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DETERMINANTS OF MANAGEMENT OF THE MODERN LANDSIDE AREAS

Abstract

Modern airports and neighboring areas are characterized by functional integration, conducive to the targeted space management. Airports, in addition to strictly aerial functions, participate in non-aeronautical business activities. Such business activity generates economic benefits for all participants of the market environment and in many airports they exceed revenues from basic activity. The determinants of the scale and directions of development of landside areas are external factors (location, spatial, geopolitical, formal and legal) and internal (market, economic, marketing, environmental, other) individualized for particular airports. The dynamic development of processes and their effects justify the purposefulness of the problem and its exemplification. For its presentation, the method of verifying source literature and accumulated research material was used.

Keywords: airports, landside areas, determinants of space management

Introduction

Air transport determines evolutionary spatial transformations, socio-economic activity, market relations and territorial competitiveness. The effects of branch expansion (direct, indirect, induced and catalytic) are a derivative of airport operations and are reflected in the development of comprehensive investment projects around civil airports. The active role of the branch is confirmed by statistics characterizing its impact on the macro- and microeconomic development of the economy.

The primary determinant of the modern management of landside areas are terrain reserves, in the second place – branch infrastructure. The airports (interchange, regional) are nodes of urbanized areas and their regions generating air mobility

of the population, economic cooperation, expansion and opening of markets as well as strengthening the territorial availability and functional connections of spatial structures. Airports are also elements of multimodal transport systems that increase the communication and investment values of their surroundings. They are an asset of the innovation of a specific place, institutional equipment that facilitates communication with the international environment. In the 21st century, hard (measurable) location factors are replaced by soft factors (difficult to measure). Enterprises are looking for such location advantages that will not only help them minimize production costs, but also enable them to achieve a high competitive position. They also trigger the functions of constituting commercial areas around the airport, consistency of their elements, integrating location choices and behavior of entities managing them¹. This development has a spatial, functional, technical, market, economic and environmental dimension, and each of them has the attribute of effective management.

Relations and synergistic effects of management of entities located in the landside areas² correspond to the model views of territorial cohesion³, including Camani's (tequila model)⁴ and the model of the E. Medeiros's star⁵. In the first one it exposes quality, identity and territorial efficiency, in the second – social and economic cohesion, cooperation/management, environmental sustainability and polytheism of development.

Landside areas are the implication of the city-forming and region-forming impact of transport points on the shape of functional space development⁶. In addition, there are economic functions (industrial, transport, commercial, logistic, marketing, social and managerial and business dependencies that determine their effective use). The wide range of activities in the landside areas constitutes their importance for macro- and micro-environment. Thus they are interesting for the local government institutions, state-owned entities and entities related or unrelated with aviation activities interested in locating in these areas, followed by other determinants: environmental, spatial, legal, administrative, technical and technological, economic,

¹ A. Ruciński, *Planowanie i lokalizacja sieci regionalnych portów lotniczych*, ZN UG, Dissertations and Monographs 80, University of Gdańsk Publishers, Gdańsk 1986, p. 1–249, also: T. Markowski, *Opinia w sprawie Komunikatu Komisji UE pt. Zielona Księga w sprawie spójności terytorialnej – przekształcenie różnorodności terytorialnej w siłę* [in:] *Spójność terytorialna wyzwaniem polityki rozwoju Unii Europejskiej. Polski wkład w debatę*, eds. A. Baucz, M. Łotocka, P. Żuber, Warsaw, Ministry of Regional Development, p. 70–97.

² M. Stangel, *Rozwój strefy okołolotniskowej a port lotniczy – efekt synergii*, Przegląd Komunikacyjny 2013, 7, p. 18–25; also: D. Rucińska, A. Ruciński, *Współzależności rozwoju portów lotniczych i struktur zagospodarowania przestrzeni z uwzględnieniem stref okołolotniskowych*, Prace Komisji Geografii Komunikacji 2017, 20(2), p. 57–68, DOI 10.4467/2543859XPKG.17.011.7393.

