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Coherent Land Policy and Land Value

Abstract: The present article is an attempt at to prove the thesis that the accurate selection of land use in a local spatial development plan carries over to the behaviours of investors and has a positive influence on the value of land affected by noise nuisance neighbouring an airport – i.e. it does not depreciate it. To this aim, a case study of transaction prices of non-developed land located near the Bydgoszcz airport – Szwederowo was carried out. In its region, two study areas were selected: I – with a noise level of 55–60 dB and II – with a noise level not exceeding 55 dB, and next, the market of land zoned for services-related and services-technical development, parking lots, depots, and warehouses in these areas was diagnosed. Resources of the strategic noise map (SNM) were used in the research. The research period covered years 2016–2018. The studies show that the location of a real property in an impact area of airport noise was not an obstacle and did not limit market turnover of real property which remained under the unfavourable influence of this factor. The reason behind the demand is the shrewd introduction of functions in the local plan in the area of increased noise levels as an expression of coherent land use planning. The article addresses the need for the real estate market for help in planning, decision-making and implementation activities in the field of spatial and real estate management.

Keywords: coherent land policy, land prices, airport noise, Bydgoszcz

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1. Introduction

Every designer or urban planner strives to maintain the spatial order of the analysed area when creating a land development concept. Urban planning involves the transformation of space, and the proposed solutions bring about many economic, social and environmental benefits, as long as the correct distribution of the function of individual areas, also referred to as coherent localization in topic-related literature, takes place. An expression of the economic advantage is the value of the space which, under conditions of a market economy, can be expressed by land value, a measure of which is, in turn, its market price (when the land can be the subject of market turnover).

Dealing with the planning of space in the empirical layer is the field of economic activity referred to as spatial planning, which can be perceived differently in individual countries. In nearly all countries which are members of the United Nations Economic Commission for Europe (UNECE or ECE), spatial planning pertains to the identification of long- or short-term aims of the development of an area, promoting more rational management, and accommodating for competitive political aims. It covers activities aimed at balancing the needs of economic development with those of environmental protection and social needs [1]. It is an instrument which ought to balance the right of ownership with public interests. As follows from the concept of G. Larsson [2], despite the strong role of EU legislation, the principles of spatial planning are not and will not be unified in EU countries, as this is made impossible by the strong historical and cultural differences of its individual member states, i.e. currently 28 countries. No EU country has an ideal planning system, the widespread use of which would guarantee success and be a satisfactory solution for everyone [3].

Among the advantages of an efficient planning system which refers directly to investment activities, the following ought to be mentioned:

- creating spatial order by clarity and readability of spatial structures,
- higher stability in terms of realizing investments and investors' trust,
- ensuring demand investment land properties,
- accurateness of the localization of functions of individual areas, both in relation to the transportation network as well as the workforce.

In Poland, legislators assumed that, in situations of designating areas of land for given functions and determining the guidelines of their management and development at all levels of spatial planning, from national to local – commune, spatial order and sustainable development ought to be assumed as the basis for action.

The concept of spatial order has been used by urban planners for decades, and was not defined in Polish legislation until 2003 [4] as: “such development of space which creates a harmonious whole and accounts for, in ordered relations, all functional, socio-economical, environmental, cultural and compositional-aesthetic considera-

tions and requirements". Under the new definition contained in the Urban-Building Code [5], it was added that spatial order ensures that the economy and society operate in a rational, effective manner, in accordance with the principles of sustainable development, as well as minimizing the number, scale and scope of potential spatial conflicts. What is characteristic is the fact that, among the features of spatial order, it is not (despite common belief) "compositional-aesthetic" issues which dominate, but rather the essence of spatial order is a "harmonious whole" as well as "ordered relations" of many considerations, including socio-economic ones [6: p. 127]. Spatial order therefore implies order and harmony between various components of space and functions of the spatial structure, expresses functionality, logic, readability and clarity of spatial structures, harmonization with nature, and environmental balance. Spatial order raises the quality of space, the society's quality of life and the quality of the natural environment, as well as influencing the effectiveness of management. This, in turn, increases the value of space and its individual segments in the form of land (also real property).

