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ANALYSIS OF LOCAL SPATIAL DEVELOPMENT PLANS FOR THE SMART CITY OF RZESZOW (POLAND)

Abstract: The purpose of the article is to analyze of local spatial development plans as well as zoning and spatial development conditions and to determine the impact of these works on the development of the Smart City on the example of the city of Rzeszow. The comparative analysis will consist in showing the availability of local spatial development plans in the city of Rzeszow. The experimental database will be publicly available and up-to-date map portals. The research materials were obtained from the Geodetic and Cartographic Documentation Center in Rzeszow (Poland) in the years 2011–2019 were subject to analysis during a study visit of scientists from the Lviv National Agricultural University in Dublany (Ukraine). The City of Rzeszow was chosen for detailed research, because Rzeszow ranks 55 in the European Smart Cities ranking. It is worth noting the list included 6 Polish cities, including the City of Rzeszow. In Rzeszow Smart City the research was carried out on 23 districts of cadastral registration. In the Smart City of Rzeszow, decision on development conditions constitute a much larger number (7318) than the local spatial development plans (107). On the basis of the presented data, it was found that the most design work was carried out in 2016–2019. The article is of research nature, hence a lot of attention was devoted to the analysis of particular plans performed in the Rzeszow Smart City and on the graphic presentation of results.

Keywords: Smart City, real estate management, spatial planning, local spatial development plans, development conditions

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Introduction

The current times are undoubtedly the period of urban development. The process of migration to urban centers is continuously increasing throughout the world. It is estimated that, in a few years, 75% of the population around the globe will have been living in cities (Bieda et al., 2016). European cities face the challenge of combining competitiveness and sustainable urban development in connection with economic and technological changes caused by globalization and the integration process. Very evidently, this challenge is likely to have an impact on issues of Urban Quality such as housing, economy, culture, social and environmental conditions (Papadopoulou & Giaoutzi, 2017). Therefore, you meet and create a smart city. The attempt to define the city of smart city, among other things, took place: Giffinger et al. (2007), Calagliu et al. (2009), Lombardii (2011), Batty et al. (2012), Dameri (2013), Manville et al. (2014), Glasmeier & Christopherson (2015). A Smart City is a city well performing in 6 characteristics (Smart Economy, Smart People, Smart Governance, Smart Mobility, Smart Environment, Smart Living), built on the smart combination of endowments and activities of self-decisive, independent and aware citizens (Stratigea et al., 2015). These 6 parameters also include multidisciplinary issues such as the quality of the living space. On the other hand, the living space is planned directly in the local spatial development plans or in the zoning and spatial development conditions. The living space is planned in accordance with applicable regulations and technical standards. However, according to the Polish Construction Law (Act, 1994), construction works require a building permit. The local spatial development plans are required for a building permit, or if not, the zoning and spatial development conditions. Spatial planning should regulate spatial development, taking into account the public and private interests, and enabling the development of public and private investments in construction projects (Krajewska et al., 2014; Żróbek et al., 2020; Żróbek-Sokolnik et al., 2021). Therefore, it can be concluded that planning work is an integral part of real estate management and the investment process in the city. Among other things, this topic was considered, among others, by: Kwartnik-Pruc & Hanus (2014), Buśko & Przewięźlikowska (2016), Kukulka et al. (2017), Wolny et al. (2017), Balawejder et al. (2018); Szafranska et al. (2020); Telega et al. (2021) and others, but no research was conducted in the context of Smart City.

Therefore, the purpose of the article is to analyze the completed of local spatial development plans as well as zoning and spatial development conditions and to determine the impact of these works on the development of the Smart City on the example of the city of Rzeszow. The comparative analysis will consist in showing the availability of local spatial development plans in the city of Rzeszow. The experimental database will be publicly available and up-to-date map portals. The research materials were obtained from the Geodetic and Cartographic Documentation Center in Rzeszow (Poland). The research materials were obtained during a study visit of scientists from the Lviv National Agricultural University in Dublany (Ukraine) at the PWSTE The

Bronisław Markiewicz State University of Technology and Economics in Jarosław (Poland).