³ The concepts of territorial cohesion were reflected in models such as: tequilas, stars, presented in the INTERCO, TeMo and other projects.

⁴ R. Camagni, *Territorial Development Policies in the European Model of Society* [in:] *Territorial Cohesion and the European Model of Society*, ed. A. Faludi, Lincoln Institute of LAND Policy, Springer, Berlin 2008, p. 33–47.

⁵ E. Medeiros, *Territorial Cohesion: A Conceptual Analysis*, Lizbona: Institute of Geography and Spatial Planning (IGOT) Alameda da Universidade, [http://ww3.fl.ul.pt/pessoais/Eduardo Medeiros/docs/PUBPAP_EM_Territorial_Cohesion.pdf](http://ww3.fl.ul.pt/pessoais/Eduardo%20Medeiros/docs/PUBPAP_EM_Territorial_Cohesion.pdf) (access: 20.03.2018), p. 19.

⁶ *Porty lotnicze wobec polityki otwartego nieba*, ed. A. Ruciński, FRUG, Gdańsk 2006, p. 86–110.

marketing, socio-cultural. The list of location factors is open, often individualized in relation to a specific case.

The research shows that the landside areas are a source of spectacular benefits and economic effects of all beneficiaries. They are also a powerful instrument of territorial marketing in the process of shaping the image and brand of airports, cities and regions, and strengthening their competitiveness on the global market.

The availability of transport is attributed to the particularly high rank in the development of the airspace. This economic and market category as well as the index of transport territory management determines the quality and functional usability of these areas. In development programs of airports and their markets, the development and commercial use of landside areas is a strong stimulus of their favorable transformations.

1. Theoretical basis for the development of spatial structures – a review of the literature and methodology

Space is an environmental, non-renewable, rare good. Space management is focused, among others, on its features (limitation, resistance, diversity, dynamics, fulfillment, continuity, structure), reasons for economic diversity, legal and regulatory conditions (spatial planning, land management, real estate management, etc.), location choices and transformations of settlement production structures, including transport and regional ones.

Spatial management is the subject of interdisciplinary interest, including spatial and development policy, law, social sciences, geography, statistics, construction engineering, mathematics etc. Pioneering studies in this field include analyzes of representatives of the classical school regarding land use as a productive good and sources of rent [A. Smith (1776), D. Ricardo (1875), K. Marx (1885), others]. The theory, models and methods of its use with regard to distance (location of production resources, demand, costs, interactions) were presented by: J.H. von Thunen (1826, 1842, 1850), W. Launhardt (1882), A. Weber (1909), D. Ricardo (1875), E.W. Burgess (1925), H. Hoyt (1939), A. Marschall (1925), W. Christaller (1933), A. Loesch (1933, 1940), C. Harris, E.L. Ullman (1945), E.M. Hoover (1949), F. Perroux (1950) and others. Even the oldest, classic models are used in the design of contemporary spatial systems. Market analyzes and interactions with the environment were conducted by: W. Launhardt (1882), A. Weber, A. Marshall and I. Prodoehl (1925), W. Christaller, T. Palander (1935), A. Loesch, J. Tinbergen (1939), C. Ponsard (1992), W. Isard (1965) and others. The new economic geography is connected, among others, concepts of growth poles – F. Perroux (1950), Krugmann (Nobel Prize winner in economics – 2008), polarization – G. Myrdal (1957), A. Hirschmann (1957), L.H. Klaassen (1997), J.G. Williamson (2008), others. Today, issues of space development are developed in Poland, among others by J. Regulski, R. Domański, T. Markowski, Z. Zuziak, K. Gawlikowska-Hueckel, J. Zaucha and teams of town planners and architects.

The problems of landside areas development appeared in the English literature at the beginning of the 21st century. The concept of Airport City and Aerotropolis was announced in the USA, the country with the most developed market of air services in the world⁷. Publications of American authors dominated the knowledge market in this area, but in the last decade more and more often elaboration of the authors of the representatives of countries in which the idea of the development of Airport Cities and Aerotropolis is practical (China, Korea, Great Britain, Germany, the Netherlands).

