ARCHITECTURE CIVIL ENGINEERING ENVIRONMENT
The Silesian University of Technology No. 1/2011

AIRPORT-RELATED SPATIAL DEVELOPMENT – GLOBAL TENDENCIES AND KATOWICE AIRPORT AREA PERSPECTIVES

Michał STANGEL*

* Dr. Ing. Arch.; Faculty of Architecture, Silesian University of Technology, ul. Akademicka 7, 44-100 Gliwice, Poland
E-mail address: *michal.stangel@polsl.pl*

Received: 5.01.2011; Revised: 7.02.2011; Accepted: 31.03.2011

Abstract

The intensive airport-related area development is a new spatial phenomenon worldwide. The growth of air transportation and airports in Poland in the last few years is related to the economic development and progress towards contemporary standards, and was catalyzed after Poland joined the European Union in 2004, which resulted in an intensification of international contacts. Over the last years there have been several investments in airport infrastructure in the country, and new airports have been planned. Along with the growth of airports importance, airport-related commercial and spatial development takes place both in the immediate surroundings of the airport, as well as further located sites linked to the airport by good transportation infrastructure. The passenger terminal becomes surrounded by a range of additional functions, such as commerce, dining, specialized services, conference centers, hotels, as well as zones of commercial activity. As a consequence airport zones attract urban central functions, and the process is described by several researchers as the emergence of "airport cities". These spatial phenomena can be described on various levels and scales. The paper presents the theoretical context, and discusses the cases of airport areas in Warsaw and Katowice.

Streszczenie

Intensywne zagospodarowanie stref okołolotniskowych jest nowym zjawiskiem przestrzennym na świecie. W Polsce rozwój lotnictwa i portów lotniczych w ostatnich latach związany jest z globalnymi trendami, nadrabianiem zaległości cywilizacyjnych i intensyfikacją kontaktów z odległymi częściami Europy i Świata, zintensyfikowanymi zwłaszcza po wejściu Polski do Unii Europejskiej w 2004 roku. Prognozowany jest dalszy intensywny wzrost lotnictwa w Polsce co najmniej do roku 2030, a w związku z tym rozpoczęte i planowane jest szereg inwestycji związanych zarówno bezpośrednio z infrastrukturą lotnisk (tzw. strefa „airside", obejmująca drogi startowe, płyty kołowania, budynki terminali itp.), jak i ze strefą „landside" (parkingi wielopoziomowe, hotele, itp.). Wraz ze wzrostem ilości przewożonych pasażerów i ładunków terminal pasażerski obrasta szeregiem dodatkowych funkcji. W największych portach lotniczych są to już nie tylko sklepy wolnocłowe i gastronomia, ale wyspecjalizowane usługi, centra konferencyjne, hotele, a także strefy aktywności gospodarczej. Wielu badaczy uważa, że w konsekwencji strefy okołolotniskowe przyciągają funkcje tradycyjnie zarezerwowane dla centrów miast, a w procesie funkcjonalnej i przestrzennej ewolucji terminalu pasażerskiego powstają nowe zespoły urbanistyczne i nowy typ przestrzeni miejskiej, określane jako „airport city". Rozwój ten rozpatrywać można na różnych poziomach i w różnych skalach. Artykuł prezentuje globalny kontekst zagadnienia, oraz studia przypadków planowanego rozwoju stref okołolotniskowych przy lotnisku Chopina w Warszawie, oraz przy lotnisku Katowice w Pyrzowicach.

Keywords: **Urban design; Urban planning; Airport-related development; Airport city; Airport region; Aerotropolis; Katowice airport; Silesia.**

1. INTRODUCTION

Airports in Poland have been developed intensively in the last few years. Civilian aviation is the fastest growing branch of transportation in the country, and the rate of growth is among the highest in the World [1]. This trend started with the political system transformation in 1989, continued with the country's economic development and progress towards contemporary standards, and was further catalyzed when Poland joined the European Union in 2004, which resulted in the intensification of international contacts. Another catalyzing effect comes

from the entrance of the low cost airlines into the Polish market, which made air flights available to the general public, and increased competitiveness between both the air operators and the airports. The number of passengers has grown from 7.13m in 2003 to approximately 20 m in 2010, and is prognosed to further rise and exceed 60 m in 2030 [2]. The volume of cargo operations has been growing steadily as well (from 50,000 tons in 2004 to over 71,000 tons in 2009) [2].

With the growth in air transportation, the airports are being developed. Current investment in the infrastructure of the eight existing airports in the Trans-European Transport Networks (TEN-T) is valued over 4.7m złoty (with 1.27m EU funding) [3]. Building a few new airports in the near future is planned or discussed, including a major Central Polish Airport between Warsaw and Łódź. Along with the growth of airports importance, surrounding areas, airport – related commercial and spatial development takes place both in the immediate surroundings of the airport, as well as sites located further away linked to the airport by high roads and railway. These include facilities both for the passengers (hotels, parking, dining, etc.) and aviation – related businesses (offices, catering, service, etc.), as well as industrial zones and logistic centers. These developments have spatial implications on various levels and scales, and the airport is an important element of the potential, image and competitive position of cities.

