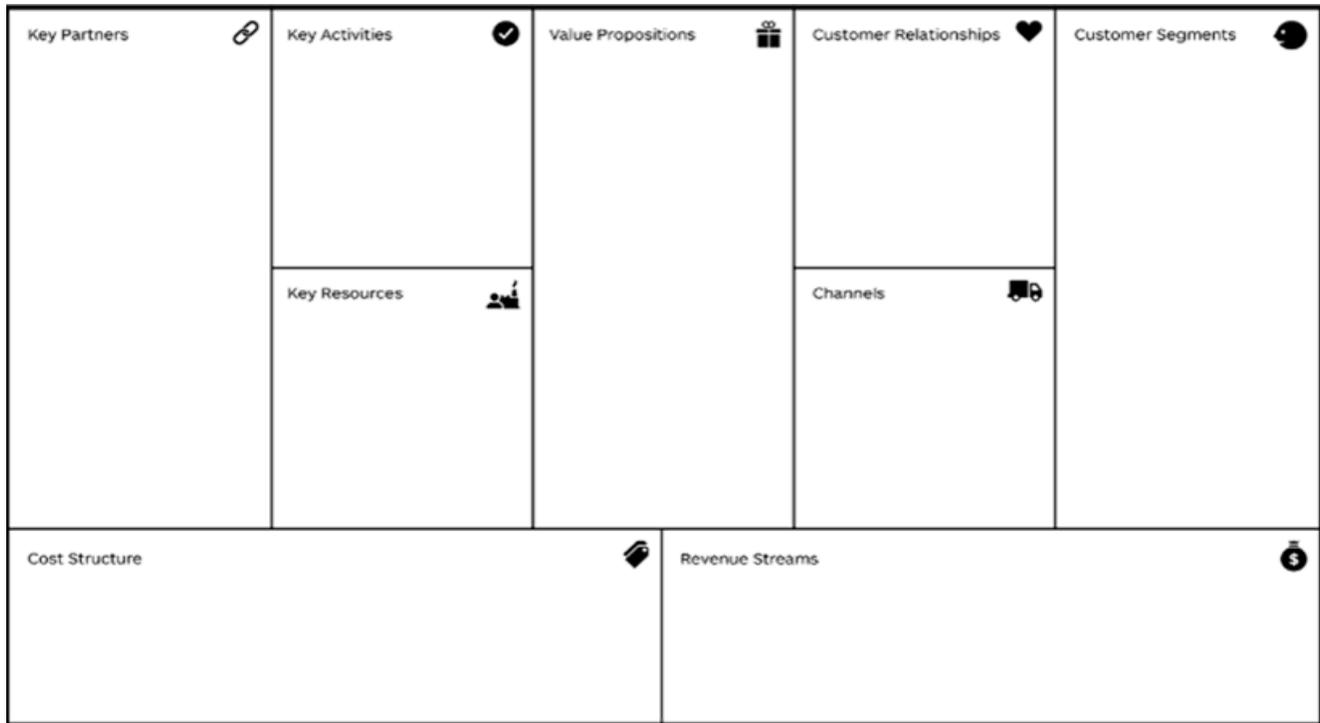
Figure 1 - Osterwalder and Pigneur's proposal of business model (2011)

them value, the customer relationships that describe the relations that a company establishes with the customer segments and the revenue streams that describe how the company generates revenue from the customer segments (Osterwalder & Pigneur, 2011).

On the left side of the central block, the key resources held by the company can be seen, needed to create the value proposition, as well as the key activities that describe the essential tasks that must be performed to produce and offer the value proposition, the key partners that define the strategic partners that can give a company a competitive advantage in the market and finally, the cost structure that describes the cost of operations involved in creating and delivering the value proposition (Osterwalder & Pigneur, 2011).

2.3. AIRPORT BUSINESS MODELS

The existing literature on business models in the airport industry is reduced. Kalakou and Macário (2013) applied the theory of business models to twenty case studies and identified five standard business models for five categories of airports:

Primary Hub, Secondary Hub, Business Airports, Low-cost Airports and Cargo Airports.