In Poland, the problem of development of landside areas is new and less attention is paid to the literature. This results from the lack of practices, experiments and research, and until recently, the possibility of adapting foreign experiences. Available publications are M. Stangel (2014), P. Wróbel (2012), A. Ruciński (1968, 1971, 2008), E. Marciszewska (2010), employees of the University of Economics in Poznań. For some Polish airports, Airport Cities projects have been developed for their commercial application. This topic, however, gains on research attractiveness, as evidenced by contributing scientific studies and recommendations for the effective development of landside areas.

The general principles of spatial management, including the public one⁸, concern: rational use of it, creating systems subject to protection, obeying the paradigms of sustainable development policy. They refer to various structures including urban, local, regional, national⁹, they are difficult to adapt quickly. The urban centers of settlements are a mobilizing factor for the development of contemporary space. Their strong subjectivity results from the concentration of the population, active in the management processes. Common features of city models are defined in the Leipzig Charter for the Sustainable Development of European Cities, indicating on the principles of its programming and financing¹⁰. According to P. Soldatos (1987), contemporary urban systems are characterized by import and export of factors of production, investment, workforce, goods and services, presence of foreign companies, organizations and diplomatic missions, export of factors of production, direct transport connections by highway systems, high-speed railways, international airports, intensive communication on a national and international scale, developed sector focused on relations with entities of international brand, municipal public and private institutions.

The rules for spatial development in Poland are specified in the Act on spatial planning and development of March 27th, 2003¹¹, individual acts (administrative decisions, e.g. building conditions, location of investments including public

⁷ J. Kasarda, G. Lindsay, *Aerotropolis: The Way We'll Live Next*, Penguin Books Limited, 2011.

⁸ One of the factors shaping the contemporary public space are social needs, tendencies to build relations that take into account the rational development and use of these areas.

⁹ P. Lorens, *Gospodarowanie przestrzenią a polityka równoważenia rozwoju*, Studia Regionalne i Lokalne 2005, 2, p. 30–31.

¹⁰ THE LIPSKA CARD for the sustainable development of European cities adopted at the informal ministerial meeting on urban development and territorial cohesion in Leipzig, 24–25 May 2007; the document developed during the German presidency deals with the challenges, opportunities and historical, economic, social and ecological differences of European EU cities, ministers responsible for urban development agreed on common principles and policies for their development.

¹¹ Act of 27 March 2003 on spatial planning and development (Journal of Laws of 2015, item 199, as amended).

ones), local spatial development law and general acts, omitting the generally applicable source of law (e.g. study of conditions and directions of spatial development of voivodeships, concept of spatial development of the country). Spatial management has a territorial and urban dimension (shaping the structures of its development), economic (implementation of economic undertakings and their effects), social (creating conditions for shaping the quality of life of the population), environmental (protection of the natural environment and sustainable use of its values.) The implementation of conditions harmonizes the objectives and benefits of the targeted development of space, in this aspect the analysis of the issues related to the immediate surroundings of airports – landside areas.

2. Air transport as an economic issue

Air transport development is defined by numbers, confirming a higher growth rate in the last half-century compared to other industries. The prosperity stimulators are: population growth, systematic growth of the creative “middle class”, i.e. people earning from 10 to 100 USD/day including adjustment of amounts to the purchasing power of individual currencies and innovation-oriented interest, expansion of air connections, strong influence of global trade and international tourism. The declining prices of air services are also a favorable factor (in 2017, 60% lower than in 1970).

