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Questa è la versione Post print del seguente articolo:

Original
Determinants and strategies behind commercial airports' performance in general aviation / Giovanelli, L., Rotondo, F.. - In: RESEARCH IN TRANSPORTATION BUSINESS & MANAGEMENT. - ISSN 2210-5409. - (2022), pp. 1-14. [10.1016/j.rtbm.2022.100795]

Availability:
This version is available at: 11388/283460 since: 2022-05-02T09:11:32Z

Publisher:

Published
DOI:10.1016/j.rtbm.2022.100795

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note finali coverpage

(Article begins on next page)

05 November 2026

Research in Transportation Business & Management xxx (xxxx) xxx

Contents lists available at ScienceDirect

Research in Transportation Business & Management

journal homepage: www.elsevier.com/locate/rtbm

Determinants and strategies behind commercial airports' performance in general aviation

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ARTICLE INFO

Keywords:
General aviation
General aviation operations
Commercial airports
Determinants
Strategies

ABSTRACT

Although general aviation has become increasingly important for commercial airports to diversify aeronautical activities and improve overall performance, little empirical research has been devoted to the topic so far. Whereas other aspects of commercial airports' business (low-cost traffic, scheduled traffic, cargo, commercial revenue) have been widely investigated, to our knowledge this is the first research focusing on the conditions and strategies driving general aviation performance. This paper aims to examine the determinants of general aviation operations in commercial airports and the relationships between determinants and strategies developed by market leaders to gain a competitive advantage. An explanatory sequential mixed method was used. First, a panel data analysis was carried out on all the 44 Italian commercial airports that have operated general aviation flights over the period 2007–2018, to understand which variables have an effect on general aviation traffic. Second, a qualitative investigation was used to highlight how airport companies that have achieved success exploit these variables to outperform competitors. The combination of both quantitative and qualitative data, and the patterns observed across cases, led to the presentation of eight theoretical propositions, which were summarized in a preliminary model.

1. Introduction

General Aviation (GA) is defined as the operation of any type of civilian aircraft for purposes other than commercial passenger transport, cargo transport and military transport. As a residual category, it encompasses a number of different activities, such as business aviation and aero-taxi operations, aerial spraying and sightseeing, flight instruction and aerial firefighting operating (Federal Aviation Administration, 2012).

GA plays a crucial role in the transport industry and in general society, for several reasons. First, as an alternative to scheduled commercial flights, it supports mobility in peripheral areas or those affected by infrastructural problems and inefficient road and railroad systems. This is even more important in case of disaster or other emergencies, which require more flexible and door-to-door transportation for food, fuel, medical supplies or similar (Smith, 2012). Its tailored, adaptable and less restricted services make GA increasingly important to the overall health and dynamism of a region's economy, since it gives the business community, from occasional users to major multinationals, the opportunity to link production sites, offices or partners in different countries and effectively provide services from any location at any time. The same characteristics make GA particularly suitable for wealthy people travelling for leisure. Finally, GA represents an opportunity for commercial airports to diversify their aeronautical business and improve overall performance in increasingly competitive aviation markets.

The impact and future perspectives of the GA business have recently been assessed by the General Aviation Manufacturers Association (GAMA). Findings showed that the number of GA aircraft, amounting to more than 362,000 units at a global level, is growing in all continents (*General Aviation Manufacturers Association (GAMA)*, 2020). In particular, in 2018 in the United States, which accounts for about 55% of all aircraft and has more than 5000 airports open to this type of service, GA has generated $77 billion in labour income (including wages and salaries, benefits, and proprietors' income) and contributed $128 billion to gross domestic product (GDP) and 1.2 million jobs, including indirect, induced, and enabled impacts.

Despite the importance for the economic growth of regions and the viability of airport companies, few studies have examined GA business (Comer & Wikle, 2015; Weisbrod, 1990). Most of effort has been devoted to modelling demand for operations in GA airports to support

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https://doi.org/10.1016/j.rtbm.2022.100795
Received 21 July 2021; Received in revised form 7 February 2022; Accepted 9 February 2022
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Please cite this article as: Lucia Giovanelli, Federico Rotondo, *Research in Transportation Business & Management*, https://doi.org/10.1016/j.rtbm.2022.100795

decision-makers in planning and allocating public resources for constructing and upgrading aviation facilities (Ghobrial, 1997; Ghobrial & Ramdass, 1993). The present paper is intended as a contribution to this topic as it aims to examine the determinants of GA traffic in commercial airports and, consequently, identify which strategies are developed by airport companies to gain a competitive advantage in such a niche market. The main research questions addressed by this study can be summarized as follows: what are the determinants of GA operations for commercial airports? How can airport management turn such determinants into a competitive advantage in the GA business and improve performance at the corporate level?

2. Literature review

Although there are different conceptual interpretations of GA (European Commission, 2008), it generally refers to all aviation activities with the exception of military and commercial air carriers' activity (Kane, 1996). Such a broad definition includes several different activities, which can be operated from both private and public airports (FAA, 2012), and which are classified by the International Civil Aviation Organization (ICAO) into instructional flying, business flying, pleasure flying, aerial work and other flying (ICAO, 2009).

GA operations, which include takeoffs and landings at an airport, are also divided into local operations and itinerant operations. Local operations refer to aircraft operating in the traffic pattern or within sight of the tower, e.g., for sightseeing or flight instructions. Itinerant operations deal with operations of aircraft going from one airport to another, as is the case for air taxis and business flights.

Since the pioneering study of Baxter and Philip Howrey (1968), increasing attention has been paid to the role of GA in the air transportation system and its impact upon the economy and society. This is due to the importance that this niche market has gained in the air transport industry (Wells & Chadbourne, 1994). For instance, in the United States, which has the highest number of air passengers in the world, GA accounted for 90% of registered aircraft and 75% of all movements made at airports in 2012 (Comer & Wikle, 2015). Since then, the number of GA aircraft has increased from 360,000 to 440,000 in 2019 at a global level. The number of airports has increased from more than 5000 to more than 5100 in the United States and from more than 3900 to more than 4000 in Europe. A constant growth has also been registered in Asia, the Middle East and South America.

In the United States, the outstanding growth of GA in terms of employment and production is widely attributed to the *General Aviation Revitalization Act* of 1994 (GARA). This was a federal statute of repose designed to protect aircraft manufacturers from the uncertainties and costs associated with what has been termed 'long tail' liability (Darwin, 1996). In particular, the GARA aimed at protecting the manufacturers of aircraft and their component parts from liability lawsuits that arose more than 18 years after the aircraft was first manufactured and delivered to a customer (Stolzer, 1998). Then, in 2012, the FAA published *General Aviation Airports: A National Asset*, which set out criteria for classifying GA airports into four categories: National, Regional, Local and Basic. In 2014, this classification, after being revised and amended with the inclusion of 'Unclassified' airports, was used in the *National Plan of Integrated Airport Systems (NPIAS) 2015–2019 Report* (Federal Aviation Administration, 2014).

In Europe, addressing the specificities of GA was not relevant until the extension of the community competences in aviation safety and security, the upgrade of the Single European Sky and growing concerns about environmental impacts of aviation. Therefore, the first intervention by the European Commission was in 2008 when, following broad consultations, the Communication 869(2007), 'An Agenda for Sustainable Future in General and Business Aviation', was adopted (European Commission, 2008).

In the Communication, two negatives were also highlighted other than several positives associated with the GA's growth. The first was the potential increasing competition between GA and the broader airline industry for access to airspace and infrastructure due to the growing gap between airport capacity and demand. This means that slots for non-scheduled operators may be available only on an ad-hoc basis in larger airports, which are often congested on the ground. Furthermore, small aircraft may be unattractive to airport managers as they carry fewer fare-paying passengers and are more sensitive to wake vortices created by larger aircraft. This issue should be addressed by investing in special infrastructures, such as dedicated terminals, runaways or aprons, which will have to be financed by the airport. Secondary airports, which are usually less congested, are more prone to provide GA services, therefore contributing to a more even distribution of traffic. However, their infrastructure is increasingly used also by the airline industry seeking additional capacity.

The second negative is the impact of GA on the environment in terms of noise and gaseous emissions. Although this issue is in common with the broader airline industry, some slight differences need to be remarked. First, overall gaseous emissions from GA are small compared to CA, but emissions per passenger may be higher. Second, they increase with larger aircraft, such as those used in BA. Furthermore, the localised character of these activities and the relatively small size of the aerodromes involved have sometimes led local communities to express concern about the noise impact of light aviation on their quality of life. However, at the moment, most GA aeroplanes are already subject to uniform noise certification standards, and noise-related operating restrictions for small aerodromes are not justified and therefore not introduced yet.

Among the priorities for a sustainable future of GA, the Commission identified the need for improving statistics in order to increase policy makers' up-to-date knowledge and enable them to effectively regulate this sector. In 2015 a basic set of data to facilitate the collection and analysis of the relevant information and ensure proper application of proportionality and subsidiarity principles in future GA developments was established (European Commission, 2015). Furthermore, in 2014, the European Aviation Safety Agency (EASA) created a dedicated department to engage more pragmatically with general aviation. A 'GA Roadmap' to set up strategic priorities for the growth of this industry was issued.

