

## Airport Catchment Area- Example Warsaw Modlin Airport

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**Abstract.** The form and functions of airports change over time, just like the form and function of cities. Historically, airports are understood as places of aircraft landing, control towers operation and location of other facilities used for communication and transport. This traditional model is giving way to the concept of so-called Airport Cities, based on the assumption that, in addition to its infrastructure and air services, also non-air services are performed, constituting a source of income. At the same time, their reach and impact on the economy of the areas around the airport are expanding. Idea City Airport appeared in the United States in the late twentieth century. The author is J. D. Kasarda, he believes that it is around these big air ports that airport cities develop. In the world, there are currently 45 areas which can be classified in this category, out of which 12 are located in Europe. Main air traffic hubs in Europe are not only the most important passenger traffic junctions, but also largest centres dispatching goods (cargo). It can be said that, among the 30 largest airports, 24 are the largest in terms of both passenger and freight traffic. These airports cover up to 89.9% of the total freight transport of all European airports. At the same time, they serve 56.9% of all passengers in Europe. Based on the concept of Airport City was developed document THE INTEGRATED REGIONAL POLYCENTRIC DEVELOPMENT PLANS FOR THE WARSAW MODLIN AIRPORT CATCHMENT AREA. The plan developed takes into account the findings of the Mazovian voivodeship spatial development plan, specifying the details of its provisions where possible. The development is the first step for the implementation of the concept of the Modlin Airport City. The accomplishment of this ambitious vision will only be possible with hard work of a number of entities, as well as taking into account the former Modlin Fortress, currently under revitalisation, in concepts and plans.

### 1. Introduction

Modern airports and their surroundings are constantly changing, as does the form and functions of contemporary cities. So far, the public awareness associated airports with the place of plane landing, functioning of control towers and other facilities used for air transport. Currently, this traditional model gives way to the idea of the so-called air cities. This idea is based on the assumption that in addition to own infrastructure and services, the airport also develops additional services, not related to air, which are a source of revenue for the airport. At the same time, the scope and impact on the economy of the areas around the airport is developed and expanded. Special attention should be paid to the examples observed in Europe and around the world, which can be patterns for the concept of construction and reconstruction of the existing airports. This way of thinking about the airports and areas around them makes the current airport terminals become shopping centres and the areas of business and leisure. In the vicinity of the terminals the hotels, office complexes, logistics centres and free trade zones are built. Revenues of the airport are additionally reinforced through advertising placed in terminals and parking fees. The financial analyses of the airport budgets have shown that in some cases the airports have obtained greater income from additional sources than from air services, such as airport fees, service charges for the passenger traffic control. These results undoubtedly are an incentive to develop the idea of Airport Cities in the vicinity of the airport.



The idea of the Airport city appeared in the United States of America in the late XX century. J. D. Kasarda is its author, who thinks that the airport cities develop around these great ports. Currently, there are 45 areas in the world, which can be qualified into this category, of which 12 are in Europe. The main air traffic hubs in Europe include not only the largest hubs of passenger traffic, but also the biggest centres of loading goods (cargo). It can be said that among the 30 largest airports, 24 airports belong to the biggest ones, both in terms of passenger and freight transport. These airports include up to 89,9% of the total freight transport of all European airports. At the same time, they support 56,9% of all passengers in Europe.

## **2. The European background of the functioning of the airports and areas around them**

After the Eurostat data analysis, it can be stated that currently there are about 660 airports functioning in Europe. The vast majority of them are, however, small ports with moderate traffic. The main airports, which are used by over 100 thousand passengers a year, are only 314 facilities. They are located in European regions characterised with the highest ratios of economic development. Also the location of the main airports in Central Europe is strongly correlated with the economic development of the regions, in which they are located. The data on passenger traffic shows that 6.1% of all European airports are the regional airports; 3.9% of the European airports are secondary nodes, and only 2,0% of the European airports are the main nodes. According to the data from Eurostat, 88% of airports in Europe are small regional airports. The presented data shows that the air traffic is concentrated in several ports. In Europe, there are only 30 airports which service more than 10 million passengers a year. These airports have, however, serviced 58.2% of all 660 million passengers who travelled between the European airports in a year. Moreover, these airports include up to 89.9% of the total cargo transport of all European airports. As indicated by the information from Eurostat, the freight air traffic mainly relates to the intercontinental transport. European destinations constitute a much smaller part (15.3%), compared to passenger traffic. In general, the largest airport hubs dominate both in terms of the passenger and cargo transport, still, there are a few airports, which have specialised in terms of freight traffic.