2. AIRPORT AND ITS SURROUNDINGS – FUNCTIONAL EVOLUTION

Transportation nodes have always been places of intense contacts and interchange, and thus centers of economic growth and development. As privileged locations, they have attracted investment and have become subject to intensified spatial development. A similar process may be observed in case of airports, and with the growth of passenger and cargo traffic, there is a growing tendency to attract additional aeronautical and non-aeronautical activities. The passenger terminal becomes surrounded by a range of additional functions, such as commerce, dining, specialized services, conference centers, hotels, as well as zones of commercial activity. Small scale examples of new functions may include a hairdressing salon or the chapel in Katowice airport terminal B, or parking lots which have appeared on private plots in close proximity to the airport. Examples of additional functions in the worlds largest airports include cinemas, fitness centers, and a tropical butterfly park at the Singapore Changi Airport, a casino and Rijksmuseum art gallery at Amsterdam Airport Schiphol, a spa at the Hong Kong International Airport, or Frankfurt's largest airport clinic, with over 36,000 patients annually [4].

Güller and Güller [5] propose classifying these activities into three categories, according to their relation to the airports core business:

Core aeronautical activities are part of the technical operation of the airport, directly supporting the air traffic function.

Airport-related activities have a direct relation to air-freight or air-passenger movements (e.g., logistics and distribution activities, terminal retail and hotels, or conference centers). Their competitiveness and/or business revenues are closely tied to the scale of air traffic.

Airport-oriented activities choose the airport area because of the image of the airport and its typically excellent ground accessibility. The price of land and surface connectivity, rather than relation to air traffic, are the key factors in determining those activities location in the airport area.

3. MODELS OF AIRPORT RELATED SPATIAL DEVELOPMENT

As described above, the airports and their surroundings are subject to different growth and spatial development activities, and new spatial and functional relations emerge between the airport, its surroundings and the region. This phenomena have been observed by urban and regional researchers, who have attempted to include them in their spatial development models such as "Edge Cities" (Joel Garreau), "Edge Nodes" (Dolores Hayden), "Airport Corridor" (Maurits Schaafsma, 2003), "Urban Nodes" (Nina Hartwig) or "City Ports" (Michael van Wijk) [6]. John Kasarda (2000) introduced the "Aerotropolis" model, which is a holistic and optimistic vision of an emerging airport – related spatial and functional organism stretching up to 30 km around the air hub. Johanna Schlaack suggested a down – scaled, multi nodal and spatially distributed model – the Airea – which she suggests may be more reasonable in European context [6]. The most established models, often referred to in other contemporary approaches remain however, those of the *Airport City* and the *Aerotropolis*, described below.

3.1. Airport City

The "airport city" model describes the structure of clustering functions expanding beyond the terminal and landside zone of the airport. These functions

