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The Polish Air HUB or the Central Airport in Poland, the Solidarity Port

Jakub Blachut¹

¹Cracow University of Technology, Faculty of Architecture, Institute of City and Regions Planning A5, st. Warszawska 24, 31-155 Krakow, POLAND

jakub_blachut@o2.pl

Abstract. The Central Communication Port, i.e. the Solidarity Port, is to be the investment that will be the best communicated place on the map of Poland in the project assumptions. The target location has been revealed in recent months. The new airport HUB and the railway junction will be built in the Baranów municipality, about 40 km west of Warsaw – soon the Polish government is to adopt the CPL concept. Within 10 years, a new airport, a railway station and a node for High Speed Railways and expressways connecting the new investment with road infrastructure in Poland are to be built. At the beginning, the concept predicts two runways, and ultimately there will be four. The total area planned for the investment is 3 thousand hectares. Initially, the capacity is planned at 45 million passengers per year. Current calculations are based on the 2010 data projection. A new analysis is currently being prepared, the completion of which is planned for mid-2018 to establish the final investment limits. Conceptual work is underway to resolve the main terminal for passenger check-ins. Two concepts are present in the discussions. The first one assumes the airport railway. It is used not only on expanding airports, but also on some of the most modern ones. This solution is more flexible and therefore cheaper, on the other hand, it extends the time of unproductive loss of passengers. On the other pole are terminals built in a concentric way, resembling a starfish. This solution is less flexible, more expensive, but more convenient for passengers. Current plans for the next two years include the preparation of comprehensive documentation, obtaining all environmental permits and approvals, as well as developing an architectural concept. The Central Communication Port will be designed on this basis. A new city is to be built around the CCP, it is to connect Warsaw and Lodz. The plans include construction of high-speed railways as well as metropolitan and agglomeration railways. Because the suggested travel time by fast railway is to last 15 minutes from Warsaw and 25 minutes from Lodz, it will not be the only Warsaw-CCP-Lodz connection. The airport HUB will be the best communicated place on the map of Poland, ideal for business meetings, fairs and company headquarters. The planned development of this area is beyond the scope of the typical Airport City and Aeropolis. This is a place where not only companies from the aviation industry and transport can develop.

1. Introduction

The contemporary upward trend in the global aviation market is already a strong trend. There is an increase in the number of passengers from year to year. There is a demand for new routes, an increase in frequency on the already existing ones, a greater demand for cargo transport, that generate a need to develop airports and build new and larger ones. Mega-airports are structures which respond to the demand of the aviation market, they are elements of the global aviation network. They dominate in terms of scale and possibilities, but also compete with each other on a global scale, [1]. Their development is



not something new, this has already happened in the development of aviation in the 1970s. The airports such as Charles De Gaulle in Paris (over 32 square km) or Dallas-Fort Worth with an area of approx. 70 square km come from this period, moreover, this port has been the number one on the list of the greater airports in the world in terms of surface for over four decades. The Dallas-Fort Worth airport was opened in 1974 and was one of the first examples of an airport constructed from scratch as a mega-structure. Its design and construction coincided with high economic growth and increase in air traffic. This caused high expectations for future air traffic and goals that the airport should meet. A lot of attention was devoted to the location of the airport. Located between two large cities, Fort Worth and Dallas (according to data from 2015, this area is inhabited by over 7 million people), and also four hours' flight from every major city in the USA, Canada and Latin America, makes it a very beneficial location from the point of view of the hub airport.



Figure 1. Dallas Airport, [2]

There are currently five terminals operating at the airport, and the field reserves allow for the construction of another five, which in the future will allow to increase the capacity of up to 120 million passengers a year. The airport development strategy estimated that in 2010 the airport will serve nearly 100 million passengers. The airport capacity results for 2010 showed slightly more than half of the forecasted number. This shows that the market potential for the airport has been significantly rescaled, but as the subsequent years show, the traffic is still growing since 2010 and already in 2014 it was 63,5 million passengers, in 2016 – nearly 65,7 million. The mega-airport Dallas-Fort Worth is on a scale of a small city. There are 7 runways and 165 gates at the airport. In 2016, over 672 thousand of operations were carried out there. The route network of 27 airlines departing from the airport includes 223 destinations. The airport employs over 60 thousand employees. In 2011, the modernization of terminals was initiated including, among others, the self-check-out zones, parking and implementation of

environmentally friendly technologies, with a total value of nearly 2,7 billion dollars. The completion is planned for 2018.