ACI Europe published a study on the ownership structure of European airports. The study analysed data from 403 airports. Over 85% of the indicated airports is entirely or largely in the public domain. Only 8,7% (35 airports) are entirely private airports, they service 13,8% passengers and 15,4% of freight traffic in Europe. Public airports, in whole or in a significant part, service 71.5% of passenger traffic and 72,8% of freight traffic. The airport is an investment with a high capital intensity, where the recovery time of the invested costs is very long. This is one of the main reasons why airports are or remain in the possession of public entities. In the past few decades, the ownership structure has been modified, and in consequence their management has changed. During this period, 80% of European airports have been turned into commercial corporations operating on the market principles. The majority, which has once constitute the property of public institutions, currently operates as commercial entities. Private airports also have features in common with the biggest airports – nearly half of the European airports takes off from airports that are fully or partly owned by private shareholders. It should be noted that currently passengers have much more opportunities than in the past. With the rapid development of new routes, a large part of today's passengers has a choice between two or more airports. This selection is apparently the result of the following phenomena:

- a considerable geographical convergence – almost 2/3 of European citizens are at a distance of approx. 2 hours' drive to at least two airports,
- an increase in the number of connections – a greater choice for the departing passengers,
- greater awareness of the flight prices among the passengers (an easier access to information, e.g., via the Internet),
- increasing the possibility of changing destinations.

The combination of these factors means that there is more competition between airports. This means that in the near future the ports will be constantly transformed and developed. The aim of the airport should be to use its position on the market and to increase the economic and operational efficiency.

A new form of the functioning of airports in Europe significantly affects the issue of employment. The airport offers the ability to create new businesses and jobs. The European airports employ 156 thousand people as direct operators (e.g. in airport management, maintenance, security, etc.), 748

thousand people work for airlines and ground control agents at airports (e.g. flight crew, staff, etc.), 308 thousand work in the airports, retail stores, restaurants, hotels, and almost 314 thousand. An example would be the airport hub in Frankfurt am Main, where 80 thousand people are employed in the airport and airport services.

Research shows that for the airport to be able to develop and maintain a sufficiently large activity outside the airport, thanks to which it can be recognized as the "Airport City", it must have a certain minimum flow of passengers. In the areas, where the airport services at least 15 million passengers a year and where the number of directions exceeds 40-50 and where, at the same time, at least one airline uses the given airport as its base airport, the development of the "Airport city" form can be considered, offering services outside the airport. The airports, which at the same time do not meet the above-mentioned conditions, it is postulated to consider other opportunities of development.

### **3. Determinants of Polish airports**

In Poland in 2013, the register of the Civil Aviation Authority had 14 airports: 13 active and 1 inactive (Szczytno-Szymany). Poland is one of the European country most poorly equipped with airports, which is shown by their number in relation to the number of inhabitants (3,4 ports per 10 million inhabitants) and the surface (4 ports per 100 thousand km<sup>2</sup>). A characteristic feature of the current airport network is the good equipment of the western and central part of Poland of airport infrastructure. The only provinces, which do not have their own airports are: the Świętokrzyskie, Podlasie and Opole regions. Moreover, the Warsaw agglomeration, as the first one in Central and Eastern Europe with the opening of the Warsaw airport – Modlin has joined the metropolis, which have the so-called secondary airports, where low-cost carriers offer their flights. So far, the central port in Poland is the International Airport of Frederic Chopin in Warsaw, while the remaining airports are included to regional ports. In Poland, the dynamic development of the aviation market has a relatively short history, as until the end of the 90s of the XX century this sector has been "monopolized" by the International Airport of F. Chopin in Warsaw. This was because the airport in Warsaw was considered to be the so-called national hub, and regional ports played the role of providing passengers to it. The main direction, to which you could fly from regional ports was the IA in Warsaw, where the passengers could change to planes flying to other countries. The main impulse for the development of the aviation market, and thus the development of airports, was the opening of the Polish "sky" associated with the Polish accession to the European Union. The accession of the EU membership by Poland was associated with the necessity to liberate the national laws concerning the market access for the European carriers, which took place as a result of the adoption of provisions included in the so-called third liberalization package. In accordance with the provisions of this package, the carriers are entitled to freely exercise the air transport within the European Community.