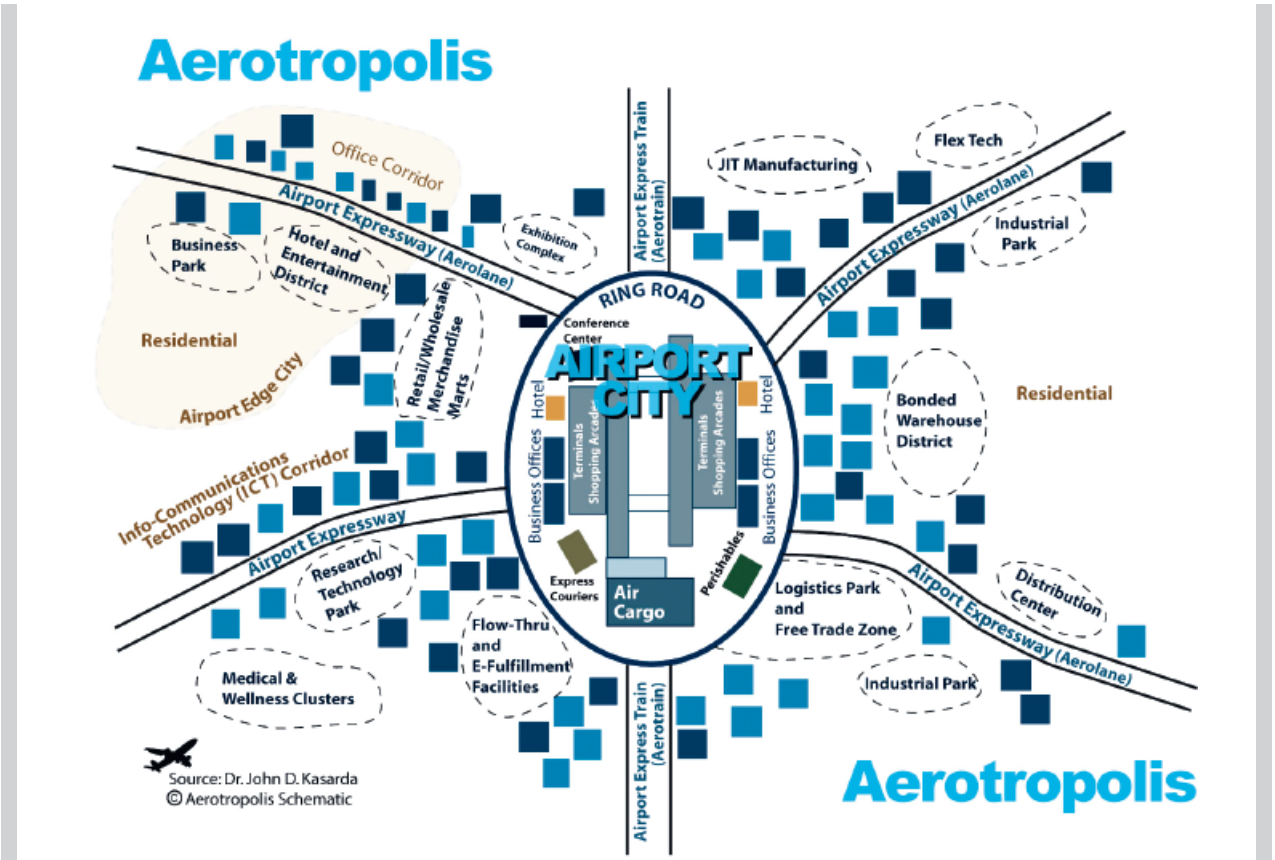

Figure 1.
Aerotropolis schematic by John Kasadra. Source: www.aerotropolis.com, (c) John Kasadra, 2010

include transportation hub facilities such as a train and bus station, car renting, multi-level parking, as well as commercial functions such as shopping malls, dining, offices, and a range of new site specific functions (as described in the previous chapter). The model emphasizes the dense development, resembling in many ways the central business district, or even a modern urban centre. In most cases the "Airport City" is an integrated real estate development planned by an airport authority or another planning institution related to the airport, and variations of the term are used for marketing and branding; e.g. *Air City, Aeropolis, Aeropark, Aviopolis, Avioport, Flight Forum, Sky City or Airpark* [6].

While the spatial configuration of the commercial functions surrounding the airport terminal first resembled those of a large shopping mall, with several freestanding objects separated by parking lots, the airport cities currently designed are envisioned as dense, multifunctional urban neighborhoods, with the placemaking qualities such as landscaping, carefully designed open spaces resembling urban squares and avenues, iconic architecture and public art. Some of the current examples include Frankfurt Airport City, Amsterdam – Schiphol, Hong Kong Airport City or Dubai World Central (DWC). Smaller developments include the planned airport cities in Dublin, Belgrade or Manchester.

Chopin Airport City

A recent example of planned integrated development of a new urban district can be found in Warsaw. The Chopin Airport City is a project of transforming the area in front of the Chopin Airport (previously called "Okęcie") into a dense, urban business and commercial district with recreation and entertainment facilities. The Chopin Airport in Warsaw is located within the city, about 10 km south east from the city centre. It serves more than 8 million passengers annually, being the largest Polish airport (over 40% of total Polish air traffic). In the last few years the airport has been modernized and a new terminal (T2) was completed in 2007. The area in front of the terminals is mostly occupied by car parks – multi-level short stay parking closer to the terminal buildings and long stay parking further away. In the middle of the area there is a four star

hotel with conference facilities, and the construction of another hotel is planned in the near future. A new railroad link with the city center is being finished, with a station located underground, close to terminal A.

The winning competition design by a major Polish architectural company JEMS proposed a dense urban structure with clear spatial links to the existing terminal buildings, the new railway station and the surrounding areas. The functions range from commercial and office space, a conference and exhibition centre, to sports and recreational facilities. The buildings are formed into a modern variation of the urban block, with well defined "active edges" of the open spaces. The proposed landscaping includes the creation of the Fryderyk Chopin Park. According to the authors description, the park shall be easily visible from the road leading to the Airport, and constitute a characteristic feature of the complex, establishing a new relationship between Chopin Airport City and the capital. The focal point of the park will be in a public square with service functions. The park will mainly serve recreational purposes and will also be open to the public. As planned by the architects, the park area will be designed so as to form a meadow with clusters of trees, a pond and a landscaped escarpment with accompanying facilities such as catering establishments, fitness clubs and galleries. As envisaged in the winning design, the resources of the existing Żwirki i Wigury street are to be preserved. The street's best features will be highlighted thanks to the planned development of the area, and transparent design of streets, pedestrian areas and squares [7, 8].

Within the project, Chopin Airport plans to develop the area of about 10 hectares and provide over 150 thousand square meters of usable space. According to the airport authorities the estimated cost of the investment is 10 billion PLN. The next phases of Chopin Airport City project implementation shall involve refining the competition design into a development masterplan, and preparing a municipal land development plan [7].

3.2. Aerotropolis

John Kasarda (2000) introduced the term "aerotropolis" to describe the new spatial development phenomenon in the airport-proximate suburban space, extending far beyond the airport city and incorporating a broader range of functions. As Kasarda observes, while the airport attracts the airport-related functions first, in the next phases those functions attract other further functions too, which may not be directly linked to the airport itself. Kasarda proposes a model and diagram of an "aerotropolis", stretching up to 30 km around the airport terminal. The model includes services, aviation related businesses, office complexes, cargo, and even residential zones, organized along the transportation corridors. Proposing a range of urban design and planning principles in developing such zones, Kasarda follows the principles of smart growth and sustainable urban development, such as rational land use and saving resources, density to reduce traffic and infrastructure demand, linking complementary functions, as well as creating a unique sense of place for local communities. The aerotropolis diagram shows a theoretically ideal situation with the development surrounding the airport in all the directions, with fast transportation links. The real life situations depend on several site specific limitations, such as preserved green spaces, previously developed land, residential areas, rivers and water basins, etc.