Currently, the Dallas-Fort Worth airport has been dethroned by the Ad-Dammam airport, also known as the King Fahd Airport, in terms of surface area, located in Saudi Arabia. Its total area is 780 square kilometres. According to the official information provided on the airport's website, its current used area is less than 37 square kilometres.

The airport was opened in 1999 and one of the terminals was intended for the exclusive use of the royal family and has an area of 25 thousand sqm. A mosque with an area of 46 thousand sqm was built there. The airport has two runways, it is the hub for the national carrier – Saudia. In 2009, the King Fahd Airport serviced 4,1 million passengers. In 2015, the 9th million passenger was welcomed at the airport.



Figure 2. Singapore Airport, there is a mosque in the area of the King Fahd Airport, [3]

According to the theory of Dr John Bowen published in the book "The Geography of Transport Systems", there are basically two elements: The first one is a regional economic development that generates an increase in both passenger and cargo traffic. While the other one is the location of large air operators that use the airport as their main hub, which will entail greater transit traffic. In the context of high growth, it exerts considerable pressure on the development of airport infrastructure in order to cope with the considerable level of traffic expected in the future. Airports that have become mega-structures use both of these elements, like, for example, Frankfurt which is the base airport for Lufthansa airlines.

2. Airports in Poland: International Chopin airport in Warsaw

In the last quarter of a century, the Polish economy has a positive GDP growth, and it at the beginning of the nineties of the last century, it started from a rather low level, it is now noticed that without the expansion of the existing technical infrastructure, further dynamic growth will not be possible. This applies to many aspects, but the most key ones include the development of transport infrastructure, which also includes air transport. Polish regional airports have already undergone a major reconstruction and the network of their connections is constantly being expanded with both national and foreign

connections. Changes in the European aviation market caused by the emergence of low-cost airlines, mainly covered the secondary and regional airports. Large air junctions have for a long time resisted the change, but the dynamics of changes on the aviation market in Europe caused that also large interchange airports are changing their offer.