### **4. The Modlin airport, the spatial conditions and development opportunities**

Polish airports are characterised by a large disparity between the national airport in Warsaw, and other regional airports. Despite the growing number of passengers in all regional airports in 2004-2012, the Chopin Airport in Warsaw still maintains its position as the largest airport in Poland.

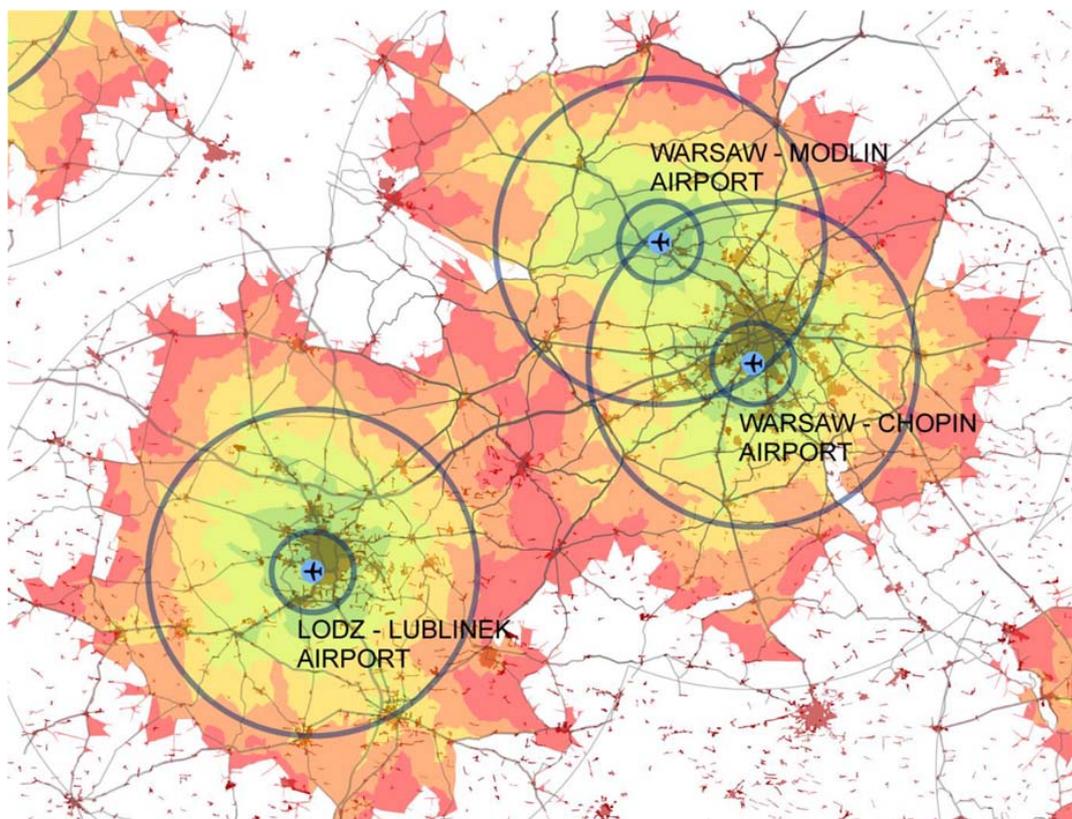


Figure 1. The overlapping of impact spheres of the airport in Modlin and in Warsaw. Source: J. Jeżak, The model of spatial relations between the airport and the metropolitan city – the conditions, possible directions of actions – conference materials

