



AALBORG UNIVERSITY
DENMARK

Master Thesis

A regional strategy for Bergamo Orio al Serio

ANDREA GROTTTO

Aalborg University
Urban Planning & Management
June 2019

Index

List of figures

Abstract

Introduction

1. Research design

2. Literature review

2.1 The aviation trends

2.2 The impact of airports

2.2.1 *Airport-led development*

2.2.1.1 Spatial development

2.2.1.2 Economic development

2.2.1.3 The debate around airport-led development

2.2.2 *The airport and the territory*

2.2.2.1 Accessibility and multimodality

2.2.2.2 The environmental impact

2.3 Conceptualize the new airport area

2.3.1 *Airport governance*

2.3.2 *The urban models*

2.3.2.1. The weaknesses of the models

2.3.3 *The role of the airport in the regional transport network*

3. Analytical framework

4. The Case: Bergamo Orio al Serio Airport

4.1 The airport and its activity

4.1.1 *The physical dimension*

4.1.2 *The operational dimension*

4.1.3 *The growth of the airport*

- 4.1.4 *The role of Ryanair*
- 4.1.5 *The role of the airport*

4.2 The context of the airport

- 4.2.1 *The territorial context*
- 4.2.2 *The process of transformation of the territory*
- 4.2.3 *The land use*
- 4.2.4 *The economic impact*
- 4.2.5 *The accessibility of the airport*

4.3 The stakeholders

- 4.3.1 *Economic actors*
- 4.3.2 *Direction and control of activities actors*
- 4.3.3 *Territorial actors*

4.4 The framework of the planning instruments

- 4.4.1 *The transportation planning*
- 4.4.2 *The ordinary general planning*

5. Analysis

5.1 The main conflicts around Bergamo Orio al Serio Airport

- 5.1.1 *Air traffic forecasts*
- 5.1.2 *The vision and the strategy*
 - 5.1.2.1 *The strategy of the main planning instruments*
 - 5.1.2.2 *The strategy of SACBO*
 - 5.1.2.3 *The strategies of the customers of the airport*
- 5.1.3 *The airport in the regional transportation network*
- 5.1.4 *The environmental impact*

6. Discussion

7. Conclusions

7.1 The need for a regional strategy for Bergamo Orio al Serio Airport

References

List of figures

Figure 1: Location of Bergamo Orio al Serio Airport (regional)

Figure 2: Location of Bergamo Orio al Serio Airport (local)

Figure 3: Physical limitations for Bergamo Orio al Serio Airport

Figure 4: The Lombard airport system

Figure 5: Bergamo Orio al Serio Airport in the European TEN-T Network Corridors

Figure 6: Land use around Bergamo Orio al Serio Airport

Figure 7: Transportation network around Bergamo Orio al Serio Airport

Figure 8: The TEN-T Network Corridors

Figure 9: The planned Lombard railway network

Figure 10: The planned Lombard road network

Abstract

Worldwide airports have been experiencing a radical change in services they provide to users; they are no longer just places for planes to take off and land but mixed use urban nodes. In many cases, airport master plans are lacking of a large-scale development vision and turn out to be incapable to deal with the spatial and socio-economic impact in airport regions. The thesis explores the case of Bergamo Orio al Serio, a fast-growing Italian airport now facing the challenge of finding a balance between the satisfaction of the forecast growth in air traffic demand and the cohabitation with the surrounding territory. A review of theories and possible strategies on airport-led development to manage are investigated and applied to the case. The new airport development plan for Bergamo Orio al Serio and the main planning documents of the sector are examined, as well as interviews with local authorities are performed with the purpose of grasping the main conflicts around the considered airport. The thesis argues for a long-term development vision at the regional scale to be included in airports master planning with the purpose of effectively managing the various impacts generated by airports in their regional context.

Keywords: airport regions, development strategy, long-term vision, regional planning.

Introduction

Nowadays airports are undergoing a process of functional and spatial transformation from infrastructural nodes to multifunctional centres (Knippenberger, 2010). In addition, many airports around the world are complexly integrated into the existing urban environment and must constantly negotiate a set of problematical relations and impacts (Freestone, 2009). In this context and in order to deal with such challenges, researchers call for a more comprehensive conceptualization of airports in their regions.

The case of Bergamo Orio al Serio Airport has been considered and analyzed in relation to the inspected literature, with the ultimate aim of suggesting a possible direction of future development.

Specifically, the present thesis call for the adoption of a definitive vision for the development of the airport capable of considering the main conflicts and opportunities created by the presence of the airport not only in the immediate proximity of the airport, but also in the whole airport region. It is also argued that such vision underlying airport master plans should be consistent with the development strategies envisaged by the planning framework in charge of addressing the airport-related themes.

In order to tackle the described research problem, the following research question and subquestions have been devised.

Research question:

How can a long-term vision at the regional scale for the development of airports ensure an efficient accessibility on the landside and the cohabitation with the territory?

Subquestion 1: *What is the impact of airports on the territory and how it can the cohabitation be ensured?*

Subquestion 2: *How can a long-term vision at the regional scale ensure a balanced development of Bergamo Orio al Serio Airport within the transportation network and with the territory?*

Subquestion 3 (Discussion): *What are the implications of this research for the role of the planner?*

I chose this particular topic because I am strongly interested in the discussion about mobility, transportation infrastructure and planning, with specific reference to airports. Despite their historic role in shaping metropolitan and urban forms and their recent transformation into mixed use urban nodes, airports have been relatively neglected in scholarly planning literature. Furthermore, since airports are often regulated by national or independent authorities, have long been a “black hole” in metropolitan planning strategies. However, there is a vibrant political debate around the challenges faced by airports and airport regions nowadays. Therefore, since I have had the possibility to closely follow the events affecting Bergamo Orio al Serio Airport, I decided to analyze and discuss this particular case in the my Master thesis.

As mentioned earlier, the present thesis focuses on the development of a vision and the elaboration of a strategy for the development of Bergamo Orio al Serio capable of integrating the main concerns related to the airport activity. Specifically, as suggested by the reviewed literature, the airport master plan should develop accordingly with the vision for the entire national and regional transportation system, as well as in line with the provisions indicated in the territorial planning instruments. In this perspective, the planning of Bergamo Orio al Serio should accurately reflect the strategies adopted by the ordinary planning framework in order to effectively manage the impacts induced by the airport on the surrounding territory.

My conclusions, besides pointing to the importance of a regional perspective in airport development, argue for the alignment of airport master planning and broader urban and regional objectives. The thesis could then provide useful insights to the academic debate around the conceptualization of airports and towards a more efficient planning approach to manage the airport-led urban and regional development.

The present thesis is made up of seven chapters. In the first chapter (1. Research design) the research question and the subquestion are presented as well as the methods used to answer each of them are outlined.

The second chapter (2. Literature review) contains the theories investigated in order to be then used for the considered case of Bergamo Orio al Serio.

The third chapter (3. Analytical framework) constitutes a scheme which explains in detail how the literature review contained in the second chapter is used to support the content of the fourth chapter related to the considered case.

The fourth chapter (4. The case: Bergamo Orio al Serio Airport) consists of the description of the chosen case in which specific airport elements and characteristics are considered in light of the inspected literature review, as illustrated in the analytical framework.

In the fifth chapter (5. Analysis), the main conflicts around Bergamo Orio al Serio are outlined and then analyzed with reference to the chosen literature.

In the sixth chapter (6. Conclusions), the most important findings from the analysis chapter in relation to the research question are summarized, and a conclusion on the investigated research problem is provided.

Lastly, in the seventh chapter (7. Discussion) possible learnings for the role of the planner in such planning processes are presented, as well as possible future research agenda on the same topic.

1. Research design

In this chapter the research question identified to answer the research problem of the present thesis and the relative subquestions are presented. For each of these subquestions the methods used to answer them are outlined.

Research question:

How can a long-term vision at the regional scale for the development of airports ensure an efficient accessibility on the landside and the cohabitation with the territory?

The present thesis seeks to answer the research question above by applying concepts, theories, and strategies identified in the literature review chapter.

Two subquestions have been individuated with the aim of helping me answer the research question:

Subquestion 1: *What is the impact of airports on the territory and how it can the cohabitation be ensured?*

In order to answer the Subquestion 1 I first describe the trends that nowadays are affecting the aviation sector, and specifically airports and their activity. Successively, I illustrate the main features of the most important impacts of airports in their surrounding territory, both in terms of spatial and economic development, as well as from the environmental standpoint. Moreover, airports and their development are also related to the development of the other modes of transportation to access airports.

Then, I present relevant theories on the importance of a development vision at the regional scale and the need for the elaboration of a shared strategy among all involved stakeholders in order for airports to deal with the challenges outlined before. The chosen literature calls also for a more integrated approach between airport and city and regional planning sectors with the aim of aligning their objectives.

Subquestion 2: *How can a long-term vision at the regional scale ensure a balanced development of Bergamo Orio al Serio Airport within the transportation network and with the territory?*

To answer the Subquestion 2 I first portray the case of Bergamo Orio al Serio Airport that I have considered in the present thesis for analyzing the research problem. In particular, in light of the chosen literature, I outline the physical and operational features of the airport, its activity and its territorial context of location. Also, I describe the role that the airport plays at the international, national and regional scale and I identify the main stakeholders involved and the framework of planning instruments of reference. For this aim, statistics and indicators

measuring airline traffic and activity, total passengers and movements, collected by the Italian Aviation Authority ENAC, have been used.

Successively, in the analysis chapter, I analyze the most critical conflicts around Bergamo Orio al Serio making use of various methods. The present thesis lies on publicly available planning documents and studies, complemented by an interview with a local authority deeply involved in the Bergamo Orio al Serio affair. In particular, a document analysis of new airport development plan ADP2030, plans of other airports, EIAs, local, regional, and national planning documents has been conducted and an interview with the Mayor of Orio al Serio, the most impacted Municipality overall, has been performed.

Thus, I explain how these critical conflicts can be mitigated by the development of a vision for the airport employing a strategy at the regional scale allowing for a more balanced and effective management of the airport activity and impacts. I conclude by highlighting also the importance of a better integration between airport master plans and the national and regional planning framework so that the development visions of these instruments converge towards common objectives.

Subquestion 3 (Discussion): *What are the implications of this research for the role of the planner?*

This question is related to the discussion chapter (7. Discussion) and it is related to the potential learnings for planners from such planning processes, and set possible future research agenda for the considered research problem.

2. Literature review

In this chapter, a review of relevant literature on airports and their relationship with the regional context on various grounds is contained. The first section (2.1) describes the main trends affecting the aviation sector and more specifically the growth of air traffic and the changing role of airports.

Successively, in the second section (2.2) relevant articles, studies and theories on airport-led development both in terms of the urban and the economic standpoint in such global context are presented. Furthermore, the role of airports within the regional transport system and their environmental impacts are described.

In section 2.3 relevant various theories, strategies and models on the planning of airport regions are discussed with the aim of clarifying the position of the thesis in relation to the outlined literature.

Therefore, in the last section of the present chapter (3.4), the need for a airport development strategy at the regional scale is recognized.

2.1 *The aviation trends*

Over the past two decades, global airline traffic has experienced a dramatic increase in terms of passengers and goods moved. In line with this trend, international aviation organizations' forecasts show that a 4%-5% annual growth over the next 20 years is likely to continue. Air traffic in Europe is expected to double by 2030, leading many European airports to capacity and congestion problems. In the Italian context, in 2018 a 3% of increase in aircraft movements has been registered with different situations for the two main components of air traffic: passenger traffic grew in 2018 at the rate of almost 6% in terms of passenger traffic, while a substantial constance characterized the important transport of goods.

The dominant discourse within the aviation industry is growth and forecasts of business travels, tourist flows, and cargo movements all point upward. Powerful interests, driven by the perceived link between airport development and economic growth, converge to promote the expansion of the aviation sector (Freestone and Baker, 2011). However, these seemingly unrestricted growth scenarios of the aviation industry are now questioned on several grounds (Freestone, 2009). There is in fact a strong NIMBY ("Not In My Back Yard") reaction against new airports and airports expansion, by which protesters stress airports negative impacts such as noise, congestion, physical and mental health, property prices, and urban sprawl.

In the outlined international context of the aviation sector, the role of airports in the local and regional setting has changed; from being important transportation nodes, airports are now are largely considered as vital multifunctional centres of contemporary cities and regions. This change of role of airports around the world has been driven by a number of factors including the airport operators' need to generate additional revenue streams, industries' pursuit of affordable and accessible urban land, and the increasing role of e-commerce and logistics over the last quarter century (Schaafsma et al., 2008). At the same time, according to Graham A.

(2001) airport commercialization and airport privatization can be considered as two of the key trends that have stimulated the process of transformation of airports (Graham A., 2001).

Airport commercialization refers to the transformation of airports from a public utility to a commercial enterprise through the adoption of more business-like management practices (Freestone, 2009). Many airports have turned themselves into big shopping malls and progressed into a more intensive property development on vacant airport land, sometimes extended beyond the actual airports boundary in joint ventures (Freestone, 2009).

Airport privatization is the transfer of the management of airports, and in some cases ownership as well, to the private sector (Freestone, 2009). Due to the the progressive loosening of their historic ties with the State, worldwide airports have shifted from being a branch of government to commercially-oriented businesses (Doganis, 1992). As a result, privatized airports are no longer government departments but commercial enterprises where non-aviation services' revenues have increased significantly (Saldiraner, 2013).

As a result of such trends affecting the nature of airports, as businesses seeking profit-making opportunities, airports have sought to exploit their land assets for commercial and business development (Baker et al., 2010). Market forces and corporate strategies have given rise to new types of airports, far more complex and interlinked in their metropolitan settings than the isolated landing fields of the past (Güller and Güller, 2003). The changed nature of airports in their metropolitan context and the emergence of new pressures and problems consequently require a better understanding of airports' complex role and their spatial interactions (Baker et al., 2010). However, since the outlined trends have been played out with different vigor and character depending on the scale and mix of airport activity in its metropolitan context, the process of transformation of airports has unfolded in a variety of ways (Freestone and Baker, 2011).

2.2 *The impact of airports*

2.2.1 Airport-led development

Transformations in the role of airports have been played out against the intersecting trends towards inexorable growth affecting both cities and aviation (Freestone, 2009). Notwithstanding a scatter of "shrinking cities", urban populations have been steadily rising and extended metropolitan regions have become a dominant urban form with concomitant demands for transportation infrastructure and connectivity. Similarly, as described in the previous section, even though checked by successive exogenous shocks such as terrorism, surging oil prices, and economic crises, the historical growth in aviation activity has been steadily upward (Freestone, 2009). As a result, metropolitan regions around airports have experienced substantial spatial and economic development over the last decades (Appold and Kasarda, 2013). J. D. Kasarda has captured with his notion of a "fourth wave of development" the emergent reality in which "airports shape urban development and business location in the twenty-first century as much as highways did in the twentieth century, railroads in the nineteenth and seaports in the eighteenth" (<http://aerotropolis.com/airportcity/index.php/about/>). Most of this airport-led

development has been spontaneous and haphazard, and often neglected by urban and regional planners (Van Wijk et al., 2014).

2.2.1.1 Spatial development

Airports have proven increasingly influential in shaping urban form and structure (Baker et al., 2010). Along with the growth of air traffic, airports have in fact become a source of attraction for new settlement and air transport-related activities, causing the areas surrounding airports to become densely populated (Saldiraner, 2013). The spatial transformation is characterized by the fact that knowledge industries, firms associated with high-level service sector (such as finance, insurance and real estate), and logistics (goods with a fast-cycle production chain) tend to agglomerate in specific urban environments and research clusters (Knippenberger, 2010). Since urban development at airports mainly occurs within locations with strong links to the global production chain (Wade, 2007), airports can be understood as both users and producers of spatial developments within their region (Knippenberger, 2010, p. 210).

On the other hand, the growth of cities has also impacted on the scale and operations of airports (Kasarda, 2001; Schaafsma et al., 2008). This reciprocity between cities and airports has intensified in the last decades as air travel has expanded and it has been amplified through forces of privatization and commercialization (Baker et al., 2010). Schaafsma et al. (2008) have also highlighted how the influence of airports on the urban structure has been felt not just in close proximity of airport grounds, but at the metropolitan and regional scale (Schaafsma et al., 2008).

However, the capacity of airports in shaping new urban forms raises important challenges for contemporary metropolitan governance, environmental management, and planning (Güller and Güller, 2003). Airport-led spatial development has increasingly become a contested concept at the center of the debate and, as Leinbach (2004, 47) notes, such airport-led development adds to “already existing externalities of noise, pollution, and increased traffic congestion” the impacts of urban sprawl, gridlock, and socio-spatial segregation (Leinbach, 2004).

Thus, airports have spawned new urban forms, mostly spontaneously and less rarely deliberative (Freestone, 2009), which pose challenges for spatial planning in the surrounding urban and regional environment (Baker et al., 2010). To meet such challenges, integrated visions and strategies for addressing the correlation between airport development and urban development are strongly needed (Van Wijk et al., 2014). As a result, many airports have been developing expansion strategies which use the attractiveness of the airport as a real estate development location.

2.2.1.2 Economic development

The role of transport infrastructure as a factor of growth and development of cities' and regions' economies is broadly recognized as crucial. Among the various types of transport infrastructures, airports are indicated as particularly strategic because of the increasing importance of air transport in global connectivity (Percoco, 2010). For cities and regions, a high-performance airport is a key asset of competitiveness (Union des Aéroports Français, 2017) and

a catalysts of investment at the service of the local and regional economy. J. D. Kasarda (2000a and 2006) has been prominent in highlighting the significance of airports as engines for local and regional economic development thanks to the attraction of directly aviation-linked activities and more indirectly aviation-orientated land uses through accessibility, agglomeration, and prestige economies, both in the immediate airport surroundings and along the connected transportation corridors (Kasarda, 2000a and 2006). Airports are also showcases of their cities or regions, and they are often named after famous national figures, even if the majority of airports' names refer to the city or area they serve (Boquet, 2018).