The aim of the present article is to prove the thesis that the accurate choice of land functions in a local development plan carries over onto the behaviours of investors and has a positive influence on the value of land in the proximity of an airport affected by noise nuisance – i.e. it does not depreciate it. A case study for areas near the airport in Bydgoszcz has been described. Transaction prices from the years 2016-2018, which were derived from notary acts collected in a real estate cadastre compared with information regarding the land function resultant from the local plan and data on airport noise found on immission maps of the L_{DEN} indicator of the strategic noise map of the city of Bydgoszcz [7], were subjected to analysis.

The study was carried out using the following research methods:

- studies of literature as well as provisions of law regarding the protection of the environment against noise,
- studies of source materials, including the local spatial development plan, strategic noise map (SNM) resources and the base map of the study area,
- a case study with a description of prices of non-developed land from the assumed study area intended for service-related and technical-service related development, warehouses, depots, bases, workshops, etc.

Moreover, the following computer programmes were used: Excel calculation spreadsheet, Statistica 13.1, as well as the Walor program for analysing the transaction prices of real estate. Describing the features of real estate relied on on-site inspection.

Maintaining spatial order for the entire country depends, to a large degree, on the local level, i.e. the level of the commune. The local planning documents have a significant influence on the real estate market and value of land, explaining why further analyses will only refer to planning studies at the level of the commune.

2. Factors Influencing Land Value

The land market (non-developed, comprising the whole or part of a land property) is influenced by many factors, including internal ones – physical and environmental, connected with the actual land real property, and external, which E. Kucharska-Stasiak [8: p. 190] divided into: economic, legal, demographic, political and social ones. Among the legal factors referring to land, it is worth drawing attention to all kinds of legal restrictions resulting from the resolutions of the local land development plan and considerations resulting from the requirements of environmental protection, including the established protected areas: those protecting ecologically valuable areas as well as being the consequence of potential threats. There have been many studies on the topic of the determinants of market value of real estate (also land), and their effects are expressed in legal regulations regarding the estimation of their value and in the extensive literature on the topic [9–15]³. In regards to land properties, typical factors which buyers are influenced by upon their purchase are: the location of the real property, its legal standing, the surface area, the state and level of available technical infrastructure, accessibility, the state of the development of the surroundings of the property, the prestige of the location and neighbourhood, environmental aspects as well as planning guidelines – zoning (function) of the area, location of the given function in relation to other functions, location of the given function in relation to elements of the spatial layout, limitations arising from the principles of shaping spatial forms, considerations regarding the anticipated range of available utilities and availability of technical and social infrastructure equipment, as well as limitations in the manner of using individual areas [16: pp. 77–78]. According to some researchers, the beauty and picturesqueness of the landscape are also important criteria in the assessment of the visual attractiveness of a given place [17: p. 33], while the quality of air and noise can influence the prices of real estate, as ecological awareness is decisive to the valuation of the natural world by people and shapes ecological thinking. Some of the above-mentioned factors are connected with the organization of space and environmental factors, among them – noise, which increases along with socio-economic development and the location of functions posing a noise nuisance [18]. The described factors affect the specific manner in which land is used in different ways, e.g. environmental factors are very important to noise-sensitive real estate (with residential, recreational or educational functions).

The following question therefore arises: how does spatial order and coherent land use planning established in a local land development plan, which should hierarchize all considerations, influence land value? And is it positively received by the market participants? In a purely economic context, this positive reception

³ Only some of the most recent works on this subject matter have been cited.

of properly managed space ought to be expressed by higher prices paid for real estate (transaction prices, rental prices), as well as in the prices of the land itself. The ordering and transformation of space in an already shaped structure when introducing burdensome functions which affect neighbouring areas (e.g. roads, railways, tram lines, airports, water treatment plants, landfills) evokes particular conflicts. All the while, despite the general improvement of the state of space and an increase in its value, unique individual situations which cause a decrease in the value of the real estate will arise [19]. For such areas and real estate, a compensation system is reserved in legal regulations, but it remains beyond the scope of the deliberations of this work.