The Aviation Benefits 2017 Report shows that there are over 1400 airlines in the world and 3900 airports. The network of the most important air connections consists of over 54000 destinations, where in 2016 about 3.8 billion passengers were served, carrying out transport work of 7.1 trillion FTKs. Approximately 30% of transports are operated by low-cost carriers (LCC). Over 53 million tons of goods were transported (205 billion FTKs) with a total value of over USD 6.5 trillion (e.g. twice the GDP of Germany), of which approximately 87% were consumer goods purchased from online stores. Every day, about 10 million passengers use air transport and carry cargo for 18 billion USD. The share of air transport in global GDP reached 2.7 trillion USD (about 3.5% of GDP in 2014). In each of the given characteristics there was an increase compared to the previous year, i.e. 2016. It is estimated that in 2034 the values will double, reaching an increase of 122% in the indicated period¹².

In addition, aviation is a strong labor market, generating approximately 10 million seats in airlines and airports, traffic control and over 53 million outside of aviation mainly in the tourism sector (branch catalytic effect). In the light of ICAO forecasts, in 2034 the aviation industry will employ over 99 million people.

Contemporary airports, from branch points and transfer hubs are transformed into multifunctional, technological and economic organizations, often functioning in a varied market environment. Intensity of air operations requires adaptation of innovative solutions to eliminate the negative effects of congestion. It is estimated that in 2030, in the 100 largest airports, it may affect up to 1200 million passengers

¹² ICAO: Aviation Benefits 2017 Report – The importance of aviation on supporting the global economy, <https://etradeforall.org/aviation-benefits-2017-report-importance-aviation-supporting-global-economy/> (access: 3.04.2018).

(about 20% of demand for air services). As this phenomenon applies to the largest airports, which will support 85% of global demand in 2030, there is a need for targeted adaptation of the offered usable space, changes in modeling organizational and management structures, including non-aeronautical and non-operational activities diversifying portfolio of airports. It is estimated that this income is 39.8% and 4.9% respectively. It is also estimated that airport revenues related to property management account for around 40% in global terms and around 30% in European airports with a systematic upward trend. The average of 0.7 sq. m of retail space per 1000 passengers handled generates 3–4 times higher revenues per 1 square meter compared to local shopping centers outside airports. The presented values justify the purposefulness of the transformations of airports and their surroundings, they constitute an encouraging direction of changes in their supply offer¹³ and investments in facilities increasing transport accessibility, commercial and residential attractiveness of landside areas¹⁴.

Long-term development trends of the air transport market point to the constant growth dynamics in each business segment, the progression of innovation and the pace of implementations ahead of other sectors of the economy and the impact on investors and stakeholders in the industry¹⁵.

In 2017, 4.1 million passengers were served at Polish airports, i.e. by 6 million more than in the previous year (+17.7%). 39% of the share was allocated to the Warsaw Chopin Airport and 61% to regional airports. According to the Civil Aviation Office's forecasts, in 2025 the demand for air services in Poland will increase to 65 million passengers and in 2035 94 million passengers¹⁶ will be served at Polish airports. This means an improvement in the national aviation mobility index, although it is still quite low (0.9 trips per year/person) in comparison with other Western European countries. Air traffic forecasts in Poland lead to rational, pro-development investment decisions conditioning the sustainable operation of airports and neighboring space.

3. Model landside areas

The globalization, civilization and development processes of air transport open the possibility of targeted development of landside areas. Contemporary demographic and economic processes trigger strong investment pressure in modern, intelligent and sensitive buildings and their users to manage change, implement effective models of management and economic and financial systems.

¹³ *Ibidem*, p. 40.

¹⁴ www.dtz.com (access: 5.04.2018).

¹⁵ Air traffic forecasts and market development are developed by aviation organizations and institutions and aircraft fleet manufacturers (eg ICAO, IATA, ULC, Airbus – “Global Market Forecast – GMF” (World Market Forecast), Boeing – “Current Market Outlook – CMO” (Current market prospects), “Bombardier Commercial Aircraft Market Forecast”, “Embraer Commercial Aviation Market Outlook”, “ATR Regional Turboprop Market Outlook”. Boeing forecasts have been published regularly since the late 1950s.

¹⁶ www.ulc.gov.pl (access: 4.04.2018).