4. KATOWICE AIRPORT – EMERGING AIRPORT RELATED DEVELOPMENT

Katowice Airport is located in the northern part of

Figure 2.
Dublin Airport City visualisation, project by HOK.
Source: www.dublinairportcity.ie/growth.html, (c) Dublin Airport City

Figure 3.
Surroundings of Chopin Airport in Warsaw – photo by author

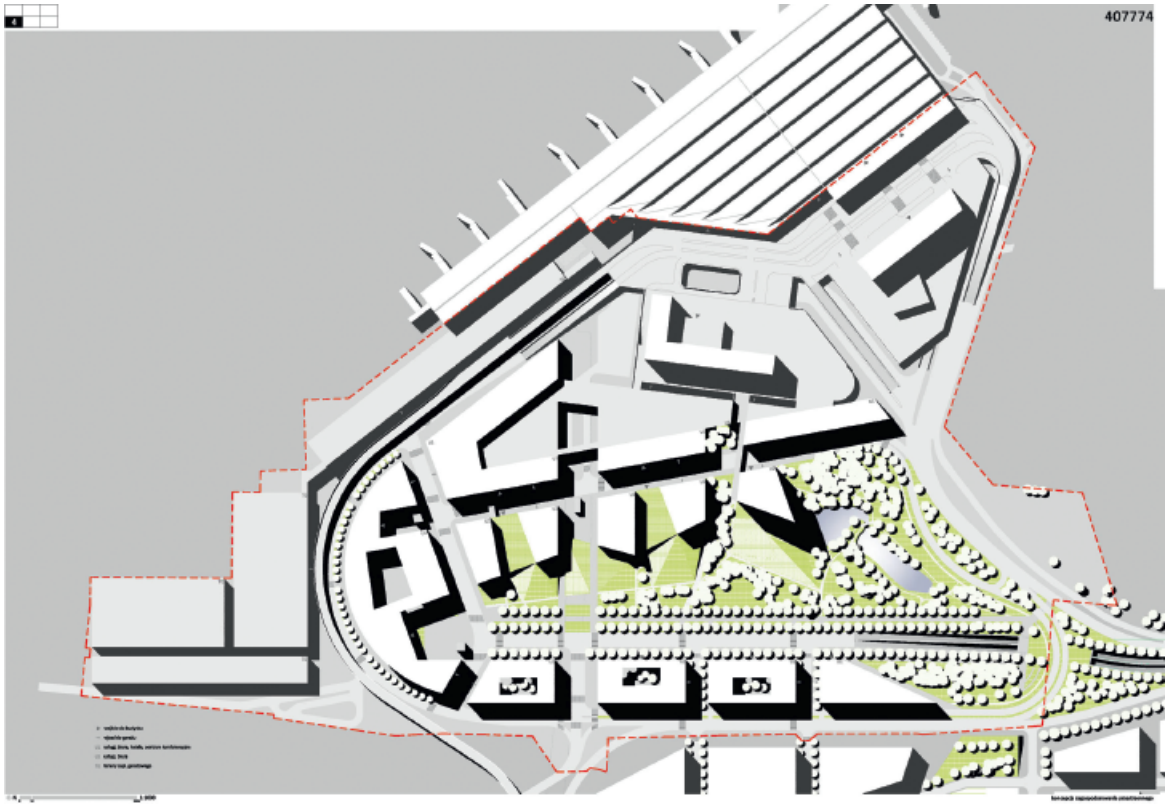

Figure 4.
Chopin Airport City winning competition conceptual masterplan by JEMS architects (c) JEMS architects

the Upper Silesian Agglomeration, in the village of Pyrzowice; about 20 km north of Katowice. The airport dates back to 1938, when a military airport was set up and further developed by the occupying German troops. In the seventies the airport began its civilian operation, and since the end of 20th century has undergone intensified development, further accelerated by Poland's joining to the European Union and the operations of the low cost airlines. The airports area is over 570 ha. The airport is ranked as class C – a large regional airport. The facilities include one runway, a cargo terminal, two passenger terminal buildings of a total surface equal 22 000 sq m and a capacity of 4 million passengers per year. In 2009 it served 2.5m passengers (giving it third place in Poland after Warsaw and Kraków-Balice) [8].

4.1. Existing and planned airport-related development

As the airport has grown in the amount of air operations in the last few years and further growth is anticipated, the airport infrastructure has been modernized and developed according to a masterplan. The first masterplan was developed by a team from Silesian Technical University in 2001, and a subsequent masterplan in 2008 by an international consortium. The airport masterplan envisions a general development scheme of the airport, both airside infrastructure and landside facilities, such as improvement of vehicular access and circulation, improvement of car parking; the construction of a new multi level parking, new railway connection and station linked with the terminals, new terminal building, hotel and conference center and commercial buildings [9].