Frank (2011), in his work examines the business models of three airports, in order to find out whether there is, in the airport industry, a pattern between the various models. The chosen airports have different locations and types of administration. The conclusions of Frank (2011) show that each airport takes into account different factors, originating different models of revenue, although all use a structure divided into two segments: aeronautical revenue and non-aeronautical revenue.

Struyf (2012) studied the theory of the business models and their application at airports. In his work, he describes how to design a business model in airports and the relationship between the elements of a model. Finally, he applies the theory to two case studies.

3. VARIABLES AND CASE STUDIES

The identification of variables that characterize the business model of the airports was based on the elements of the airport industry that characterize each of the blocks of the proposed business model of

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
Number of transport agents partnerships (units) Number of airline partnerships (units)	Real-estate activities (units) Differentiating activities (units) **Key Resources** Total terminal area (m2) Number of runways (units) Number of gates (units) Total anual air transport movement capacity (thousands) Companies owned by the airport (binary)	Number of destinations (units) % of destinations with a duration superior to 5 hours (%) Acessibility (1-9) Punctuality (%)	Long-term contracts with low-cost airlines (binary) Long-term contracts with tradicional airlines (binary) **Channels** Publications (binary)	Anual passenger traffic (millions) % of transfer passengers (%) % of leisure passengers (%) Total number of airlines (units) % of tradicional airlines (%) Number of comercial agents (units) Number of real-estate agents (units)
Cost Structure			**Revenue Streams**	
Total costs (millions)			Total revenue (millions) % of aeronautical revenue (%)	

Figure 2 - Variables considered for analysis

Osterwalder and Pigneur (2011). These elements were collected from existing literature about airport industry's business model and studied complementary literature related to airports. After the identification of the variables, it was necessary to choose a set of smaller variables. Ninety-one variables were identified, and reduced to thirty-eight. The reduction was based on three criteria: ease, source, and importance. However, during the process of data collection, some of these variables were dropped due to lack of information, and others since the values presented were equal to the ones relating to the total sample. In the end twenty-six variables remained to analyze a sample of forty airports. The variables removed because of their similarity to the total sample have not been analyzed, but are mentioned in the presentation of the results. The variables can be observed in Figure 2. The variables Real-estate activities[1] and Differentiating activities[2] account for 1 for each different activity performed at the airport, corresponding to the category to which

they belong. The variable accessibility[3] may display a value of 1 to 9 depending on the different possibilities of access to the airport.

The sample consists of airports belonging to twenty-seven countries, twenty-five of which belong to the European Union. The other two countries are Norway and Switzerland. The studied airports are: Frankfurt (FRA), Heathrow-London (LHR), Paris (CDG), Amsterdam (AMS), Brussels (BRU), Madrid (MAD), Fiumicino-Roma (FCO), Lisbon (LIS), Helsinki (HEL), Vienna (VIE), Stockholm (ARN), Copenhagen (CPH), Oslo (OSL), Zurich (ZRH), Warsaw (WAW), Tallinn (TLL), Vilnius (VNO), Riga (RIX), Budapest (BUD), Athens (ATH), Zagreb (ZAG), Bucharest (OTP), Praha (PRG), Ljubljana (LJU), Luxembourg (LUX), Sofia (SOF), Bratislava (BTS), Berlin (TXL), Munich (MUC), London-City (LCY), Lyon (LYS), Bergamo (BGY), Liverpool (LPL), Gatwick-London (LGW), Ciampino-Roma (CIA), Barcelona (BCN), Milan (MXP), Geneva (GVA), Venice (VCE) and Porto (OPO).

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[1] Possible activities: Health clinics, Spa, gym, Conference Center, Hotel, Hostel, Casino, golf courses, cinema
[2] Possible activities: prayer room, yoga room, meeting room, games room, events, Museum, library, playground

[3] Possible access: subway, train, bicycle, bus, car, taxi, uber, ferry, car rental

4. STATISTICAL ANALYSIS OF DATA

Given that the chosen variables define Osterwalder and Pigneur' business model proposal (2011), the intention was to combine the airports that have a higher similarity to these variables with the aid of statistical techniques.