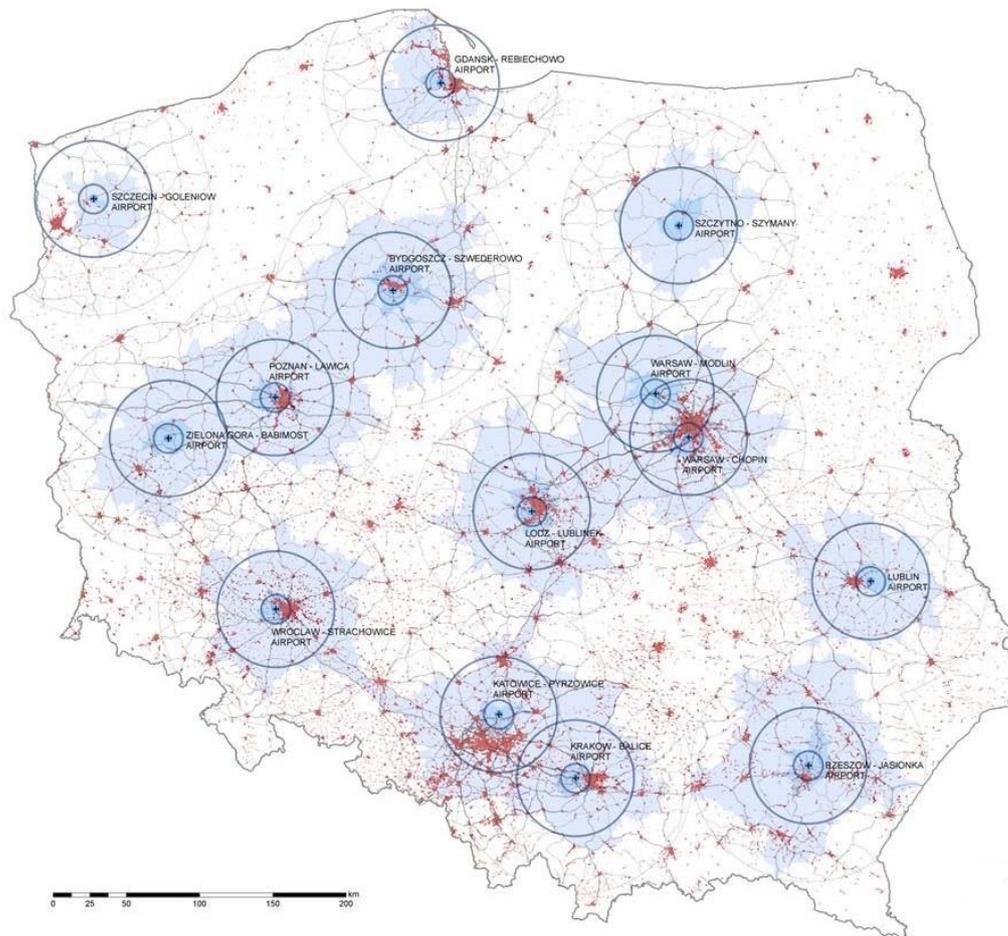


Figure 3. Location of regional airports in Poland

Currently, Chopin airport in Warsaw is the main airport in Poland and the air hub in this area of Europe. In the middle of this decade, airports in our country served over 30 million passengers. It is forecasted that in 2030 the number will increase to 60 million, and this number will continue to grow. The existing regional airports will not be able to handle such a large number of passengers. The analyses on the reconstruction and expansion of the Chopin airport stated that the possibilities are very limited and the current airport infrastructure is approaching the maximum capacity of the airport's limits. The concept considered assumed the extension of Modlin and focus on its cooperation with the Chopin airport as an aviation bio-pol, but some experts in the aviation market noticed that the Modlin airport has unfavourable natural conditions to base the solution of a large airport. The construction of the new Central Airport with the use of the capital airport was planned, it might improve efficiency for several years, but it will not bear the inflow of passengers.

3. Central communication port, development of ideas and concepts

The first information about the need to build a new airport for Warsaw appeared in the 1970s. Analyses to determine the location of the central airport were made in 2003, and in 2006 a feasibility study for the “Central Airport” project was created, and subsequent analytical works were carried out in 2010.

At the meeting on November 7, 2017, the Polish government adopted the concept of construction of the Central Communication Port, the location of the new airport includes the location between Warsaw and Lodz. The new airport is to be able to handle up to 100 million passengers a year. The adopted document is not only the concept of building a new airport with the railway station, but also a transport strategy for Poland for the next 20 years.