In a model perspective, the landside areas¹⁷, integrated commercial units generating unique added values are:

- areas of commercial development in the immediate vicinity of airports with entities involved in activities coordinated or uncoordinated with air transport and providing benefits to airports from their non-aeronautical activities. Some accidental locations may be a problem for the orderly development of landside areas. The immediate proximity of airports encourages the location of commercial service activities (car parks, logistics infrastructure, hotels, restaurants, motorization, etc.);
- Airport City – an economically active urban space with multi-purpose commercial facilities as a development of the non-aeronautical functions of the terminal. They are made up of generally available shopping and service complexes, business and logistics parks, conference and congress, exhibition and trade fairs, hospitality and recreation facilities, entertainment, salons and galleries, sometimes integrated with the management system with the airport. In the legally owned part, airports can undertake non-aeronautical commercial activities, e.g. investment, development, management, service, etc.;
- Aerotropolis – extensive spatial structure with a centrally located Airport City, an urbanized area, even with a radius of about 30 km with increased capacity of communication routes enabling connections with areas with diverse functions (industrial, service, business, airport needs, passengers and cargo, research and development, housing)¹⁸;
- Airport Corridor with concentration of development of landside areas along transport routes in relations between airports and city centers with a strong public transport function, developed commercial and residential development around stops and intermodal nodes. This direction of the port's influence on the development of coastal areas refers to the historically established function of city-forming and region-forming transport to other spatial development structures;
- Airport Region, the scope of which determines the relations with the airport, signed with an isochron of a 2-hour journey to the airport or an isoline to 90 km of spatial distance. It is an area shaped by the flows of people, goods and cash;
- Airport Area are prestigious locations of entities in a city or region related to air transport, e.g. consortia (plants) of aviation companies, developers and providers of software for aviation and logistics companies, agencies and air ticket distribution offices (also for transport/coach service of passengers' needs organized by airports), international corporations significant for aviation operations or state aviation institutions¹⁹.

J. Kasarda's classification is the authorial work of the beginning of the second decade of the 21st century, but the time and capital intensity of investment processes

¹⁷ J. Kasarda, G. Lindsay, *Aerotropolis...*; M. Stangel, *Airport City. Strefa okolołotniskowa jako zagadnienie urbanistyczne*, Helion, Gliwice 2014, p. 44.

¹⁸ M. Stangel, *Airport City...*, p. 44.

¹⁹ J. Schlaack, *Defining the Airea. Evaluating urban output and forms of interaction between airport and region* [in:] *Airports in cities and regions: research and practice*, eds. U. Knippenberger, A. Wall, 1st International Colloquium on Airports and Spatial Development, Karlsruhe, 9–10 July, 2009; M. Stangel, *Airport City...*, p. 44.

in large-scale landside areas is about the durability of model transformations. Practice also shows that the development of these areas sometimes proceeds selectively in an individual way for different airports (e.g. public spaces around some of the regional airports in Brazil are adapted almost exclusively to the needs of the tourist traffic)²⁰.

The landside areas are characterized by determined economic activity, including: main – aviation (technical, related to the use of branches air traffic service) and non-aeronautical, but focused on extended economic cooperation with the airport²¹. This localization is interesting for entities of air services or often using air services, others – satisfying the additional needs of the two groups of entities mentioned above, as well as those interested in using infrastructural areas, not always aviation services, e.g. B+R sector (science and technology parks, start-ups, conference and educational centers), companies of the so-called BPO/SSC sector²², conducting industrial activities (special economic zones, industrial parks), commercial (business and office complexes of the “Flex-Tech” type), service type (TSL, parking, hotels and catering, duty-free shopping centers, wholesale, retail), insurance, banking, insurance, customs warehouses, settlement structures²³.

4. Determinants of the location and functioning of landside areas – selected aspects, research results and discussion

Contemporary trends in the development of landside areas encourage redefinition of their perception as separate spatial structures around aviation facilities. These are structures about the new subject matter of the urban commercial space and the development trend of the urban and regional development structures²⁴. They are common around large US airports with a tendency to adapt to smaller airports in the world, aspiring to benefit from the activities of the immediate environment.