In the last two decades, the growth of air traffic demand has induced an increase in services, with employment growth at the airport and new socio-economic opportunities, especially in the local area, thanks to greater connections for the territory served by the airport. This positive spiral has created wealth, employment and new accessibility opportunities for the territories involved. However, employment mix and growth tend to be proportionate to the scale of airport operations and according to its functional role of aircraft servicing centre, freight facility, or passenger hub (Weisbrod et al., 1993). Over the same period, airport-related development has also changed in character and increased in scale; early aviation-linked businesses (often makeshift and engineering-related) have been gradually supplemented and supplanted by more extensive commercial development serving the increasing passenger and cargo activity. Thus, the trend has been toward "more upscale and less industrial-based type of development" (Dempsey et al., 1997).

As a result, the attraction of business activity requiring air transport access into airport areas through agglomeration economies has raised issues for industrial location policy and the possible need to reserve land for such firms (Warffemius et al., 2009).

The long tradition of airport impact studies has recognized four different economic impacts expressed in terms of employment and production (Graham B., 2003; ACI, 2004): direct impact (on and off site), indirect impact, induced impact, and catalytic impact.

The direct impact corresponds to the employment and income generated by the direct operation of the airport, on and off site. The indirect impact refers to the employment and income generated by the chain of suppliers of goods and services necessary for the execution of the airport activities. The induced impact pertains to the employment and income generated by the mechanism of spending incomes received by employees created by the direct and indirect effects. Lastly, the catalytic impact refers to the employment and income generated by the role of the airport as a driver of spatial and economic growth and as an attractor of new firms (ACI, 2004). The direct and indirect off site effects constitute the majority of the impacts, on the basis of the mechanism of transmission of economic effects known in the literature with the term "ripple effect".

Nevertheless, some researchers argue that the long-term economic impacts of airports and their concrete effects on the economic structure of the region are hard to measure and criticize that the calculations of direct, indirect, induced and catalytic impacts is inadequate to support public decision-making (Kasarda and Appold, 2014; Knippenberger, 2010, p. 210).

2.2.1.3 The debate around airport-led development

The spatial and economic impact of airports on their regions has grown in the last decades. As a result, urban and regional planners have started to integrate the governance of airport regions into their core work (Van Wijk M. et al., 2014). In spite of this, many researchers believe that the presence of an airport alone does not necessarily translate into a significant airport-led development (Kasarda, 2000b; Freestone and Baker, 2011). Critical factors which could impinge on the likely economic development led by an airport include the nature and scale of the airport activity (the passengers/cargo split and the potential to be a hub), the support from air carriers and businesses, the extent of government incentives, and the regional ground transportation accessibility. In addition, the unavailability of large development areas, the unattractiveness of the airport site for investors, restrictions on development of non-aviation uses, and the concerns of adjacent communities can represent constraints to successful airport-centric economic development (Freestone, 2009; LeTourneur, 2002).

Thus, in some researchers' opinion, the correlation between air traffic and regional economic development is not as close as might be expected (Freestone and Baker, 2011), and regional development strategies should move on from the the implicit assumption of indicating the airport as a regional growth pole and abandon the classic diffusionist idea of economic growth imported by airports and spread outward (Freestone, 2009). The "build and growth will come" optimism evident in numerous economic development prospectuses must be tempered by the realpolitik of the aviation and logistics industries, as captured by an industry insider's comment that "airlines go to markets, not airports" (quoted in Erie, 2004).

To conclude, even though airports are largely considered as powerful economic development tools because of their major spatial and economic impacts, there is debate as to whether increased aviation activity is a cause or effect of economic growth (Freestone, 2009). In any case, there is a strong correlation between metropolitan growth and aviation (Brueckner, 2003). In this context, since most airport-led development has been spontaneous and ill-planned with systemic regional intervention noticeably lacking (Freestone and Baker, 2011), airport planning is required to find a balance between exploitation of the economic potential and protecting the airport area from and urban sprawl (Van Wijk et al., 2011).

2.2.2 The airport and the territory

3.2.2.1 Accessibility and multimodality

Many European airports are located relatively close to their city centres or in the vicinity of large metropolitan regions (Schaafsma et al., 2008). Such airports, in contrast to peripheral airports, have the privilege of being better connected to the ground transportation systems. This fact is extremely important for airports because regional, national, and international high-speed rail lines allow high-performance transportation connections, while efficient road networks give airports access to large catchment areas (Scholl and Nebel, 2014). For these

reasons, the successful operation of an airport hinges on quality land-based regional access (Baker et al., 2010) and the backlog of transport infrastructure potentially causes a decrease in the efficiency of the airport and slows down the development of the region's economy.

Airports should then be supported by an efficient transportation network, generally seen as a comprehensive ground transportation system of road and rail routes, not only to connect with the surrounding areas and city, but also with all other important cities in the region. In this perspective, links to high-speed train networks are essential (Saldıraner, 2013).

The valorization of the airport accessibility can bring many benefits such as the attraction of new activities supporting the operations of the airport and of time-sensitive activities, the concentration of businesses with high-travel demands, and the attraction of non-aeronautical development lured by agglomeration economies (Freestone, 2009). The first of these refers to activities and services directly supporting airport operations (flight kitchens and aircraft maintenance), airport-related freight services (shipping and freight forwarding) and services for airline employees and passengers such as hotels and car rental franchises. Since the actual cost of moving materials long distances is a small element in the total cost of shipping door to door, the economic savings and efficiencies are to be gained in land-based and inter-modal operations, underlining the importance of airport accessibility (Freestone, 2009), also time-sensitive goods-processing and distribution functions such as e-commerce, warehousing, and perishables handling are attracted towards airport areas. Lastly, airport proximity is also a magnet for face-to-face business organizations whose operations require frequent travel such as insurance, banking and finance, printing and publishing, and business services (York Aviation, 2004).

Furthermore, since airport-related car traffic is recognized to be a major contributor to the negative impact of airports on the surrounding communities (Cohen et al., 2007) and multimodal connections between airports and other transportation modes are increasingly important for both passenger and goods transport in terms of economic growth (Schalk, 2010), new multimodal transport linkages constitute an opportunity to shift away from automobile-based mobilities to alternative modes of land transportation (Boquet, 2018). According to Upham et al. (2003) airports should develop as intermodal transport hubs connected to an integrated public transportation network. This would partially disassociate the link between air travel and airport-induced car traffic (Upham et al., 2003). It is worth to be highlighted also the fact that privatization trends have increased the airports' focus in generating connectivity and transitioned airports from being passive infrastructure providers to now having a more active role in facilitating increased connectivity and stimulating the realization of integrated mobility systems (Bloch, 2018).

The entire airport catchment area would benefit from investments on airport accessibility. New and upgraded transport infrastructures around airports allow the movement of people and goods further and faster and thus increases the airport's catchment (Baker et al., 2010).

2.2.2.2 *The environmental impact*

Airports have become economic growth and city branding hotspots, albeit not without considerable controversies (Freestone and Baker, 2011). Notwithstanding its employment and income generating capabilities, airport-led development comes in fact with environmental costs (Freestone, 2009).

The main negative effects of airport activity on the surrounding environment are noise, air pollution, traffic congestion, and modification of land uses. As mentioned in the previous paragraphs, airports also generate economic development, but not necessarily in the areas affected by their negative effects; while the benefits in terms of economic growth and development of an airport spill over across the region and affect a large geographical area, the environmental costs are suffered by residents of the neighboring local communities (Upham et al., 2003).

The impacts of an airport's operation on the surrounding environment and the lives of residents of the local communities not only affect massively the capacity of an airport, but also its potential for future growth. Local community opposition can constrain growth through limitations on the number of flights and confound efforts to gain planning approval for further airport development.

- The acoustic zoning

The presence of law gaps and institutional mismatches regarding airport-induced noise regulations tend to aggravate the negative consequences of increasing air traffic on the backstage, where local residents suffer most costs (Lassen and Galland, 2014). One of the most critical issue for airport operators and local administration is the need for a more effective land use planning, to prevent the residential units and sensible receptors from being in noise sensitive areas around airports (Upham et al., 2003).

With the aim of planning airport regions from a land use standpoint, In this regard, the acoustic zoning represents an useful normative tool in the hands the Municipalities surrounding the airport to manage the land use and the location of activities accordingly to the legislation of the sector. The acoustic zoning basically consists in a demarcation line that comprises the areas characterized by existing and future possible aircraft noise pollution levels above the established limit. With the establishment of the demarcation line, the areas outside the demarcation line that could instead count on having noise levels not exceeding the limit, even in future. Technological advances in noise reduction and aircraft conceivable could also shrink the demarcation line. This would produce spaces that could be used in future for other noise sensitive uses, provided that these spaces are seen in connection with the entire potential area for future settlement development (Scholl and Nebel, 2014). The potential for industrial and commercial activity development in these spaces could contribute in for developing an integrated strategy of spatial development in airport regions. Urban and regional planners should then rethink the notion of compatibility and conceptualize the acoustic zoning as just an instrument for limiting settlement development, but as a strategic opportunity for other types of noise tolerant development benefitting from a near-airport location (Baker et al., 2010).

In this regard, Schaafsma et al. (2008) are pessimistic about the effectiveness of conventional land use planning procedures in airport areas and suggest the need to explore more stakeholder-oriented approaches (Schaafsma et al., 2008). Zoning around Amsterdam Schiphol Airport has allowed only air transport-related activities (warehouses) to be located in order not to create further residential areas affected by aircraft noise (Van Wijk et al., 2011).

2.3 Conceptualize the new airport area

2.3.1 Airport governance

Airport regions lie “in the crossfire of differing ambitions” from a number of players including airport operators, investors, local authorities, infrastructure providers, and regional and national agencies (Güller and Güller, 2003, p. 144). Traditional planning approaches seem increasingly weak in dealing with the multifaceted challenges of nowadays worldwide airports. A more actor-oriented planning process negotiating “contracts” between airports, stakeholders and communities are required to be adopted (Freestone, 2009). In addition, more consultative approaches in which strategic visions are derived from roundtable discussion between key actors is needed (Freestone and Baker, 2011). Therefore, it has been highlighted the need for a platform that bridges airports and the public sphere, where different viewpoints can be coordinated in order to identify a common understanding of aviation and a shared vision of the direction for further development of airports (Bloch, 2018).

In many cases airport priorities have been shown to override local knowledge and needs, and even where consultative and planning bodies for airport areas exist, decision-making remains complicated and biased (Lassen and Galland, 2014).

With reference to the governance of airports, a major problem regards the lack of information exchange with local authorities, responsible for urban and regional territorial and mobility planning, in relation to the development of airport master plans. Coordination and cooperation among the corresponding planning authorities have not fully achieved in many cases and, as a result, local or regional plans did not include appropriate integration of airports, cities, and regions (Saldiraner, 2013). This missing interrelationship between airport, city, and regional planning is often due to the outdated understanding airports only as transport infrastructures, the gap between the different sectoral jurisdictions regarding airports and their activity, and the different scale of planning levels from national to local, which inherently devalue the regional scale (Knippenberger, 2010). The local, regional and national authorities can have in fact different approaches in supporting the production of aviation and the provision landside capacity such as railroads or roadways, and managing the different form of externalities (Bloch, 2018). As a result, most airport region development has been spontaneous and haphazard with mismatches with the local land use plans, mainly because planning and governance structures have been fragmented and have not seen the full range of problems and possibilities (Van Wijk et al., 2011).

2.3.2 *The urban models*

In the history of airport planning, development and management, significant changes have taken place over decades as a result of the need to increase airport capacity. The entrepreneurial management of modern airports goes beyond facilitating the movement of aircrafts, towards seizing a variety of commercial and industrial opportunities and a wider land use area of airport-related development (Baker et al., 2010), as well as connecting airports to other modes of transportation networks.

In this perspective, urban models are significant new trends in airport master planning, in which airport-related development is conceptualized as no longer limited within the airports surroundings, but expands to include the whole regions where airports are located (Saldiraner, 2013). It has to be underlined the fact that airport-led development can occur across a spectrum of scales from the immediate fringe (the airfront) to the metropolitan region (Freestone and Baker, 2011). For this reason, five of these models have been considered and discussed in the present thesis on the base of the considered case: the airfront, the airport and cargo city, the airport corridor, and the aerotropolis, which consider progressively larger and more complex territorial impacts.

The “airfront” refers to the “myriad of commercial, industrial, and transportation facilities and services intrinsically tied to the airport” (Blanton, 2004). The typical land use mix of these airport fringe areas include car rental facilities, hotels and meeting facilities, cargo services, manufacturing and warehousing (Freestone and Baker, 2011).

The “airport city” concept foresees directly airport-connected commercial land development around airports for shopping malls, offices, cargo facilities, tourism, leisure, and health facilities in a metropolitan setting. The scale of such development depends by several critical factors such as air connectivity and regional economic level (Peneda, 2010).

The “cargo city” regards airports having the cargo transportation as principal activity and whose surrounding areas are populated with logistics centres, including manufacturing and assembling facilities and warehouses (Saldiraner, 2013). Two of the key features for a cargo city to function are the close collaboration between the airport management company and cargo and logistic companies, and the availability of multiple modes of transportation to the main cities of the region.

The “airport corridor” seeks to transform the space between an airport and the central city in a band of integrated economic zone of property development crossed by road and rail infrastructures. The success of the corridor derives from diverse factors such as airport size and geographic location, landside connectivity, land availability, and the makeup of the regional economy (Freestone and Baker, 2011).

The “aerotropolis” is a concept that emerges from J. D. Kasarda’s works, consisting of a core “airport city” at the center of a wider metropolis and interconnected by dedicated motorways (“aerolanes”) and high-speed rail links (“aerotrails”). This “aerotropolis” model envisages an urban form characterized by a core integrating aeronautical and non-aeronautical uses including warehouses, industrial and logistic parks, business offices, hotels and conference centres housing time-sensitive goods processing and distribution facilities and firms dependent on

frequent business travel (Freestone and Baker, 2011), with outlying more extensive mix of shopping precincts and entertainment districts (Freestone, 2009). Residential districts occupy the wedges between the aerolanes and aerotrains, away from the main flight paths (Freestone, 2009). A key “aerotropolis” principle which is worth mentioning is the desirability of clusters development combine with green spaces instead of continuous strip development, in opposition to the “airport corridor” concept.

2.3.2.1 The weaknesses of the models

The urban models described in the previous section present some weak points on various aspects. In the next paragraphs, the main weaknesses of these models are detected and explained.

First, all the considered urban models are underpinned by the ruling assumption of inexorable future growth in line with the rhetoric of the aviation sector, and the discourse largely revolves around expansion, setbacks to growth, and profits (Freestone and Baker, 2011). Critiques of airport-centered development urban models point to their overoptimistic “build and growth will come” attitude and simplistic outlook about economic benefits (Kasioumi, 2015). The economic benefits of planned airport-led development are certainly there but their sustainability is put at risk by cyclical downturn and exogenous shocks affecting negatively on air traffic volumes (Freestone and Baker, 2011).

The outlined urban models are pointed to present an unsustainable urban form from the environmental standpoint because they would augment the already existing impacts of noise and air pollution, and traffic congestion. In this regard, one of the main challenges that urban models should deal with consists in incorporating in the planning vision of the airport in its urban setting based not just on preventing incompatibility but towards promoting environmentally sustainable development in the fullest sense (Freestone, 2009). From an urban planning perspective, the main conceptual weakness of these urban models lies in their tacitly endorsement of the inevitability of an extensive “sprawl and scatter” pattern of suburban land use development (Freestone, 2009). Despite the role of airports in urban regeneration has been broadly recognized (Robertson, 1995), the urban structure of the models could generate problematics in terms of community impacts such as relocation of neighborhoods and social-spatial divisions between riches and poors.

Another negative planning aspects of the presented urban models is the fact that their main focus is erroneously on the development of airport area and less on the multifaceted interactions between the airport and the surrounding metropolitan environment (Freestone, 2009).

To conclude, the reviewed urban models are rather weak with respect to their top-down approach to planning and in addressing implementation of concrete plans and projects. These urban models are mostly economic conceptualizations with insufficient weight given to the

acknowledgement of the wider urban and regional systems, neglecting the reciprocity of airports and regions and the complexity of stakeholders' relationships (Baker et al. 2010).

2.3.3 The role of the airport in the regional transport network

Two of the most important factors affecting the functional role of an airport in its regional transport network are the economic base of its service area and the level of competition within the catchment area, both from other airports and from other modes of transportation. The diversity of the economic base determines demand and growth potential (origination and destination versus hubbing) and the disposable income levels and trends in population tend to influence traffic mix between business and holiday (Musalo Hyland, 1996). In addition, the composition of the regional economic system (commercial, productive, and tourist sectors) can have a significant role in determining the importance of the the freight air traffic component for the airport.

Another important key asset to consider when elaborating strategies for airport regions is the presence of an adequate transport infrastructure serving both passenger and freight traffic. In this way, airports located closed to transport infrastructures of national and regional importance can count on large catchment areas and logistics and businesses opportunities.

A further element to take into account in such planning processes is the level of urbanization of the area surrounding the airport, which can represent a obstacle for future air traffic development.

Thus, the region's economic level and composition, along with the features of the territory surrounding the airport, are a fundamental factors on which development strategies for the regional transport network should be based.

Besides defining the role of the airport in its regional network, national and planning authorities are required to distribute the resources in a balanced way and according to the functional differentiation of airports.