First, a univariate statistical analysis was performed to have a perception of the data collected, and afterwards, a multivariate statistical analysis, more specifically, a factor analysis and cluster analysis. In the cluster analysis were used the hierarchical and non-hierarchical methods. In the case of hierarchical methods, the Ward and complete-linkage criteria were used. The non-hierarchical method used was the k-means. Statistical analysis was performed using the SPSS Statistics 24 program and, for additional calculations, Microsoft Excel was used as well. The data were standardized prior to analysis.

From the analysis of the results presented by the tests performed, it was possible to identify five groups,

shown in Table 2. These groups are formed by twenty-five airports of the sample. Table 3 shows the distances between the centers of the groups and Figure 3 presents a chart with the centers of the groups for each of the variables used in the analysis. Airports belonging to the same group present differences amongst them. Table 4 exposes these differences since it presents the variance and standard deviation of the groups, as well as the contribution of each of the variables for this variance. Finally, Figure 4 contains a chart with the profit per passengers obtained by the airports belonging to the groups identified.

5. PRESENTATION OF THE RESULTS

The five groups identified in the statistical analysis feature similar business models amongst airports within the same group and distinct business models from airports belonging to other groups.

For this reason, these five groups represent five different business models. These business models are the end result of this dissertation and were built

Table 2 - Groups identified in the statistical tests

Group 1	Group 2	Group 3	Group 4	Group 5
LHR	CPH	TXL	BGY	LCY
CDG	OSL	LIS	OPO	LUX
AMS	ARN	PRG	CIA	
FRA	VIE	OTP	LPL	
MAD	HEL		VCE	
MUC	GVA			
	BRU			
	LGW			

Table 3 - Distance between the centers of the groups identified in the tests

Cluster	1	2	3	4	5
1	-				
2	5,199	-			
3	7,927	3,919	-		
4	9,786	5,573	4,375	-	
5	10,126	6,082	5,838	5,418	-
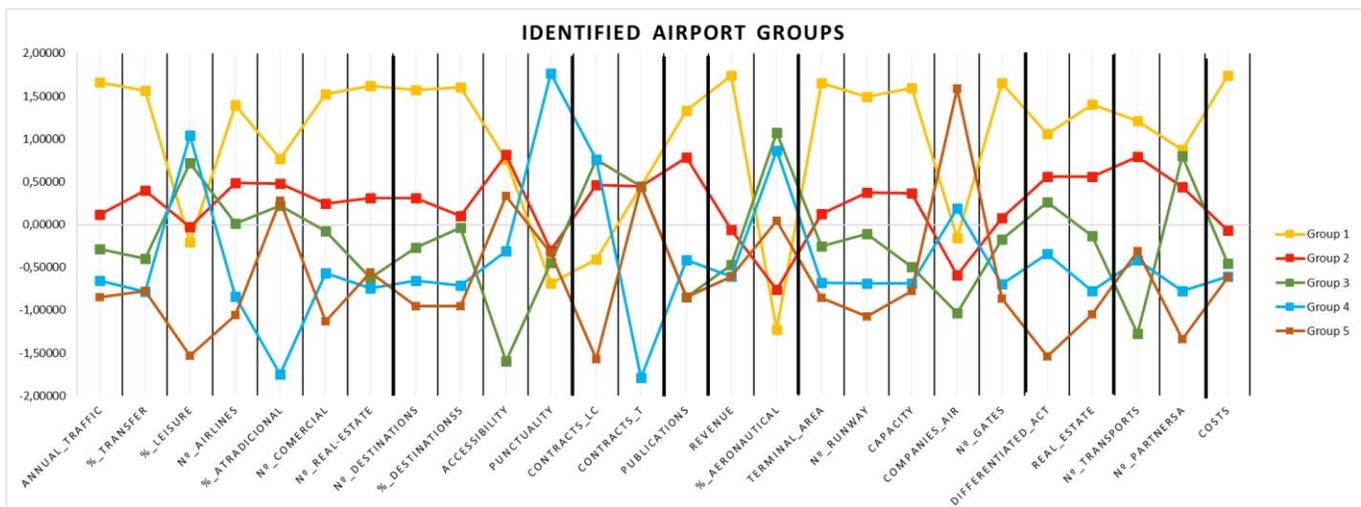
Figure 3 - Center of the groups identified in the statistical experiments