Undoubtedly for land located in the impact area of airports, one of the more important factors influencing value and prices will be the interconnected planning guidelines and environmental considerations, with noise being among environmental factors negatively influencing the surroundings. Analyses carried out on real estate markets of other European countries [20] as well as American [21] markets prove that the influence of noise is connected with the type of realized function on the given real estate. This was also confirmed by Polish researchers [22: p. 6], who found that the negative influence of airport location is especially noticeable for the category of residential and recreational real estate. In the case of commercial real estate, on the other hand, this influence can be beneficial, while it is typically neutral for industrial properties. In a further part of the present deliberations, the authors of the publication will draw particular attention to the influence of noise on the value of land in connection with the spatial structure of a given area, and the analysed case study will be an attempt to answer the question of whether situating an airport in Bydgoszcz and the noise connected with it have had a negative influence on the prices of neighbouring land and, by the interpolation of prices, their value.

3. Analysis of Prices of Land Located in the Neighbourhood of Bydgoszcz-Szwederowo Airport – Case Study

The aim of the work formulated at the beginning of the article regards demonstrating that the accuracy of the choice of land functions in a local spatial development plan carries over onto the behaviours of investors and has a positive influence on the value of land in the proximity of an airport affected by noise nuisance – does not depreciate it. This aim was realized on the example of an area the development of which takes place based on the local plan, which was and is to ensure spatial order of neighbouring areas. The issue is interesting seeing as how the location in space of untypical functions causes various consequences to real estate located in their surroundings. The notion that the localization of functions causing

a noise nuisance in space lowers the value of land in their neighbourhood is commonly known. Is this really always the case? Or does perhaps coherent land use planning minimize the scale of potential spatial conflicts, in this case in areas that are difficult in the context of urban planning connected with noise nuisance? And how is such an area (as potential investment land) perceived by the real estate market?

3.1. Description of Study Area

The airport in Bydgoszcz was created as a result of the expansion of the military airport which had been operating on the outskirts of the city since World War I. The Jan Paderewski Bydgoszcz International Airport is located in the south-western part of the city, only approx. 3 km from the city centre, on the Szwederowo estate. For this reason, it is also referred to as the Bydgoszcz-Szwederowo Airport. The airport is located in the area of the Bydgoszcz Commune, as well as partially in the area of the Białe Błota Commune, next to a national road, which takes a common course for roads No. 5 and No. 25. From the south and west it is surrounded by the Bydgoszcz Forest, bordering the Bydgoszcz housing estates of Szwederowo and Górzyskowo from the north, and Glinki from the east. An important advantage of the airport is its location next to the exit road from the city as well as close connection with the planned expressways, i.e. expressway No. 5 as well as expressway No. 10 (Fig. 1). The characteristics of the analysed airport are presented in Table 1.



Fig. 1. Location of Bydgoszcz-Szwederowo airport

Source: <https://www.google.pl/maps> (accessed: 30.04.2019)

Table 1. List of basic information on airport in Bydgoszcz

Detailed list	Airport in Bydgoszcz
Distance from the city centre	3–4 km
Surface area	146 ha
Number of runways	1
Length/width of runway	2500/60 m
Surface of runway	concrete
Civil airport certificate	YES
Affiliation to TEN-T network	NO
Number of passengers served in 2018	approx. 413,000
Number of directions of national flights	0
Number of directions of international flights	8
History	From a military airport
Limited Use Area	NO
Developed Noise Map	YES

Source: own elaboration based on data from <https://plb.pl> (accessed: 30.04.2019)