In 2010 the Chair of Urban and Spatial Planning of the Architecture Faculty, Silesian University of Technology was commissioned to prepare a spatial vision of the possible development according to the masterplan. The conceptual design (led by the author) included refining several elements from the overall masterplan. Transportation facilities included refining main road access and internal circulation, multi level car parks, a railway station and a skywalk connecting the station with the terminals. An architectural massing proposal of the new Terminal C proposed a dynamic form with waving roof, which could be developed in three stages. An alternative design proposal included details resembling the Katowice railway station. The

Figure 5.
Surroundings of Katowice airport – photo by author

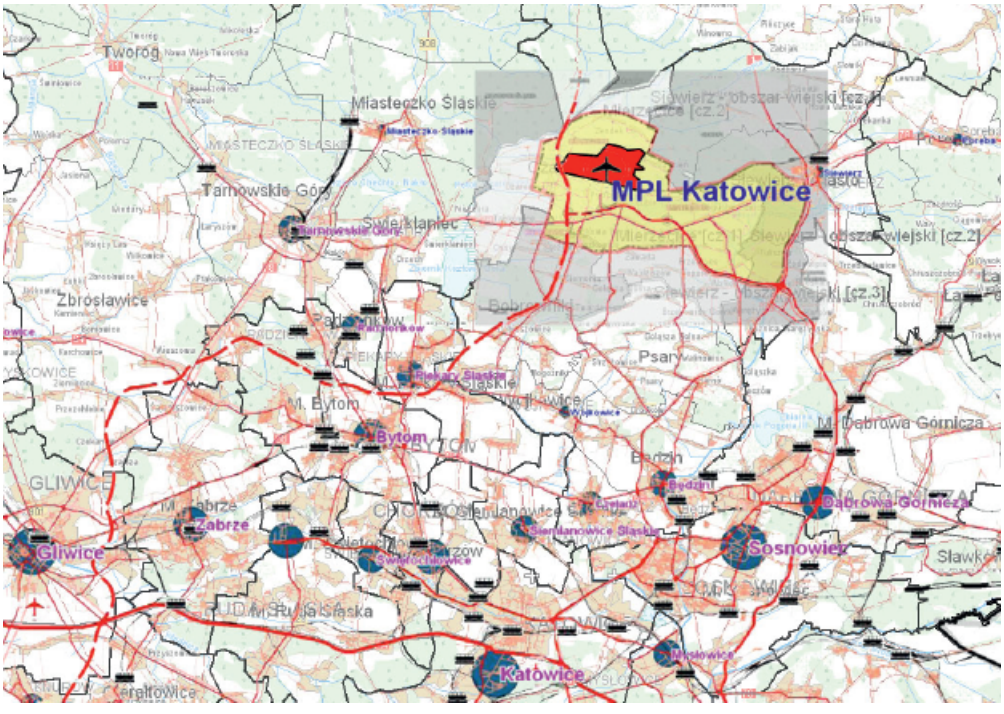

Figure 6.
Katowice airport in Silesian region

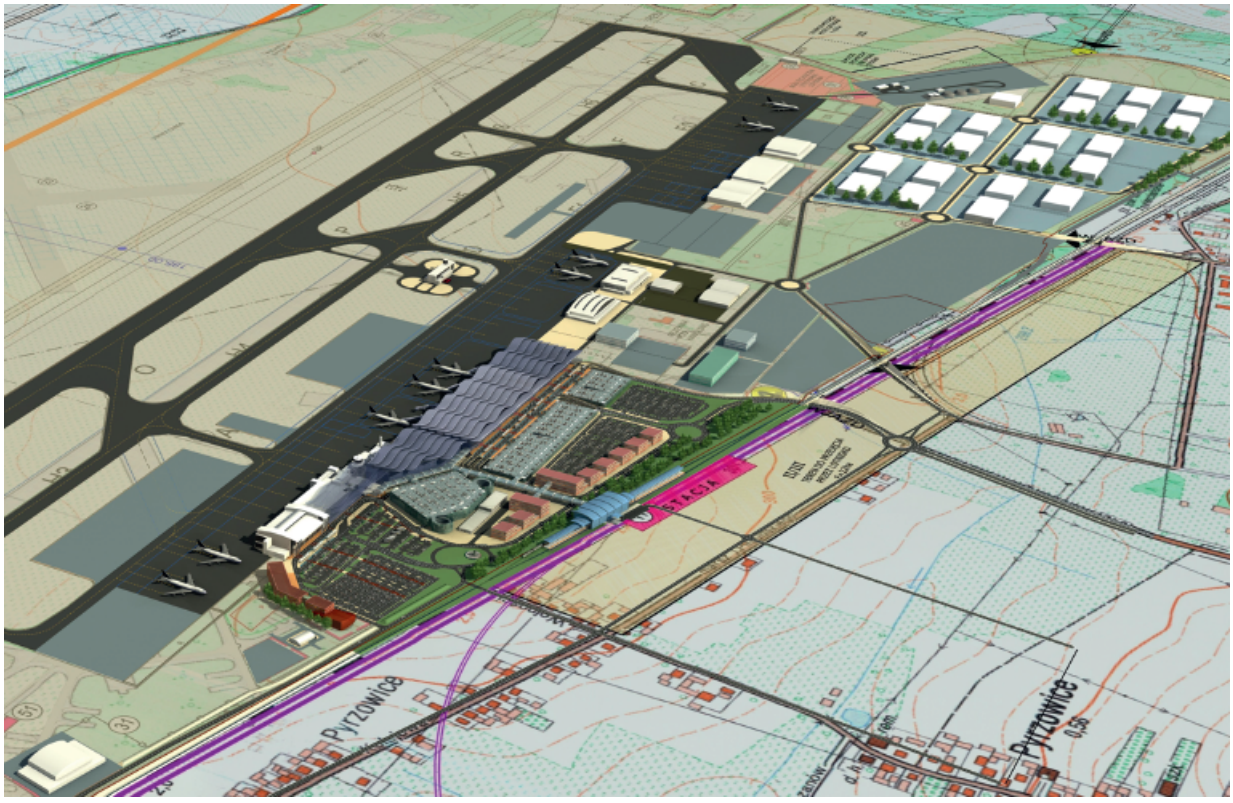

Figure 7.
Katowice Airport landside development design concept – visualization (rendering by arch. Damian Serwata, supervised by author (c) Katowice airport)