The regional airport system management and development is an actual problem in many countries around the world. In this regard, Marintseva K. has identified three possible management strategies for the Ukrainian context (Marintseva, 2013). A first possible strategy consists in the concentration of financial and technological resources on the development of the dominant regional airports, defined on the basis of passenger traffic and airport capacity. A second possible strategy foresees the development of the main airport of the considered region as an international airport and the other regional airports as domestic. However, this strategy could lead to a decrease of traffic flow as passengers can choose alternative modes of transport for domestic movements. Lastly, a third possible development strategy envisages that all airports are developed in the same way so as to enhance the efficiency of the whole airport regional system in terms of increased degree of air transportation access for the population of the considered region (Marintseva, 2013). In this last case, massive investments for providing efficient connection with the other modes of transportation and with other cities are required and the costs significant costs for airport ground access systems modernization could lead to negative effects for the airports regional system functioning (Marintseva, 2013).

- The coordination of airport and planning instruments

Airports are in need for greater convergence between airport planning and city and regional planning, and consequently, regional development strategies and local spatial frameworks must be coordinated with airport master plans (Freestone, 2009; Freestone and Baker, 2011). Cooperative land use planning will assist airport master planning to evolve from isolated statements of on-airport development to visions which interconnect with broader statements of local, regional and national level (Baker et al., 2010).

There is also the need for a more equipped regional governance to handle land use development challenges in the wider airport regions fragmented into multiple authorities and conflicting interests of different groups of stakeholder (Freestone and Baker, 2011). Through a strategic cooperation, economic benefits may be leveraged for both the airport and the region by favoring appropriate commercial and industrial development and linkages in line with the regional assets (Baker et al. 2010).

An integrative vision which recognizes the nature and the international, national, regional importance of airports as driver of regional growth in the perspective of a balanced development is required. Therefore, a better understanding of the catalysts for industrial, commercial and residential development within the region in which the airport is located and the regional direct, indirect and induce impacts of such developments is fundamental (Baker et al. 2010).

As suggested by the case of Helsinki Vantaa Airport, a district-wide comprehensive plan that provides for organized land use and multimodal mobility may facilitate the planning of industrial and commercial corridors associated with the airport (Freestone, 2009; Baker et al., 2010).

Conclusions

As already mentioned in the previous sections, an airport area perspective only compounds the wickedness of the planning challenges highlighted so far (Freestone and Baker, 2011). Aviation concerns need to be incorporated more explicitly into urban planning processes (Hicks, 2007) and airport master planning has to mesh into a more comprehensive airport area planning process (Jarvis, 2007). "A new approach is required, bringing together airport planning, urban and regional planning, and business site planning in a synergistic manner so that future development will be economically efficient, and socially and environmentally sustainable" (<http://aerotropolis.com/airportcity/index.php/about/>). Also Baker et al. (2010) have drawn attention to the importance of moving research and practice beyond the traditionally compartmentalized analysis of airport issues and policy-making by addressing the interdependencies between airports and regions (Baker et al., 2010).

With reference to the airport-led economic development, Baker et al. (2010) highlight the need of deeply understanding the relations between airport-related investment into infrastructure, industrial, and commercial facilities, and the surrounding region's present and potential economic activity. In this way, planners and policy makers may be better able to determine the land uses which add more value being located at or near the airport than elsewhere (Baker et

al. 2010). In this sense, Helsinki Vantaa Airport in Finland is an interesting model of a mixed use commercial, industrial and residential centre capitalizing on the advantages that the Finnish international airport brings. Through a cooperative agreement the Finnish government and relevant stakeholders have been able to establish a district-wide comprehensive plan along with an economic and marketing development strategy (Baker et al., 2010).

In light of the considerations contained in the previous sections is then required a far greater awareness at a regional scale from all involved stakeholders that airports are no longer just transport infrastructures, but mixed-use activity centres and corridors, which need to be comprehended wholly as new urban forms (Güller & Güller, 2003). The issue of airports governance is fundamental when considering the changing role of airports, and in particular, in understanding and addressing present and future vision for economic development and land use conflicts between airports and regions (Baker et al. 2010). In this sense, it appears clear the need for an effective governance of airport regions to coordinate the interests of various institutions, public authorities, corporations and other stakeholders with the aim of synthesizing a common view for the airport among them and setting shared objectives. Calls for a broader conceptualization of airports planning are increasingly heard (Freestone and Baker, 2011), by which the broad impact of airports, affecting the entire region in which are located, should be channelled through development strategy in line with the territorial planning instruments and depending on land availability and transportation opportunities (Schaafsma et al., 2008).

3. Analytical framework

From the relevant literature reviewed in the previous chapter, the main elements the urban and regional planners should consider when analyzing the development of strategies for airport regions has been identified.

The physical dimension of airports as well as its geographical location are certainly fundamental factors when considering airport development challenges and problems, as well as its operational activity in terms passenger and freight air traffic. These features can in fact help planners understand the role that airports have carved out in their regional context and their potential future role. Therefore, in the next chapter the current physical layout of Bergamo Orio al Serio Airport in its local context is considered, as well as a description of the geographical setting of the airport is furnished. In addition, the main characteristics of the air traffic activity occurring at the considered airport is analyzed with the aim of understanding the connotation of the airport both at present and in the future perspective. In this regard, the massive growth of air traffic that have been affected Bergamo Orio al Serio for many years, along with the role that the main customer of the airport, Ryanair, is outlined in the next chapter.

The territorial context in which the airport is located is also significant to be investigated, along with the process of transformation that it has undergone over the decades. A further element to consider when looking at the territorial context of an airport is certainly the role of the airport in its regional transpirational system, as well as the accessibility conditions to the airport both for passengers and goods.

As mentioned in the literature review chapter, nowadays many airports, even if largely celebrated for their positive economic impact, are having difficulty in developing and expanding due to their massive environmental impacts on the surrounding communities. Therefore, the multifaceted impact of the airport on the surrounding territory and communities is to be examined both from the spatial, economic and the environmental standpoints to grasp insights for a future development strategy.

The characterization of an airport also includes the description of the governance framework gravitating around the airport, including main stakeholders directly and indirectly involved in the operation of the airport, as well as the review of the national, regional, and local planning instruments that govern the considered activity, infrastructure, and territory.

The territorial and airport planning framework and the underlying vision and strategies of such planning documents will be examined and put in relation with the new airport development plan of Bergamo Orio al Serio with the ultimate aim of proposing a different planning approach of airport regions.

In light of these considerations suggested from the chosen literature review, the aforementioned elements characterizing an airport have been researched for the considered

case of Bergamo Orio al Serio Airport and described in the next chapter. These information will be useful for the analysis of the considered case in light of the review literature.

4. The Case: Bergamo Orio al Serio Airport

4.1 The airport and its activity

4.1.1 *The physical dimension*

Bergamo Orio al Serio is an Italian private airport situated 5 km south-east of the city centre of Bergamo and 50 km north-east of the city centre of Milan. The airport benefits from its strategic position in the middle of northern Italy, close to the main roads of the Italian highway system, and consequently it constitutes the perfect gateway to access any region of northern Italy.

The airport is located in the municipal territory of Orio al Serio within the Province of Bergamo, and it occupies also small portions of the municipalities of Grassobbio, Seriate, and Azzano San Paolo.

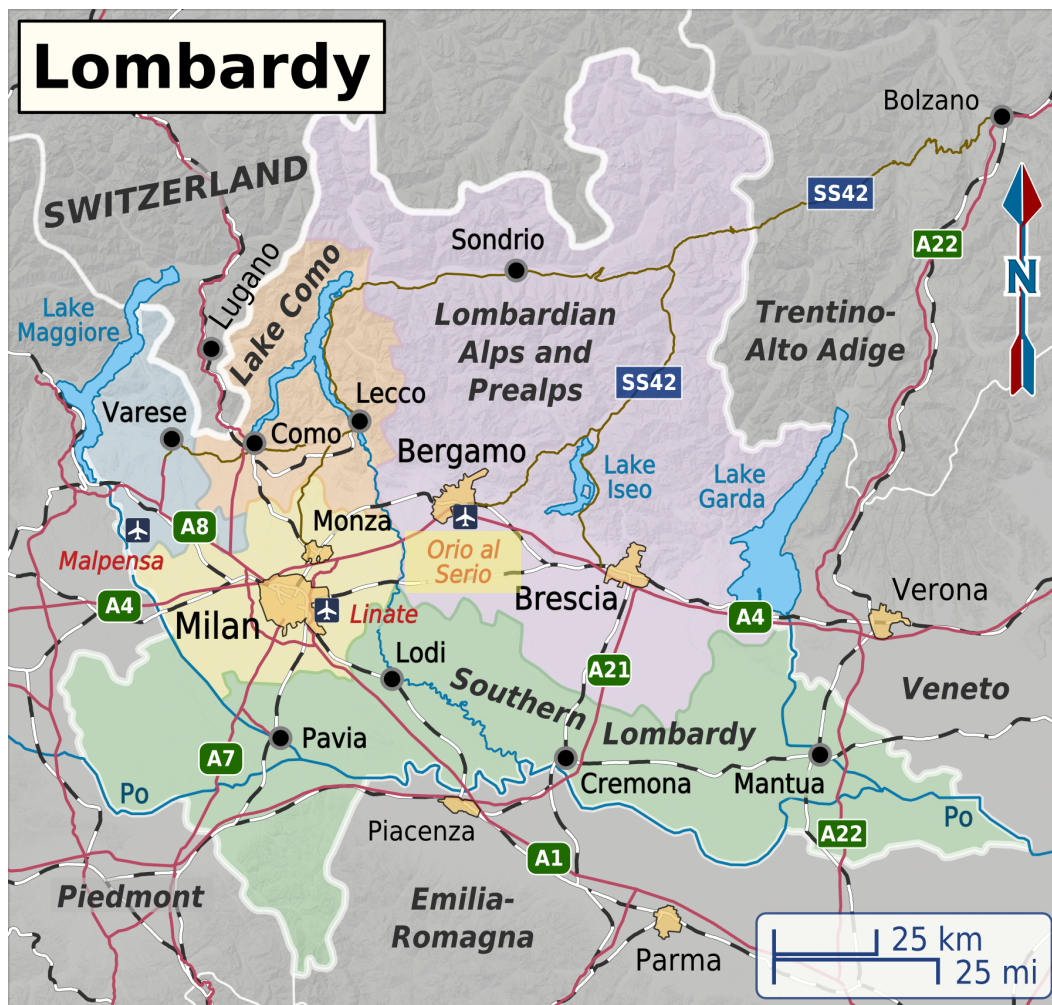


Figure 1: Location of Bergamo Orio al Serio Airport (regional)



Figure 2: Location of Bergamo Orio al Serio Airport (local)

Bergamo Orio al Serio Airport is situated in a highly anthropized territorial context, characterized by a mixture of residential, agricultural, large production and commercial areas with a dense transport infrastructure network, and in presence of natural elements such as water bodies and natural parks. As it can be seen from the figure below, the airport is constrained by the A4 motorway to the south, the Provincial Road SP591bis to the west, the State Road SS671 to the north, the urbanized fabrics of the municipality of Orio al Serio, to the north-west, and of Grassobio, to the south-east, and by the Serio river and the connected Regional Park to the east.



Figure 3: Physical limitations for Bergamo Orio al Serio Airport

In addition to the outlined physical limits, the airport presents a current layout heavily biased towards the south, on a portion of territory closed by the runway and the A4 motorway. This has induced a longitudinal development of the airport infrastructure, in which all the activities and necessary services and spaces related to passengers and freight and courier traffic are concentrated, allowing little flexibility for a rational and functional development of the airport. The reduced availability of space and the contiguity of the A4 motorway also compromises the accessibility system. According to the current infrastructural layout of the airport, the only possible access to the airport is from the west via the road network.

4.1.2 The operational dimension

The considered airport presents on one side characteristics of a city airport for its location only 5 km from the city centre of Bergamo and in a strongly urbanized area, on the other side a traffic, above all low-cost tourism, of international level and in continuous growth.

With regard to the different components of aviation traffic, in 2018 the 82,3% of the air traffic volume (in terms of movements) at Bergamo Orio al Serio Airport was connected to scheduled flights, 9,1% to cargo traffic, 2,3% to charter carriers, and 1,6% to the general aviation component (Bilancio di Esercizio 2018, SACBO). Concerning the passenger traffic, Bergamo Orio al Serio Airport turns out to be the first national airport dedicated to low-cost operators, mainly due to the low-cost Ryanair, which has included the airport in the list of the main European hubs of reference. Over the years, Bergamo Orio al Serio Airport has also developed an important role for the Italian air cargo sector and has become an important Italian base for the main shippers given the location adjacent to the motorway network and the strategic position of the airport with respect to the territorial context. In terms of quantities of goods transported, the airport is the third national airport after Milan Malpensa and Rome Fiumicino airports, and its market share in the Italian cargo transport sector is around 11%.

While Milan Malpensa is used both for general cargo transport and for courier traffic, Bergamo Orio al Serio expresses numbers exclusively for courier traffic. The traffic on Brescia is instead focused on the handling of post, which represents approximately 90% of the volumes handled by the airport (MIT, 2017).

The operation of the airport is continuous over a 24-hour period. Although the runway can be used in both directions, according to the current infrastructure, the preferential direction of use is the direction from east to west for both landing and take-off operations as it causes less interference with the western airspace shared with Milan Linate Airport. During the night period, opposite operational configuration is preferred in order to limit the overflight of aircraft over population centers located to the west of the airport.

4.1.3 The growth of the airport

In 2018 Bergamo Orio al Serio Airport has registered a total of 12.936.399 transit passengers and with a steady cargo movement of more than 120 thousand tons per year (123.032 tons of cargo during 2018), reinforcing its third position in the ranking of national airports for both passengers and cargo, and its fifth position in the ranking of handled movements with 89.533 movements (<http://www.assaeroporti.com/statistiche>).

The aforementioned data related to the scheduled flights activity carried out in 2018 confirm the percentage of increase of the passengers movement by 4,9% compared to the previous year (2017), with an average of 50.000 passengers more a month than in 2017. In this sense, the growth trend in progress since 2002, with an average annual increase of more than 10%, has been confirmed, supported both by the offer of connections implemented by the airlines operating at the airport (the Irish Ryanair in particular) and thanks to the management strategies put in place by the management company of Bergamo Orio al Serio Airport SACBO. As a result, Bergamo Orio al Serio is characterized by a constantly growing traffic with the highest rhythm among the airports in northern Italy.

The positive trend recorded in the first four months of the current year (January-April 2019) of +4,3% of transit passengers compared to January-April 2018 suggests that over 13 million passengers will be exceeded at the end of this year (<http://www.assaeroporti.com/statistiche>).

With the aim of coping with these trends and with the growth of traffic demand expected by the planning instruments of the sector, in 2017 the airport management company SACBO has presented the Airport Development Plan 2030 in which defines the infrastructural and operational interventions to be realized in the next decade.

4.1.4 The role of Ryanair

Bergamo Orio al Serio Airport was Ryanair's first Italian base when it was established in 2002 and it is now the main Italian Ryanair hub (Dunn, 2017). Specifically, Bergamo Orio al Serio has been the third Ryanair airport by destinations served in the period from 2007 to 2017 (124 destinations), behind only London Stansted Airport (184), Ryanair's largest base, and its home base Dublin Airport (131). As a result of the strong growth of the activity of Ryanair at Bergamo

Orio al Serio Airport described in the previous section, Ryanair now represents the main reference carrier by far for the airport and this fact makes Bergamo Orio al Serio a very competitively priced Milan area airport.

Together with Hahn and Charleroi airports, Bergamo Orio al Serio symbolizes the Ryanair's strategy of serving big cities through out-of-town airports: Charleroi for Bruxelles, Hahn for Frankfurt and Bergamo Orio al Serio for Milan. Although in the last years Ryanair has started serving also the main airports of these three big European cities, in each case the Irish low cost carrier still has a larger operation at the alternative airport than the primary one. Bergamo Orio al Serio shows this trend: Ryanair began operating on Milan Malpensa Airport in 2015, and quickly grew to serve nine destinations from, but at the same time growth at Bergamo Orio al Serio Airport has solidly continued (Dunn, 2017).

Over the course of years, Ryanair's activity has increased dramatically and has seen the constant increase in the number of destinations and the variation in them (Ceriani, 2012). The company's expansion policy is constantly on the lookout for markets and looks to the exclusive pursuit of profits without much interest for the territories in which it operates. Ryanair has in fact a very aggressive strategy towards airports and this is exemplified by some choices, such as in the case of London Stansted and Valencia airports. Here, Ryanair decided to strongly reduce flight frequencies (London) and temporarily cease to operate (Valencia) in response to an increase of airport charges applied by the airports' management company, causing a remarkable drop of passengers in the two airports. These considerations must, however, be framed in a context in which over the last few years in Europe around 2,500 new routes a year have been opened and around 2,000 closed, with an active balance of about 500 routes a year, but with an obvious greater ease in the change of route by the carriers (about 55% of the new routes are closed in the first two years). In the case of Bergamo Orio al Serio Airport, the 65% of the all routes operated during the decade 2007-2017 were still operating in 2017 (<https://www.anna.aero/2017/02/01/best-most-worst-ryanair-bases/>). In this regard, in 2012, local newspapers reported the news about the renewal of the contract between Ryanair and SACBO for further 12 years according to which the Irish company is required to continue to make the airport of Bergamo Orio al Serio its main hub of Southern Europe, boosting routes and increasing the number of passengers.

4.1.5 The role of the airport

Bergamo Orio al Serio Airport Bergamo Orio al Serio Airport, also known as Il Caravaggio International Airport and Milan Bergamo Airport, is part of the Milan airport system alongside the Milan airports of Malpensa and Linate, which is the second airport system in Italy by passengers behind the airport system of Rome. Together with the airport of Brescia Montichiari the three Milan airports constitutes the Lombard airport system which represents approximately 25% of passenger traffic handled by the entire national system. In the year 2018 Lombard airports have in fact exceeded 46 million passengers and more than 100 airlines operate, including 17 cargo ships (<http://www.assaeroporti.com>).