A limited use area (LUA)⁴ was not established around the analysed airport. In connection with the above, in a further part of the studies, the area of the impact of the airport on the prices of properties was determined on the basis of analyses of source materials diagnosing airport noise in the environment. A limit value of nuisance for airport noise in the amount of 55 dB was assumed, irrelevant of the time of day (day or night). Assuming more rigorous conditions indicating the area of the impact of noise connected with the airport as compared to those specified in the local plan (in which a flight zone with a noise level of 65 dB was indicated) resulted from the change in legal provisions [23]. The material providing information regarding the noise nuisance was the Noise Map of the City of Bydgoszcz [7]⁵ which, among others, presents the course of equal-loudness contours of a given level of decibels [24] (Fig. 2).

⁴ In Poland, in accordance with art. 135 section 1 of the Act of 27 April 2001 Environmental Protection Law: “if, from an ecological inspection or from the assessment of the impact of an undertaking on the environment [...] or from post-implementation analysis, it results that, despite the application of the available technical, technological and organizational solutions, quality standards of the environment outside the area of a plant or other object cannot be preserved, a Limited Use Area (LUA) is established for a sewage treatment plant, composting plant, transportation route, electrical lines and a power station, as well as a radiocommunication, radionavigation and radiolocation system. Depending on the type of objects, this area is set up by the provincial assembly or provincial council in the form of a resolution. These bodies, creating a limited use area, determine the borders of the area, limitations in terms of zoning, technical requirements regarding the buildings as well as manner in which the areas can be used” [24].

⁵ This is Phase III of SNM mapping in Europe.



Fig. 2. Fragments of the Noise Map of the City of Bydgoszcz with the course of equal-loudness contours of airport noise for indicators: a) L_{DEN} – long-term average level of noise expressed in decibels (dB) indicated over all days of the year, accounting for the time of day (understood as the time frame from 6 a.m. to 6 p.m.), time of evening (understood as the time frame between from 6 p.m. to 10 p.m.) as well as time of night (understood as the time frame from 10 p.m. to 6 a.m.); b) L_N – long-term average level of noise expressed in decibels (dB) indicated over all times of night in the year (understood as the time from 10 p.m. to 6 a.m.) – key as in Figure 4

Source: Noise Map of the City of Bydgoszcz [7]

The impact area of the airport on the urban space of Bydgoszcz (Fig. 2) mostly covers areas within the borders of the actual airport, wooded areas around the airport, allotment gardens in the Biedaszkowo District, as well as areas on the eastern side of the transportation artery – Jana Pawła II Avenue, i.e. the Glinki District. This is an area characterized by a high degree of urbanization with a dominance of service-residential real estate, but with service-technical development closer to the airport. The spatial structure of the analysed area was identified on the basis of the local land development plan of the Glinki “C” zone of Bydgoszcz (Fig. 3) [25].