The Modlin airport with the Chopin airport in Warsaw create an air bipolar. The location of the airport on the outskirts of the Warsaw agglomeration makes the access to the airport a crucial element determining its importance. The existing road network constitutes a good connection with the airport. An important barrier, however, may be the lack of access from the northern side of the airport and the low capacity of the national road no. 62, located further between the objects of the Modlin fortress and the airport area. The distribution of isochrones of the drive to the airport indicates a good communication of the port on the north-south line. However, also the development the east-west lines should be important for the development of the port, especially in the direction of Plock, which would allow to significantly expand the zone of direct impact of the airport. The Modlin airport at present does not have a direct rail connection, which significantly hinders the access to the port and extends the travel time to the airport. Therefore, a key issue for the airport development will be the direct link between the railway of the Modlin airport with Warsaw (the construction of the missing siding and the railway station near the port). Over 2 million people live in the airport's surroundings, within 40km. Demographic potential of the airport is much higher, if we take into account the availability of the roads to the airport, and not only the distance in a straight line. And so, in one hour the population of over 3,5 million people is achieved. The Modlin airport has one of the highest indicators of demographic potential among the Polish airports, which is a very strong asset in talks with the airport lines. The small distance of the airport from the capital of Poland, the Warsaw agglomeration, which is inhabited by a population with a high purchasing potential, and the limited spatial development capabilities of the airport in Warsaw allow the assumption that the Modlin airport has healthy and durable economic foundations for functioning and development. The current dynamic development of the airport, however, indicates the need to develop analyses on the emerging Modlin Functional Area, which would allow to conduct the investments in this area even more effectively.

### 5. The Master Plan of the Modlin airport – the chance and limitations

The Modlin airport has undertaken the development of a new Master Plan. The shared current concepts are radically different from the concepts presented a year earlier. The scope of the reserved areas has been limited (withdrawal from the concept of building the second runway), focusing on the use of the existing one. The airport's plan is to develop the existing runway towards the west, enlargement of the existing apron, preparing new positions for de-icing planes. The new runway will be a significant investment, for the planes of an airline based on the airport. The investments located outside the airport should mention the new terminal for passenger checking in, airport hotel, parking near the terminal and the missing section of the railway line (Modlin Airport) crucial for improving the speed of getting to the airport, with the rail station. At the moment, it has not been decided whether this will be an underground or above-ground station. Figure 2 presents the diagram of the target development of the airport.

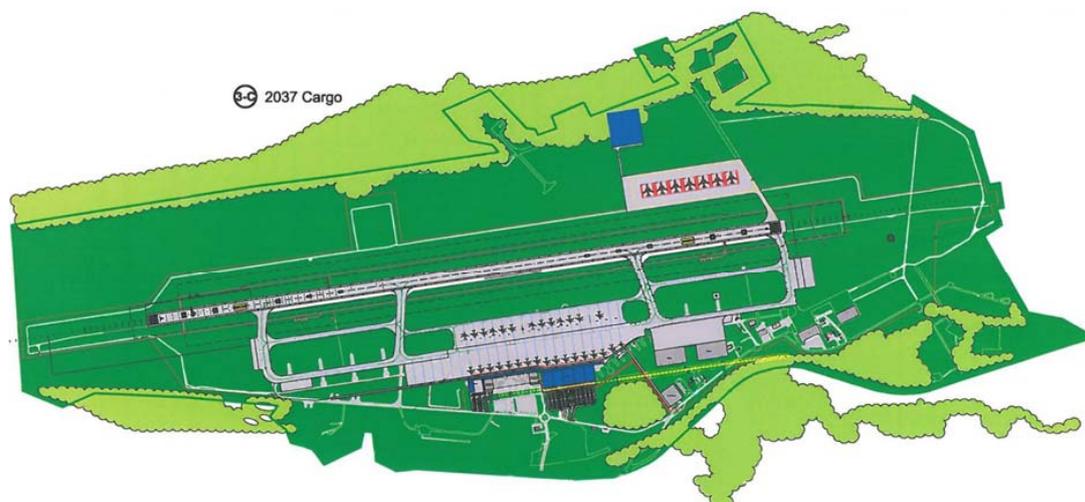


Figure 2. Elements of the Airport Master Plan – target development of the area, International Airport in Modlin