The primary determinant of the economic development of air transport and space around the world is demography and an increase in the population reporting the demand for air services. Its dynamics sanctions the influence of branches on the development of the surrounding space and investment recovery on the basis of the needs and usefulness of only one branch of transport.

Another determinant of launching investment projects is the natural location specifics of the economic landside areas, land and water costs. In addition to local assets (topography and location), free land is included for economic use correlated

²⁰ A.M. Elisangela, P. Silva, P. Marcelo, A.A. Queiroz, S.J. Fortes, *Establishing a priority hierarchical for regional airport infrastructure investments according to tourism development criteria: a brazilian case study*, <https://www.academia.edu/35710059/> (access: 4.04.2018).

²¹ M. Güller, M. Güller, *From Airport to Airport City*, Barcelona 2003, from: M. Stangel, *Airport City...*

²² The so-called BPO/SSC sector (Business Process Outsourcing and Shared Service Center) – implementation of business processes for corporate clients from around the world.

²³ J. Kasarda, G. Lindsay, *Aerotropolis...*

²⁴ P. Lorens, *Tematyzacja przestrzeni publicznej miasta jako wynik współczesnych procesów rozwoju urbanistycznego* [in:] *Regiony nadmorskie 12. Wybrane problemy przekształceń miast Polski Północnej*, ed. M. Pacuk, University of Gdańsk, Gdańsk–Pelplin 2006, p. 105–119.

with the specific needs of airports. As a result, their existing order changes – from open spaces to compact development in the immediate and further vicinity of the terminal, development of communication routes to spatially dispersed objects relative to the port or airport. The value and prices of land in the surrounding areas are a locational rent, paid by investors and natural persons interested in acquiring a preferred location in conditions of limitation or shortage of areas around the airport for commercial development.

The primary determinants of the development of landside areas include airports, their economic priorities and development initiatives. More recently, plans to modernize these facilities and build new airports include business models for the creation and use of landside areas. Other factors are also noteworthy, including the individually diversified scale of airport operations or location specifics. This mainly applies to newly emerging airports for which landside areas are elements of strategy and master plans for their creation (including Beijing Capital International Airport, Kuala Lumpur International Airport, Singapore Changi Airport, Incheon International Airport, Hong Kong International Airport, Shanghai Pudong International Airport, Bangkok Suvarnabhumi Airport, others). At the Asian and Australian airports (Indian, Indonesian, Brisbane, Halim Perdanakusuma Airport, Sydney Airport, Melbourne, Canberra Airport, Darwin Airport and many others) with a strong increase in air traffic, almost equal attention is paid to the development of their landside and logistics facilities. The logistic determinant is important for modeling the functions of small airports, post-military airports, not involved in regular air transport, e.g. in Poland – Przemysł-Arlamów, Stary Sącz, Piła, and others.

The infrastructural determinant determines the evolution of the landside areas. Transport infrastructure conditioning accessibility, reduction of transport costs, its usefulness and quality (also of energy, water, communication and media systems) is an essential element of technical equipment and location advantage of these areas²⁵. Location and transport accessibility is also an important image factor of airports and their surroundings (marketing determinant)²⁶. Their location on the outskirts of city requires efficient transport connections, correlated with the functioning of urban areas. Criteria for such service are met by modern inter-branch transport integration solutions that reduce unwanted congestion and external transport costs. Instead, they determine their effective use, social mobility, environmental conditions and a rational division of transport tasks²⁷. The most frequently indicated are the advantages of rail transport (mass, reliability, regularity, pro-ecological character). This corresponds to the concept of AirPort Link, the development of intermodal airport connections with city centers, increasing the transport accessibility of destinations, comfort, travel safety, the possibility

²⁵ The timeless transport factor has been permanently connected with the theory and practice of locating economic activity since the 19th century, somehow overriding other location factors (distribution of production and markets, quality and efficiency of production factors, price levels, taxes, investment incentives, political stability, foreign investments and regional political climate).