GA serves many purposes. For suburban areas, small- or medium-sized cities and rural communities without commercial airline services, especially where the quality of roads is poor and the railroad system is lacking or inefficient, GA is essential to promote mobility and economic development. For instance, Button, Doh, and Yuan (2010) assessed the role of small airports (not necessarily being GA airports) in economic development in Virginia and found that doubling passenger numbers produced up to a 4% increase in per capita income. Furthermore, Redondi, Malighetti, and Paleari (2013) evaluated the role played by small airports in European connectivity and found, in many contexts, very significant increases in average travel times as a consequence of the closure of airports with traffic of less than one and two million passengers per year. Starting from the tenet that all disasters are local and that, in the United States, it is hard to find a citizen who is not within 50 miles of a GA airport, Smith (2012) highlighted the vital role that GA airports play in disaster response and recovery efforts.

Generally speaking, GA has specific social and economic value, as it provides individuals, companies and local communities with tailored, flexible and high-quality transportation that increases people's mobility, regional cohesion and business growth. In particular, business aviation (BA) is the part of GA that is strictly devoted to the needs of commerce and specifically tailored to the needs of the client, who can be either an occasional user or a major multinational. As defined by ICAO (2009), BA concerns the "operation or use of aircraft by companies for the carriage of passengers or goods as an aid to the conduct of their business". Based on the principles of flexibility and responsiveness, BA can take different forms, such as operators offering one-off charter services, or fractional jet ownership rather than in-house airlines operated by many of the

world's largest companies (Oxford Economics, 2012). BA is a rapidly evolving and dynamic sector whose development, as argued by Budd and Graham (2009), is in part a consequence of the air transport liberalization as it created new opportunities to overcome negative effects such as delays, congestion and poor customer service. Pazourek and Václavík (2017) pointed out that gradual upgrades in both aircraft and infrastructure have changed the character of BA and raised capacity and operational issues that need innovative solutions. Interestingly, Yen & Chen, 2017 investigated business travellers' choice behavior between business charter and the business class of commercial airlines in the cross-strait market and found that fare is the most important factor, followed by gender, seniority, and the number of business trips during the previous year, for choosing business charter. BA currently accounts for two-thirds of the 25.5 million flight hours of GA flights in the United States, and flying to over three times the number of airports connected by scheduled services in Europe (*General Aviation Manufacturers Association (GAMA),* 2020). However, the coronavirus disease 2019 (COVID-19) outbreak has had a considerable impact on BA, as it had on the global aviation industry. A general overview of this impact is difficult to have since the measures taken at national levels in response to the spread of the pandemic have had very heterogeneous effects on the different markets. For instance, among the main European BA markets, the United Kingdom had the most significant drop in BA traffic from January to August 2020 (−37% below 2019) and a more timid recovery than in the rest of Europe. In France, Europe's leading BA market, the measures taken by the government at the beginning of the crisis had immediate effects (traffic fell 80% during the month of April, while −33% was recorded from January to August 2020), before seeing a slow but stable recovery until the summer. Similar, the measures taken by the German government led to a drop in BA traffic which stabilised at around −70% (from January to August 2020, Germany was −25% below 2019), but the recovery was ahead of Europe's average curve with traffic returned to normal by the first week of July. In Italy, since the country experienced the first outbreak of COVID-19 contamination, the curve was a few weeks ahead of the other countries (−85% of traffic at the bottom of the crisis and − 35% from January to August 2020), and the recovery of traffic from mid-June was slightly slower than the European average.

In general, although BA is predominantly used by business leaders travelling to quickly reach production sites, offices or business partners in different places at any time, it also offers wealthy people travelling for leisure unparalleled accessibility to major tourism destinations in terms of proximity and transfer times (Suau-Sanchez & Voltes-Dorta, 2019). GA and BA also constitute a significant source of qualified staff for the wider aviation industry (European Commission, 2008) and, in response to increased competition, an opportunity for commercial airports to increase traffic and sources of revenue by diversifying their aeronautical business. However, the impact of GA on total revenue varies depending on the type of airport, context and, consequently, GA activities that are developed. In the last decades, the ongoing liberalization of air transport markets, the advent of low-cost carriers and more price-sensitive and better-informed passengers around the world are among the factors that have changed the role of airports from mere monopoly infrastructure providers to varied companies competing for traffic and other business opportunities to succeed (Copenhagen Economics, 2012). In addition to airline development, this change has also been prompted by the commercialisation and privatization of airports (Gillen, 2011). Today, commercial airports are multi-business companies simultaneously engaged in aeronautical and non-aeronautical business striving to attract and retain airlines, passengers and any stakeholder who can add value and increase revenue (Forsyth, Gillen, Müller, & Niemeier, 2010; Rotondo, 2019). First, the development of GA operations is essential for airports in rural or peripheral areas to achieve a critical mass of traffic by attracting tourists or developing specialised services such as instructional flights. Second, it permits larger commercial airports to complete their value proposition and address the needs of high-value customers, such as business and luxury travellers. From an aeronautical perspective, GA has similar revenue sources to CA, that is, fees associated with aircraft parking and storage, aviation-related ground, aeroplane detailing and building rent, landing fees and fuel flowage fees. This type of revenue is tied to total movements and aircraft landed weight, therefore revenue generation is highly dependent upon the airport's location and the role of BA, as they influence the number and types of airport users and aircraft. When BA is notable, non-aeronautical revenue increases at ever faster rates than traffic and aeronautical revenue due to contracts with luxury brands paying the lease for selling or advertising their products within the terminal, and the provision of inflight catering and outsourced services, such as hotel accommodation and transport, which are often purchased from partners and then sold to travellers. Additional operating costs are associated with heavier aircraft and outsourced services. This means that GA should generate sufficient traffic to outweigh operating costs and cover the significant capital costs required to build GA infrastructure and meet safety standards. However, it may make sense to subsidise a GA airport to receive broader economic benefits, especially for public airports.

Weisbrod (1990) argued that GA facilities (and improvements to those facilities) provide a range of potential benefits. These can be classified into user benefits (e.g., travel time and operating cost savings and safety improvements) and economic benefits (e.g., business expansion, job and income generation, new business attraction). Weisbroad proposed a framework for evaluating GA benefits from a survey of businesses that use this type of flight service in Massachusetts. Swartz, Donovan, and Clower (2016), after a survey of 146 GA airports in Texas, demonstrated that strong, significant positive relationships exist between airport capabilities (accessibility and infrastructure), airport size (number of employees), airport activity (in terms of operations) and economic activity (referred to the flow of dollars and products associated with the operations being conducted at the airport). Their findings suggest that investment (public or private) in improved airport capability might stimulate increased economic activity directly and indirectly, i.e., by increasing the number and importance of activities taking place at the airport. The General Aviation Manufacturers Association (GAMA), whose primary aim is to foster and advance the general welfare, safety, interests and activities of the GA industry, publishes an official annual report on GA results and future perspectives. This report measures the total economic contribution of GA by aggregating four types of impact: direct (i.e., economic activity within the GA industry), indirect (i.e., economic activity occurring throughout the supply chain associated with GA), induced (i.e., economic activity resulting from household spending of labour and proprietor's income earned directly or indirectly from GA-related activities), and enabled (i.e., economic activity resulting from the visitors' destination expenditures associated with GA flights).

However, while a significant body of research has been devoted to commercial airports, very few studies have examined GA airports and those that have are mainly from a policymaker's standpoint. These studies were basically intended to assist city, county or state officials in planning and allocating public funds for constructing and improving GA facilities (Weisbrod, 1990). Even when analyses were conducted at the airport level, for instance, to develop GA demand forecast models, their primary aim was to drive public investment decisions. In this regard, the GRA, Incorporated, on behalf the Federal Aviation Administration (FAA), created a number of models to forecast the GA activities in order to conduct cost-benefit analyses associated with airport development (GRA, 2001, 2001b, 2011). Baxter and Philip Howrey (1968) were the first to investigate the determinants of county-level GA operations, showing that socioeconomic and demographic variables such as population, personal income, agriculture employment, number of airports and airport quality, which was measured by the fraction of airports with runway lights and paved runway, were significant determinants. Ghobrial and Ramdass (1993) proposed two econometric models that related the number of aircraft operations and number of based aircraft at

GA airports to a number of socioeconomic variables and characteristics of the areas in which the airports were located. Twenty GA airports in the state of Florida were considered in the study. Findings revealed that per capita income, runway length, the fact that a county could be considered as a vacation destination and the presence of military or industrial bases have a significant effect on demand. Ghobrial (1997) extended this analysis by enhancing the structure of the model and using a larger sample of units, i.e., 82 airports in the state of Georgia. Findings showed that the presence of aviation-related services such as avionics, charter flights, rental, repair and crop dusting, as well as the role of the area as a tourist destination, are important factors in determining GA operations. Hoekstra (2000) used a linear regression model to forecast GA operations at small towered and non-towered airports. In particular, he compared data from 127 small towered airports and 129 small non-towered airports in nine states of U.S., and found that the number of based aircraft at an airport, income per capita and the fact an airport was also engaged in commercial services are important demand determinants. Black and Chimka (2011) proposed a new model to improve upon existing models (especially the GRA models), in terms of its ability to estimate total annual operations by GA. They found, among others, that the population within 100 miles contributes to GA operations while the number of certificated pilot schools at an airport has a negative effect. Li and Trani (2014), building on Ghobrial (1997), developed an airport-level GA demand forecast model using as explanatory variables some socioeconomic and demographic factors, the availability of supply factors, the competition from the CA, the number of based aircraft and the presence of a flight school. They found that the relative fuel price, i.e., fuel price compared with personal income, is a significant determinant of airport-level GA demand.