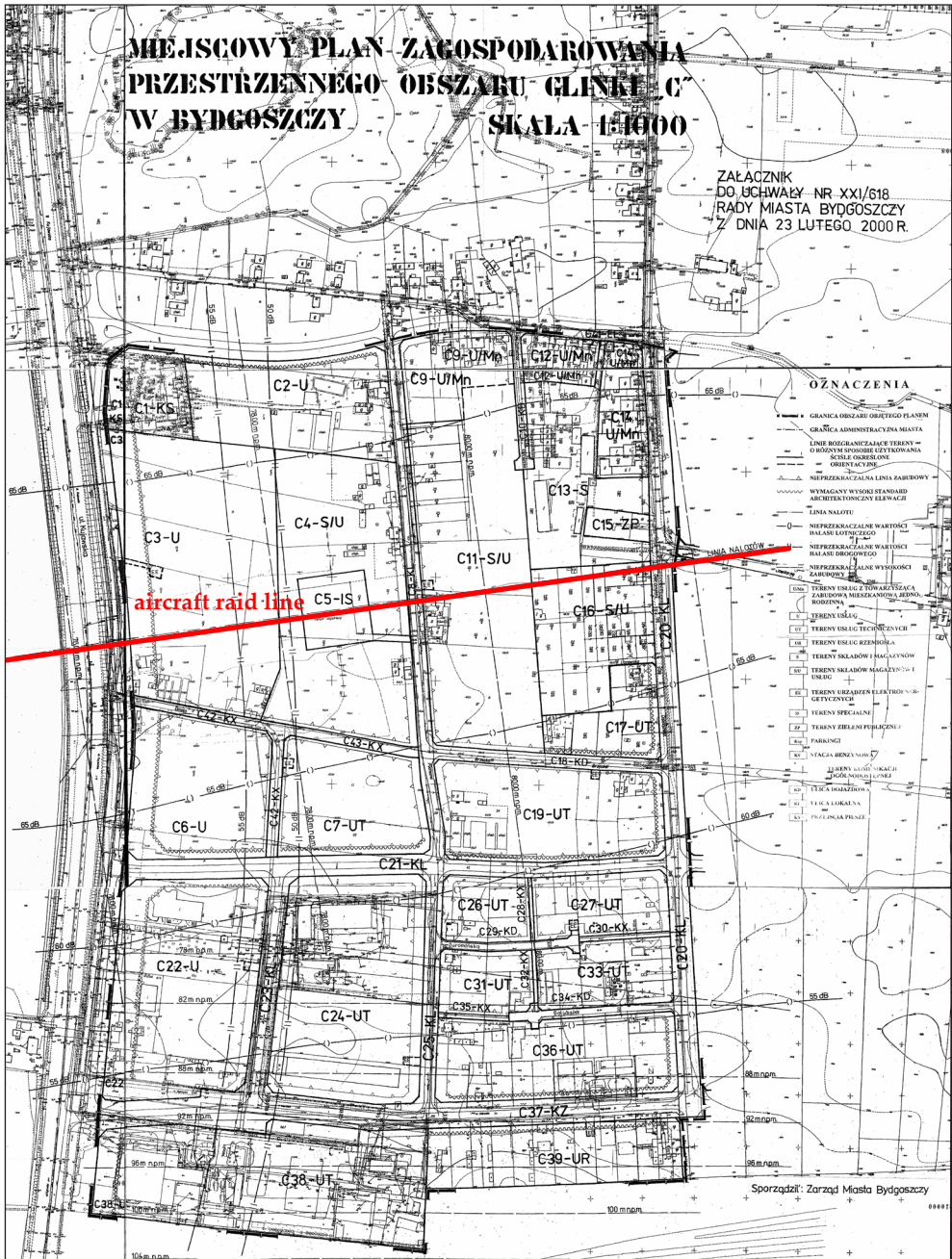
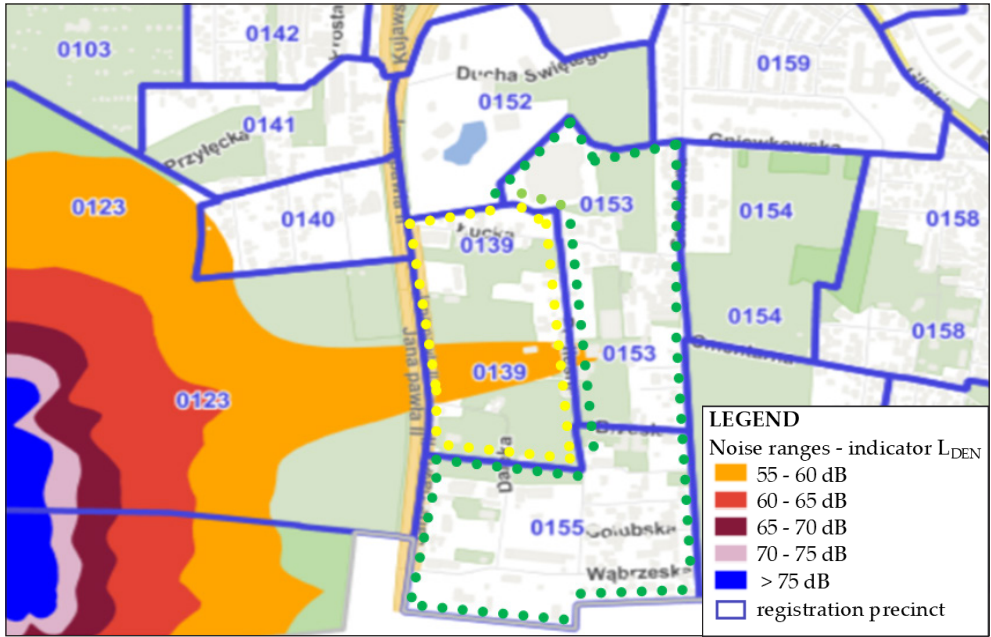