	Annual_Traffic	%_transfer	%_leisure	Nº_airlines	%_Atradicional	Nº_comercial	Nº_real-estate	Nº_destinations	%_destinations5	Accessibility	Punctuality
Group 1	2,0%	4,2%	0,3%	1,9%	0,4%	0,6%	0,9%	1,6%	1,8%	1,5%	7,5%
Group 2	1,6%	4,5%	5,0%	3,0%	0,7%	0,4%	2,8%	2,4%	1,6%	1,7%	10,1%
Group 3	0,8%	4,8%	5,1%	2,8%	0,3%	8,2%	1,5%	0,4%	12,9%	0,0%	0,9%
Group 4	0,2%	0,3%	5,7%	4,8%	25,0%	2,8%	0,6%	0,7%	1,0%	0,0%	3,6%
Group 5	0,0%	0,3%	3,7%	0,0%	3,1%	0,0%	1,9%	0,6%	0,0%	36,4%	12,6%

	Contracts_lc	contracts_t	Publications	Revenue	%_aeronautical	Terminal_area	Nº_Runway	Capacity	Companies_air	Nº_gates
Group 1	10,5%	0,0%	0,0%	9,9%	1,1%	5,2%	10,7%	2,1%	7,6%	2,2%
Group 2	6,7%	0,0%	6,7%	0,6%	17,6%	3,2%	2,1%	6,6%	10,5%	1,3%
Group 3	0,0%	0,0%	24,1%	0,0%	2,8%	0,6%	0,0%	0,8%	13,2%	1,1%
Group 4	0,0%	0,0%	18,7%	0,0%	3,9%	0,2%	2,5%	1,0%	13,6%	0,0%
Group 5	0,0%	0,0%	15,7%	0,0%	3,0%	0,0%	0,0%	0,6%	0,0%	0,0%

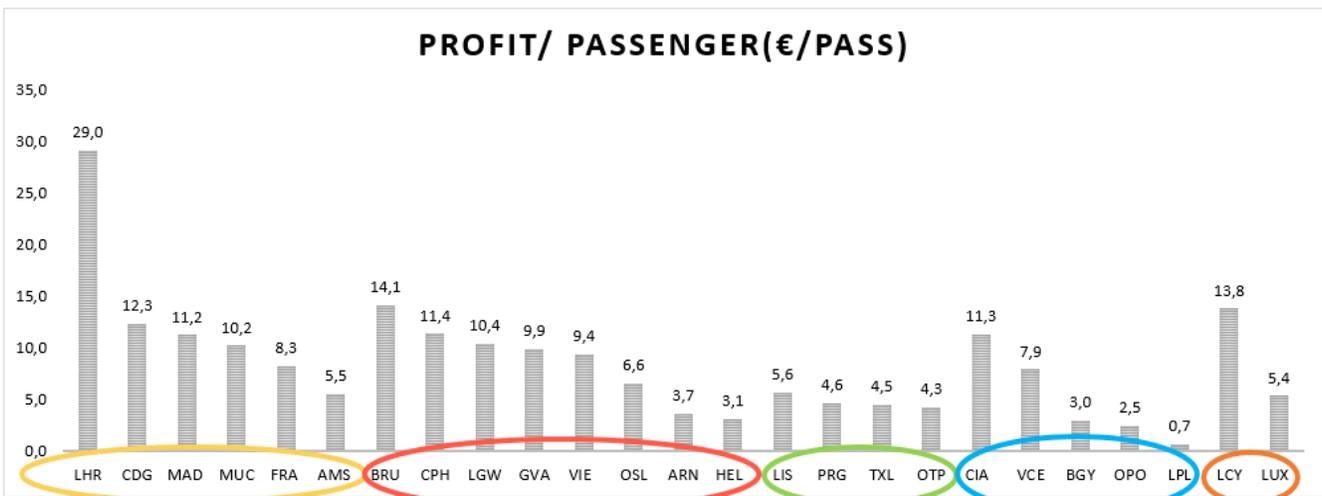|	Differentiated_act	Real_estate	Nº_transports	Nº_PartnersA	Costs		Σ Variance/n	Standard Deviation
Group 1	4,4%	5,5%	5,5%	6,6%	6,2%		2,52	1,59
Group 2	2,6%	3,1%	3,6%	1,2%	0,5%		1,23	1,11
Group 3	4,1%	2,8%	1,2%	11,7%	0,0%		1,82	1,35
Group 4	2,7%	5,0%	4,2%	3,3%	0,0%		1,69	1,30
Group 5	5,4%	16,2%	0,3%	0,0%	0,0%		8,36	2,89