Johnson and Gu (2017) estimated operations at 2284 GA airports in the United States using NPIAS GA airport categories: National, Regional, Local, Basic and Unclassified airports. They found that based aircraft and total operations in the NPIAS categories are different from each other, with the exclusion of Basic airports which cannot be distinguished from Unclassified airports, concluding that the new FAA classification is helpful for improving GA operations. Suau-Sanchez and Voltes-Dorta (2019), in their study of the drivers of scheduled airport traffic in winter tourism regions in Europe, showed that catchment area (measured by population within a short distance to the airport), competition (measured by the presence of nearby airports that can serve as viable substitutes for the airlines), and infrastructure outweigh accessibility to ski resorts as the main drivers of scheduled traffic.

To the best of our knowledge, no study has been conducted to understand, particularly in the context of commercial airports, what the determinants of GA operations are and the relationships between the determinants of GA operations and the strategies, skills and capabilities, and organisational models implemented by commercial airports to succeed in such a business. In particular, more investigation is required on several aspects: critical determinants of GA performance and the relative importance of internal variables (i.e., traffic, type of services and passengers handled by an airport) and external variables (i.e., socioeconomic, demographic and competitive conditions of the area in which an airport is located), airport management's awareness of the role of these determinants and consequent development of ad hoc strategies to succeed in such a business, motivations driving the decision to invest in the GA business for different types of airports, context factors influencing the kind of competitive strategies, skills and capabilities and organisational models required to gain different types of competitive advantage. Therefore, these aspects are now examined through an explorative analysis and a preliminary model of determinants and strategies for gaining a competitive advantage in the GA business is proposed.

3. Methodology

3.1. Airport sample

This paper focuses on the Italian market of GA and, particularly, on all commercial airports that have operated GA services continuously during the period 2007–2018, that is, only the airports recording GA operations in each of the years included in the period investigated. Italy was selected as a significant case because its airport system, despite being in line with the leading European countries in terms of the number of commercial airports related to population and territorial extension, is mainly composed of large regional airports, small regional airports and small local airports scattered across the country, which have a more important role compared to other countries in air traffic (KPMG, 2020). In fact, as revealed by many studies, the geographical features of Italy and its infrastructure inadequacy cause severe issues of accessibility and intermodality (Parlamento Italiano, 2010). This is why the recent *National plan of airports* sets out the development of the GA as a key goal. Airports delivering GA services are deemed to make an essential contribution to community mobility and widespread access to productive areas to the benefit of local business and tourism, although, at the moment, GA operations are slightly fewer compared to other European countries (Ministero delle Infrastrutture e dei Trasporti, 2014). Furthermore, the choice to contextualise the study to the Italian market permitted us to limit regulation and competitive differences among airports (Vogel & Graham, 2013), whereas the selection of the data for 2007–2018 was made to examine the evolution of GA over a sufficient period using the most recent available data.

The final sample comprises 44 airports, since, from the 50 airports involved in GA during the period under investigation, six were excluded as GA airports not operating commercial flights. Airports and their main characteristics are shown in Table 1, and then briefly described.

The Italian airport industry is made up of two large Community airports, i.e., the intercontinental hubs of Rome Fiumicino and Milan Malpensa, seven national airports and many medium- to small-sized airports scattered across the country. In 2018, more than 185 million passengers were handled at the industry level, with Rome Fiumicino and Milan Malpensa alone accounting for more than 40% of the total passengers and the first nine-busiest airports for more than 73%.

Table 1 also shows that almost 70% of the sample airports have mixed public-private ownerships, with a slightly higher percentage of ‘mostly public’ airports (36.36%) than ‘mostly private’ airports (31.82%). Almost 30% of the airports are ‘fully public corporatized’, while only one airport is ‘fully private’. It is important to note that Law no. 537/1993 established the constitution of stock companies for managing airports regardless of the public or private nature of ownership.

Most airport companies (86.36%) hold the so-called ‘total concession agreement’, whereby companies are responsible for both aeronautical and non-aeronautical services, and receive all airport revenues for a maximum period of 40 years. Furthermore, only two companies hold a ‘partial concession agreement’, in which the state is responsible for aeronautical facilities and most related receipts for a maximum period of 20 years. The Pantelleria airport is the only one still controlled by the state, while three commercial airports do not belong to state property. Finally, there are six multi-airport systems (MAS), i.e., Rome, Milan, Venice, Verona, Puglia and Tuscany, in which a single company strategically manages more than one airport, in five cases by a holding company (ADR, SEA, Aeroporto Valerio Catullo, Aeroporti di Puglia and Toscana Aeroporti) and in one case through a controlling interest (SAVE in the case of AerTre). The geographical location of the airports in the sample is shown in Fig. 1.

3.2. Method of analysis

In line with the research aims, an explanatory sequential mixed method was used (Creswell, 2014). First, a quantitative analysis was

Table 1
Sample airports.

N	Airport	IATA code	Airport company	Category(EU classification)	Ownership	Concession agreement	GA operations
1	Rome Fiumicino	FCO	ADR	A	MPRI	T	0.23%
2	Milan Malpensa	MXP	SEA	A	MPUB	T	2.16%
3	Bergamo	BGY	SACBO	B	MPUB	T	3.08%
4	Milan Linate	LIN	SEA	B	MPUB	T	19.80%
5	Venice	VCE	SAVE	B	MPRI	T	4.14%
6	Catania	CTA	SAC	B	FPC	T	1.27%
7	Bologna	BLQ	SAB	B	MPUB	T	14.62%
8	Naples	NAP	GESAC	B	MPRI	T	11.74%
9	Rome Ciampino	CIA	ADR	B	MPRI	T	12.78%
10	Palermo	PMO	GESAP	C	FPC	T	3.26%
11	Pisa	PSA	Toscana Aeroporti	C	MPRI	T	7.58%
12	Bari	BRI	Soc. Aeroporti di Puglia	C	FPC	T	7.69%
13	Cagliari	CAG	SOGAER	C	MPUB	T	7.74%
14	Turin	TRN	SAGAT	C	MPRI	T	13.55%
15	Verona	VRN	Aerop. Valerio Catullo	C	MPUB	T	9.79%
16	Florence	FLR	Toscana Aeroporti	C	MPRI	T	10.81%
17	Treviso	TSF	AerTre	C	MPRI	T	16.08%
18	Lamezia Terme	SUF	SACAL	C	MPUB	T	9.15%
19	Brindisi	BDS	Soc. Aeroporti di Puglia	C	FPC	T	5.63%
20	Olbia	OLB	GEASAR	C	MPRI	T	33.14%
21	Alghero	AHO	SOGEAAL	C	FPC	T	4.48%
22	Trapani	TPS	AirGest	D	MPUB	T	3.40%
23	Genoa	GOA	Aerop. di Genova	D	MPUB	T	28.99%
24	Trieste	TRS	Aeroporto FVG	D	FPC	T	32.03%
25	Pescara	PSR	SAGA	D	FPC	T	27.64%
26	Ancona	AOI	AERDORICA	D	MPUB	T	21.90%
27	Reggio Calabria	REG	SOGAS	D	FPC	T	33.49%
28	Crotone	CRV	Soc. Aeroporto S. Anna	D	MPUB	T	14.49%
29	Perugia	PEG	SASE	D	MPUB	T	36.14%
30	Parma	PMF	SOGEAP	E	MPRI	T	57.21%
31	Lampedusa	LMP	Astaeroservizi	E	FPC	T	4.68%
32	Rimini	RMI	AiRiminum 2014	E	FPRI	T	21.35%
33	Pantelleria	PNL	GAP	E	MPRI	D	3.43%
34	Cuneo	CUF	GEAC	E	MPUB	T	65.52%
35	Bolzano	BZO	ADB	E	FPC	P	87.10%
36	Elba	EBA	AlaToscana	E	MPUB	Private	81.42%
37	Brescia	VBS	Aerop. Valerio Catullo	E	MPUB	T	53.04%
38	Grosseto	GRS	SEAM	E	MPRI	P	58.19%
39	Salerno	QSR	Soc. Aerop. di Salerno	E	FPC	T	68.58%
40	Foggia	FOG	Soc. Aeroporti di Puglia	E	FPC	T	50.75%
41	Villanova d'Albenga	ALL	AVA	E	MPUB	T	87.84%
42	Taranto	TAR	Soc. Aeroporti di Puglia	E	FPC	T	48.43%
43	Aosta	AOT	AVDA	E	MPRI	Private	99.27%
44	Biella	–	SACE	E	MPRI	Private	92.95%

Key *Category*: A: large Community airports (annual passengers >10 million); B: national airports (5 million < annual passengers <10 million); C: large regional airports (1 million < annual passengers <5 millions); D: small regional airports (annual passengers <1 million); E: small local airports (annual passengers <250,000).
Ownership: FPC: Fully Public Corporatized; MPUB: Mostly Public; MPRI: Mostly Private; FPRI: Fully Private.
Concession agreement: T: Total concession agreement; P: Partial concession agreement; D: Direct state control; Private.
GA operations: GA operations on total operations (CA + GA). Average percentage over the period 2007–2018.

carried out on data collected in the field to understand which variables affect GA operations and, in particular, the relative importance of internal and external variables. Second, a multiple-case study was carried out to identify which strategies are developed by market leaders to use those variables as a lever and gain a competitive advantage in such a niche market. The first phase was carried out from September 2019 to July 2020; the second phase from November 2020 to March 2021.