Fig. 3. Fragment of the local land development plan for the Glinki “C” zone of Bydgoszcz for the identification of research areas

Source: http://mpu.bydgoszcz.pl/pliki/060_U (access: 30.01.2016)

The spatial structure of the analysed area in the aircraft flight zone covered areas in balance units, which were intended for service-related, warehouse, and technical and craftsmanship service functions not allowing for the construction of new residential buildings (C3-U, C4-S/U, C5IS, C6-U, C7-UT, C11-S/U, C13-S, C-16 S/U, C 17-UT) – on the basis of these specifications, research areas I and II were indicated.



KEY:

- AREA I – areas with the possibility of noise levels in the 55–60 dB range
- AREA II – areas with noise levels below 55 dB

Fig. 4. Study area neighbouring the airport in Bydgoszcz

Source: own elaboration against the background of a Noise Map of the City of Bydgoszcz [7]

- The area of the Glinki “C” (Fig. 4) district was selected for studies of land value:
- as AREA I, Section 139, in the zone of increased noise levels, i.e. in the 55–60 dB range;
 - as AREA II – sections 153, 155 in the zone where the level of noise is below 55 dB.

The real properties located on study areas I and II are characterized by a similar general location in the area of Bydgoszcz, a similar layout of the transportation network and accessibility to the city centre, as well as a similar availability of technical and social infrastructure. They differ in terms of specific location and noise nuisance connected with airport noise.

3.2. Analysis of Land Prices

The study covered the transaction prices of land real estate (undeveloped) recorded in the period from 2016 to 2018. The market of the analysed land segment in the time under study was characterized by the stability of prices. The choice of the study period resulted from the continuation of studies carried out in the years 2009–2015⁶. Information pertaining to the concluded land property sales contracts came from the repertory Land and Buildings Register (real estate cadastre), kept by the Department of Property and Geodesy of the City Hall in Bydgoszcz. The analysed transactions pertained to undeveloped land with ownership rights.

In AREA I (with increased noise 55–60 dB), a total of merely three transactions were noted in the research period (all notary acts were analysed), for service-related development, service-technical development, car parks, depots and warehouses. Land properties from the analysed area were not zoned for residential development. For the majority of areas of the Glinki estate, a local land development plan has been developed which, for areas with increased noise levels, does not allow for the implementation of a residential function. The analysis of transactions makes it possible to claim that land located in the zone where the impact of noise is at a level of over 55 dB elicited prices 172.61 – 270.00 PLN/m² (Tab. 2).

Table 2. List of transaction prices of undeveloped land real estate – Bydgoszcz, obr. 139

No.	Transaction date	Location	Surface [m ²]	Right to land	Zoning in the local plan	Price [PLN]	Unit price C_j [PLN/m ²]
1.	23.06.2018	Glinki, obr.139 ul. Daleka	1,738	property	C7 UT	300,000	172.61
2.	29.03.2018	Glinki, obr.139 ul. Podleśna	3,953	property	C2 U	838,036	212.00
3.	19.12.2017	Glinki, obr.139 ul. Jana Pawła II	6,071	property	C3 U	1,639,170	270.00