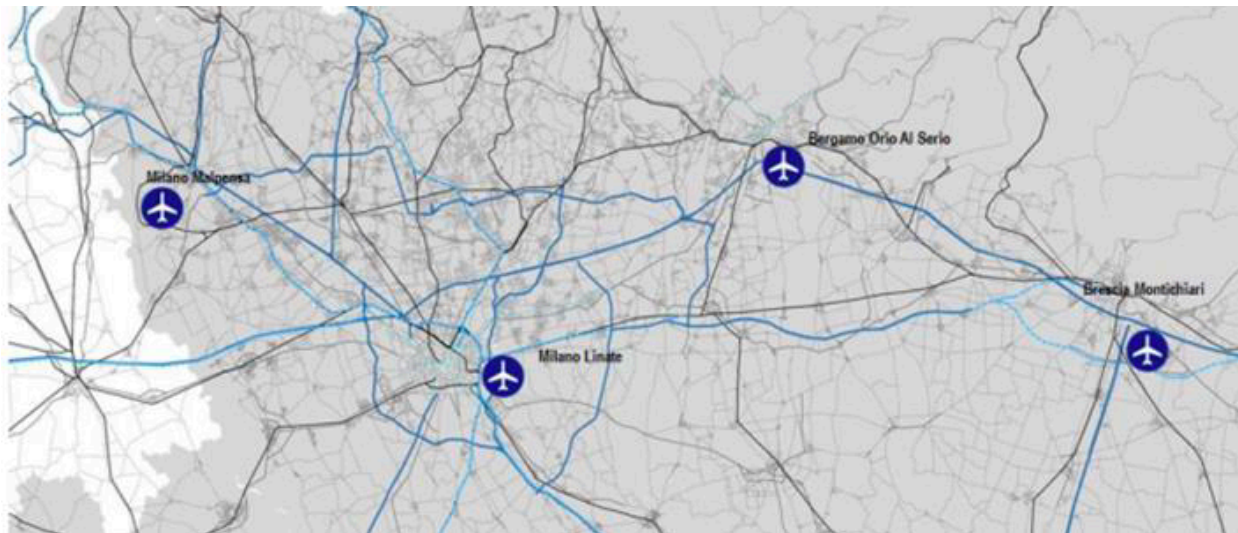


Figure 4: The Lombard airport system

In the outlined regional context, Bergamo Orio al Serio Airport is the second airport by passengers of the Milan airport system and has a strategic role in Lombardy both for the levels of traffic reached and for the size of its catchment area.

In relation to the national context, Bergamo Orio al Serio Airport is identified in the National Airport Plan (PNA) as an airport of national interest. Within the North West basin, where all Lombard airports fall, the PNA confirms the role of intercontinental airport for Milan Malpensa and the “point to point” role with stable traffic for Milan Linate. For Bergamo Orio al Serio the PNA envisaged a further growth of passenger traffic along with a slowdown of goods. Lastly, the PNA foresees a reserve of capacity for the future and a role of “all cargo” airport for Brescia Montichiari Airport. At national level, the airports of Malpensa, Linate and Orio al Serio are among the top four in the national ranking for passenger traffic (immediately after Rome Fiumicino) and, in the case of Malpensa, in first place for the transport of goods. Added to these is the airport of Montichiari, whose vocation is oriented towards the cargo business and constitutes a reserve of capacity for the entire system, without underestimating the potential that it could have with regard to the development of passenger traffic given the position center of gravity along the axis of the Po valley.

At the European level, the Milan airport system is one of the most important airport systems thanks to its geographic and economic strategic position. As part of the TEN-T, Bergamo Orio al Serio Airport is included in the “Core” Network. In particular, Bergamo Orio al Serio Airport is part of the Mediterranean and Rhine-Alpine Network Corridors, and it is strategically located right in the middle between the Rhine-Alpine and Scandinavian-Mediterranean Corridors.

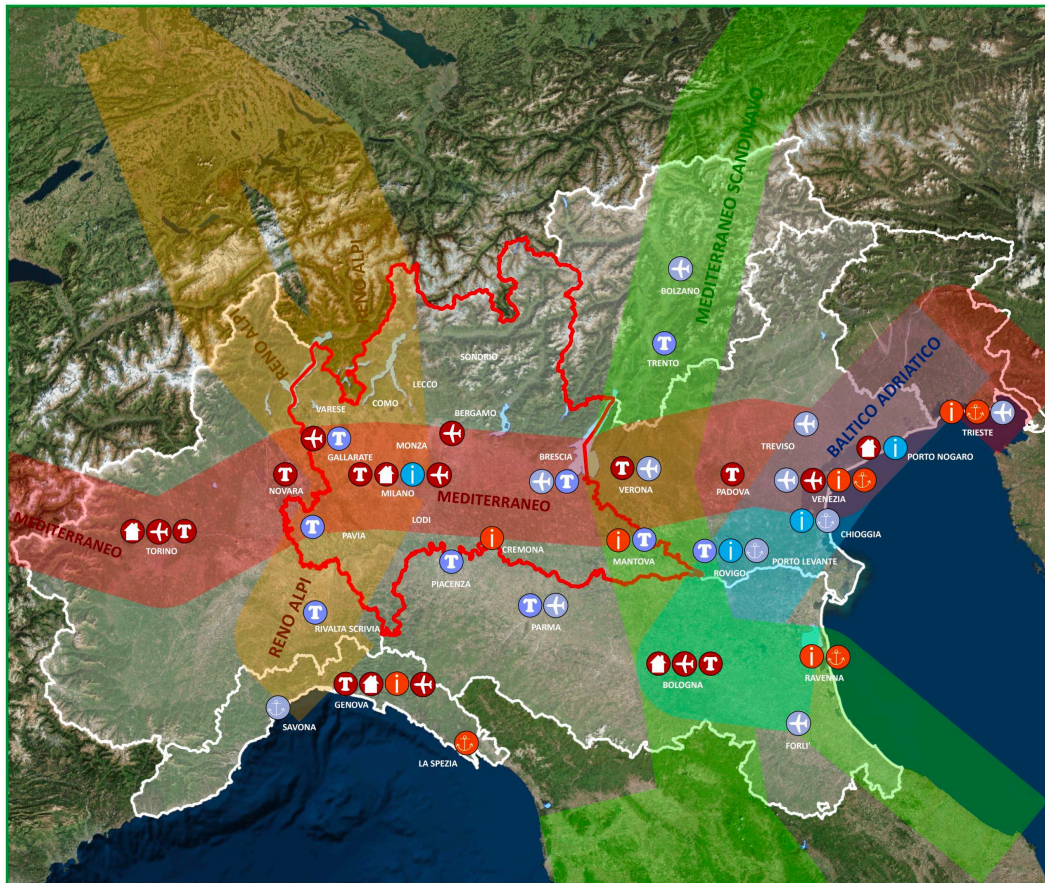


Figure 5: Bergamo Orio al Serio Airport in the European TEN-T Network Corridors

In light of the presented data, Bergamo Orio al Serio Airport has a key role in the regional context of the Lombard region as well as at the national and scale, and it is considered as strategic in the European transportation network.

- The catchment area

The catchment area of Bergamo Orio al Serio Airport is not limited only to the Lombardy region, but also includes the north-eastern part of Italy (a significant portion of Veneto to the east and Emilia Romagna to the south). In particular, over 70% of passengers comes from the Lombardy region (39.1% from Milan, 26.2% Bergamo, 11.6% Brescia). To these are added a portion of passengers whose origin is Piedmont (7.3%), Veneto (8.0%) and Emilia Romagna (6.0%).

As a result, the airport benefits of a robust catchment area including the areas with the highest GDP in Italy, with 10 million residents within 90 minutes and 810,000 companies based within 60 minutes (<http://www.therouteshop.com/profiles/bergamo-airport/>).

Given its geographical location, Bergamo Orio al Serio airport offers diverse opportunities for tourism to passengers:

- Art and cultural cities (Milan, Bergamo, Brescia, Verona, Mantova, Piacenza);

- Shopping outlets and malls in Milan and in the surroundings, such as the very close Orio Center shopping mall;
- Skiing on nearby mountains;
- Lake tourism (Garda, Iseo, Maggiore, and Como lakes)
- Gastronomy and wine tourism.

(<http://www.therouteshop.com/profiles/bergamo-airport/>).

4.2 *The context of the airport*

With the aim of identifying a development vision for Bergamo Orio al Serio Airport and it has emerged from the literature review, it is crucial to investigate the the most important features and strategic assets in the territory surrounding the airport.

4.2.1 *The territorial context*

Bergamo Orio al Serio Airport is located in a territorial area between the outskirts of Bergamo and the low Lombard plain with a high rural connotation. The Lombard plain, which is considered as a unitary settlement area, is characterized by a high level of functions and services present in a territorial context of historical and consolidated centrality. Near the plain, the hilly area is characterized by high density urban areas, where it emerges among all the city of Bergamo. These urban areas include all the major historical centers and are characterized by an intense use of land, where urbanization and edification prevail over the empty and free spaces that are rare or residual.

Within this landscape context, Bergamo Orio al Serio Airport is therefore located right among the ambit of the dense urban suburbs of Bergamo and the first offshoots of the typical agricultural territories of the lower Lombard plain. Here, Bergamo Orio al Serio Airport is included between two important infrastructural axes, such as the railway line to the north and the A4 motorway to the south.

4.2.2 *The process of transformation of the territory*

The structure of the Lombard plain has undergone profound changes throughout history, especially due to the phenomenon of the widespread urbanization of the contemporary era that has determined the transformation of the distinctive features of this territory. In particular, the territorial context within which Bergamo Orio al Serio Airport is located is the result of a profound process of urban expansion which affected the functional layout of the territory. From prevailing agricultural use of the soil and by a settlement system consisting solely of rural hamlets and isolated farmhouses that characterized the lower Bergamo plain until the first post-war period, the strong urban expansion, that saw its most intense phase at the begin of the 60s, has determined a strong settlement development around the ancient centres occupying agricultural plots. In this regard, the limited size of the old centres in relation to the overall extension of the residential and commercial destination systems shows the recent evolution of the urbanized fabric. Agricultural open spaces characterized by large plots where the prevalent

use of the soil is the cultivation of arable land and grazing and portions more or less disrupted of buildings mix give life to a landscape of transition and therefore more inclined to continuous transformations.

The outlined urban development towards the territories of the Lombard plain began along the infrastructural connecting routes (highways and railways), which, as a practice, played the role of structuring axes. The railway line and the A4 motorway each in its own way and at different times, have influenced the urban development of the territory they crossed. If, in fact, for a long time the presence of the railway network has limited the proliferation of the urban areas of Bergamo towards the more purely agricultural areas of the low plain, after the construction of the A4 Motorway, the still free areas closest to it have become strategic for the placement of important commercial, industrial and technological centers. In this regard, the urban development from the purely industrial and commercial character of the municipalities of Azzano San Paolo and Grassobbio near the A4 motorway route is a clear example.

The location of some important interventions in the tertiary sector, the goods cycle and metropolitan leisure along the A4 motorway has led to the creation of a specialized director in these sectors, who finds its physical, functional and conceptual crowning in the presence of Bergamo Orio al Serio Airport.

As a result of these evolutionary processes, the polycentric structure that characterizes the settlement system on the outskirts of Bergamo within a purely agricultural context and dissected by important infrastructures for mobility have been generated. Interestingly, the considered area is characterized by the presence of the first signs of metropolitan dispersion with knots such as multi-functional buildings and shopping centers alongside the road director, which are the driving force of urbanization.

4.2.3 The land use

As mentioned in the previous section, urban growth, spreading within the Bergamo plain and crossing the railway line, has occurred intensive, sometimes disordered, and in the absence of an adequate urban design, determining the presence of numerous highly urbanized areas, mainly located along the main road link infrastructures. Specifically, the area to the north-west of the Bergamo Orio al Serio airport is occupied by the offshoots of the municipality of Bergamo, where the use of land is divided between continuous and discontinuous urban fabric of residential complexes, production areas and large public and private service facilities. Similarly, the northern area of the airport is occupied by the same type of land use, related to the municipality of Seriate and Orio al Serio. The southern area of the airport grounds, even if less intense than the northern side, is occupied in part by both continuous and discontinuous urban fabric, and by the presence of productive areas and public and private service facilities related to the municipalities of Stezzano, Azzano San Paolo and Grassobbio. Areas covered by permanent meadows and occupied by bushes and shrubs can be noticed along the course of the Serio river, in the south-eastern side of the airport. In the eastern area, in a context of predominance of arable land, production areas and settlements of large public and private facilities related to the municipalities of Bagnatica and Brusaporto are located.

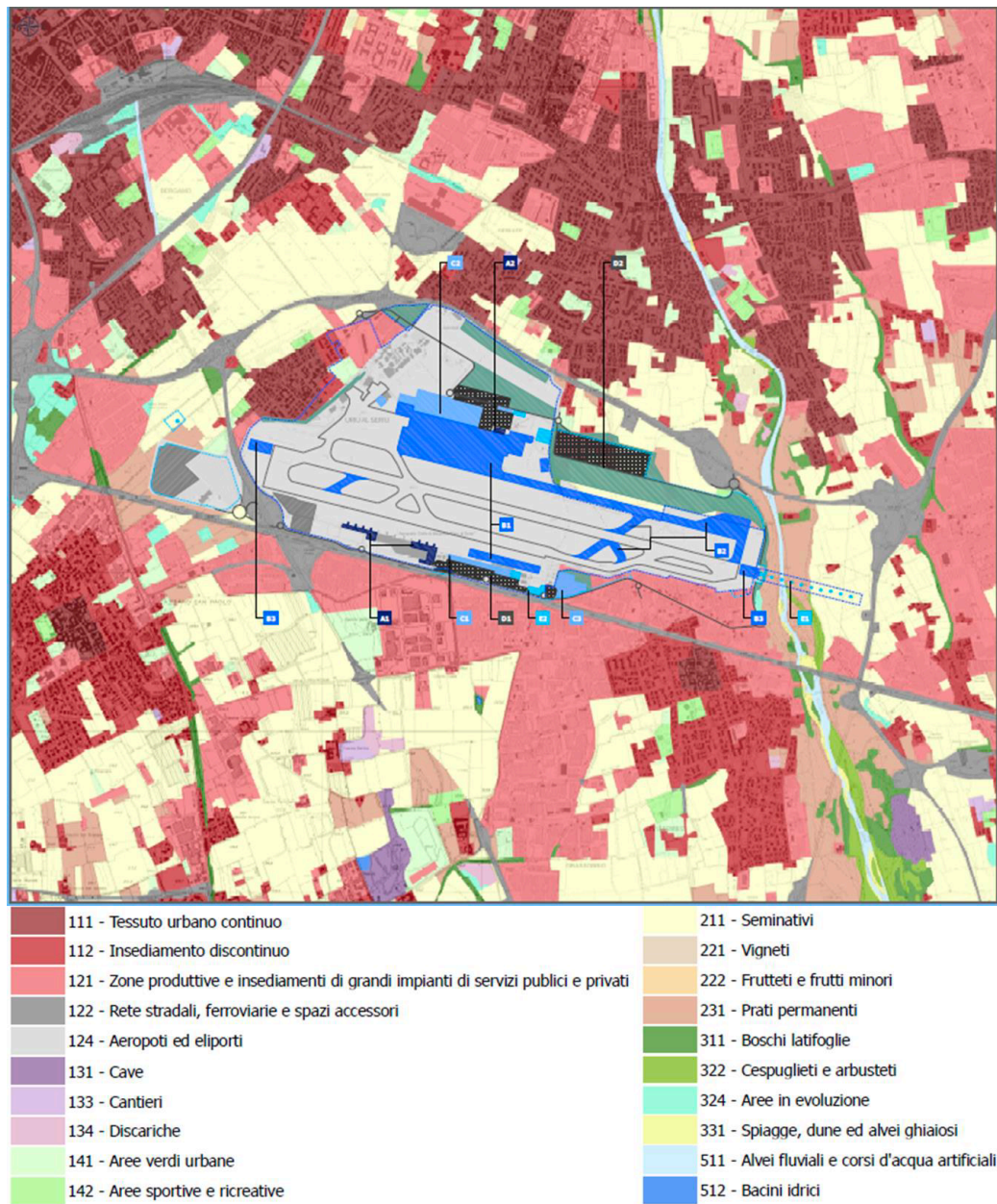


Figure 6: Land use around Bergamo Orio al Serio Airport

4.2.4 The economic impact

Bergamo Orio al Serio Airport constitutes a driving force for the economic development of the Province, contributing about 8% to the GDP of the Province of Bergamo (SACBO, 2018). The presence of the airport guarantees today over 9,500 direct jobs, 8,300 jobs occupied by workers whose activities are indirectly related to the airport (management company, handlers, companies, flight controllers, state bodies, security at the gates, cleaning, shops, catering, restaurants and shops), and registering employment levels that exceeds 6,500 induced jobs on the territory. With the catalytic impact that counts more than 32,000 jobs, the total amount of jobs created by Bergamo Orio al Serio Airport is estimated by SACBO around 56,000 jobs (Bilancio di Esercizio 2018, SACBO). For these reasons, the importance of direct, indirect, induced and catalytic economic effects deriving from the presence of the Bergamo Orio al Serio Airport for the entire provincial economy is recognized by all the local stakeholders, including the territorial actors who request to limit the number of flights.

4.2.5 The accessibility to the airport

At present Bergamo Orio al Serio Airport can only be reached via the road network. The primary road accessibility system to the Bergamo Orio al Serio airport is constituted by the A4 motorway and the provincial network, represented by the interurban axis (SS671) and the SP591bis, serving the entire territory in which the airport is located. With respect to the local context there are two access gates: a main one from the west for access to the passenger terminal, to the freight and airport services area through the SP116 and a secondary one, from the east, through Via Orio al Serio and Via Matteotti starting from the Grassobbio junction along the SS671, dedicated to airport employees only. The road accessibility of Bergamo Orio al Serio Airport has been enhanced in the last years through the connection with the Bergamo Southern Bypass and the BreBeMi motorway.