To identify the determinants of GA operations of Italian commercial airports, a panel data analysis running a random effects model was performed. The choice to adopt the random effects model was supported by the Hausman test ($\chi 2 = 16.04$; $p = 0.0985$). The dataset is strongly balanced since all panel members are observed every year and all data were available for the period 2007–2018 (except for passengers flying on long-haul flights, passengers flying on low-cost flights and overnight stays, which referred to the period 2008–2018).

GA operations (GA Ops), including takeoffs and landings at an airport, were selected as the only dependent variable, since they better account for GA performance than passengers.

A considerable amount of data was gathered on both operational aspects of commercial airports, such as traffic size, traffic nationality, traffic seasonality, length of the routes, incidence rates of cargo and low-cost traffics, and environmental aspects of the area in which airports were located, such as potential market size, economic wealth, tourist attractiveness, intensity of competition, and value of tourism demand. Variables were selected purposefully but also on the basis of data availability.

As a result of an explorative data analysis, six indicators were selected as internal independent variables and five measures as external independent variables. The internal variables were measured as follows:

1. Annual commercial passengers flying from and to airports (Com Pax), which is a well-established indicator of airport operational size (Com Pax was preferred over workload units after an explorative data analysis. A workload unit, which is a measure adopted at the international level that helps to uniform the traffic volume of airports characterized by different aeronautical activities, expresses a passenger with baggage or 100-kg cargo);
2. Incidence rate of international passengers on annual commercial passengers flying from and to airports (Int Pax);



Fig. 1. Geographic location of airports.

3. Incidence rate of passengers in the four busiest months of the year on annual commercial passengers flying from and to airports (Seas Pax), which accounts for traffic seasonality;
4. Incidence rate of passengers travelling on extra-European flights on annual commercial passengers flying from and to airports (LH Pax), which accounts for the importance of long-haul flights and the length of the route network;
5. Incidence rate of tons of cargo on annual workload units from and to airports (Cargo), which accounts for the importance of the cargo traffic;
6. Incidence rate of passengers travelling on low-cost flights on annual commercial passengers flying from and to airports (LC Pax), which accounts for the importance of the low-cost market.

For these variables, a unique source of data was used, i.e., the statistical yearbooks issued annually by the Italian civil aviation authority (Ente Nazionale per l'Aviazione Civile — ENAC). Collecting data from a single database served the purpose of using standardized and comparable information on the airport sample.

Then the following external variables, which were believed to have

an impact on GA operations, were selected:

1. The population of the provinces or metropolitan areas in which airports are located (Pop), which accounts for potential market size[1] (Baxter & Philip Howrey, 1968; Black & Chimka, 2011; Suau-Sanchez & Voltes-Dorta, 2019);
2. The unemployment rate of the provinces or metropolitan areas in which airports are located (Unemploy), which accounts for population wealth (Baxter & Philip Howrey, 1968; Ghobrial & Ramdass, 1993; Hoekstra, 2000; Li & Trani, 2014);
3. Overnight stays at tourist accommodation establishments in the provinces or metropolitan areas in which airports are located (OS), which accounts for attractiveness of an area (OS was preferred over tourist arrivals after an explorative data analysis) (Ghobrial, 1997; Ghobrial & Ramdass, 1993);
4. GA operations operated by all competitors (both commercial and general aviation airports) within 150 km (Comp Ops), which account for competitive pressure in GA business (Comp Ops was preferred over the number of airports providing GA services within 150 km and GA passengers flying from and to airports within 150 km after an explorative data analysis) (Li & Trani, 2014; Suau-Sanchez & Voltes-Dorta, 2019);
5. Number of five-star hotels as a proportion of total hotels of the provinces or metropolitan areas in which airports are located (5-Star), which is used as a proxy for the wealth of visitors to a certain area (5-Star was preferred over the number of five- and four-star hotels as a proportion of total hotels of the provinces or metropolitan areas in which airports are located after an explorative data analysis) (Ghobrial & Ramdass, 1993; Suau-Sanchez & Voltes-Dorta, 2019).

In order to have comparable and harmonized information on these aspects, the database of the Italian National Institute of Statistics (Istat) was used as a unique source of data for 'Pop', 'Unemploy', 'OS' and '5-Star', while the statistical yearbook of the ENAC was used for 'Comp Ops'.

Table 2 shows the descriptive statistics for the variables used in the random effects regressions.

Table 2
Descriptive statistics.

Variable	Mean	SD	Max	Min
Independent variables				
Internal variables				
Com Pax	3,409,267.72	6,453,737.25	42,896,831	0
Int Pax	45.12	30.73	100	0
Seas Pax	48.18	23.47	100	0
LH Pax	3.63	8.90	90.34	0
Cargo	5.65	18.46	100	0
LC Pax	40.72	33.02	100	0
External variables				
Pop	906,117.53	987,817.05	4,355,725	6100
Unemploy	10.73	6.06	31.46	2.17
OS	6,623,973.22	8,349,438.86	37,042,454	218,225
Comp Ops	21,347.60	29,581.74	155,648	0
5-Star	1.85	1.73	8.82	0
Dependent variable				
GA Ops	3974.84	4896.94	57,216	0

[1] Italy is divided into 20 Regions, 119 Provinces or Metropolitan areas, and 7926 municipalities. The square kilometres of Provinces and Metropolitan areas range from the 7692.09 of Sassari to the 212.51 of Trieste, while populations range from the 4,342,212 inhabitants of Rome to the 84,379 inhabitants of Isernia.

Once the variables affecting GA operations had been identified, an exploratory multiple-case study was used to understand whether and how market leaders exploit favourable conditions to gain a competitive advantage. In line with the importance of achieving a critical mass of traffic for revenue generation, successful airports are considered those with the highest market share, in terms of air transport movements (ATMs) related to GA, at the country level. Therefore, the selected cases were Milan Linate, Rome Ciampino, Olbia, Bolzano and Biella; that is, the top five Italian commercial airports for GA operations over the period 2007–2018. Other than considering traffic figures, a replication approach was followed to choose the cases. This means that each individual case was carefully selected as it consisted of a whole study (or experiment) used to gather information needing to be replicated by other individual cases. In this regard, the cases served as multiple experiments expected to produce similar results (literal replication) or contrasting results (theoretical replication) according to the different GA activities carried out by airports (Yin, 2003). Similarities and differences among cases, in terms of environment and strategy, were compared through an iterative process during data elaboration to build a theory (Eisenhardt, 1989). In January 2021, the five airports were contacted by email and the executives of the GA business were invited to fill in a questionnaire to assess their awareness of the importance of external conditions for GA business and outline the strategies developed to support those conditions and, consequently, achieve success. In particular, the questionnaire was semi-structured and divided into three sections. The first is an identity section of five questions to collect basic information on the airport, the company and the respondent. The second section is devoted to shedding light on the strategic, competitive and organisational aspects of the GA business and consists of 16 questions (four closed and 12 open). The main investigated topics deal with target customers, type of competitive advantage, resources and capabilities used to gain this advantage, main partners, portfolio strategy, main competitors and future goals. The final section focuses on the impact of the COVID-19 pandemic on the GA business and consists of five questions (four closed and one open). In fact, since the COVID-19 pandemic developed during the first phase of the research, causing, among others, severe impacts on the whole air transport industry and the GA, it was decided to include this issue in the qualitative investigation to gather preliminary evidence. In this regard, respondents were asked to report their perceptions of the effects of COVID-19 on the GA business, the role of GA business in fostering airports' resilience and recovery from the crisis, and the strategic adjustments required to keep addressing customer needs while respecting COVID-19 regulations. The questionnaire was prepared during November–December 2020 and submitted online in February 2021. When necessary, information was supplemented by telephone interviews during which respondents were invited to speak freely and elaborate on their responses. To triangulate data and build a chain of evidence, a document analysis, including annual reports, official reports by industry associations and newspapers was used as an additional source of information. In particular, secondary data mainly referred to operational, competitive and financial performance, as well as investment plans of airports, were used to reinforce the description of the cases and support the findings from the qualitative investigation. Questionnaires were collected during February 2021, and data were analysed by all investigators in collaboration during March 2021. Data analysis was divided into two stages: first, concepts and relationships were identified and compared for each case; second, a cross-case search for explanations and patterns was undertaken in order to set out research propositions.