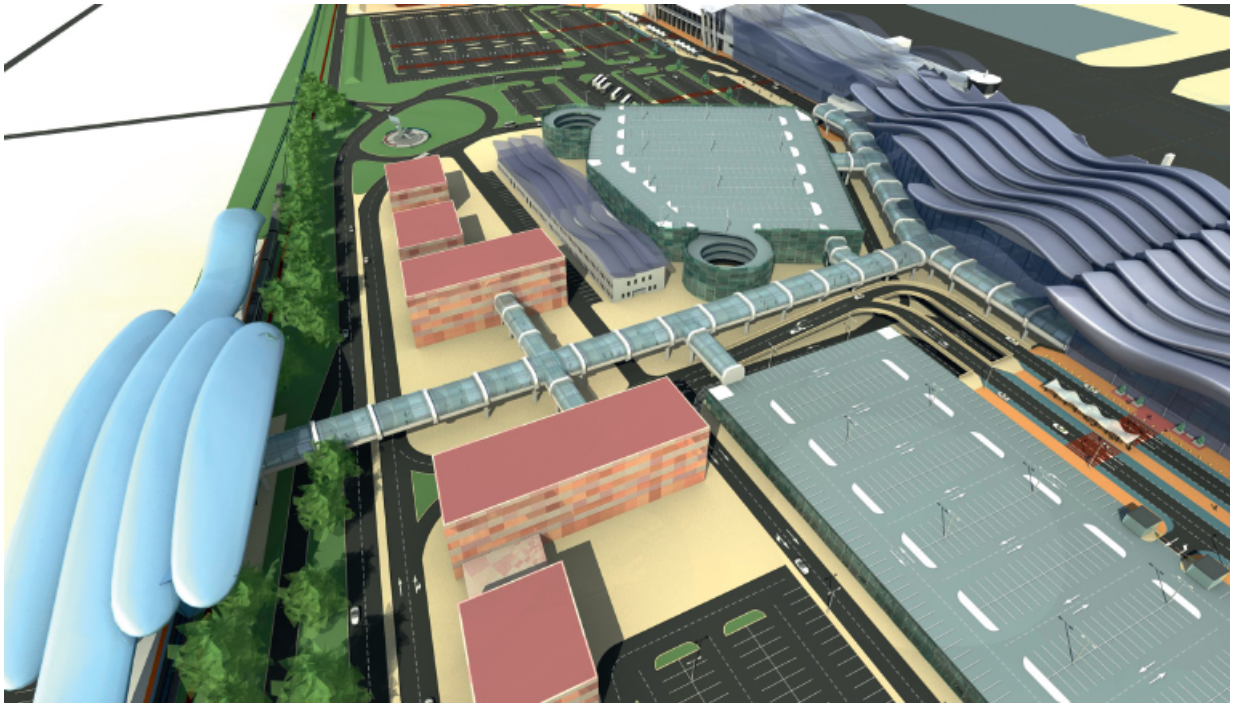

Figure 8.
Katowice Airport landside development design concept – visualization (rendering by arch. Damian Serwata, supervised by author (c) Katowice airport)