Figure 4 - Bar chart: profit per passenger from identified airport groups

based on the values collected from the selected variables from the airports belonging to the groups identified. Before presenting the five models one needs to take into account the variables removed from the analysis for having the same value as all the airports combined. Thus, it is necessary to refer them yet again, since they characterize the five models. Figure 5 is the business model canvas proposed by Osterwalder and Pigneur (2011) with the common elements of five business models. Figure 6 shows the business model of the airports belonging to group 1, represented in yellow in Figure 3.

Group 1 is characterized by its dimension, presenting the largest number of customers in the various segments, the greater number of activities and resources, higher costs, and revenues. By Jarach's

(2001) classification, these airports belong to the Primary hub category and by Adikariwattage's (2012), they are international transfer airports of very large dimensions.

Figure 7 shows the business model associated with the group 2, represented in red in Figure 3. This is the group that contains the largest number of airports within the sample and it is the second largest group in terms of dimension. By Jarach's (2001) classification, these airports belong to the Secondary hub category and by Adikariwattage's (2012), they are international transfer airports of large dimensions.

Figure 8 shows the business model associated with group 3, represented in green in Figure 3. The airports of this group are by Adikariwattage's classification (2012), international transfer airports of large

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
Firefighters, security, cleaning, air navigator	- Provision of airport infrastructure and ground handling - Commercial activities inside the terminals - Aircraft maintenance*****	-Offer of 7 main services: **1.** Aeronautical services; **2.** Aircraft maintenance*****; **3.** Accessibility air-land; **4.** Comercial activities; **5.** Events; **6.** Real-estate activities; **7.** Advertising	- Free wifi - Dedicated offices - Social networks - Blog - Events	
	Key Resources		**Channels**	
			- Site - Media - Newsletter - Email - Phone - App******	
Cost Structure			**Revenue Streams**	

* With the exception of London-City airport (**LCY**)

** With the exception of Bratislava airport (**BTS**)

Figure 5 - Business model canvas proposal with the elements in common for the entire sample of airports

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
- Large number of transport agents (11-16 Partners) - Large number of airlines (2-5 Partners)	- Large number of differentiating activities (4-7 activities) - Large number of real-estate activities (4-7 activities)	- Very wide air connectivity (196-257 Destinations) - High % of intercontinental flights (25%-46%)	- Long-term contracts with tradicional airlines	- Mostly tradicional airlines (84%-97,5%) in a total of (80-121) airlines - High passenger density (42-75 Millions) - Balance between leisure passengers (58%-64%) and business passengers - High % of transfer passengers (18%-55%)
	Key Resources		**Channels**	
	- High capacity (440 000-700 000 aircraft per year) - 2-6 Runways - Large terminal (170 000-425 000 m2) - Large number of gates (145-169 gates)	- High accessibility (6-7 Accesses) - Punctuality (74%-84,7%)	- Financial publications	- Large number of comercial agents (107-140) - Large number of real-estate agents (10-13)
Cost Structure			**Revenue Streams**	
- High costs (368-1575 Millions €)			- High revenues (934-3753 Millions €) - Balance between aeronautical revenues (52%-61,5%) and non-aeronautical revenues	