4. Results

Table 3 presents the results of the quantitative analysis, adopting a random effects method on a panel spanning 2007–2018, as described in the previous section. The first column lists the independent variables and the second column reports the results related to the dependent

Table 3
Results of the quantitative analysis.

	GA Ops
Independent variables	
Internal	
Log (Com Pax)	−294.0
	(263.9)
Int Pax	−1.257
	(9.024)
Seas Pax	3.994
	(6.256)
LH Pax	−14.62
	(27.94)
Cargo	−3.054
	(26.82)
LC Pax	−2.162
	(8.215)
External	
Log (Pop)	548.4
	(705.2)
Unemploy	−120.8**
	(47.60)
Log (OS)	388.5
	(544.8)
Log (Comp Ops)	711.3**
	(281.6)
5-Star	415.6*
	(246.8)
Constant	−12,391
	(9659)
Observations	438
Number of N	42
chi2 (p-value)	25.82
	(0.0006)

Random effects model; Standard errors in parentheses; Stat. Sig. * p < 0.10, ** p < 0.05, *** $p < 0.01$.

variable of GA operations. The results indicate that the unemployment rate of the area in which airports are located, the GA operations of competitors and the percentage of five-star hotels of total hotels of the area in which airports are located exert a statistically significant effect on an airport's GA operations. In particular, the unemployment rate has a negative influence ($p < 0.05$), whereas competitors' GA operations and five-star hotels have a positive influence ($p < 0.05$ and $p < 0.10$, respectively). This confirms that external variables matter more than internal variables in determining GA operations. In fact, only the population wealth, the intensity of competition in GA business and the wealth of the tourism segment turned out to be associated with GA traffic.

As these external variables can be seen as key pre-conditions to developing GA operations, the qualitative investigation aimed to understand how market leaders exploit them to gain a competitive advantage in GA business. The following subsections present the cases separately, with main findings summarized into two thematic matrix displays in order to facilitate cross-case analysis (Miles, Huberman, & Saldana, 1999). Table 4 illustrates the competitive strategies developed by airports and Table 5 the impact of COVID-19 on the GA business and airport responses to the crisis.

4.1. Milan Linate 'Enrico Forlanini' airport

Milan Linate is by far the first-ranked Italian airport for GA traffic, with an average of 24,652.58 operations over the period 2007–2018 (21,314 in 2018). In 2019, Milan Linate's GA was involved in four out of five top airport pairs in the country, including the busiest route with Rome Ciampino (1210 flights).

The GA business is managed by SEA Prime SpA, a sub-company of the holding SEA SpA, which controls both commercial airports of Milan (Linate and Malpensa). It also holds 30.98% of shares of SACBO SpA, the company controlling the airport of Bergamo (which handled 12,827,267 commercial passengers in 2018, ranking third at a country level). SEA Prime manages all airport infrastructures dedicated to GA at Milano Linate and Milano Malpensa, which together constitute the fifth GA airport system in Europe, with almost 26,000 operations in 2018. In particular, the experience gained at Linate is used by SEA Prime as a base for the development of the GA business at Malpensa, in order to complete accessibility for passengers and operators to the city of Milan and Lombardy.

Through a recent complete review of the business model, the management has been able to take advantage of the external environmental opportunities. In fact, Milan Linate has a unique location, i.e., it is less

Table 4
Competitive strategies of market leaders.

Airport	Milan linate	Rome ciampino	Olbia	Bolzano	Biella
External variables	Population, wealth, tourist attractiveness	Wealth, tourist attractiveness, political centre	Attractiveness for luxury tourists	Wealth, tourist attractiveness	Wealth, entrepreneurial vitality, competitive pressure
Target customers	Mix of business and leisure passengers, mainly European	Mix of leisure passengers, business passengers and politicians	International luxury travellers	Mix of business and leisure passengers, mainly international	Flight training attendees, national and local
Strategy	Broad differentiation advantage	Cost advantage and sustainability	Focused differentiation strategy	Cost advantage	Focused differentiation strategy (specialisation)
Resources, skills and capabilities	Unique location, knowledge of airport operations, advanced training in safety operations, advanced skills in welcoming and managing luxury travellers	Unique location, efficiency and customer care	Unique location, advanced skills in welcoming and managing luxury travellers, flexibility	Unique location, efficiency and quality	Knowledge and capabilities in the field of flight training
Types and levels of collaboration	Key aeronautical activities are internalized	Operational relationships within the supply chain	Internalisation and commercial partnerships	Full internalisation	Internalisation and partnerships with the Ministry of the Interior, other aeroclubs and providers of air communication and electronic systems
Portfolio strategy	Legal and operational separation	Complementarity and integration	Legal separation with operational integration	No separation	No separation
Main competitors	None in the catchment area	Other types of transport	In the future, other luxury destinations	Lack of direct competition	Low competition from other aeroclubs and private schools
Future goals	Increasing sustainability, capacity and quality	Exploiting market potential and reinforcing sustainability to boost profitability	Finding new ways to increase the value of customer services	Maintaining a leadership in GA while increasing CA traffic	Expanding the business by means of a better intermodality

Table 5
COVID-19 pandemic and the GA business.

Airport	MILAN LINATE	ROME CIAMPINO	OLBIA	BOLZANO	BIELLA
COVID-19 impact on GA	Medium in terms of both traffic and revenue	Medium in terms of traffic, high in terms of revenue	Medium in terms of traffic, high in terms of revenue	Medium in terms of both traffic and revenue	High in terms of both traffic and revenue
GA contribution for recovery from the crisis	Medium to high	Medium to high	High in terms of both traffic and profits, especially in the off-peak season	Low due to airport's characteristics	Medium to high
Reasons	GA has undergone fewer restrictions, traffic has been less affected because of customer characteristics, high safety standards more easily provided to customers	Easier to ensure safety conditions, possibility to reach destinations not covered by scheduled flights	Better safety conditions, small number of passengers per flight, increased willingness of wealthy people to fly private, increased request from luxury villa owners in the off-peak season	GA has undergone fewer restrictions	Better safety conditions
Strategic adjustments	Flow management techniques to separate passengers	Increased operational flexibility	Increased safety standards, stronger collaboration with border police and healthcare authorities, new office devoted to facilitating administrative procedures and ensuring compliance with COVID-19 regulations	None	Tight cost control and marketing investments

than seven kilometres from the city centre and serves a large catchment area characterized by wealth and high tourist attractiveness. The respondent points out that the GA's customers are a mix of business and leisure travellers, two thirds from Europe and one third from non-European countries. GA passengers are mostly interested in taking part in some of the many exhibitions and events organized in Milan or its surrounding area.

Consequently, the management has opted for a differentiation strategy based on a full range of high-quality services tailored to its customer segment's needs. These include exclusive lounges, parking lots, meeting rooms and VIP services dedicated to aircraft, passengers and crews available 24 h a day, as maintenance, conciergerie, border control facilities, catering, limousines and tax-free services.

As stated by the respondent, key processes for success are operational coordination and terminal management. This is why some key aeronautical activities, such as aircraft ground handling and hangar parking, which require tighter control over service quality, are directly provided by SEA Prime. Other services, such as additional handling services and maintenance, are outsourced. The company differentiates its value proposition through unique resources and capabilities, such as the knowledge of airport operations, advanced training in safety operations and advanced skills in welcoming and managing luxury travellers. The unique location and, especially, the company's skills, are the reasons for a substantial lack of real competitors in the catchment area. Within 150 km from the airport there are the highest volumes of competitors (12.92 airports providing GA services on average over the period 2007–2018, about 58% of which are commercial airports) and traffic (about 76,157 average GA operations over the period 2007–2018). However, the respondent clarifies that Milan Linate only experiences weak competitive pressure from a few airports in Northern Italy. Another factor is the decision to run the GA business as a separate entity, from both a legal and a managerial point of view: a sub-company directed by a Chief Executive Officer and General Director, composed of 43 employees, is dedicated to GA, whose activity is based at a specific terminal. Ultimately, the GA business is viewed as incompatible with the CA business and integration between the two exists only in relation to a small number of administrative activities. The GA business accounts for less than 5% of the total revenue of SEA Prime. The management has set out three objectives to further develop the business in the future: increasing sustainability (electric mobility and biofuels), capacity (new hangars) and quality through new investments.

The respondent reports that COVID-19 pandemic has had a medium impact on both traffic and revenue related to GA. The leadership has helped Milan Linate airport to tackle the effects of the crisis, mainly because GA has undergone fewer restrictions and traffic has been less affected because of customer characteristics, for instance, in terms of higher propensity to travel during troubled times. Furthermore, as a niche market, high safety standards can be more easily provided to customers. However, other than usual actions taken to ensure compliance with COVID-19 regulations, such as temperature measurement, sanitization of buildings and common areas, and social distancing, some other strategies have been used to increase the effectiveness of GA business during the crisis, such as the separation of passengers through the introduction of flow management techniques.