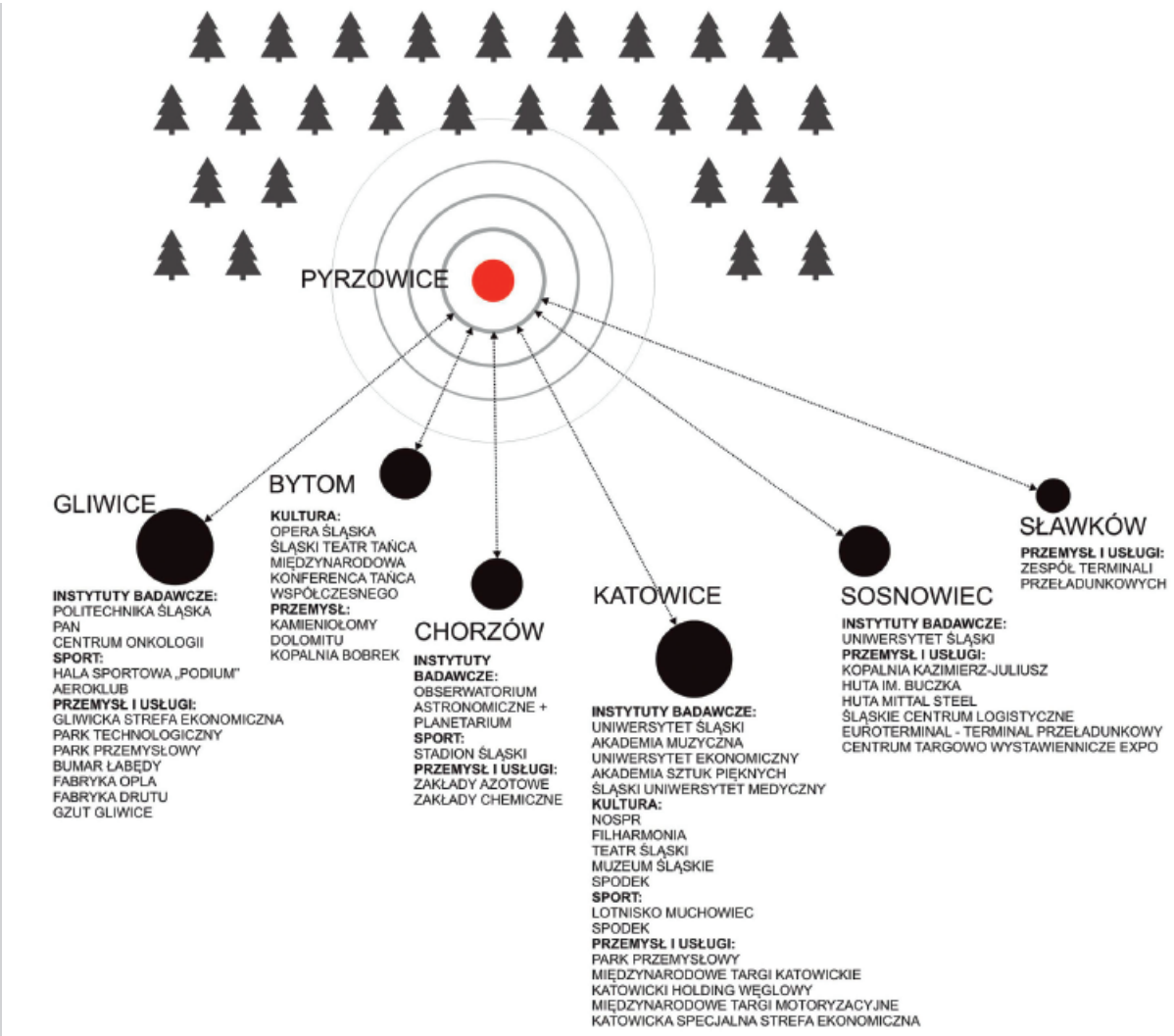

Figure 9.
A diagram of potential functional relations between Katowice Airport and the main cities in Silesian Agglomeration (drawing by architecture student Sabina Mrowińska, supervised by author)

new terminal functions are split into two levels, with the departures hall on upper floor and arrivals hall below. Additional functions include a hotel with a conference centre, office complex, new administration buildings, as well as catering, industrial/cargo zone, and a new general aviation terminal. The design also included an evaluation of current conditions of the space in front of the terminal, and a range of landscaping improvements, such as planting, urban furniture, new paving and lighting [10].

Katowice Airport has a growing impact on the region, and while it might be to early to speak of an "aerotropolis" type development happening, several existing or planned developments may be seen as hints of the future direction of the intensified development in the zone surrounding the airport. These elements of development include:

- Traffic improvement – the construction of A1 highway, with the Pyrzowice node very close to the airport; planned improvement of the 913 road linking S1 and the airport – building a second lane
- Railway link with Katowice and Bytom, as well as the prospective possible high speed train station near the airport
- A significant amount of small private developments around the airport, such as parking lots, restaurants and accomodation
- Provision of industrial and commercial areas in the villages neighboring the airport – Mierzęcice and Ożarowice in the local strategic and planning documents; as well as in the updated Spatial