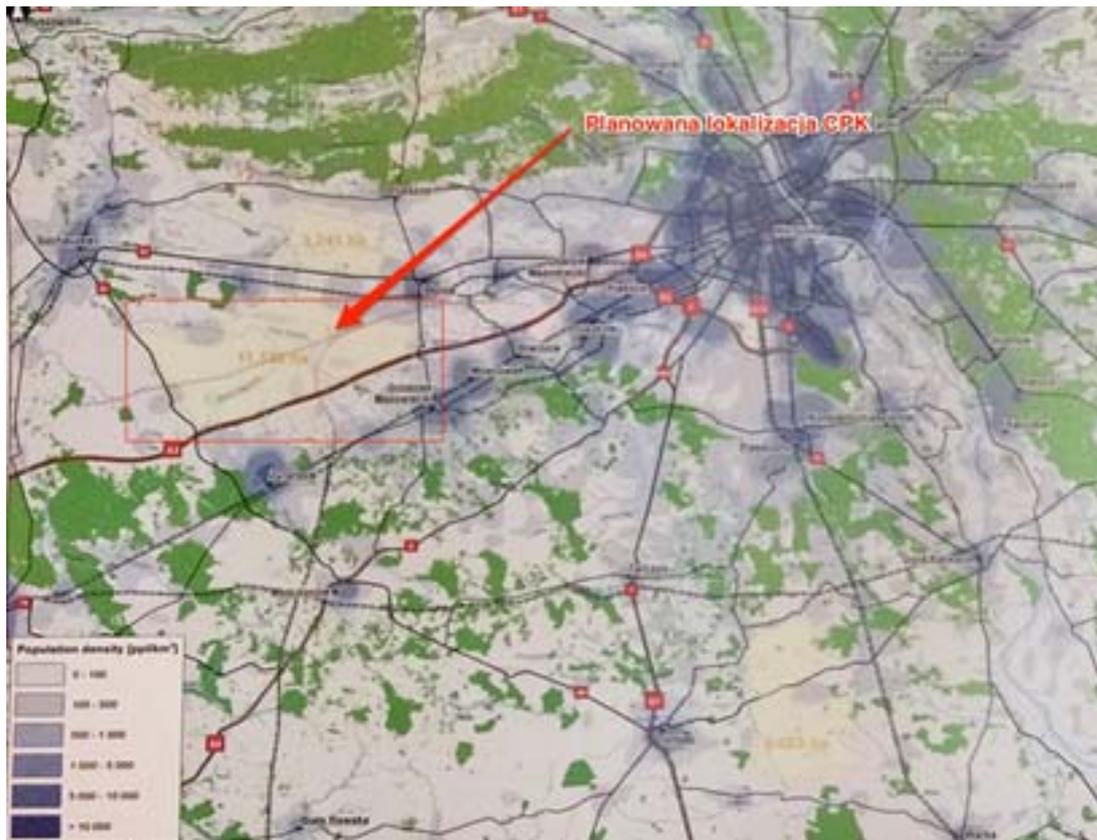


Figure 4. The map shows potential locations. The one in the area of Stanisławów has almost 4 times more acreage than the 3 thousand ha required for the construction of the CCP, [4]

The Central Communication Port or the Solidarity Port in project assumptions is to be the investment that will be best communicated with the area on the map of Poland. The target location has been revealed in recent months. The new air HUB and the railway junction will be built in the Baranów municipality, about 40 km west of Warsaw. Within 10 years, a new airport, a railway station and a hub for High Speed Railways and expressways connecting the new investment with road infrastructure in Poland are to be built. In the concept, at the beginning two runways are planned, and ultimately there will be four of them. The total surface of the area planned for the investment is 3 thousand ha. Initially, the capacity of 45 million passengers a year is planned. Current calculations are based on data from 2010. A new analysis is currently being prepared the completion of which is planned for mid-2018 to establish the final investment limits.

An example from China is the ancestor of the Polish CCP solution. The Beijing airport is experiencing the same problem of operating at maximum efficiency as the Chopin Airport. The project of a new airport on the outskirts of the capital in Daxing is currently being implemented. The investment

process was planned for 4 years of construction and in 2019 a new airport will be opened. The completed facility at the basic level will allow to handle 45 million people. Ultimately, it is to be the world's largest airport. The current Beijing airport is also the largest giant in Asia, its function is based on three terminals. With such a number of terminals, the airport in Beijing served 94.4 million passengers in 2016. The creators of the Daxing airport plan for one terminal to handle over 100 million passengers a year. In contrast to the current leader in terms of passenger service (the Hartsfield–Jackson Atlanta International Airport), domestic and foreign flight terminals are located under the roof of one giant terminal with an area of 700 square meters. In contrast to the airport currently being built in China, its American equivalent consists of two separate terminals



Figure 5. The concept of a new airport in China, [5]

The concepts on the solution of the main terminal of passenger check-ins are under development. Two concepts appear in the discussions. The first one assumes the airport railway. It is used not only at expanding airports, but also at some of the most modern airports. This solution is more flexible and therefore cheaper, on the other hand, it extends the unproductive time lost by passengers. On the other pole, there are terminals built in a concentric way, reminiscent of a starfish. This solution is less flexible, more expensive, but more convenient for passengers.

Current plans for the next two years include the preparation of comprehensive documentation, obtaining all environmental permits and approvals, as well as developing an architectural concept. The Central Communication Port will be designed on its basis.

A new city is to be built around the CCP, it is to connect Warsaw and Lodz. The plans include the construction of high-speed railways, as well as metropolitan and agglomeration railways. Because the suggested time of travel by fast train is to last 15 minutes from Warsaw and 25 minutes from Lodz, but it will not be the only connection Warsaw-CCP-Lodz. The airport HUB will be the best communicated place on the map of Poland, ideal for business meetings, fairs and company headquarters. The planned development of this area goes beyond the scope of the typical Airport City and Aeropolis. This is a place where not only companies from the aviation and transport industry can develop.