4.2. *Rome Ciampino 'Giovan Battista Pastine' airport*

The GA business in the airport of Rome Ciampino is directly run by Aeroporti di Roma Spa (ADR), the holding company in charge of managing both the commercial airports of Rome, i.e., the large community airport of Rome Fiumicino, approximately 20 miles from the city centre, and the national airport of Rome Ciampino, whose short distance from the centre (about 7.5 miles) earns it the qualification of city airport. Whereas Rome Fiumicino is by far the first-ranked Italian airport in terms of commercial passengers (42,896,831 in 2018) and, as a large intercontinental hub, transit passengers (94,225 in 2018), Rome Ciampino is mainly devoted to short-haul international connections (96.1%, about 99.98% of which are operated by low-cost carriers) and GA flights. In particular, in 2018 Rome Ciampino recorded 8987 GA operations, ranking fourth among Italian commercial airports and eighth when also considering GA airports. In line with the national trend, more than 50% of Ciampino's GA traffic is commercial, which excludes private flights while, differently from the Italian average, 50% of its traffic is domestic. Ciampino's GA connects 626 airports and is involved in five of the country's top ten airport pairs, including the busiest route, i.e., that connecting Ciampino with Milan Linate.

The management is aware that some external variables incentivize the GA business in the area, such as the wealth and the huge tourist traffic in Rome, and the fact that the city is the political-administrative centre of the country. Two elements are viewed as key for the airport's success: the location, due to the closeness to the 'Grande Raccordo Anulare' ring road, and the ease of access for both the business and premium leisure segments. This is why no other airport, in the opinion of the respondent, is viewed as a competitive threat while alternative types of transport represent the main competitors. Only 2.58 airports within 150 km, on average, have provided GA services over the period 2007–2018 (only one of them being a commercial airport), for a total of about 27,500 operations, on average, over the same period.

Therefore, specific strategies have been developed to address the needs of high-end tourism and representatives of government and institutions. From a structural perspective, a huge restructuring programme aimed at enhancing the overall experience of GA customers was

completed in 2017. The size and comfort of the GA terminal have increased with the use of high-quality design, materials, furniture and a new hospitality lounge. In particular, an innovative sustainable approach has been adopted to differentiate the airport's value proposition from the others, consisting of the isolation of the terminal's envelope, the use of recyclable materials and more energy efficient technical systems, which earned the building the Leadership in Energy and Environmental Design (LEED) Gold certification.

From an operational perspective, GA is strongly integrated with the business portfolio of ADR and complementary to CA, but a 'Head of Aviation Business Development' has been appointed to manage the GA terminal and coordinate many actors. The GA services are provided through a set of partnerships with handlers and operators. The respondents claims that the cornerstones of success are efficiency and customer care, which are achieved through high flexibility and rapidity of processes. He adds that, in the future, the company aims to support the high growth potential of the Rome market and to reinforce sustainability as a way to boost profitability.

The respondent also reports that COVID-19 has had a medium impact on the total GA traffic but a strong impact on revenue. However, the airport's leadership in the GA business has been important and will be more so in the future, for recovering from the financial crisis due to the pandemic. The reason is twofold: first, GA is a niche market in which it is easier to ensure safety conditions; second, because it permits passengers to reach several destinations that are not currently operated by scheduled flights.

From a strategic point of view, the company's capabilities were crucial to tackling the crisis and still satisfy the target customers' needs. The high operational flexibility facilitated service adaptation and compliance with anti-contagion policies.

4.3. Olbia Costa Smeralda airport

A dedicated company, the Eccelsa Aviation Spa, which is totally owned by the holding company controlling the airport of Olbia Costa Smeralda (Geasar Spa), has been created to manage the GA business. Olbia airport is a unique, more than a rare case in the Italian setting of an airport created by a private actor who still represents the majority shareholder. In 1974, the opening of a new airport was the last step of a huge long-term plan, started in 1961, through which a small group of wealthy foreign entrepreneurs, headed by the Ismaili Prince Karim Aga Khan, created the 'Costa Smeralda', a 'vacation paradise' of 55 km of coast located in the North-Eastern part of Sardinia. This aimed to satisfy the world aristocracy of beauty, elegance, intelligence and wealth by bringing together structures and service of the highest quality while protecting the natural environment. Since the beginnings, GA was conceived as the main means to satisfy these target customers' travelling needs. In 2018, with 11,544 GA operations, Olbia airport ranked second at a country level, while over the period 2007–2018, with 10,230.33 average operations and 21,174 passengers, it was fourth among commercial airports. Considering that, over the same period, it had an annual average of 2,075,869.83 total passengers, it is also the airport in which the GA business exerts by far the highest impact on the overall aviation performance among airports still involved in CA. With 640 flights in 2019, Olbia - Nice Côte d'Azur was the third-busiest GA route among those involving Italian airports.

The management is well aware that the first reason for the GA's success is being the main gateway to the 'Costa Smeralda' for the rich tourists staying in luxury villas, yachts and five-star hotels. In this regard, the respondent says that the target customers are leisure wealthy travellers, mainly foreigners, who fly privately for holiday and business. The management has adopted a focused differentiation strategy, offering unique features to fulfil the demands of the narrow market of luxury consumers. A wide range of top-quality, highly customized services is arranged to address the customers' needs. From an aeronautical point of view, every type of technical service and board service is provided for all types of aircraft, with particular attention for large aircraft, which represent the most served and remunerative. On the ground, luxury reception services, catering (via the dedicated sub-company Cortesa), flight crew handling and laundry services are directly provided by the company. Hotel accommodation, tourist services such as car, helicopter, yachts or bike rentals, taxi, or other services such as luxury sport cars, fresh flowers, international newspapers or ice are provided through collaborative partnerships. The terminal's premises are rented to luxury shopping boutiques (including Bombardier, Rolex and Karasardegna) and alliances are also used to provide travel services such as aircraft rentals and aeronautical insurance and fiscal services. Over time, partners have turned to customers for many services, such as technical assistance and maintenance.

The respondent points out that human resources are the key to success via advanced language skills and luxury customer relationship skills. In particular, staff are highly trained from a technical, psychological and emotional perspectives to manage this customer segment. Conversely, the respondent sees the poor specific training of external personnel involved in certain processes (for instance, border or finance police personnel and customs officers in charge of control activities) as a critical element, which may affect overall service quality. In the summer, which is the peak period, Eccelsa has over 50 workers (80 when considering partners' staff).

Although being a separate entity under the control of a General Manager, the GA business is integrated as much as possible in Geasar's portfolio, as revealed by the strong relationships with the other subcompanies of the group and the fact that the President of Eccelsa is also the CEO of Geasar.

Due to its location advantage, no other airports are currently considered by the respondent as a credible threat, although new luxury destinations and, consequently, competitors, could emerge in the future. There is only one current competitor within 150 km, but it has very low traffic (about 583 average operations over the period 2007–2018). The unique target market and the difficulty of replicating quality standards are also the reasons why an expansion strategy to other airports was first proposed and then abandoned, at least for the moment.

In a context of general traffic reduction and miscommunication related to Sardinia's situation due to the COVID-19 pandemic during the summer, the GA business has achieved good results compared to both national and international markets. Despite decreasing traffic from the Middle East and the United States, passengers from Italy and Europe have consistently grown and movements from September to December 2020 have increased by 35% on average compared to 2019. However, although total passengers decreased by 22%, total revenue fell by 50% due to the prevalence of smaller aircraft.

Ultimately, due to its high flexibility, in the opinion of the respondent the GA business has strongly contributed to the recovery of the Olbia Costa Smeralda airport from the COVID-19 pandemic, in terms of both traffic and profits, especially in the off-peak season. The main reasons have been the possibility to guarantee better safety conditions and the small number of passengers per flight, who usually belong to the same family, as well as the increased willingness of wealthy people previously flying commercial to fly privately. The GA business has captured the request from luxury villas' owners to reach their properties several times a year, to benefit from more comfortable and safe living conditions. This shift in customer behavior has had a strong impact on the company's profitability, as explained by a break-even point that reduced from around two million passengers in 2019 to around one million passengers in 2020. From a strategic perspective, increased safety standards, stronger collaboration with border police and healthcare authorities, and the creation of a new office devoted to assist passengers, even before departures, by facilitating administrative procedures and ensuring compliance with COVID-19 regulations, have been used to increase GA business effectiveness.