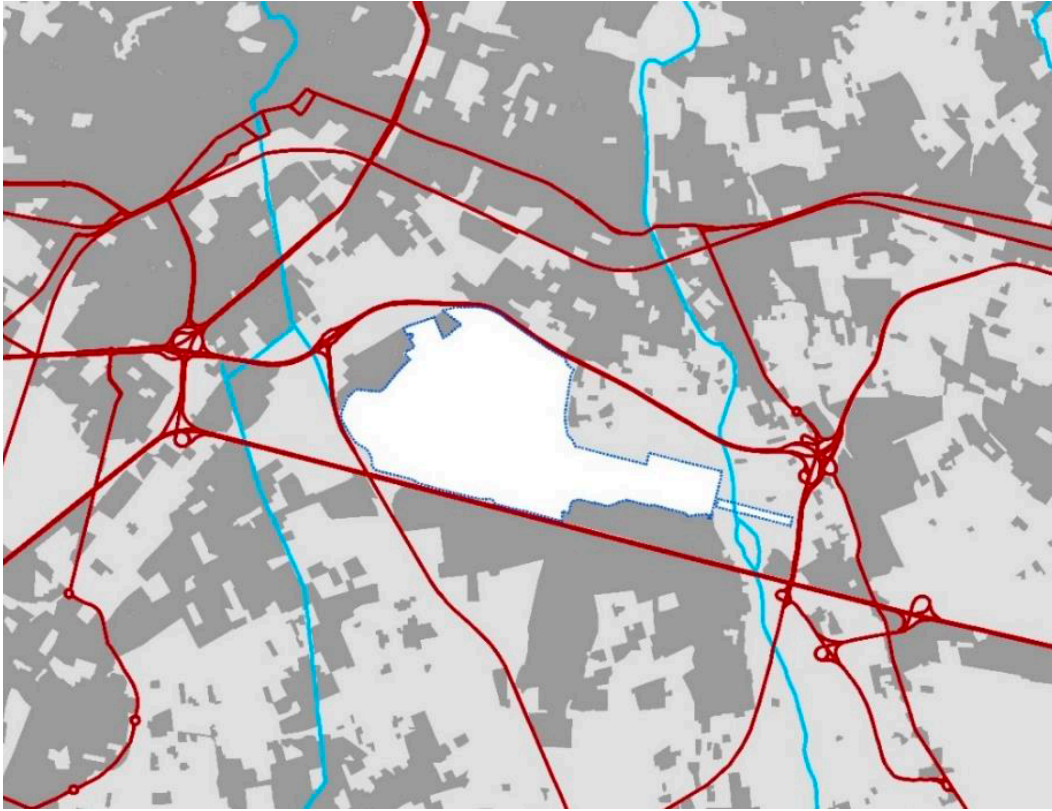


Figure 7: Transportation network around Bergamo Orio al Serio Airport

With reference to public transport, at present the Bergamo Orio al Serio Airport is not equipped with a direct railway connection with the regional transportation network. The connection with the railway network is therefore ensured by bus services that connect the passenger terminal to the Bergamo and Milan Central railway stations, along with many other destinations in northern Italy.

In the absence of a direct rail connection, the modal distribution of access to the airport is currently split for 66% on cars and 34% on coaches and buses (Ceriani, 2012). In actual fact, most of the vehicular traffic flows on the A4 motorway through the Bergamo tollgate and the interurban axis (SP671). From these statistical data, it also appears that the different access methods vary in percentage terms depending on the city; as for Milan the bus represents the preferential mode of access to the airport, passengers originating from the cities of Bergamo and Brescia reach the airport mainly by private car (SACBO, 2018).

4.3 The stakeholders

Bergamo Orio al Serio Airport is located in a heavily urbanized and densely populated area. It is from this premise that derives the number of actors involved in the operation of the airport, in the planning and control activities, and in the definition of the policies of territorial development. The subjects involved can be grouped into:

1. Economic actors, linked to the airport activity, bearers of interests essentially of an economic and income type;
2. Actors who carry out activities of direction and control of the airport activity (Direction and control of activities actors);
3. Territorial actors, locally impacted by the airport activity.

4.3.1 Economic actors

The main economic actors at Bergamo Orio al Serio Airport are the airport management company (SACBO) and the passenger and cargo carriers, along with the airport employees.

- SACBO

SACBO (Company for Bergamo Orio al Serio Civil Airport) is the company that manages Bergamo Orio al Serio Airport. SACBO was established on July 16, 1970 and one year later (March 20, 1972) the competent authorities certified the suitability of the Bergamo Orio al Serio Airport infrastructure and the ability to perform civil air traffic. The shareholding structure of SACBO is constituted as follows:

- SEA* (Airport Exercises Company) with 30.98% of the shares;
- UBI Bank 17.90%;
- Municipality of Bergamo 13.84%;
- Bergamo Chamber of Commerce 13.25%;
- Province of Bergamo 10.20%;
- Credito Bergamasco 6.96%;
- Other private partners 3.88%.

*SEA Group manages the airports of Milan Linate and Milan Malpensa providing all services and related activities.

- Carriers

Regarding the passenger traffic, Ryanair is the most important carrier operating the airport of Bergamo Orio al Serio, handling more than 80% of passengers of the airport and directly employing about 650 employees (Ceriani, 2012). The second carrier for handled passengers is the Hungarian WizzAir with a market share of 8.7%. The Italian Blue Panorama confirms itself as the third carrier with a little less than 200,000 passengers per year, with a market share of 1.5%. Concerning the goods and courier traffic, The German logistics company DHL handles about 70% of the gravitating goods on Bergamo Orio al Serio Airport (Ceriani, 2012) and is an important actor both for the economic purposes of SACBO and for the territory, since it employs about 650 employees within the DHL system. It is estimated that the induced effect of DHL is around 1,200 people.

4.3.2 Direction and control of activities actors

The actors who carry out activities of direction and control on the Bergamo Orio al Serio Airport activity and on the planning of the interventions are, at the state level, the Ministry of the Environment and the Ministry of Infrastructures and Transport and, at the territorial level, the Region and the Province, with competences not specific to airports, but with territorial and environmental planning competences. The civil aviation regulator (ENAC) and air traffic control authority (ENAV), in addition to the Airport Commission, decide on issues related to the impact of the activity on the territory and its mitigation. In particular:

- The Ministry of the Environment deals with concerns related to the environmental impact assessment (EIA) of airports' infrastructure and operation. In particular, it performs the functions of setting maximum limits for the acceptability relating to the different types of pollution and the verification of compliance with the provisions set out in the environmental compatibility decrees.
- The Ministry of Infrastructure and Transport has the competence of planning, supervision and control of airports and airport systems, and the evaluation of investment plans.
- The Lombardy Region is appointed to the territorial planning of the Region and sets the guidelines related to the structure of the Lombard airport system and the role of each individual airport in the territorial development of the Region. In particular, the Region manages the distribution of air traffic between different airports in the perspective of a coordinated and synergistic development with the territories in which they are located. Furthermore, its duties include the realization of all infrastructures planned to improve the access to airports.
- The Province of Bergamo, that is part of the shareholding structure of the Bergamo Orio al Serio Airport management company SACBO, is the coordinating subject of territorial development interventions and defines the strategic guidelines for the policies and the choices of territorial, landscape, environmental and urban planning of supra-municipal relevance.
- ENAC (National Agency for Civil Aviation) deals with multiple aspects of civil aviation regulation such as the examination and assessment of the regulatory plans and interventions, investments and development programs in the airport sector. It also plays a coordination function between the various interests in terms of environmental issues.
- ENAV (National Agency for Flight Assistance) is the company to which the State delegates the management and control of civil air traffic in Italy.

- The Airport Commission is established by ENAC with the task of defining anti-noise procedures and identifying the areas of respect for the airport surroundings. The Airport Commission is the place for confrontation in which the local authorities can influence the choices concerning the environmental effects on the territory of airport activities. The Airport Commission of Bergamo Orio al Serio Airport is composed of representatives of:
 - Lombardy Region;
 - Municipalities of Bergamo, Orio al Serio, Grassobbio, Seriate, Azzano San Paolo, Bagnatica, Brusaporto and Costa di Mezzate;
 - Province of Bergamo;
 - Ministry of the Environment;
 - ARPA (Regional Agency for Environmental Protection);
 - SACBO;
 - ENAV.

4.3.3 Territorial actors

The territorial actors are those interested in the impact, positive in economic and employment terms but negative in environmental terms, deriving from the development of the activity of Bergamo Orio al Serio Airport.

- Municipalities

Several Municipalities are affected by the operation of Bergamo Orio al Serio Airport, especially in terms of negative effects such as noise and air pollution, vehicular traffic, and land consumption. On the one hand, the Municipalities are required to use the land in compliance with the legislation for the protection against pollution, that is to minimize the environmental impact on the populations of the areas surrounding the airport. On the other hand, they must comply with the obligations arising from the airport acoustic zoning and implement the airport noise abatement measures in their rehabilitation plans. In 2010 the Mayors of 12 Municipalities established the so called Permanent “Board of Majors” to constantly check the airport situation and keep any evolution under control.

- Legambiente

Legambiente is the most widespread Italian environmental association. In the Bergamo Orio al Serio Airport affair Legambiente aims at protecting the environmental resources and the rights of the residents.

- Citizens Committees

The Citizens Committees were born spontaneously as a response to the problems that the development of Bergamo Orio al Serio Airport has produced for those who live in its immediate vicinity or along the take-off and landing routes. The Committees put forward several requests,

some common, others more specific, depending on the location of the Municipality where they were born, with respect to the impact that derives on their territories in terms of noise, limitations on the use of soil, and congestion. In 2011 the Committees gave themselves a Coordination, as a result of the dialogue that led to the sharing of common objectives. They are part of the Coordination of Citizens Committee:

- Bergamo Airport Committee (which includes the municipalities of Colognola, Campagnola and Malpensata);
- Cassinone Without Borders (representing the municipalities of Bagnatica and Seriate);
- Aerei Azzano Committee;
- Stezzano Airport Committee;
- Committee for a different airport of Grassobbio;

The first purpose of the Coordination of Citizens Committees is to identify a place of discussion in which a confrontation is made that allows citizens to give voice to their requests and to claim their rights, and to obtain a collaborative dialogue with the institutions to tackle the issue of territorial cohabitation of Bergamo Orio al Serio Airport in a shared way.

4.4 The framework of the planning instruments

In this section the most relevant planning instruments for the considered case of Bergamo Orio al Serio Airport are listed and described. First, the most important plans in force related to the planning of the transportation sector at the international, national and regional scales are outlined. Successively, the relevant planning instruments concerning the general planning at the regional, provincial and local scales are taken into account.

4.4.1 The transportation planning

The framework of the transportation planning instruments can be summarized as follows:

- European Level
 - Ten-T Strategic Plan
- National Level
 - National Plan of Airports (PNA)
- Regional Level
 - Regional Mobility and Transport Program (PRMT)
- The European Level

At the European level, the Ten-T (Trans-European Transport Network) is an European Commission policy directed towards the implementation and development of an Europe-wide seamless transport network of roads, railways, airports and seaports. The aim of TEN-T is to close gaps and remove bottlenecks existing between the transport networks of EU member States with the ultimate objective of strengthening the social, economic and territorial cohesion

of the EU. The TEN-T seeks to achieve this aim through the construction of new physical infrastructures and the modernizing and upgrading of the already existing ones. The TEN-T consists of two planning layers: the “Comprehensive Network” (to be completed by 2050) that covers all European regions, and the “Core Network” (to be completed by 2030) that identifies the most important connections and nodes within the Comprehensive Network. In order to facilitate the coordination between TEN-T projects nine Core Networks Corridors has been identified. (https://ec.europa.eu/transport/themes/infrastructure/about-ten-t_en).



Figure 8: The TEN-T Network Corridors

Within the TEN-T, the Milan airport system is one of the most important airport systems thanks to its geographic and economic strategic position on the “Mediterranean” and “Rhine-Alpine” Core Network Corridors. Specifically, the airports of Bergamo Orio al Serio, Milan Linate and Milan Malpensa are included in the “Core network”, while Brescia Montichiari Airport is included in the “Comprehensive network”.

- The National Level

The National Level is primarily composed of the National Plan of Airports (PNA) produced by ENAC. The PNA constitutes a planning act for the country’s airport system and for the integration of airports and the other modes of transportation present or planned on the territory in logic of intermodality and harmonious development of infrastructure and services. The PNA incorporates the European TEN-T and characterizes the national airport system by identifying the airports of national interest, and in particular some of particular strategic importance. These airports of strategic importance are the airports that effectively meet the demand for air transport of large volumes and catchment areas and are able to guarantee this function over time, due to the capacity of the infrastructure and the degree of accessibility and integration with other mobility networks.

The PNA divides the Italian territory in 10 traffic basins and all Lombard airports within the north-western basin.

The most recent PNA (completed on February 2014) identifies as priority interventions for the national airport network, necessary to satisfy future traffic demand, the upgrading of airport infrastructures, with responsibility and care of airport operators, and the enhancement of accessibility and intermodality, which is the responsibility of the State and local authorities.

Since the PNA identifies the Bergamo Orio al Serio airport as an airport of national interest, ENAC considers necessary to make infrastructure adjustments and interventions to cope with it. In particular, the PNA identifies as priorities the construction of the railway connection with the Bergamo and Milan railway stations and the expansion of the motorway infrastructures in the Province (the Lombard Pedemontana and the External East Bypass of Milan).

- The Regional level

The Regional Mobility and Transport Program (PRMT) identifies the objectives, strategies, and the actions for mobility and transport in the territories of each Italian region. With reference to the Lombardy region, the PRMT calls for redesigning the existing transport service and infrastructure and identifies the priority interventions in relation to the spatial and economic development of the Lombardy region. The target of the PRMT in force, approved by the Region on September 20, 2016 consists in enhancing the connectivity and promoting the multimodality of the transport system of Lombardy, with the ultimate aim of strengthening the competitiveness and the socio-economic development of the territory. In this perspective, the PRMT in force strongly supports the development of the Lombard airport system and the road and rail accessibility to airports. The following figures show the main interventions identified for

the upgrading of the primary road and rail network linked to the Lombard airport system. With particular regard to Bergamo Orio al Serio Airport, the PRMT considers as priorities the realization of the High speed/High capacity railway line connecting Treviglio, Brescia, and Verona and the railway link between Bergamo Orio al Serio Airport and Milan and Bergamo.