²⁶ Based on primary research carried out at the Department of Transport Market at University of Gdańsk in 2017.

²⁷ L. Laplace, N. Lenoir, F. Pita, I. Rebello, A. Valadares, *WP1-Review of the current intermodality situation*, EUROCONTROL CARE INO project: The airport of the future: Central link of intermodal transport?, M3 SYSTEMS, ANA, ENAC-AEEL, 2004.

of reducing their costs, shortening travel times, reducing the scale of environmental degradation and independence from weather conditions. According to the Railway Institute, effective organization of railway connections with landside areas reduces the travel time to 50%, taking over 40% of traffic. According to the International Air Rail Organization (IARO), the AirPort Link concept was implemented in about 80 airports around the world and was planned for further 230. The development of AirPort Link is associated with the expansion of air transport, the construction of interchange and integration nodes at railway stations and intermediate points at their routes²⁸. The system is used by the European airports in Cologne, Zurich, Rome-Fiumicino, Charles de Gaulle in Paris, Madrid-Barajas, Amsterdam Airport Schiphol, London Heathrow, Brussels-National or Zaventem, Munich Airport, Copenhagen-Kastrup (metro line), Malaga Airport, Arlanda Express in Stockholm, and in Poland – airports in Warsaw, Krakow and Gdansk.

The tool for implementing regional policies, airport development strategies and entities operating in landside areas is the political determinant. Its significance increases in a confrontation with the geopolitical location of these areas and the implementation of strategic economic policy plans.

The economic determinant constitutes the efficiency of management and achieving extraordinary benefits from the location of operations on the infrastructure-financed area. When making location decisions in landside areas, attention is drawn to the value and prices of land to be developed in terms of costs for investors and location rent for sellers/leases, the amount of which depends on the detailed location, the available area and the attractiveness of the airport. The amount of investment capital, project costs and the account of their effectiveness are also important. The economic benefits (also disadvantages – agglomeration costs) result from the agglomeration of activities and cooperation of entities, while being the subject of systematic research and analysis. The accessibility of air transport accelerates the export and import of labor resources, product sales, international contacts and exchange of experience. However, one should remember about the costs of restitution of the state of the environment. The market determinant, including marketing and diagnosing the competitive environment of the entities, determines the market relations of the economic and territorial competitiveness, favors creating the image value of organizations, cities and regions.

At each stage of the development of landside areas, the determinant of development are transparent formal, legal and administrative regulations. In Poland, there are statutory regulations on spatial planning and development²⁹, the Aviation Law³⁰, the Construction Law³¹, the Environmental Protection Law, contained in executive acts, ecological reviews and environmental impact assessments³², local laws and other documents entitling to invest in the vicinity of airports. The objectives and tasks to be achieved result from the spatial development strategy

²⁸ www.iaro.com (access: 13.03.2018).

²⁹ Act of 27 March 2013 on spatial planning and development (Journal of Laws of 2003, item 717).

³⁰ The Aviation Law from July 3, 2002 (Journal of Laws of 2002, No. 130, item 1112).

³¹ The Act of 7 July 1994 Construction Law (Journal of Laws of 2017, item 1332, 1529, from 2018, item 12, 317, 352).

³² The Act of 27 April 2001 on Environmental Protection Law (Journal of Laws of 2013, item 1232, with changes).

of the regions, the development of air transport, airport development programs and plans. The Aviation Law emphasizes for the indication and marking of objects (natural or man-made) in the vicinity of airports, limiting the safety of air operations and posing a threat in the vicinity of the point infrastructure of branches³³.

The socio-cultural determinant is a reflection of the idea of shaping a public space in the landside areas, which constitutes their "climatic" and functional attractiveness. It is an objective economic category, determining the price of space and market value of the location, perpetuating the development trend under the slogan "landside areas friendly for people".