4.4. Bolzano-Dolomiti airport

The airport of Bolzano-Dolomiti, founded in 1926, is located five kilometres away from the centre of Bolzano, the capital city of the independent Province of the same name. The airport has been managed by the ABD Airport S.p.A., created and totally owned by the Province until 2016, since 1992. The privatization of the company followed a referendum that stopped the proposal of a public-funded development plan. Since the beginning, the Province carried out a number of refurbishments and renovations to make the airport competitive in both commercial and general aviation. However, scheduled flights have dramatically dropped over time (38,695 average commercial passengers over the period 2007–2018, and 7885 in 2018) due to the strong competition by Verona, Milan Malpensa, Innsbruck and Monaco airports. This is why, as reported by the respondent, the company has gradually focused on the GA business, which has flourished over the period 2007–2018 (about 11,287.42 average operations). In 2018, the Bolzano-Dolomiti airport ranked third among Italian commercial airports and fifth when also considering GA airports in terms of traffic (11,475 GA operations).

A key role in the success of GA has been played by external factors such as the wealth of the area, its tourist attractiveness and the high spending power of its tourists. Most of GA passengers are international and distributed equally between leisure and business segments. Actually, ABD Airport has not developed a real strategy to exploit these external factors better and the airport location is viewed as the main element of differentiation. The lack of direct competition is revealed by medium-to-low GA traffic by competitors within 150 km (about 16,443 average operations over the period 2007–2018) and no commercial airport operating GA flights in the same area (only four GA airports have offered services occasionally). The respondent confirms that the main competitors are Verona and Innsbruck airports. Then, he argues that efficiency and quality of airport operations, due to a highly qualified staff, are the main capabilities through which key processes, which include all types of handling, are carried out. Furthermore, processes are fully internalized and there is no separation between GA and CA in terms of infrastructures, operations and employees. At the moment, GA accounts for about 55% of total revenue, while the future aim is to maintain a leadership in GA while increasing CA traffic.

The COVID-19 pandemic has had a medium impact on both GA traffic and revenue. Due to the airport's orientation towards providing cost-efficient GA services, it is believed by the respondent that the leadership in the business has not been so important for tackling the crisis, nor will be in the future. In fact, although GA has undergone fewer restrictions than CA, production costs have significantly increased to comply with COVID-19 regulations. In such a situation, no other strategic adjustments have been used to increase the effectiveness of GA business in addressing customer needs.

4.5. Biella-Cerrione 'Pietro Venanzi' airport

Biella airport is about 10 km from the city and is managed by the SACE SpA, whose majority shareholder, since 2016, is a private company involved in the business of flight training (Air Vergiate srl, which holds 91.16% of shares). Although having always been open to CA, it has not recorded commercial traffic since 2015. However, it has consolidated a leadership position in the GA business with about 11,337 average operations over the period 2007–2018, which makes it the second-ranked commercial airport at a country level.

The characteristics of the context, namely the wealth, the entrepreneurial vitality and the presence of many airport competitors, has convinced Air Vergiate to invest in and develop the airport by adopting a focused differentiation strategy, i.e., strong specialisation in air school activities. The airport, as reported by the respondent, has been viewed as an ideal setting for exploiting the company's advanced knowledge and capabilities in the field of flight training and, consequently, producing positive effects on the surrounding area in terms of attractiveness and valorization. Air Vergiate is the first professional school certified by the *European Union Aviation Safety Agency* (EASA) in Italy and has high skills in supporting air school activities. The main product is aircraft handling and maintenance (in particular, the company obtained a Part 145 Certification by EASA), delivered through a fully internalized process. The respondent points out that the main partners are the Ministry of the Interior, other aeroclubs and Leonardo, an Italian company leader in air communication and electronic systems at the international level. Then, that the customers are mainly national and local, whereas the main competitors are other aeroclubs and private schools, none of which, however, owns an airport. The ability to address the needs of such a niche customer segment is the key to gaining a competitive advantage in an area characterized by high competition, as revealed by the average presence of 10.74 airports within 150 km providing GA services for an average of about 82,190 operations over the period 2007–2018 (the third-highest values at a country level). A further expansion of the GA business, which is constantly growing in terms of revenue, is associated with a better intermodality, for instance, in terms of an improved connection with the highway.

The COVID-19 pandemic has had a significant impact on both GA traffic and revenue. However, the leadership has increased Biella airport's resilience during the crisis. In the opinion of the respondent, the main reasons are, first, the fact that such a niche market permits the provision of higher safety conditions compared to CA and, second, some slight adjustments in the strategy of the company. In order to respond to business disruption and adapt to COVID-19 regulations, the company paid more attention to cost control for ensuring effective cost reduction in all aspects of the business, while investing more resources in marketing to attract more customers.

5. Discussion

The findings of the quantitative investigation and the patterns that were observed across the cases allowed us to draw inferences regarding determinants of GA operations, strategies developed by commercial airports to gain a competitive advantage in GA business and the importance of GA business for tackling the crisis caused by the COVID-19 pandemic. These inferences were turned into eight theoretical propositions, which are presented below.

The quantitative investigation revealed that some external conditions can be seen as pre-requisites to running GA business successfully. In particular, the wealth of the population, the wealth of the tourist segment attracted to the area and the competitive pressure of other airports providing GA services are key determinants of the number of GA operations at a commercial airport. Furthermore, the three variables are closely related to each other. Population wealth is a measure of both citizen spending power and entrepreneurial vitality of a certain area, which increase the propensity to use a high-value product such as a GA flight. This finding confirms that the economic conditions of an area matter for GA traffic, as shown, although in the context of GA airports, by Baxter and Philip Howrey (1968), Ghobrial and Ramdass (1993) and Hoekstra (2000), who all considered per capita income as a measure of population wealth. In addition, personal income in relation to fuel price was found to be a significant determinant of airport-level GA demand by Li and Trani (2014), while in the forecasting model developed by Ghobrial (1997), the demand of GA activities was inelastic with respect to total employment.

Being located within a luxury destination further increases GA operations, since luxury travellers represent a niche segment with high spending power who usually fly privately for holidays and business. This finding extends the existing theory, since previous studies have assessed the importance of tourist attractiveness for GA activities (Ghobrial, 1997; Ghobrial & Ramdass, 1993), but none has focused on different tourism market segments.

Population wealth and high-value tourism, in turn, increase the

attractiveness of the GA business and, consequently, the number of competitors striving for success in a certain area. This is in line with Baxter and Philip Howrey (1968), who showed that the number of airports is a significant determinant of GA operations and, considering that the number of airports is a proxy of the price (i.e., the cost involved in travelling to and from an airport), also that price effects are significantly stronger than income effects. However, this finding contrasts Suau-Sanchez and Voltes-Dorta (2019) who, in the context of small airports serving European winter tourism destinations, found that the number of airports in the catchment area has a negative impact on scheduled traffic. As explained in the following, we argue that competitive pressure is often an incentive to differentiate an airport's value proposition from that of contiguous competitors in order to achieve a higher market share.

Our quantitative analysis also confirms, similarly to Ghobrial and Ramdass (1993) but differently from Baxter and Philip Howrey (1968) and Black and Chimka (2011), that the size of the catchment area, in terms of population, does not affect GA traffic. In addition, the investigation contributes to a better understanding of the scarcely researched relationship between CA and GA activities. Hoekstra (2000) found, with reference to small airports, that being an airport certified for commercial services is among the important demand determinants. In contrast, we showed that CA operations have no significant impacts on GA operations.

Proposition 1. Some external variables (population wealth, competitive pressure and high-value tourism) impact on GA performance, in terms of operations.

The cross-case analysis revealed that commercial airports dominating the market are well aware of the pre-conditions facilitating GA business and, consequently, develop consistent strategies, skills and capabilities and organisational models to support them. However, different rationales drive the decision to invest in the GA business. For large commercial airports, enhancing GA is a means to diversify the aeronautical business and enrich their overall value proposition, which is a compulsory choice in today's competitive scenario. This motivation is even stronger for airport companies controlling MAS, such as Milan Linate and Rome Ciampino, which use GA business as a way to both generate additional revenue streams and increase overall efficiency. Conversely, small airports finding it difficult to run CA business successfully, either because of competitive pressure or a peripheral location hindering continuity of service, such as Bolzano and Biella, see GA business as a way to ensure the financial viability of the company.

Proposition 2. Market leaders are aware of the external variables affecting GA operations and develop ad hoc strategies, skills and capabilities, and organisational models to turn them into a competitive advantage.

Proposition 3. For large commercial airports, GA represents an essential opportunity to diversify their business, whereas for small commercial airports, it represents a way to respond to competitive pressure in CA.

Competitive pressure is also a significant driver of the choice to pursue either a differentiation or a cost advantage strategy. Commercial airports facing high competition are more likely to instil uniqueness to their value proposition in order to better address customer needs and outperform competitors. The differentiation strategy can be either broad (e.g., Milan Linate) or focused (e.g., Olbia and Biella), depending on the number and type of customer segments the value proposition is offered to. It is important to evaluate the competitive pressure in relation to both the catchment area, measured by the number of potential competitors and current operations (e.g., for Milan and Biella airports), and more distant areas attracting the same type of travellers (e.g., other luxury destinations, for Olbia). Conversely, in less competitive settings, commercial airports have limited chances of increasing traffic and losing market share. Therefore, they tend to develop strategies aimed at improving efficiency and controlling costs to increase profit margins (e.g., Rome Ciampino and Bolzano).