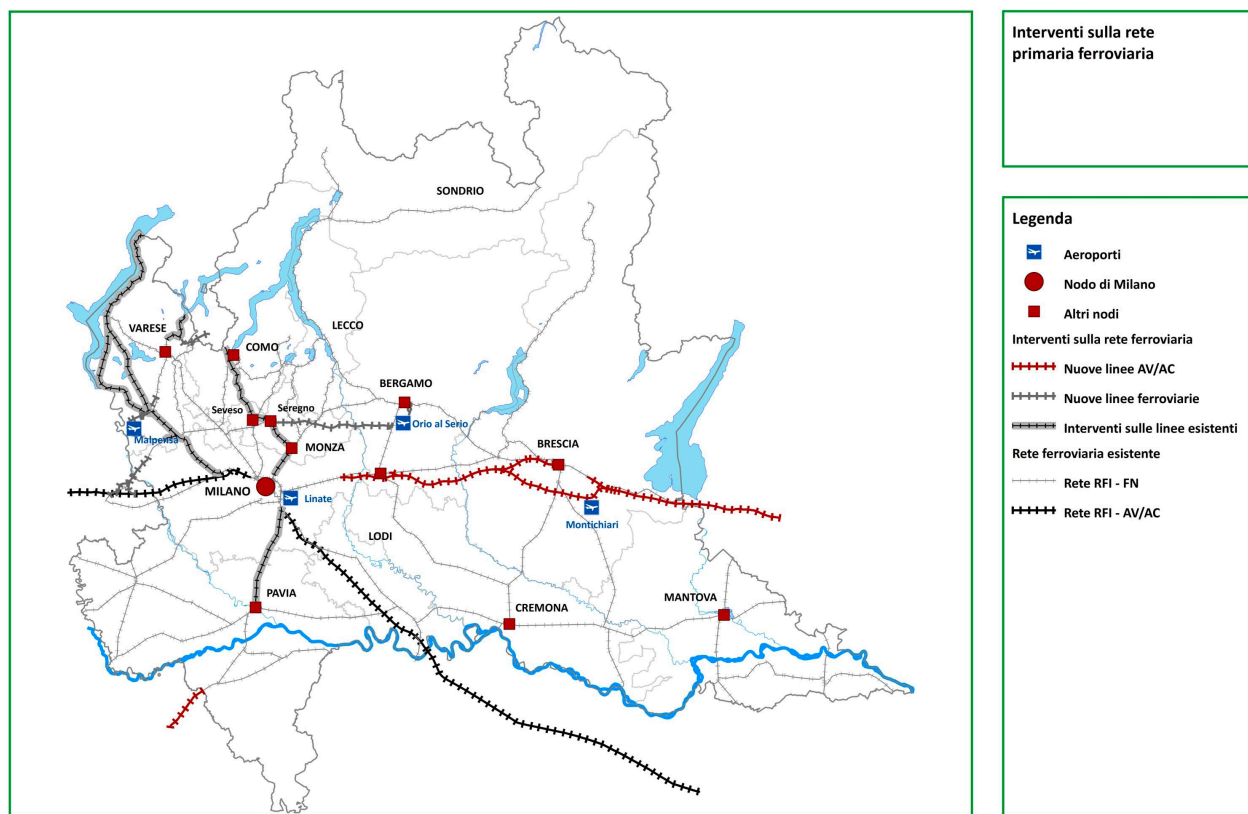


Figure 9: The planned Lombard railway network

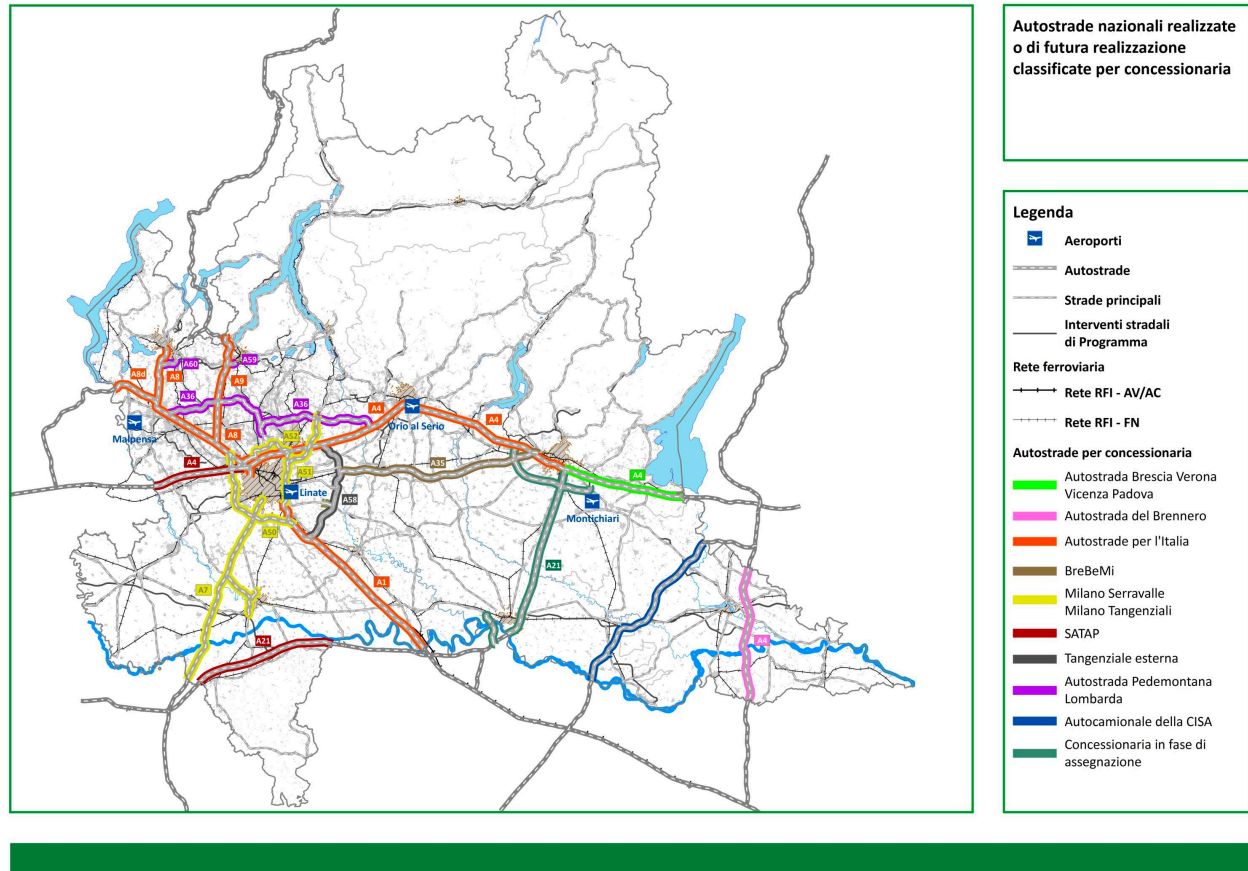


Figure 10: The planned Lombard railway network

4.4.2 The ordinary general planning

Under the current regional planning law of the Lombardy Region, which dictates the rules of government of the Lombard territory, the framework of the planning instruments can be summarized as follows:

- The Regional level
 - Regional Territorial Plan (PTR)
- The Provincial level
 - Provincial Territorial Coordination Plan (PTCP)
- The Municipal level
 - Territorial Government Plan (PGT)
- The Regional Level

The Regional Level primarily refers to the Regional Territorial Plan (PTR) which constitutes the act of direction of the programming of the region, as well as of orientation of territorial planning of the Provinces and Municipalities. The PTR of the Lombardy region in force, approved on

19/01/2010 is the tool for the strategic management of the development of the regional territory, and is closely interconnected to the PRMT in terms of both infrastructures and services, and of priority development scenarios. In particular, the strategic objectives of the PTR for the transport sector are to create an increasingly integrated mobility system by developing a multimodal infrastructure network, to ensure all the territories of the region and to all citizens, access to public services. At the same time the PTR set the conditions for an adequate offer to the demand for spaces for residence, production, commerce, and leisure, acting primarily on contexts to be redeveloped or recovered and reducing the use of free land.

- The Provincial Level

The Province, through the Provincial Territorial Coordination Plan (PTCP), defines the general objectives related to the organization and protection of its territory. The PTCP is also an act of direction of the socio-economic planning of the province and has landscape and environmental validity.

The PTCP of the Province of Bergamo, currently under revision, has set goals of environmental protection, support for economic development, the improvement of the quality of settlement, mobility infrastructure and service systems.

- The Municipal Level

The Municipal Level is implemented through the Territorial Government Plan (PGT) adopted and approved by the Municipal Council, which defines the structure of the entire municipal territory. The Municipalities, in the drafting of their PGTs, set local urban development choices in line with the objectives and guidelines contained in the PTR and the PTCP. With reference to airports, Municipalities must pay particular attention to the definition of settlement forecasts in the vicinity of airport infrastructures, defining the list of destinations and activities prohibited in relation to the problems of transport and settlement security and to the indications derived from the acoustic zoning plan. In light of the considered case, the PGTs of the Municipalities of Azzano San Paolo, Bergamo, Grassobbio, Orio al Serio, and Seriate were taken into account.

5. Analysis

In this chapter, using the development of Bergamo Orio al Serio Airport as a typical example of an airport close to a city and with important spatial problems, central conflicts and possible perspectives for its future development are brought out and related to the inspected literature. The massive expansion of the Bergamo Orio al Serio Airport activity that has characterized the last fifteen years does not seem to have not been associated with a long-term development plan for the airport in its regional setting. Therefore, the analysis seeks to answer the following research question:

Research Question:

How can a long-term vision at the regional scale for the development of airports ensure an efficient accessibility on the landside and the cohabitation with the territory?

The theories on airport-led development and insights coming from strategies of airport development in its regional context presented in the theoretical framework argue for a more in-depth understanding of the role of airports in their regional context and for a more integrated approach between the diverse ambits rotating around airports (mobility network, land use development, real estate, industrial and commercial activities).

5.1 The main conflicts around Bergamo Orio al Serio Airport

In the next paragraphs, the main conflicts around Bergamo Orio al Serio Airport are analyzed. In particular, the vision underlying the Airport Development Plan 2030 proposed by SACBO are considered in relation to the objectives and the strategies pursued by the national, regional and local planning framework emerging from the reading of the planning and programming documents.

The analysis of the case of Bergamo Orio al Serio rests on the reading of the Airport Development Plan 2030, the most recent European, Italian, and regional planning documents related to the considered case, as well as the past Environmental Impact Assessments (EIAs). Moreover, the present thesis counts on an interview with the Mayor of the Municipality of Orio al Serio, the most impacted by the airport activity overall. The possible solutions proposed for both this particular case and other airports facing similar issues emerge from the relevant literature presented in the theoretical framework.

5.1.1 Air traffic forecasts

At the national level, the most recent National Airport Plan (PNA) predicts for the Lombardy region a passenger traffic between around passengers in 2030, distributed in the airports of Milan Malpensa and Linate, Bergamo Orio al Serio and Brescia Montichiari, according to three scenarios minimum, average, and maximum, which take into account the occurrence or

otherwise of certain conditions, with particular reference to infrastructure adjustment and enhancement of accessibility and intermodality. In the specific case of Bergamo Orio al Serio Airport an expected traffic volume between 11,5 and 13,5 million passengers per year is foreseen to 2030, taking into account some possible improvements to the accessibility system that could allow the airport to reach the high threshold level of traffic indicated by ENAC (13,5 million passengers).

At the same time also air cargo traffic is set to increase to a considerable extent in Italy in a scenario up to 2030, but lower than in other European countries. In fact, it seems that the Italian advantages compared to the geographical position at the barycenter of the Mediterranean, and the added value of Made in Italy goods, are countered by negative factors such as the insufficient efficiency of warehouses service and the lack of connections with the most productive areas of the rest of the world. In this regard, the managing director of SACBO Emilio Bellingardi has argued that Italy is currently not structured to handle goods at airports as it should and this is a pity because Italy, and in particular the Lombardy region, lives on exports, and therefore the segment cargo should be upgraded (Savelli, 2019).

In light if the high growth rates expected by the PNA, the Regional Mobility and Transport Program (PRMT) of the Lombardy region considers it necessary to develop the airport system infrastructure, in relation to the mobility of both passengers and goods.

On the one hand, in SACBO's opinion the interventions of strengthening and upgrading of the airport infrastructure to increase its capacity, together with the improvement of accessibility to the airport envisaged by the ADP2030 are consistent with the indications contained in the PNA and in the PRMT to respond efficiently to the future demand for air traffic.

On the other hand, the uncontrolled expansion of Bergamo Orio al Serio Airport in terms of air traffic occurred in the last fifteen years is among the main issues highlighted by the Board of Mayors in the so-called Mayors' note. The priority objective pursued by the Board of Mayors is to limit the development of Bergamo Orio al Serio Airport in terms of number of flights, opposing with determination "any hypothesis of exceeding the 68,570 annual movements expected by 2015 from the EIA of 2013", in the belief that further development of the airport is incompatible with the cohabitation with the surrounding Municipalities.

In this regard, the Mayors of the Municipalities around the airport have strong doubts on the air traffic projections presented by SACBO in the ADP2030, since the expected number of movements to 2030 have been almost reached in 2018, and the growth trend of the first months of 2019 suggest that they will be even exceeded at the end of the present year as can be noticed from the words of Alessandro Colletta, the Mayor of Orio al Serio:

"SACBO in the ADP2030 is saying that in 2030 the airport will reach an number of movements that was actually reached the previous year (2018). In addition, such already ongoing activity levels are flacked by the absence of the mitigation measures and the other planned works for the year 2030 such as the railway connection with the city of Bergamo. That's not correct!"

Also the Coordination of Citizens Committees asks for stopping the continuous and indiscriminate increase in the number of flights recalling the provisions of the EIA of 2003. In

particular, the Coordination calls for a limit to be set on the development of the airport and its activities, fearing that, in the absence of a defined limit, development will continue unlimited. In particular, the Committee for a different airport of Grassobbio complains the fact that the dizzying development of airport activities in just a few years took place without any intervention by institutions.

To conclude, the continuous increase in flights, not supported by a recent development plan taking into account the changed conditions compared to 2013, worries the actors of the territory, who demand more guarantees. In this regard, the territorial actors contest that the uncertainty deriving from the continuous increase in the number of flights, already beyond the limits indicated in the planning instruments, is due to the lack of a recent plan defining the maximum capacity of the airport and the potential of the airport in the long-term scenario. In the event that the Bergamo Orio al Serio airport would continue to record growth in air traffic, the Mayors of the Municipalities surrounding the airport guarantee that citizens protests will be faced by the airport management company.

5.1.2 The vision and the strategy

5.1.2.1 The strategy of the main planning instruments

At the national level, the National Airport Plan (PNA) considers Milan Malpensa as strategic airport and intercontinental gate, and Bergamo Orio al Serio Milan Linate as airports of national interest, all three in the context of the European TEN-T “Core Network”. Brescia Montichiari is instead only considered as a local airport in the PNA and included in the TEN-T “Comprehensive Network”. In terms of roles, the PNA envisages Milan Malpensa as intercontinental gate and reference airport for northern Italy, Milan Linate as city airport considering its strategic position within the metropolitan area of Milan, Bergamo Orio al Serio specialized for the tourist demand, in particular with low cost carriers and courier, and Brescia Montichiari as an important reserve of capacity, both for passengers and freight traffic, for the fitting territorial collocation in an area still not densely urbanized.

The Regional Mobility and Transport Program (PRMT) of Lombardy region, approved in 2016, having as objective the improvement of the Lombardy connections of the primary network on a macro-regional, national and international scale, supports the development of the airport system represented by the airports of Milan Malpensa and Linate, Bergamo Orio al Serio and Brescia Montichiari and the related access links. To pursue this objective, the strategy identified by the PRMT consists of creating a single airport system, open to synergies with Northern Italian airports in a macro-territorial logic, but with distinct roles for individual airports in line with the PNA (PRMT, 2016). In this way, the entire airport system can develop harmoniously, with a coherent redistribution of passenger flows in all airports based on the specific vocation of each of them, so as to fully exploit the overall capacity of the system and the territory in a coordinated manner. Specifically, according to the PRMT, the functional integration of Bergamo Orio al Serio in the Lombard Airport cargo transport system is considered important, with

particular attention to the capacity reserve constituted by the Montichiari airport that can allow to free up space for passenger traffic and lighten noise pollution in the Bergamo area.

The specialization of Milan Malpensa as an intercontinental gate defined both by the PNA and the PRMT has as objective the development of intercontinental air traffic. This particular role can not in fact be fulfilled by Milan Linate Airport due to its structural layout, that prevents its development beyond a certain limit of movements per hour, and the environmental impacts that could create problems for the densely populated areas that exist in its immediate vicinity.

On the other hand, Bergamo Orio al Serio is entrusted with the specialized role of responding to tourist demand, in particular with low-cost carriers, providing for infrastructure adjustments in order to respond to the growing demand for traffic and make it more attractive. In this regard, also the Regional Territorial Plan (PTR) of the Lombardy region reaffirms the role of Bergamo Orio al Serio as a reference point for national and international low-cost connections and couriers. However, as can be noticed from the following quote, the Mayor of Orio al Serio Alessandro Colletta clarifies that current situation is not as good as has been presented:

“The airport lacks of an identity (tourist, cargo, or international connotation..) and this makes it much more difficult to develop a specific and definitive vision for the airport. Moreover, the differentiation of the offer between more than one airlines would be beneficial for the development of a long-term strategy by SACBO.”

The case of Brescia Montichiari Airport is particularly interesting, especially in relation to the future of Bergamo Orio al Serio. Brescia Montichiari today mainly operates for postal transport but is able to perform a support function for various production sectors. It has to be said, however, that the composition of the shareholding structure of Brescia Montichiari Airport, managed by Valerio Catullo Airport of Verona, that sees the 40% of the shares in the hands of SAVE (Venice and Treviso Airports management company) and the rest of the Municipality of Verona, Chamber of Commerce of Verona and Provinces of Verona and Trento, could suggest the gravitation of the Brescia Montichiari Airports towards the North-East.

Since the factors that make an airport more attractive for cargo are represented by the possibility of night-time operation, by the economic advantage on the overall costs, and by the attractiveness of the area in terms of services and connections to the productive areas, the National Airport Plan (PNA) indicates Brescia Montichiari as an airport able to take on and consolidate over time a strategic role in the sector as a reference point for the North-West basin, considering its advantageous localization, the existing and planned transport infrastructure, and the importance of the production districts that would benefit from the presence of transport outlets cargo. The airport is in fact situated at the barycenter of northern Italy, putting it at the intersection of traffic corridors of international, national, and regional importance (BreBeMi and A4 motorways). Moreover, besides being located in the proximity of the tourist zone of Garda Lake, Brescia Montichiari is right in the middle of a prosperous production and commercial area of great importance. A further element worth to be considered is the fact that Brescia Montichiari Airport is situated in an scarcely urbanized context compared to the whole Lombard territory, so with the wide availability of areas around the airport area.

Thus, Brescia Montichiari is considered by the national and regional plans an important capacity reserve for both passenger and freight traffic to be preserved and safeguarded.

In the hypothesis of transferring part of the cargo traffic to Milan Malpensa Airport or to Brescia Montichiari, SACBO highlights that some of the possible negative consequences for Bergamo Orio al Serio Airport would be the loss of volumes and diversification of assets, as well as revenues and employment decline (SACBO, 2018). The consequent loss of competitiveness of Bergamo Orio al Serio Airport and the related territory compared to the macro-system of northern Italy would constitute a premise for a progressive depletion of the economic fabric reached by the territory, together with a loss of connectivity, whose epilogue could result in a real collapse. Therefore, in SACBO's opinion, the synergy created between Bergamo Orio al Serio and the territory in terms of logistics service must be not only consolidated, but maintained and guaranteed over time.

On the other hand, several parties (Legambiente, SEA, Citizens Committees, Municipalities) support for the decrease of the cargo activity because it can solve the issue of night flights, currently one of the most critical factors of the territorial diatribe. For this reason, many territorial actors are in favor of the functional integration of Bergamo Orio al Serio Airport in the Lombard airport system for cargo transport and in the perspective of moving part of the freight transport to Brescia Montichiari Airport, so as to allow the release of spaces for passenger connections and the reduction of courier traffic, mainly operating during the night at Bergamo Orio al Serio. In this sense the Mayor of Orio al Serio complains that:

“The awareness of the necessity for a coordinated Lombard airport system already exists but the facts that there is no coherence between the ADP2030, the development plans of the other regional airport, and the PNA suggest the lack of the will to build it. Even if ENAC is aware of the main problematic around Italian airports, the national authority is not doing anything to rationalize it.”

However, if on the one hand this new operational configuration of the Bergamo Orio al Serio would increase the airport capacity and reduce night flights, a possible side effect would be an increase in daytime flights, which in terms of noise impact “weigh less” than night, with a subsequent increase in noise pollution daily. For this reason, not all territorial actors advocate the total elimination of night flights for fear of what will happen in the day freeing slots for passenger flights.

5.1.2.2 The strategy of SACBO

The Airport Development Plan 2030 (ADP2030) presented by SACBO together with ENAC in 2017 defines how the management company strategically positions the airport in society, in relation to competitors, different parts of the aviation system and externalities, and expresses the vision that SACBO has for the future of the Bergamo Orio al Serio Airport.