### 6. Directions of spatial development – Model of the functional and spatial structure

The developed strategic document of the development of the areas around the Modlin airport presents the target functional and spatial structure of the area covered by the plan. The system of the poly-centre and band structure was adopted. The Modlin airport area will be the crucial area binding the structure. The historically shaped area of Nowy Dwór Mazowiecki and Zakroczym will be the urbanising centres around this area. These areas will be complemented by the resort in Pomiechówek and the areas urbanising north from the airport. The element binding these structures will be the bands of economic development running from the east to the west and from the north to the south along the existing and designed transport corridors. In the vicinity of areas intended for the development of economic functions, the residential and service functions will be located. They form two bands, northern and southern. In the south, they include the historically shaped urban structures (Zakroczym, the Modlin Fortress town and Nowy Dwór Mazowiecki). This band in the eastern part stretches to Pomiechówek, restricted with compact forest complexes from the north, and with the Vistula from the south. The northern band stretches from the forest complex near the village of Wymysły to Pomiechówek. The installation was formed in the shape of developed corridors. In contrast to the southern band, the northern band is cut by the forest complexes running from the north to the south. In this area there are the largest reserves of undeveloped land with the residential and service functions. The element concentrating the development around the airport will include the band of the associated natural and cultural areas, based on the existing protected natural areas and the layout of forts of the Modlin Fortress, surrounding the development areas, beyond which only the area of agricultural lands would function, open (including forest), free from the processes of intense urbanization, figure 3.

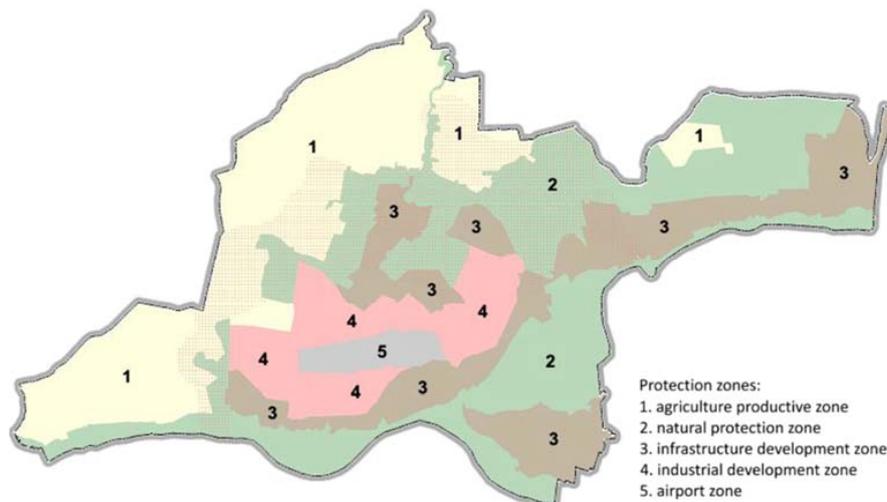


Figure 3. Protection zones in area of Modlin

## 7. Conclusions

Today's airports not only affect the development of tourism, but they act as an inductor for the emerging companies. The location in the immediate vicinity of the airport is a very beneficial aspect, and in some industries perceived as prestigious. It facilitates the economic transformation and attracts skilled workers. The emergence of a new model of developing the space shows how dynamically these areas and their surroundings are changed. Airports located outside the city centres have currently become the areas of intense exchanges. Trade and service zones are formed around airports, especially large ones, as well as the office buildings or conference centres and fairs. According to John Kasarda, over 40 airports can be described by the term Airport City thanks to the accompanying facilities. This phenomenon is growing rapidly and it now includes additional airports. However, the concept of the airport city is not clear. The formation of the Airport City requires time and the simultaneous appearance of several developmental factors. Large airports are the closest to the ideal, which support the international traffic, i.e. the London Heathrow, the Charles de Gaulle airport in Paris, or the Dutch Schiphol. Smaller airports will rather develop the selected functions corresponding to their localisation determinants and capabilities.

In this context, the Modlin Airport, which is in the early stages of its development, should focus on the selected areas of action in the direction of creating the Airport City. An important factor helpful in the selection of specific functions will probably include the proximity of the Polish capital, the Warsaw Agglomeration with over 2 million populations. In addition, the key elements of the planned functional and spatial structure will include the poly-centre aspects of the layout of the settlement network, the existing and designed transport corridors and the bands of economic development binding the airport with the surroundings. These elements as well as the economic and business conditions seem to be hard foundations for the development of the airport's potential.

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