Figure 6 - Business model canvas proposal for the airports belonging to group 1 (yellow)

dimensions. The big difference between these airports and the ones in group 2 lies in their dimension. They feature fewer resources, activities, partnerships, customers, costs, and revenues. For this reason, they resemble the ones belonging to group 4 as well. It can be concluded that group 3 is an intermediate between group 2 and group 4 and their business model has features of both.

Figure 9 presents the business model associated with group 4, represented in blue in Figure 3. Group 4 is characterized by increased punctuality and a greater focus on low-cost airlines and passengers. By Jarach's (2001) classification, these airports belong to the category of low-cost airport and by Adikariwattage's (2012), they are international origin-destination airports of medium dimensions.

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
- Large number of transport agents (11-17 Partners) - Large number of airlines (2-3 Partners)	- Large number of differentiating activities (4-6 activities) - Large number of real-estate activities (3-5 activities)	- Wide air connectivity (100-193 Destinations) - Average % of intercontinental flights (8%-24,8%)	- Long-term contracts with tradicional airlines - Long-term contracts with low-cost airlines	- Mostly tradicional airlines (73%-93%) in a total of (48-101) airlines - Medium passenger desity (16,5-43 Millions) - Predominance of leisure passengers (53%-83%)
	Key Resources		**Channels**	- Average % of transfer passenger (4%-30%) - Large number of comercial agents (58-82) - Average number of real-estates agents (3-9)
	- High capacity (205 000- 630 000 aircraft per year) -2-3 runway - Medium size terminal (40 000-258 000 m2) - Average number of gates (29-109 gates)	- High accessibility (6-7 Accesses) - Punctuality (77%-85%)	- Financial publications	
Cost Structure			**Revenue Streams**	
- Costs (180-464 Millions €)			- Revenues (233,3-914 Millions €) - Predominance of aeronautical revenue (43%-70%)	

Figure 7 - Business model canvas proposal for the airports belonging to group 2 (red)

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
- Small number of transport agents (7-9 Partners) - Large number of airline (2-4 Partners)	- Large number of differentiating activities (3-5 activities) - Real-estate activities (3-4 activities)	- Wide air connectivity (83-107 Destinations) - Intercontinental flights (1,2%-33%)	- Long-term contracts with tradicional airlines - Long-term contracts with low-cost airlines	- Mostly tradicional airlines (76%-84%) in a total of (32-66) airlines - Medium passenger density (10,9-21,2 Millions) -Mostly leisure passenger (65%-80%) - Small number of transfer passengers (2%-21%)
	Key Resources		**Channels**	- Average number of comercial agents (30-100) - Small number of real-estate agents (2-5)
	- Medium capacity (150 000-268 000 aircraft per year) -2 Runways - Medium terminal (50 000-103 000 m2) - Average number of gates (38-90 gates)	'- Medium acessibility (5 Accesses) - Punctuality (78%-80%)		
Cost Structure			**Revenue Streams**	
- Costs (100-140 Millions €)			- Revenues (172-234 Millions €) - High % of aeronautical revenue (64%-72%)	

Figure 8 - Business model canvas proposal for the airports belonging to group 3 (green)

Figure 10 shows the business model associated with group 5, represented in orange in Figure 3. Group 5 is characterized by a greater focus on business passengers and traditional airlines. By Jarach's (2001) classification these airports belong to the regional/business airport category and by Adikariwattage's (2012) they are international origin-destination airports of small dimensions.

6. CONCLUSION

This dissertation presents a study on business models in airports for the case study of Europe. This study was carried out using statistical techniques. The description of the business models of the airports of Europe was performed by a set of variables. Airport groups were formed, that represented different business models existing in Europe.