In light of the considerations emerging from the national and regional planning instruments of the sector, the ADP2030 provides for a series of actions aimed at adapting the Bergamo Orio al Serio Airport infrastructure to respond to the volumes of traffic expected at the 2030 horizon (13.8 million passengers for about 94,000 movements) and thus to fulfill the objectives pursued by the PNA and the PRMT. In this sense, the ADP2030 envisages a series of interventions on the airport infrastructure and on the operation model. In the ADP2030, SACBO has clarified to have followed an approach based on three founding choices:

- 1) Work and Territory: adoption of the vision for the future that sees Bergamo Orio al Serio Airport as an infrastructure capable of generating positive effects in terms of quality of the environment and life of local communities while delivering an efficient service.
- 2) Local proponent and collectivity: activation of a participatory path by ENAC and SACBO, intended as a tool for comparison with local communities in order to collect their concerns and requests.
- 3) Project and environmental analysis: integration of the design process and the environmental analysis of the project choices, as to guarantee the triggering of an iterative and circular mechanism for verifying the choices made and the results that have emerged (SACBO, 2018).

The vision for the future of Bergamo Orio al Serio Airport as in the ADP2030 distinguishes two types of general objectives; on the one hand SACBO has the goal of adapting the airport infrastructure to the expected traffic demand given the criticality of the current layout of the airport, on the other hand there is the commitment to create a condition of sustainable development and in harmony with the territory.

The update of the Airport Development Plan in force, drawn up in 2001 and approved in 2003, in the light of the new requirements that arise deriving from the estimated traffic demand in the short, medium, and long term by ENAC in the PNA is seen as an obligation for the airport management company SACBO. In fact, in drafting the ADP2030, SACBO has highlighted how the current airport configuration is not able to meet the needs dictated by the expected traffic and, therefore, to satisfy the demand. The various airport systems, both on the airside and landside, would be already close to saturation conditions and, therefore, unable to withstand traffic increases in the short term. In this regard, with the aim of determining the operating conditions that would derive from the natural evolution of traffic demand and from a non-intervention scenario, with an operating model unchanged from the current condition of exercise, the "Alternative Zero" has been considered. According to SACBO, the non-intervention scenario represents a solution that cannot be pursued as it is unable to meet the expected traffic demand by 2030. Furthermore, SACBO highlights how, also from the environmental standpoint, and more specifically in relation to airport induced noise, this scenario appears unsustainable.

If on the one hand the strategies of the ADP2030 appear to be in line with what is reported in the ADP and the PRMT as these would allow Bergamo Orio al Serio to respond to the predominantly tourist demand with international destination, some contradictions arise. On the goods front, in fact, SACBO has identified in the ADP2030 an operational model characterized by a traffic scenario that envisages a gradual reduction of the courier traffic, as expressly requested by the local administrations. However, despite the increasing weight of the passenger transport

component in determining the importance of Bergamo Orio al Serio Airport in the Italian airport network, the ADP2030 actually foresees massive interventions for the reorganization of the courier area in the perspective of a development of cargo activity. Therefore, notwithstanding the change in strategy which envisages not to further implement courier traffic, the massive reorganization of the courier area suggests that SACBO does not seem to intend to renounce to the strategic weight of the courier activities component in favor of a further development of passenger traffic. As a result, the Municipalities and the Citizens Committees still express serious doubts about SACBO's strategy in relation to the cargo activity. Specifically, the Mayor of Orio al Serio Alessandro Colletta in this regard has said that:

"The incoherence of the ADP2030 regarding the cargo segment could be explained by the fact that SACBO may want to keep open every possible scenario for the future of the airport."

With regard to the Lombard airport network, the Lombardy Region has in many occasions promoted the possibility to establish a holding company among the management companies of the Lombard airports with the aim of improving the management of the Lombard airport system as a whole. In this regard, the Mayor of Orio al Serio Alessandro Colletta has highlighted how:

"SACBO is required by the Lombardy Region to take into account the presence of other important airports (Milan Malpensa, Milan Linate, Brescia Montichiari) in the regional context in relation to current saturation of Bergamo Orio al Serio. In addition, the Lombardy Region has underlined the very high population density of the Bergamo area, much higher than the other Lombard airport regions. In the Lombardy region's opinion, all these facts must be included in the ADP2030 strategy."

On the possible fusion SEA-SACBO the president of SEA Pietro Modiano believes that "carrying out this operation would make the entire Italian airport system take a step forward". On the other hand, the possibility of fusion promoted by the Lombard Region and SEA was actually not shared by the Bergamo Orio al Serio airport management company SACBO. This SACBO's position can be explained taking into account that, although the SEA-SACBO fusion would benefit the airport in terms of financial sustainability and new air traffic opportunities, the airport of Bergamo Orio al Serio would lose independency in many strategic choices.

In the ADP2030, SACBO has thus confirmed its commitment to the search for strategies for convergence with the realities operating in air transport, underlining that any hypothesis of corporate aggregation must in any case allow the airport of Bergamo Orio al Serio to continue to be protagonists of a great airport development in the territory of northern Italy, in the interest of the Bergamo area.

5.4.3.2 The strategies of the customers of the airport

The uncertainties regarding the strategies of the two main customers of Bergamo Orio al Serio Airport, Ryanair and DHL, in whose hands the fate of Bergamo Orio al Serio Airport rests, induce

the airport management company to a modular planning of the development, considering also the possibility of a potential reduction of traffic by the two carriers that, in other contexts, have implemented important downsizing strategies (for example in London Stansted in the case of Ryanair, and in Brussels in the case of DHL). It should be pointed out that, however, it is difficult to hypothesize a downsizing by the main European low-cost airline over Bergamo Orio al Serio Airport similarly to what happened in other contexts, since repositioning on other neighboring airports is not feasible due to the flights taxes imposed on Milan Linate Airport and the saturation of the Milan Malpensa Airport “low-cost” terminal, fully occupied by the British EasyJet. Regarding the goods, the hypothesis of a shift of DHL to Milan Malpensa over the next few years is instead possible, taking into account the important developments expected of the cargo area of the main Lombard airport.

In any case, it is important to question the sustainability of important medium-long term investments, when high-speed railways will be even more competitive compared to air transport and low-cost airlines could change destinations, perhaps attracted by more important funding from other airports, or cancel less profitable connections. These companies, to keep their operating results high, are ready to abandon airports to their misfortune, as has already happened when the local realities have not been able to confirm their funding. In this context, there is therefore a growing difficulty in fine-tuning the development strategies of airports when the traffic is mostly dependent on low-cost airlines.

5.1.3 The airport in the regional transportation network

At the national level, the National Airport Plan (PNA) calls for interventions to develop the integration of Bergamo Orio al Serio Airport with the other transportation networks to cope the forecast of growth in transport demand. Accordingly, the PRMT of the Lombardy region is in favor of an efficient multimodal accessibility to the airport on an regional scale, so to allow the expansion of the catchment area towards the east (Province of Brescia) and the west (Province of Milan and Monza and Brianza), whose inhabitants already gravitate on the airport. (PRMT, 2016). The PRMT considers it is essential to focus on the system integration at the territorial level (macro-area of northern Italy) and on the development of intermodal infrastructure (airports, road and rail interconnections) also with the aim of guaranteeing an efficient transport of goods, in support of the Lombard industrial and production system.

The ADP2030 proposed by SACBO aims at enhancing the accessibility conditions to Bergamo Orio al Serio Airport and redistributing the traffic flows induced on the external network through the reconfiguration of the access system and the differentiation of the routes. The main elements of change that characterize the operational scenario of 2030 with respect to the current configuration are the opening of new access roads to the airport and a new direct railway connection to the Bergamo and Milan Central stations.

With reference to road accessibility, SACBO is also convinced that in the future scenario the car traffic flows will also be better distributed on the new road axes (Pedemontana Lombarda and BreBeMi motorways, External East Bypass of Milan, and the direct link with the Bergamo

Southern Bypass) determining a further improvement of the A4 motorway conditions in the Brescia-Bergamo-Milan stretch.

Concerning the connection with the railway network, in line with the provisions contained in the TEN-T, the intention to provide Bergamo Orio al Serio Airport with a railway connection is reaffirmed in the PNA and in the PRMT, as well as in the ADP2030. At present, after identifying various alternatives both technical (people-mover, tram-train, regional train) and tracks for the connection between the Bergamo railway station and the airport, the choice fell on the construction of a railway link that will allow complete integration with the regional railway system, whose construction should start in 2022/2023. With regard to the railway connection project, the Mayors require a more in-depth analysis of the information framework with reference to completion times, type of service offered, and SACBO intervention.

In SACBO's opinion, the railway connection, once activated, would be able to intercept a portion of the induced traffic and a valid alternative to bus service from Milan, thus reducing the load on the road network serving the airport. Besides the Milan-Bergamo-Orio al Serio Airport line, the airport will be also served by the existing Milan-Monza-Bergamo and the Treviglio-Bergamo suburban lines as well as the half-hourly schedule throughout the day is planned to be extended.

However, looking at the regional context, for Milan Malpensa the Milan-Turin and Milan-Zurich AV/AC (High Speed/High Capacity) lines are planned to be upgraded as part of the TEN-T "Core network" with a view to expanding the catchment area to the east and to the north. In this sense, also the PRMT aims at the strengthening of the railway accessibility to Milan Malpensa through the new service from Milan Porta Garibaldi and Milan Central railway stations that is added to the previous service from Milan Cadorna. Regarding Milan Linate, the PRMT has planned the connection with the city centre through the M4 underground and, in relation with Bergamo Orio al Serio, the road link with the External East Bypass of Milan. For Brescia-Montichiari the rail connection could be a priority to serve the airport in view of its possible development in the passenger and cargo segments.

As a result of these considerations, an efficient and large-scale connection of Bergamo Orio al Serio with the local, regional, and national railway network as planned could be a viable way to better define the strategy of development for the airport in its regional context. In this regard, it is argued that the improvement of the Bergamo Orio al Serio Airport accessibility requires more efficient and longer-range railway connections to strategic lines such as the AV/AC Milan-Treviglio-Verona and the activation of a new relationship along the Bergamo piedmont route (Orio al Serio)-Carnate-Seregno-Saronno-Gallarate - Milan Malpensa which allows to quickly connect the main inhabited centers of northern Milan and Bergamo with the two airports. In addition, in order to coordinate the passenger transportation with other modes of transportation a viable solutions would be the establishment of the airport area mobility manager.

5.1.4 The environmental impact

As mentioned in the literature review chapter, nowadays worldwide airports are having difficulty in expanding also due to an ever increasing environmental impact affecting the communities living in the surrounding areas. With regard to the considered case, thanks to Bergamo Orio al Serio Airport, the “town” of Bergamo is now on maps, but this is clashing with the local context. All territorial actors recognize the importance of the Bergamo Orio al Serio airport for the local economy, but believe that the environmental effects are becoming too heavy for the health of residents and therefore require the definition of a maximum limit of development of the airport activity.

Among the diverse environmental impacts of airport activity on the surrounding territory the noise pollution is certainly one of the heaviest and most debated and, as many other airports, also for Bergamo Orio al Serio Airport the reduction of aircraft noise is one of major challenge. The most sensitive areas in relation to the population affected by the noise produced by the Bergamo Orio al Serio airport have been identified in the municipal areas of Orio al Serio and Grassobbio, located immediately close to the sides of the runway, followed by the urban areas immediately under the take-off and landing trajectories such as those of Seriate (locality of Cassinone) and Bergamo (hamlets of Colognola and Campagnola).

With the aim of containing the acoustic effect induced by air traffic on these populations, in the ADP2030 SACBO has defined an operational model of the airport infrastructure optimized with respect to noise pollution, also favored by the strategy of reduction of courier traffic mainly operating in the delicate night time slots. This solution would result in a redistribution of traffic flows, specifically designed to affect those parts of the territory surrounding the airport which are characterized by a lower presence of housing. With respect to the issue of acoustic pollution, SACBO is convinced that the envisaged management policies would induce the containment of the disturbance of aeronautical origin to the resident population.

On the other hand, the territorial actors are exhausted and ask for the rapid replacement of the aircraft fleet operating on Bergamo Orio al Serio with a more efficient one from the acoustic standpoint already available on the market to enhance the livability of the citizens living next to the airport.

In addition, with reference to the noise issue, the Mayor of the Municipality of Orio al Serio, the most impacted from this particular standpoint, complains the fact the lack a valid acoustic zoning ongoing for many years makes the definition of a municipal land use plan much more difficult for its administration.

In this specific regard, Alessandro Colletta has expressed the main problem related to such acoustic zoning:

“A major related to the acoustic zoning is that fact that, once it will be defined, there will be huge areas of the Municipality of Orio al Serio that will have to be relocated due to noise levels above the limits established by the legislation of the sector. As a result, it will result impossible

even to carry on renovation interventions in the buildings of such areas, with the consequent deterioration of the urban fabric of Orio al Serio.”

Concerning the road traffic induced by Bergamo Orio al Serio Airport, clarifications are asked by the Board of Mayors about the traffic impact that would be generated in the road network serving the airport due to the new airport configuration envisaged by the ADP2030. In addition, Mayors require SACBO to carry on a more in-depth analysis of traffic flows in the road network surrounding the airport in relation to potential cumulative effects with other existing and approved projects and the Bergamo Orio al Serio airport such as the “Orio Center” shopping mall and the connected “Culture and Luxury Pole” as expressed by the Mayor of Orio al Serio Alessandro Colletta in the following quote:

“Thanks to the planned railway connection for Bergamo Orio al Serio it is estimated that only around 20% of the passengers will use the train to get to the airport, also in light of the possible connection with Milan Central Station and Milan Malpensa Airport, but most of the users of Bergamo Orio al Serio Airport will use the car to get to it. In this sense, no transport study on the road network serving the airport, already congested, was conducted by SACBO in order to check the traffic situation due to the massive growth of air traffic. Also regarding the construction of the new cargo area to the north has not been flanked by a serious transport study. In this sense, Orio Center is an important factor in contributing to traffic congestion within the airport area, with an average of 40,000 users a day. and should then included in such transport studies.”

The Citizens Committees have also raised the issue related to the fact that the development of Bergamo Orio al Serio Airport involves not only an increase in road congestion with consequent traffic problems, but also a variation in the use of areas, many of which they saw a transformation from agricultural to parking, with the consequent further aggravation of the traffic situation.

As a result, the airport-induced impact of the airport on the surrounding territory a strategic and long-term impact assessment should be prepared aiming at designing a broad strategy for infrastructure development and environmental impact scenarios, comparing the overall benefits and costs on at least a regional scale over a period of at least the medium term.

6. Discussion

The present chapter aims at discussing the lessons learned from the analysis of the considered case. Reflections on the explored research problem are presented, and possible further research on the topic are proposed.

Subquestion 3: *Which learnings can be draw from the present research for the role of the planner?*

From the selected literature and from the analyzed case of Bergamo Orio al Serio Airport, it has clearly emerged the significance of planning in elaborating a shared vision for better managing airport development trends in urban regions and the importance of urban planning in playing a key role in balancing the bullish pro-growth stance of the aviation industry and the critical perspective of the territorial actors questioning the impacts of airports developments (Freestone, 2009), and consequently mitigating he conflicts between airport development and spatial development (Scholl and Nebel, 2014).

As a result, the present research has shown how planners should look after the numerous issues raised by airports in their region, bearing in mind the significance of mediating between different, and often conflicting, standpoints in the management of such planning process. In this regard, the consultation of the relevant positions involved could represent an useful tool to better fine-tuning strategies and policies that heavily impact on the actors present of the territory.

With specific reference to the considered case, urban and regional planners are then called to include all the territorial actors in the decision-making of airport areas, which in many cases and for many years have been overridden by the priorities of the main economic actors involved in the Bergamo Orio al Serio affair.

Uncertainties related to technological innovation that could drive changes which might potentially alter the spatial configuration of airports and airport regions should motivate spatial planners to conceptualize the airport as an integrated assets of the urban fabric, with the aim of making them potentially usable even if its operability will be diminished or its infrastructural function reconverted in the future. In this sense, the future of airports development is strongly connected with the future of the metropolitan regions in which they are located.

Although the goodness of a regional strategy to airport planning has been clearly stated, the need for regional policy approaches for airports has to be discussed case by case, since the different planning systems and infrastructure policies involved specific conflicts and issues that ideal models of airport regional governance are unlikely to solve.

Lastly, in the perspective of further research on the analyzed topic, it could be useful also to include interviews with the citizens' representatives to look at the problem from different standpoint and scale. In addition, the exchange of experiences and solutions implemented in

other European airport regions in terms of land use and development could give useful insights for the planning of airport areas in other cases.

7. Conclusions

In this last chapter of the present thesis, the main findings learned from the the analysis of the considered case of Bergamo Orio al Serio Airport in the relation of the chosen literature are summarized.

The present thesis has shown the main weaknesses that an airfront approach to airport planning is not capable of dealing with the multifaceted and large-scale impact of airports in their regions and finding a balance between the support of airport activity and the cohabitation with the surrounding territory.

In light of the presented theories and strategies, a broader conceptualization of airports in relation to the regional airport system, and in general the regional transportation network, is a viable way to approach the planning of such dynamic areas.

Therefore, the present thesis could contribute to a new perspective for the development of visions for the future of airport areas and add further knowledge to the understating of the complex phenomenon of urban airports.

7.1 The need for a regional strategy for Bergamo Orio al Serio Airport

In Italy and Lombardy there is no coherent airport development plan; many cities have airport facilities that compete with each other, often in economic loss or are extremely problematic in coexistence with cities and territories. This is the result of the privatization of the airports and consequent liberal policies that have limited the planning and regulatory capacities of the State to the advantage of the activity and the speculative initiative of private subjects. The economic interests of investors (private and public) have thus gained the upper hand over the interests of the collectivity. It should also be noted that the fate of many airports, including Bergamo Orio al Serio, are now intertwined and dependent on those of private operators whose crisis can determine the economic and employment collapse of entire territories.