The analyses of the location of the Central Communication Port has shown that in the future it could become the main communication hub for air transport between Europe and Asia. The analyses preceding the location of the CCP emphasized the central location of Warsaw, both in the country and in relation

to the entire Central Europe. Such topographical conditions constitute justification for locating a large intermodal transit centre for passengers and goods transported by air in its immediate vicinity. The proposed location of the CCP allows for effective traffic service between Western Europe and the Far East. In the documentation, the location of the airport in Warsaw was defined as lying on the so-called “big circle” line between cities such as Beijing, Seoul and Shanghai, and Barcelona, Milan, Geneva and Munich.

Warsaw is also within the range of a typical narrow-aisle airplane flight to the countries of Central Asia. As noted by the authors of the document, carriers from ports in Western Europe are forced to use wide-body airplanes (or narrow-aisle new generation ones), which negatively affects their operating costs and the ability to offer high frequencies. In addition, the location of Warsaw near the eastern border of the time zone allows for the arrangement of favourable night rotations for short and medium range flights in the eastern directions.



Figure 6. The map showing the potential for growth for LOT Polish Airlines as an integrator of the aviation market in Central Europe, [4]

The idea of building the CCP is the development of interchange air traffic in Poland and Central and Eastern Europe. As it has been included in the document, currently 90 percent of long-distance traffic from and to Central and Eastern Europe is implemented by transfer ports located outside its area, depriving the CEE region of the benefits of this movement. West-European airports are struggling with large capacity constraints, which call into question the possibility of efficiently servicing the dynamically growing demand in the Central and Eastern European region through the hub airports of Western Europe in the long-term. At the initial stage, the CCP is to serve 45 million passengers a year, with the possibility of expanding to a capacity of 100 million passengers a year. The region of Central and Eastern Europe, which is to be the CCP impact zone, is inhabited by about 180 million inhabitants in 19 countries. The defined potential is greater than the potential of natural markets of any of the western carriers (e.g. natural markets of the Lufthansa group: Germany, Austria, Switzerland, Belgium totalling to around 110 million inhabitants). In addition, Poland is in the second place in the region in terms of population (behind Ukraine), and in the first place in terms of GDP. This significantly influences the chances of developing the CCP in Poland.

The developed study defined that carriers will be able to handle the majority of long-haul connections using 24-hour rotations of aircraft, which facilitates schedule planning. Both the east coast of the USA, and a large part of China's territory are within this framework. (According to the government document, the concept of the "Runaway and trail" deserves special attention, which expresses the expansion of connections between the European Union and China). At the same time, aircraft rotations are long enough that the base carrier usually has no problem with the effective use of its fleet, [6]. Therefore, the location of the CCP in the Warsaw area has a significant advantage over the other airports in Europe.

4. Conclusions and analyses of the potential and location decisions of the CCP

The original plans have taken various locations into account and the option of choosing Mszczonów has been widely discussed. Detailed analyses have shown that this location is too close from Warsaw, and there are too many protected areas around it. In addition, the topography of the area is not very favourable. Also the aspects of combining this location with the existing infrastructure, construction of the main railway junction in Mszczonów for the RP would require disproportionately large outlays. Finally, the decision was made for Stanisławów in the Baranów municipality, in which the planned construction of the high-speed railway line (developed feasibility study) is going on, on the plans it connects near Stanisławów with the existing CRL (Central Railway Line). Moreover, the A2 motorway at the site of the planned high-speed rail route already has a viaduct built – one will not have to stop traffic on the motorway during the investment. According to the analysis carried out by an independent expert team, in Stanisławów, the potential area on which the airport can be located, covers as many as 11 thousand ha, while the demand for the investment is 3 thousand ha. In the vicinity of Stanisławów there are also no protected areas, landscape parks or reserves that could affect the airport's operation in the future.