Figure 9 — Business model canvas proposal for the airports belonging to group 4 (blue)

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
- Average number transport agents (8-13 Partners) - Average number of airline (1-2 Partners)	- Average number of differentiating activities (2-4 activities) - Small number of real-estate activities (2-4 activities) **Key Resources** - Medium capacity (110 000-228 000 aircraft per year) -1-2 runways - Small terminal (16 000-36 000 m2) - Small number of gates (15-26 gates)	- Medium air connectivity (55-95 Destinations) - Medium accessibility (6 Accesses) - High punctuality (82%-87,5%)	- Long-term contracts with low-cost airlines **Channels**	- Predominance of *low-cost airlines* (25%-100%) in a total of (2-55) airlines - Medium low passenger density (4,8-11,1 Millions) - Mostly leisure passengers (70%-90%) - Small number of comercial agents (10-51) - Small number of real-estate agents (2-4)

Cost Structure	Revenue Streams
- Low costs (40-92 Millions €)	- Revenues (163-45 Millions €) - High % of aeronautical revenue (60%-70%)

Figure 9 - Business model canvas proposal for the airports belonging to group 4 (blue)

Figure 10 — Business model canvas proposal for the airports belonging to group 5 (orange)

Key Partners	Key Activities	Value Propostions	Customer Relationships	Customer Segments
- Average number transport agents (10-11 Partners) - Small number airlines (1 Partner)	- Small number of differentiating activities (0-2 activities) - Small number of real-estate activities (1-4 activities) **Key Resources** - Medium capacity (92 000-186 000 aircraft per year) - 1 Runway - Ownership of other companies - Small terminal (8 000-15 000 m2) - Small number of gates (5-10 gates)	- Small air connectivity (33-63 Destinations) - High accessibility (5-8 Accesses) - Punctuality (76%-84%)	- Long-term contracts with tradicional airlines **Channels**	- Predominance of tradicional airlines (69-92%) in a total of (12-16) airlines - Low passenger density (3-4,5 Millions) - Mostly business travelers (50%-63%) - Small number of comercial agents (11-12) - Real-estate agents (2-5)

Cost Structure	Revenue Streams
- Low costs (48-77 Millions €)	- Revenue (64-140 Millions €) - High % of aeronautical revenue (60%-68%)

Figure 10 - Business model canvas proposal for the airports belonging to group 5 (orange)

The aim of this dissertation was fulfilled because five groups of airports were identified that remained united in the majority of the statistical tests. These groups (present in Figure 3) represent five different business models. The airports belonging to the same group present business models similar to each other and different from other groups' business models. These business models were represented by business type models, described in Chapter 5. Of the five business models found, there are values of variables that cover more than one business model, so it can be concluded that an airport that wants to change its business model type does not need to make changes in all the blocks of the business model. Other conclusions of this dissertation are presented next:

• Airports with similar business models may present large differences in performance, as noted in Figure 4. The variance in each group (Table 4) is one of the explanations for the different performances of the

airports, since it characterizes the differences amongst airports of the same group;

• European airports continue to withhold a large predominance of traditional airlines, to the detriment of low-cost ones. Only group 4 airports move away from this trend;

• Although the predominance of non-aeronautical revenue remains, most airports present percentages between 30% to 50% of non-aeronautical revenues, which represent a large share of the revenue;

• The location of the airport is an important factor in performance and in the airport's business model, as referred to in the literature. The major urban centers present a competitive advantage over less busy areas;

• The physical dimension of the airports, that is, the resources and the activities represent a great influence in the airports' business model;

The limitations of this study regard the identification of variables, and the absence of data. The identification of the variables was carried out exclusively from the extraction of elements depicted in the existing literature on airport business models and the way they operate. The choice of elements to analyze and their transformation into variables with units of measurement are one of the limitations of this study, because it required a choice on the part of the author of this work. The absence of data also limited the choice of variables and the results of the analysis.

As future work, the author envisions extending the scope of the search to include more airports and adding new elements to the study. Conducting surveys of airport managers and agents would be interesting to understand which elements they consider most important.

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