The situation that has arisen around the airport of Bergamo Orio al Serio is quite complex. There are many interests at stake, some conflicting, and it is important that the action of the various stakeholders is in some way coordinated and concerted. In fact, it is a matter of finding a “balance” between:

1. The growth needs of the airport, linked, in particular in recent years, to certain market segments (low-cost connections);
2. The economic and employment effects related to both growth and possible repositioning of activities;
3. Cohabitation with the surrounding territory, above all the acoustic impact.

The present thesis argues for a broader understanding on how planning can support airports to contribute to local and regional development through balanced and context-dependent strategies instead of ideal urban models.

The events of Bergamo Orio al Serio Airport have meant that currently the fate of the airport is linked to the presence of low cost flights (and, in particular, the Irish Ryanair) and the important presence of courier (and, above all, the DHL carrier). This fact, if on the one hand has

contributed to the enormous development of traffic in recent years, on the other hand makes the definition of a long-term strategy of airport development by SACBO much difficult, because, to date, the airport numbers are linked to the two aforementioned companies, the choices of which greatly influence the destiny of the airport. This situation, combined with the general uncertainty regarding the world of air transport, has led the company to follow in the short term the thrusts coming from the market instead of a long-term vision.

The decision of SACBO not to identify a long-term vision for the Bergamo Orio al Serio airport also derives from the organization of the Lombard airport system. In this sense, the uncertainties regarding the structure of the regional airport system and the lack of definitive roles for each airport appear to be a negative factor for the elaboration of a focused strategy.

As a result of the consideration above, the strategy of Bergamo Orio al Serio Airport should be better defined in the medium to long term, taking into account the context in which the airport operates (the Lombard airport system and the related potential synergies), and the important role that the airport has already carved out in the basin of northern Italy, by virtue of its position and its specialization (low cost flights).

With the aim of enhancing the coordination and integration of the airports in the region, a definite vision based on local and regional social-economic conditions which should not be limited only to the improvement of the facilities to meet overall traffic growth must be developed for each airport. The policies identified in the PTR should therefore be developed in an integrated and synergic way with the mobility and transport policies outlined by the PRMT. In this perspective, all corresponding authorities (airport management, local municipalities, and governmental institutions) and relevant stakeholders are required to participate in the decision-making processes of airport master plans to share and set a common development vision.

The airport constitutes a great territorial opportunity capable of attracting tertiary and productive activities that take advantage of the international accessibility offered by the airport. Being an issue that is not strictly local, the airport development process requires a strong coordination of objectives at all levels (state, national, local) and a regional level direction to favor the achievement of a balanced relationship between development airport, settlement and environmental, as well as to carry out a stringent territorial marketing policy at international level. The main purpose must be to attract and retain high-ranking functions with high added value, guaranteeing the necessary services, but also a high level of territorial quality.

The airport master planning process should then evolve from answering questions of “what” and “why” to including other stakeholders to address questions of “how” and “why”. Airports should not expand just to suit their own capacity agenda, but share objectives and visions with other significant contributor to the local economy, as well as the communities of which they are part (Schalk, 2010).

References

- ACI (2004) The social and economic impact of airports in Europe. ACI-Europe and York Aviation.
- Appold, S.J., Kasarda, J.D., 2013. The airport city phenomenon; evidence from large US airports. *UrbanStud.*,1–21.
- Baker D., Stevens, Nicholas, and Robert Freestone, 2010. "Airports in their Urban Settings: Towards a Conceptual Model of Interfaces in the Australian Context." *Journal of Transport Geography* 18:276-84.
- Bilancio di Esercizio 2018, SACBO S.p.A.: <https://www.milanbergamoairport.it/it/bilanci/>
- Blanton, W. (2004) On the Airfront, *Planning*, 70(5), pp. 34–35.
- Bloch, J. H. (2018). Making of Hub Airports: A cross analytical approach based on aeromobilities. Aalborg University Press. ISSN: 2446-1628.
- Boquet, Yves. (2018). From airports to airport territories: expansions, potentials, conflicts. 12. 137-156. DOI: 10.5719/hgeo.2018.122.1.
- Brueckner, J. K. (2003) Airline Traffic and Urban Economic Development, *Urban Studies*, 40(8), pp. 1455–1469. DOI: 10.1080/0042098032000094388
- Ceriani A. (2012), Strategie di sostenibilità ambientale dei City airport in Lombardia. Confronti con il contesto europeo; Rapporto Finale. ÉupolisLombardia, 2012C008.
- Cohen B. S. , Arline L. Bronzaft , Maire Heikkinen , Jerome Goodman & Arthur Nádas (2007) Airport-Related Air Pollution and Noise, *Journal of Occupational and Environmental Hygiene*, 5:2, 119-129, DOI: 10.1080/15459620701815564
- Dempsey, P. S., Goetz, A. R. & Szyliowicz, J. S. (1997) *Denver International Airport: Lessons Learned* (New York: McGraw Hill)
- Doganis, R. (1992) *The Airport Business* (London: Routledge)
- Dunn, G. 2017, "Ryanair expands into the mainstream", *Flight International*, vol. 191, no. 5581, pp. 15.
- Erie, Steven P. (2004). *Globalizing LA: Trade, Infrastructure, and Regional Development*. Palo Alto: Stanford University Press.

Freestone Robert (2009) Planning, Sustainability and Airport-Led Urban Development. *International Planning Studies*, 14:2, 161-176, DOI: 10.1080/13563470903021217

Freestone, R. and Baker, D. (2011) 'Spatial Planning Models of Airport-Driven Urban Development', *Journal of Planning Literature*, 26(3), pp. 263–279. DOI: 10.1177/0885412211401341

Graham, A. (2001) *Managing Airports: An International Perspective* (Elsevier, Oxford: Butterworth Heinemann), second. ed., Cheltenham: Edward Elgar.

Graham, B. (2003) Air transport policy: Reconciling growth and sustainability?, in I. Docherty & J. Shaw (Eds) *A New Deal for Transport? The UK's Struggle with the Sustainable Transport Agenda*, pp. 198–225 (Oxford: Blackwell).

Güller, M., and M. Güller (2003). *From Airport to Airport City*. Barcelona: Editorial Gustavo Gill.

Hicks, Charnelle. 2007. "Urban Planning and Airport Issues: Integrating Aviation into the Urban Planning Process." Paper presented to the Singapore Airport Cities Conference, September.

<http://www.therouteshop.com/profiles/bergamo-airport/>

https://ec.europa.eu/transport/themes/infrastructure/about-ten-t_en

Jarvis, James T. 2007. "Enhancing Non-Aeronautical Revenues: The Evolving AirportBusinessModel." *AirportMagazine* December/ January:20.

Kasarda, J. (2000a). Aerotropolis: Airport-driven urban development. In *ULI on the Future: Cities in the 21st Century*, 32–41. Washington, DC: Urban Land Institute.

Kasarda, John D. (2000b). "Planning the 'Aerotropolis'." *Airport World* 5:52-53.

Kasarda, J. D. (2001). From airport city to aerotropolis. *Airport World* 6, 42–47.

Kasarda, J. (2006) The rise of the aerotropolis, *The Next American City*, 10, pp. 35–37.

Kasarda J. D. and, Stephen J. Appold (2014), "Planning a Competitive Aerotropolis" In *The Economics of International Airline Transport*. Published online: 07 Oct 2014; 281-308.

Kasioumi E. (2015) Emerging planning approaches in airport areas: the case of Paris-Charles de Gaulle (CDG), *Regional Studies, Regional Science*, 2:1, 408-414, DOI: 10.1080/21681376.2015.1064012

Knippenberger, Ute. 2010. "Conference Report: From Airport City to Airport Region. The 1st International Colloquium on Airports and Spatial Development, Karlsruhe, 2009." *Town Planning Review* 81:209-15.

Lassen C. & Galland D. (2014) The Dark Side of Aeromobilities: Unplanned Airport Planning in Mexico City, *International Planning Studies*, 19:2, 132-153, DOI: 10.1080/13563475.2013.876913

Leinbach, T. R. (2004) City interactions: The dynamics of passenger and freight flows, in S. Hanson & G. Giuliono (Eds) *The Geography of Urban Transportation*, 3rd ed., pp. 30–58 (New York: The Guilford Press).

LeTourneur, Christopher. 2002. "The Bricks and Mortar of Global Commerce." *Airport World* 6:36-40.

Marintseva K., 2013. PhD: The strategies of the airports regional network development. National Aviation University, *Science-Based Technologies* № 2 (18) 228, ISSN 2075-0781.

Ministero delle Infrastrutture e dei Trasporti (MIT), 2017. Connettere l'Italia. Position Paper. Azioni per il rilancio del cargo aereo, Ottobre 2017. <http://www.mit.gov.it/sites/default/files/media/notizia/2017-11/Position%20paper%20MIT.pdf>, last visited on May, 2019.

Musalo Hyland A. (1996). Airport development. *Airfinance Journal*, suppl. Guide to Airfinance in China 1996 ; Euromoney Institutional Investor PLC, Coggeshall: 19-21. ISSN 01432257

Peneda, Mauro Jose' Aguiar. 2010. "Critical Factors for the Development of Airport Cities." MSc thesis, Instituto Superior Tecnico, Universidade Tecnica de Lisboa.

Percoco, M. (2010) Airport Activity and Local Development: Evidence from Italy, *Urban Studies*, 47(11), pp. 2427–2443. DOI: 10.1177/0042098009357966

Programma Regionale Mobilità e Trasporti (PRMT), 2016. Regione Lombardia. <http://www.regione.lombardia.it/wps/wcm/connect/9bca40cd-dd7f-4c32-af86-30681e8267a4/PRMT+CON+SEGNALIBRI+dicembre+2016.pdf?MOD=AJPERES&CACHEID=9bca40cd-dd7f-4c32-af86-30681e8267a4>, last visited on May, 2019.

Robertson, John A. W. 1995. "Airports and Economic Regeneration." *Journal of Air Transport Management* 2:81-88.

SACBO (2017). Position paper sulle prospettive di sviluppo e di sostenibilità dello scalo.

SACBO (2018). "Il Caravaggio" Bergamo Orio al Serio Airport Development Plan 2030 - Environmental Impact Study.

Savelli F., 2019. La fusione Orio-Milano? Meglio farsi concorrenza published on Corriere della Sera on May 13, 2019. https://www.corriere.it/economia/aziende/19_maggio_13/fusione-orio-milano-meglio-farsi-concorrenza-59b647c0-7564-11e9-ab5b-6e5ae3374c33.shtml, last visited on May, 2019.

Schaafsma, M., Amkreutz, J. & Gukker, M. (2008) Airport and City. Airport Corridors: Drivers of Economic Development (Amsterdam: Schiphol Real Estate).

Schalk S. M., 2010. Developing a Strong Airport Vision M. Planning Advisory Service Report; Chicago Iss. 562, Ch. 2, 7-23. ISSN 0048430X

Scholl B. & Nebel R. (2014) Urban Transformation in Airport Regions, *disP - The Planning Review*, 50:2, 65-75, DOI: 10.1080/02513625.2014.945304

Statistiche - Assaeroporti. <http://www.assaeroporti.com/statistiche>, visited on March 2019.

"The "best, most and worst" Ryanair airports 2007-17". Airline network news and analysis. February 1, 2017. <https://www.anna.aero/2017/02/01/best-most-worst-ryanair-bases/>, last visited on May, 2019.

Union des Aéroports Français (2017), Les aéroports au service de l'attractivité des territoires. Le manifeste des aéroports français, Paris, visited 12 March 2019, <https://goo.gl/ZYM5s2>.

Upham, P., Thomas, C., Gillingwater, D. & Raper, D. (2003). Environmental capacity and airport operations: Current issues and future prospects, *Journal of Air Transport Management*, 9, pp. 145–151.

Van Wijk M., Kes Brattinga & Marco A. Bontje (2011) Exploit or Protect Airport Regions from Urbanization? Assessment of Land-use Restrictions in Amsterdam-Schiphol, *European Planning Studies*, 19:2, 261-277, DOI: 10.1080/09654313.2011.532671

Van Wijk, Michel & van Bueren, Ellen & Brömmelstroet, Marco. (2014). Governing structures for airport regions: Learning from the rise and fall of the 'Bestuursforum' in the Schiphol airport region. *Transport Policy* 36. 139–150. DOI 10.1016/j.tranpol.2014.08.006.

www.aerotropolis.com, visited on March, 2019.

Wade, F. (2007), 'Global airport facilities: how trends in the global supply chain link with airport real estate development', conference presentation at Airport Cities: International Gateways to regional economic development', 25-26 April 2007, Frankfurt am Main.

Warffemius, P., van der Hoorn, T. & Klaassen, H. (2009) The dynamic spatial impact of Amsterdam Airport Schiphol, *Airlines*, 42, pp. 1–4

Weisbrod, G. E., Reed, J. S. & Neuwirth, R. M. (1993) Airport area economic development model. Paper delivered to the PTRC International Transport Conference, Manchester

Yıldırım Saldıraner (2013). Airport master planning in Turkey; planning and development problems and proposals. *Journal of Air Transport Management*, Volume 32, Pages 71-77.

York Aviation (2004) The Social and Economic Impact of Airports in Europe (Geneva: Airports Council International)

Appendix

**Interview with Alessandro Colletta, Mayor of the Municipality of Orio al Serio (BG), Italy.
Performed on May 2019.**

What is the current situation of Bergamo Orio al Serio in light of the provisions indicated in the PNA?

“[...] In the most recent PNA Bergamo Orio al Serio, along with Milan Linate, have been “weakened” and these two airports are not considered only as airports of national interests. In this sense the local administrators are worried that there would be a lack of allocated resources on mitigation interventions. The Municipalities can not see the rationality between PNA, the PRMT and, in particular, the territorial actors requests of physical and environmental type. From the structural standpoint, Bergamo Orio al Serio has in fact a particular configuration that puts it really close to residential buildings, much more than in many other examples around the world and this fact leads to many issues.

How would you describe the situation between SEA and SACBO?

“On the one hand, SEA wants to maintain the economic gain coming from the prosperous airport of Bergamo Orio al Serio thanks to its share of SACBO, on the other hand SEA thinks that the massive development of Bergamo Orio al Serio would be at the expense of Milan Linate, and in particular, of Milan Malpensa, both managed by SEA.”

“The fusion between SACBO and SEA would be negative for the the territory in terms of governance and therefore in terms of freedom of choices for SACBO. In the case the fusion will be done, these choices will be dictated by SEA that is a way bigger and more powerful than SACBO. In this sense, the problematics in terms of environmental impact and compatibility of the airport with the territory would be worsened because the close relationship between SACBO n the territory would be lost.”

“In this regard, a fusion with Brescia Montichiari would be more logical in terms of protection of the territory and maintenance of the governance. In this case, in fact, Bergamo Orio al Serio would play dominant role.”

What about the lack of an acoustic zoning around Bergamo Orio al Serio?

“Together with other 17 Mayors, I am fighting for the realization of the acoustic zoning, which is the only tool in the hands of local administrators to regulate the impact of the airport on the territory, in particular from the acoustic standpoint. In this sense, in my opinion, the Lombardy Region has expressed a very good assessment on this particular situation. In fact, the Region has said that it makes sense to proceed with an environmental evaluation of the acoustic zoning only after a conceptualization of Bergamo Orio al Serio Airport in its regional panorama. In this way, Bergamo Orio al Serio Airport is required to take into account the presence of other important airports (Milan Malpensa, Milan Linate, Brescia Montichiari) in the regional context in relation to current saturation of Bergamo Orio al Serio. In addition, the Region has underlined the very high population density of the Bergamo area, much higher than the other Lombard airport regions. In the Lombardy region’s opinion, all these facts must be included in the ADP2030 strategy.”

“A major related to the acoustic zoning is that fact that, once it will be defined, there will be huge areas of the Municipality of Orio al Serio that will have to be relocated due to noise levels above the limits established by the legislation of the sector. As a result, it will result impossible even to carry on renovation interventions in the buildings of such areas with the consequent deterioration of the urban fabric of Orio al Serio.”

How can you describe the road congestion issue connected to the airport?

“Thanks to the planned railway connection for Bergamo Orio al Serio it is estimated that only around 20% of the passengers will use the train to get to the airport, also in light of the possible connection with Milan Central Station and Milan Malpensa Airport, but most of the users of Bergamo Orio al Serio Airport will use the car to get to it. In this sense, no transport study on the road network serving the airport, already congested, was conducted by SACBO in order to check the traffic situation due to the massive growth of air traffic. Also regarding the construction of the new cargo area to the north has not been flanked by a serious transport study. In this sense, Orio Center is an important factor in contributing to traffic congestion within the airport area, with an average of 40,000 users a day. and should then be included in such transport studies.”

Which is the current situation around the constitution of a Lombard airport system?

“The awareness of the necessity for a coordinated Lombard airport system already exists but the facts that there is no coherence between the ADP2030, the development plans of the other regional airport, and the PNA suggest the lack of the will to build it. Even if ENAC is aware of the main problematic around Italian airports, the national authority is not doing anything to rationalize it.”

How can be described the relation between air traffic forecasts and strategy pursued by SACBO in the ADP2030?

“SACBO in the ADP2030 is saying that in 2030 the airport will reach an number of movements that was actually reached the previous year (2018). In addition, such activity level already ongoing is characterized by the absence of the mitigation measures and the other planned works for 2030 such as the railway connection with the city of Bergamo. That's not correct!”

“The incoherence of the ADP2030 regarding the cargo segment could be explained by arguing that SACBO wants to keep open every possibility for the future.”

“The airport lacks of an identity (tourist, cargo, or international connotation..) and this makes it much more difficult to development a specific and definitive vision for the airport. Moreover, the differentiation of the offer between more than one airlines would be beneficial for the development of a long-term strategy by SACBO.”