5. The dysfunction of landside areas

The source of spatial conflicts in the landside areas may be dysfunctional land use. Peripheral locations can generate specific spatial relations, including architectural dissonance between modern and existing buildings, hindering the planned development of landside areas due to the "unevenness of spatial relations between urban, suburban and rural buildings"³⁴. The source of spatial conflicts may also be the distance of airports from city centers (agglomerations) and insufficient transport connections. The research confirms the interdependencies between the location, distance and duration of air travel, while the longer air travel reduces negative relations of time and space. Mitigation of such situations remains at the discretion of various entities, including branch carriers, transport organizers and airlines developing transport offers and network connections.

Environmental aspects (environmental determinant), including aircraft noise, are the dysfunction of areas. Airports have the power to formally limit the operating time of airports, and local governments, to identify areas of limited use of OOU, which have been designated for the majority of airports in Poland³⁵. The current activities in this area also include anti-noise procedures for take-offs, departures, approaches and landings, setting noise reduction zones around airports or minimum noise routes, special constructions of infrastructure components of airports, environmentally friendly test procedures, earthworks, acoustic screens, belts greenery, airport silencers, etc., actions to eliminate the causes of noise within the propulsion systems of aircraft. The emission level of harmful substances in flue

³³ These include: limiting the opportunities for feeding birds in areas adjacent to airports by prohibiting the construction, development or creation of favorable conditions including their breeding. In both cases, the restrictions apply to the area within 5 km from the airport borders and should be taken into account at the investment planning stage.

³⁴ P. Trzepacz, M. Luc, *Użytkowanie ziemi w sąsiedztwie portów lotniczych Polski*, https://www.academia.edu/18863762/U%C5%BCytkowanie_ziemi_w_s%C4%85siedztwie_port%C3%B3w_lotniczych_Polski (access: 24.03.2018).

³⁵ Areas of limited use are provided for by the provisions of the Act of April 27, 2001. Environmental protection law (Journal of Laws of 2008, item 25.150, as amended). They were introduced by resolutions of the Local Government Seymes of some provinces. The designation of the area is a natural consequence of the development of airports, airports and the increase in the number of air operations. From the point of view of the airports, OOU is determined by objective technical criteria, while in the relation between the airport and spatial planning – they constitute the order and stabilization of the legal situation of the real estate located within their range.

gas from aircraft engines is low and their impact on the atmosphere less harmful than many other industries. One of the methods of reducing harmful emissions is also the modification of combustion chambers of aviation fuel.

Conclusions

Contemporary landside areas are characterized by the unique usefulness of locally and functionally attractive space, the comprehensiveness of adaptation of technological, management and spatial achievements as well as modeling of socio-economic relations. They are qualified for strong determinants of the targeted development of urban and regional functional space development structures. Airports and their surroundings distinguish synergistic developmental and economic interdependencies with the environment. The presented determinants of development of landside areas provide the basis for redefining their previous perception as separate spatial structures. It is also difficult to unambiguously prioritize them – all of them are important for the proper development and operation of airports and related environments. Demographic and economic processes start investments, transfer of urban functions to the areas of airports and conditions of adaptation of solutions, which should be friendly to all users. The beneficial effects of the synergy of goals and functions are revealed in the field of economy, management, organization, market, architecture of space and housing development. The economic effects obtained extend the list of determinants of achieving further growth in location, investment and economic efficiency as well as the benefits of agglomeration. There is an increase in aviation and accompanying activity. These complexes quickly become strong stimulators of territorial development, competitiveness of airports and surrounding areas.

However, environmental conflicts lead to consider the verification of some decisions, among others concerning the development of housing areas in the vicinity of airports. The assumed increase in aviation activity, despite mitigation measures, will increasingly generate environmental nuisances for all users of the analyzed areas, including their inhabitants. In this dimension, the desirability of limiting the residential function as an element of Airport Cities should be suggested. However, due to the favorable infrastructural, economic and market effects of economically active entities, development of landsided areas is justified, which is also confirmed by the results of primary research. For example, around Gdańsk Lech Walesa Airport by 2025 is expected to create a commercial zone with an area of up to 200 000 m², which means 20 000 new jobs.

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