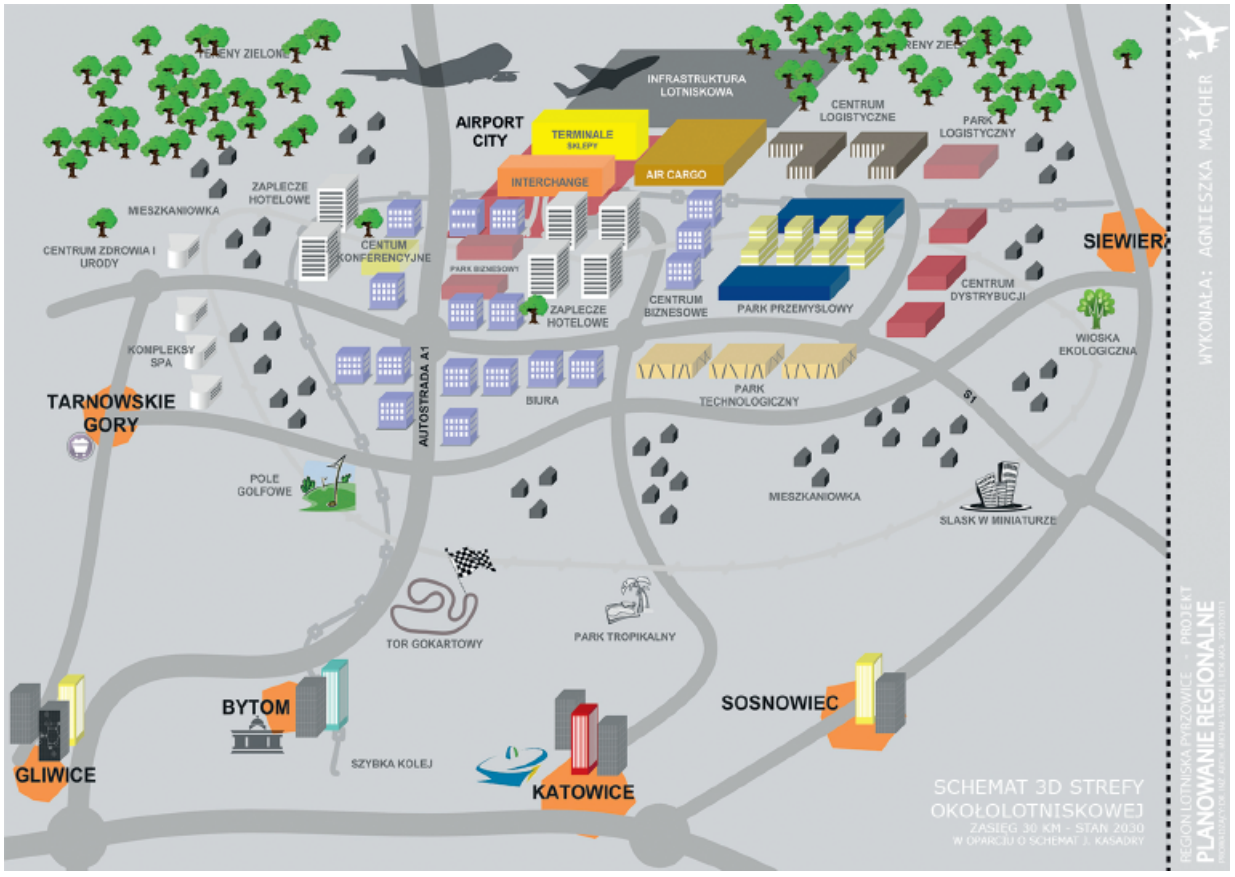

Figure 10.
A diagram showing a hypothetical further development of Katowice Aerotropolis (drawing by architecture student Agnieszka Majcher, supervised by author)

Development Plan of the Silesian Voivodship, which envisions the growth of the airport – related commercial zones along major transportation corridors linking the airport with Silesian cities [11].

4.2. Envisioning the Silesian Aerotropolis?

Looking at the early existing developments, as well as the prepared planning provisions and remembering the overall aviation growth prognosis and global trend-setting developments, one may discuss the hypothesis of future growth in the areas related to the airport. It seems that the developments and strengthening of synergic relations between the airport and its surroundings may be happening in three areas:

1. An "airport city" – the immediate surroundings of the terminal, as envisioned in the Airport Development Masterplan, with new aviation-related commercial developments, such as offices, hotel, multi level parking, cargo, logistics, light industry. The construction of Terminal C would increase the amount of retail and further passenger-oriented services. The construction of the new rail and highway links will catalyze this growth, and enable the airport to become an easily accessible destination, with amenities not directly related to aviation.

2. An "airport-related economic zone", comprising of the several large commercial sites provided in the regional and municipal spatial development plans, as well as individual businesses around the airport. The improvement of infrastructure and the emergence of the first big investors can result in clustering of further aviation related enterprises, as well as those seeking simply good connectivity (air/road/rail) and a general good business environment. The growth of businesses shall result in a synergic "snowball effect" and benefit for local inhabitants (employment) and businesses (more clients for restaurants, hotels, etc.). On the other hand intensified development is likely to result in several nuisances (environmental impacts, traffic, noise, etc.) and potential conflicts.

3. Increasing importance of the airport for the main cities – Katowice and Gliwice. Katowice as the

administrative and commercial centre of the region will continue to benefit from the airport connections, and new airport-related activities may result from new meeting and cultural venues featuring events of national and international importance: modernized Silesian Stadium, new congress center, new Silesian Museum. Furthermore, air-traffic may increase if Katowice is successful in becoming the European Capital of Culture in 2016. Gliwice on the other hand has the growing Special Economic Zone, a major regional logistics centre, as well the Technical University with the aspiring Civil Aviation Education Centre for Central and Eastern Europe. In the near future the completion of the A1 highway will link the city directly to the airport within a 20 minutes drive. Furthermore, both Katowice and Gliwice have small airports which are planned to be improved for general aviation and air taxis, and in the future may take over some of smaller and regional air traffic. This synergic relation of the airport and the cities may further result in "airport-corridors" along the express road S1/86 and the new A1 highway.

5. CONCLUSIONS

As consequence of growth and new functional development, the areas around airports attract urban central functions and evolve into complex spatial structures of a new type, called "airport cities" or "aerotropolises". As in most of the world, civilian aviation has grown in Poland over the last few years and airports and their surroundings have been intensively developed. The presence of an airport is an important element of cities potential, image and competitive position. Recent airport-related development in Poland and further planned landside investments include new functions, which can be seen as traces of the emergent airport cities. The case studies of planned airport area developments in Warsaw and Katowice airports are quite different. While the Chopin Airport City is a project involving the transformation of the areas around the access roads to the airport into a dense, urban business and commercial park, the Katowice developments envision a less dense mix of services related to the passenger terminal. Current planning documents and policies, envision however, intensive infrastructure development and new commercial industrial zones located along the transportation corridors linking the airport with Silesian cities. Given the potential of the region, this may give ground for the emergence of a "Silesian aerotropolis" in the future.

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