Proposition 4. Commercial airports located in highly competitive settings are prone to developing differentiation strategies, whereas those located in low competitive settings are prone to developing cost strategies.

Unique location stands out as the main resource behind the strategy of market leaders. However, successful airports also add specific skills and capabilities, which vary in relation to context characteristics and, consequently, type of competitive advantage that is pursued. In the case of differentiation strategies aimed at gaining an advantage in highly competitive settings, commercial airports develop high skills in luxury passenger management, flexibility and service customization (e.g., Milan Linate and Olbia) and technical competencies (e.g., Biella). In the case of cost strategies aimed at gaining an advantage in less competitive settings, commercial airports develop high skills in resource use, service quality and reliability (e.g., Rome Ciampino and Bolzano).

Proposition 5. At the airport location, which represents its main resource, market leaders join specific skills and capabilities depending on the context and the type of competitive advantage.

Commercial airports run the GA business differently, from both a managerial and organisational point of view, depending on the type of competitive advantage that is pursued. A differentiation advantage is mainly associated with the decision to run GA separately from CA (e.g., Milan Linate) or, at most, achieve a low level of integration between them (e.g., Olbia, in which integration refers to certain operational and administrative aspects). The rationale behind this decision is that more independent strategic management, dedicated resources and facilities enhance the uniqueness of the value proposition. Conversely, pursuing a cost advantage is mainly associated with the decision to fully integrate GA and CA, since the two services are viewed as complementary businesses of an airport's portfolio. Their combination, in terms of strategies, resources and processes, is conducive to higher efficiency (e.g., Rome Ciampino).

Proposition 6. Market leaders pursuing a differentiation advantage manage GA as a separate business, whereas market leaders pursuing a cost advantage fully integrate GA and CA businesses.

Although the COVID-19 pandemic has had a strong impact on GA activities, being a leader in the market has fostered airports' resilience and recovery from the crisis. This positive effect is mainly due to the facts that GA has undergone fewer restrictions than CA, that propensity to fly is higher for GA travellers compared to CA travellers, and that in such a service it is easier to ensure high safety conditions. It is worth noting that the airports pursuing a differentiation strategy, which aims to offer a unique value proposition to customers characterized by high expectations and many alternatives of choice, have introduced more devices and solutions and invested more resources for securing the GA business effectiveness and maintaining a leadership position. Examples include flow management techniques in the case of Milan Linate, a dedicated office to facilitate compliance with COVID-19 regulations in the case of Olbia and new investments in marketing in the case of Biella.

Proposition 7. The leadership in the GA business contributes to recovering from the COVID-19 crisis.

Proposition 8. Airports pursuing a differentiation advantage make more strategic adjustments to secure GA business effectiveness.

The eight theoretical propositions are summarized in the model shown in Fig. 2 and briefly explained below. The model suggests that some external variables have a primary role in determining GA operations (P. 1). However, airport management must recognise them and develops consistent strategies to gain a competitive advantage (P. 2).

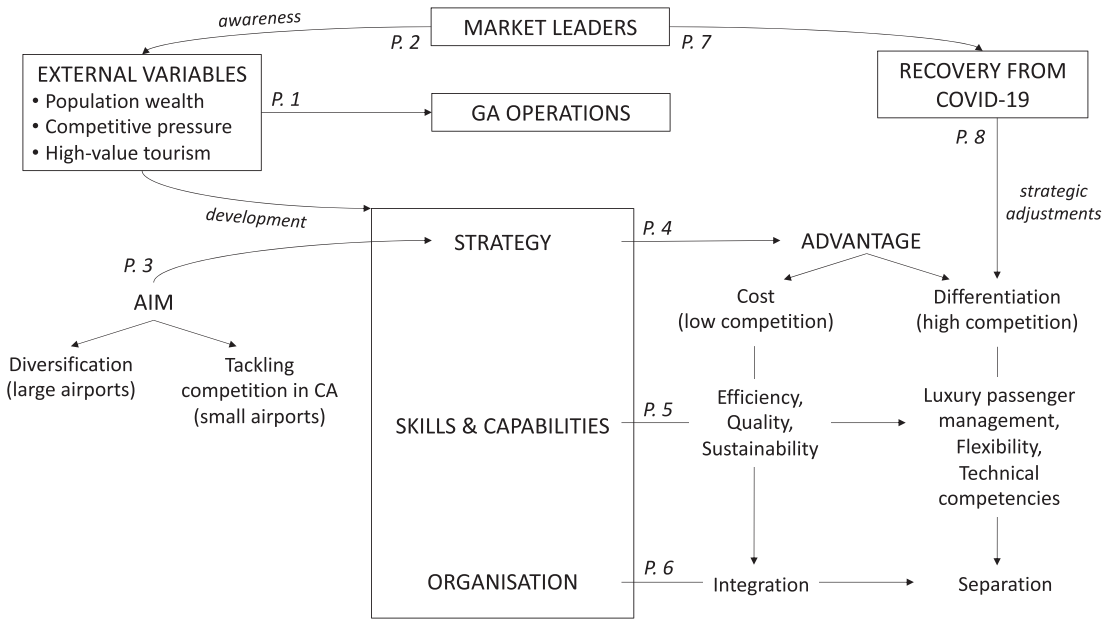


Fig. 2. A model of determinants and strategies for gaining a competitive advantage in the GA business.

Different motivations drive the decision to invest in GA for large and small airports: the first ones aim to diversify their business while the second ones aim to tackle competition in CA (P. 3). The level of competition influences the type of strategy adopted by the airports since high competition is associated with cost strategies while low competition with differentiation strategies (P. 4). Consistently with the competitive pressure and the type of strategy, the airports develop ad hoc skills and capabilities (P. 5) and organisational models (P. 6). In general, being a leader in the GA market in terms of operations contributes to recovering from the COVID-19 crisis (P. 7). In particular, adopting a differentiation strategy requires more strategic adjustments for securing airport leadership in the GA business (P. 8).

6. Conclusion

This paper aimed to examine the determinants of GA operations and, consequently, identify which strategies are used by commercial airports to gain a competitive advantage in such a business. In particular, our analysis provides an answer to two research questions. First, it shows that the population wealth, the competitive pressure and the high-value tourism in the area in which commercial airports are located are key determinants of GA operations. Consequently, it points out that external variables are more important than internal variables, such as CA traffic, type of services and type of passengers handled by an airport, in influencing GA operations. These findings clarify that the decision to invest in the GA business should be driven by the presence of certain socio-economic characteristics in the area surrounding the airport. However, these characteristics are merely pre-conditions of success. Wealthy areas and high-value tourism destinations inevitably attract a large number of competitors in the business. Airports, therefore, have to turn such determinants into a competitive advantage by developing ad hoc strategies, skills and capabilities, and organisational models. The patterns observed across the cases confirm a relationship between determinants and strategies, skills and capabilities, and internal organisational models used by market leaders for achieving success in the GA business. We developed a set of propositions to present these relationships, summarized in a preliminary model of determinants and strategies for gaining a competitive advantage in the GA business. This model also considers the impact of COVID-19 on the GA business, the role of GA business in fostering airports' resilience and recovery from the crisis, and the strategic adjustments required to secure GA business effectiveness during the crisis.

Alongside this theoretical contribution, this study has relevant implications for practitioners. First, it helps airport management to understand when it is worth investing in the GA business and how, i.e., which strategies, skills and capabilities, and organisational models are likely to lead to success depending on the environment. Furthermore, it provides insight into the appropriate portfolio strategy to manage CA and GA businesses effectively. The findings support policy makers for the purposes of industry planning, as they show that GA opportunities should be considered in identifying the role an airport may have for recovering efficiency and competitiveness of air transport at country level. Since GA represents an important option to diversify or specialize the aeronautical business, specific policy regulations and resources could be devoted to promoting such a business so as to relaunch uncompetitive airports.

The limitations of this study pave the way for future research. First, the current analysis is context-specific, therefore it needs to be replicated in other countries to test the preliminary model that has been proposed. The selection of variables influencing GA performance was conditioned by the availability of data. The extension of the investigation to other national settings could allow us to include new variables as possible determinants of GA activities, in order to build a more robust and comprehensive theory of determinants and strategies for gaining a competitive advantage in the business. Finally, although this paper provides some preliminary findings on the impact of COVID-19 and the strategies developed by airports to tackle its adverse effects, this issue needs further investigation over a prolonged period.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authorship statement

All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated sufficiently in the work to take public responsibility for the content, including participation in the concept, design, analysis, writing, or revision of the manuscript.

Furthermore, each author certifies that this material or similar material has not been and will not be submitted to or published in any other publication before its appearance in the Research in Transportation Business and Management.

Declaration of Competing Interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Acknowledgements

All persons who have made substantial contributions to the work reported in the manuscript (e.g., technical help, writing and editing assistance, general support), but who do not meet the criteria for authorship, are named in the Acknowledgements and have given us their written permission to be named. If we have not included an Acknowledgements, then that indicates that we have not received substantial contributions from non-authors.

This statement is signed by all the authors (a photocopy of this form may be used if there are more than 10 authors):

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