Source: own elaboration on the basis of prices from notary acts

In AREA II (with noise under 55 dB), a total of 11 transactions were noted during the research period, of which 9 were included in the analysis, seeing as how the remaining two were not concluded under market conditions. Those included in the analysis pertained to purchasing land with a similar function to that in Area I, i.e. service-related development, service-technical development, car parks, depots, warehouses and production. The areas from the analysed zone were also not intended for residential development. This allows for comparing the value of land with the same functions in areas I and II, which are moreover characterized by similarity in

⁶ The results of studies published in [19].

terms of their general location and accessibility to the main roads. The prices pertained to the right of ownership, thus the same type of rights to land as in Area I. The prices of land located outside the noise impact zone (under 55 dB) elicited lower prices of 146.91 – 250.26 PLN/ m² (Tab. 3).

Table 3. List of transaction prices of undeveloped land real estate – Bydgoszcz obr. 153, 155

No.	Transaction date	Location	Surface [m ²]	Right to land	Zoning in the local plan	Price [PLN]	Unit price C_j [PLN/m ²]
1.	22.02.2018	Glinki, obr.153 ul. Brzeska	987	property	C 17UT	145,000	146.91
2.	20.04.2016	Glinki, br.153 ul. Podleśna	11,906	property	C 11 S/U	2,000,000	167.98
3.	29.03.2016	Glinki, br.155 ul. Wąbrzeska	860	property	C 36 UT	165,000	191.86
4.	02.06.2017	Glinki, obr.155 ul. Dobrzyńska	944	property	C 19 UT	184,500	195.44
5.	06.10.2016	Glinki, Obr.155 ul. Lidzbarska	946	property	C 27UT	185,000	195.56
6.	27.06.2017	Glinki, Obr.155 ul. Dobrzyńska	831	property	C 19 UT	172,500	207.58
7.	20.07.2017	Glinki, Obr.155 ul. Brzeska	855	property	C 19 UT	200,000	233.92
8.	23.02.2017	Glinki, Obr.155 ul. Lidzbarska	1,741	property	C 19 UT	425,000	244.11
9.	01.05.2018	Glinki, Obr.155 ul. Brzeska	979	property	C 19 UT	245 000	250.26

Source: own elaboration on the basis of prices from notary acts

Description of transaction prices from areas I and II is presented in Table 4.

Table 4. Descriptive statistics of transaction prices in the analysed sections located in the neighbourhood of the airport in Bydgoszcz in the years 2016–2018

Specification	Area I (noise 55–60 dB)	Area II (noise under 55 dB)
Number of transactions subjected to analysis	3	9
Average	218.20	203.74
Median	212.00	195.56
Minimum	172.61	146.91
Maximum	270.00	250.26

Source: own elaboration on the basis of prices from notary acts (Tabs. 2 and 3)

From the results presented in Table 4, it follows that, in Area I (with an increased noise level), the average transaction price in the amount of 218.20 PLN/m² for undeveloped land was higher than the average price of land properties located outside the zone under the impact of airport noise, amounting to 203.74 PLN/m². This is a difference of approx. 7%.

In the analysed case, aircraft noise (despite expectations) is not a price-depreciating factor for service-technical functions. The same tendency was observed in earlier studies regarding the prices of land from the 2009–2015 period [19]. It ought to be added that in Area I (in the area of noise impact), a lower number of transactions was noted; this is due to the fact that this is an area which has already been significantly invested in, and there are not many free land parcels left to be developed. The smaller – than in Area II – supply of land properties as well as location closer to the main transportation route with better exposition contributed to the increase in their value over the average from Zone II.

3.3. Conclusions from the Analysis

- The location of the airport in Bydgoszcz on the outskirts of the city means that zones under the impact of airport noise overlap the investment areas in the city.
- The proper planning of functions of land surrounding the airport (termed coherent land use planning) for services, warehouses, depots, bases, workshops, etc. has caused market participants to declare a demand for real estate in the proximity of the airport and prices of land are not lower than the average prices of land zoned for similar functions in the same district, but outside the zone of increased noise.
- Residential areas are distributed outside the zones of noise nuisance.
- Areas exposed to the greatest noise, at a level of over 60 dB are found within the borders of the airport.
- It is most likely due to these reasons that a limited use area (LUA) was not established around the airport in Bydgoszcz.