The construction of the airport assumes the cost of PLN 19–20 billion, the calculations include: the construction of a new railway Warsaw-Lodz line, together with the station and links with the existing railway lines, the cost of PLN 8–9 billion. Moreover, the costs of road construction – they determine the maximum limits of the fork. The minimum variant is a combination of Sochaczew (National Road 92), CPK (A2) and Grójec (S8). While the maximum variant assumes the extension of the ring around Warsaw, from the south – to Kołbiel (node S17) and Mińsk Mazowiecki (Node A2), and from the north from Sochaczew through Wyszogród, Zakroczym, Serock to Wyszaków. The valuation of this road element of the investment ranges from PLN 2 to 7 billion.

The road bypass from the point of view of the CCP is important for cargo transport – it will allow trucks to bypass Warsaw. However, it is not absolutely necessary. The idea of the Central Communication Port differs from the idea of the Central Airport that the airport hub of the intercontinental significance and the railway hub constituting the core of the passenger transport system will be integrated in one place. The project launches the possibility of changes that will realistically improve the functioning of transport and the quality of life in Poland. The CCP is to connect Warsaw and Lodz. Therefore, in addition to the high-speed railway, the hub will also include a metropolitan and agglomeration railway. It is assumed that a fast train journey will take 15 minutes from Warsaw and 25 minutes from Lodz. However, this will not be the only connection Warsaw-CCP-Lodz.

The aim of the project is the "construction and operation of a profitable, innovative transport hub, which on the one hand will gain a place in the top ten of the best airports in the world, and on the other, will lead to the creation of a national rail passenger transport system as an attractive alternative to road transport".

The construction of the Central Communication Port – the Solidarity Port" includes mainly:

- construction of the international airport near the village of Stanisławów in the Baranów commune, west of Warsaw
- construction of a railway junction, which is to extend beyond the function of the airport rail station
- construction of even over 900 km of railway lines in Poland
- construction from 65 to nearly 250 km of roads in the country, depending on the chosen variant

- enabling the dynamic development of LOT Polish Airlines as the main carrier in Central Europe
- reorganization of air traffic in the Warsaw agglomeration for the duration of construction of the CCP and after its opening
- elimination of transport exclusion of cities and residents, by providing quick access to the CCP, and thus also to Warsaw
- integration of the Warsaw and Lodz agglomerations
- development of the “Airport City” with hotels, exhibition and congress areas, company headquarters

The new Solidarity Port is to be an airport operating 24 hours a day, 7 days a week, throughout the year. The assumed airport parameters are to enable the service of the largest aircraft in the world. The CCP parallel runways are to be 4000 metres long and at least 60 metres wide. The airport is to meet the guidelines for short transfer times:

- 35-45 minutes in domestic traffic
- 45-60 minutes in international traffic.

The basic assumption of the CCP is to connect it with the largest cities in Poland within 2-2,5 hours, and in the case of Warsaw, up to 25 minutes or 15 minutes by fast rail (originally, the second option was planned, i.e. the construction of the HSR section). The commercial speed of at least 140 km/h on railway lines leading to the CCP is mentioned in the concept: Technologically, the railway system even without using the high-speed rail technology (above 250 km/h) is able to meet the standard set for all Polish agglomeration beyond Szczecin, for which the primary role should be attributed to domestic air connections. The concept also assumed punctuality on relations to and from the CCP above 95 percentages (for delays above 3 minutes). The Central Communication Port is to be served by 500 inter-regional trains per day, and their total delay time should not exceed 100 minutes per day.

The concept stipulates that the Central Communication Port must be ready for expansion by the so-called alternative means of transport, "Hyperloop-friendly", which means that its project will have to assume sufficient spatial reserves, so that we will not be surprised by the implementation of this technology

References

- [1] Rodrige, J.P., Slack, B., Comtois, C., (2013) „The Geography of Transport System”, Routledge, New York.
- [2] https://en.wikipedia.org/wiki/Dallas/Fort_Worth_International_Airport, access 05/2018
- [3] <https://www.straitstimes.com/singapore/sats-first-foreign-player-in-saudi-arabia-air> access 05/2018
- [4] <https://businessinsider.com.pl/finanse/makroekonomia/centralny-port-lotniczy-spowoduje-wzrost-pkb/elj1t3t>, access 05/2018
- [5] <http://www.zaha-hadid.com/architecture/beijing-new-airport-terminal-building/> access 05/2018
- [6] Kansky, K. (1963) „Structure of transportation network: relationships between network geography and regional characteristics” Research Papers 84, University of Chicago, department of Geography.