4. Summary

The above analysis of land prices in the neighbourhood of the airport in Bydgoszcz indicated that the location of the real properties in the zone under the influence of aircraft noise was not a hindrance and did not limit the market turnover of real estate, which remained under the negative influence of this factor. The reason behind the demand is the proper introduction of land functions in the area of increased noise, i.e., above all – services, technical services, trades, areas of car parks, depots or warehouses for which aircraft noise is not as detrimental as, e.g. for areas of residential development. Thus, there is no clear signal from the market indicating limited demand for service-technical real estate in the zone under the influence of

aircraft noise. The buyers of the real estate, who are for the most part investors, see the proximity of the airport in Bydgoszcz as a factor influencing the increased attractiveness of real estate with non-residential functions⁷. The results of studies carried out on the Poznań market of real estate surrounding the Poznań-Krzesiny Airport [22: p. 39], which showed the influence of noise on the price of commercial real estate to be positive or neutral, were also confirmed.

This makes it possible to confirm the thesis and express the view that spatial order, and the resultant coherent land policy, created in a local development plan with a well-planned function of the area and transportation service as well as clearly-formulated investment conditions, carries over onto the behaviours of investors as well as having a positive influence on land prices (does not depreciate them). In this case, in relation to land with a service-technical function near the airport in Bydgoszcz, there is no basis for spreading the belief that the localization of functions of noise nuisance (e.g. airports) lowers the value of land in the neighbourhood.

The presented case study is an example of properly carried out spatial policy and spatial planning.

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⁷ The view expressed during a discussion at a conference in Toruń “Direct foreign investments in the Kujawsko-Pomorskie Voivodeship”, Toruń, 30.11.2015. For more on the topic of determinants of investing in the areas of the Kujawsko-Pomorskie Province see [26].

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Koherencja lokalizacyjna a cenność gruntów

Streszczenie: W artykule podjęto próbę udowodnienia tezy, że trafność doboru funkcji terenu w planie miejscowym przekłada się na zachowania inwestorów i wpływa korzystnie na cenność gruntów objętych uciążliwością akustyczną w sąsiedztwie portu lotniczego – nie deprecjonuje ich. W tym celu zaprezentowano case study z opisem cen transakcyjnych gruntów niezabudowanych położonych przy lotnisku Bydgoszcz-Szwederowo. W jego rejonie wytypowano dwa obszary badawcze: I – o poziomie hałasu 55–60 dB i II – o poziomie hałasu nieprzekraczającym 55 dB, a następnie w tych obszarach zdiagnozowano rynek gruntów przeznaczonych w miejscowym planie zagospodarowania przestrzennego pod zabudowę usługową, usługowo-techniczną, parkingi, składy, magazyny i warsztaty. W badaniach wykorzystano zasoby strategicznej mapy akustycznej (SMA). Okres badania obejmował lata 2016–2018. Z przeprowadzonych badań wynika, że lokalizacja nieruchomości w strefie oddziaływania hałasu lotniczego nie ograniczała obrotu rynkowego nieruchomości, które pozostawały pod niekorzystnym oddziaływaniem tego czynnika. Przyczyną popytu jest trafnie wprowadzona funkcja terenów w planie miejscowym w obszarze o podwyższonym poziomie hałasu jako wyraz koherencji lokalizacyjnej. Cel artykułu wynika z zapotrzebowania rynku na określony zakres badań, które mogą wspomagać działania planistyczne, decyzyjne i realizacyjne w obszarze gospodarki przestrzennej i nieruchomości.

Słowa

kluczowe: koherencja lokalizacyjna, ceny gruntów, hałas lotniczy, Bydgoszcz