Characteristics of the research object

The city of Rzeszow was selected for detailed research, as Rzeszow occupies 55th place in the ranking of European Smart Cities (PLEEC project studies). The ranking includes 6 Polish cities, including the city of Rzeszow. The city of Rzeszow is located in the south-eastern part of Poland, on the Wisłok River. Rzeszow is the capital of the Podkarpackie Voivodeship (Fig. 1). It is the central academic, economic and cultural center of this region.



Fig. 1. Location of Rzeszow
Source: Bieda et al., 2020

The city of Rzeszow is divided into 23 cadastral districts. The layout of cadastral districts in the city is shown in Table 1 and Figure 2. Rzeszow covers an area of 12,900.9627 ha. This is 10,1% of the entire county's area. It has more than 196,208 inhabitants. This constitutes 0.5% of the population in Poland and 9.2% of the population of the Podkarpackie Voivodeship. In terms of population, Rzeszow is the largest city in the region and the 17th city in Poland. The average population density is 1,550 people/km².

The advantage of Rzeszow is its attractive location, well-developed road network, public transport and natural values. The city undertakes various efforts to continuously improve the natural environment. Rzeszow plays an important point on the map of Europe. It has an international airport. There are also intersecting international routes of road and railway communication (Noga et al., 2017). Rzeszow focuses on educated youth. In the city there are two large state universities and several private ones.

Many enterprises and production plants prosper in the city, with around 100,000 employees. Constant development of Rzeszow and receiving the title of Smart City, forced somewhat city authorities to expand the borders of their territory by acquiring new areas. Beginning from 2006 to the present, Rzeszow joined a new cadastral district every year, thanks to which it increased its area. Over the past few years, they have been attached: 2010 – part of Miłocin and Budziwój; 2017 – Bzianka; 2019 – Matysówka and part of Miłocin; 2021 – Pogwizdów Nowy.

The acquired areas and the possibility of their utilities can be evidence of further investments, and thus the creation of new jobs, as well as the development of residential construction. Among other things, residential housing has an impact on Smart Living in the city of Rzeszow (Balawejder et al., 2018). Therefore, good spatial planning may contribute to a better result of the city of Rzeszow in the next smart city survey of European Cities.

Table 1. The city of Rzeszow with a division into cadastral districts

No.	Cadastral districts number	Cadastral districts name	Area [ha]
1	207	Śródmieście	581,5920
2	208	Nowe Miasto	425,0513
3	209	Zalesie	533,2721
4	210	Biała	348,3492
5	211	Zwięczyca	480,2499
6	212	Staroniwa	436,8653
7	213	Baranówka	393,4461
8	214	Staroniwa II	282,8630
9	215	Przybyszówka	248,1124
10	216	Staromieście	558,2237
11	217	Pobitno	284,9171
12	218	Wilkowyja-PN	417,4105
13	219	Wilkowyja-PŁD	377,8969
14	220	Załęże	521,4642
15	221	Słocina	915,6584
16	222	Przybyszówka II	1626,8906
17	223	Zwięczyca II	723,1786
18	224	Biała II	605,8891
19	225	Budziwój	1750,6774
20	226	Miłocin	214,6943
21	227	Bzianka	404,3217
22	228	Matysówka	529,8180
23	229	Pogwizdów	240,1209
	Summary		12900,9627

Source: own study



Fig. 2. The division of the city of Rzeszow into cadastral districts
Source: own study based on the data from the Geodetic and Cartographic Documentation Center in Rzeszow (Poland)

Spatial planning in Smart City Rzeszow

Spatial planning is an extremely powerful tool with which the development of even the largest space can be shaped (Bieda & Parzych, 2013). Spatial planning determines the state of the designed site. Existing planning materials can influence the initiation of real estate processes (Bieda & Dybał, 2021). This is especially noticeable when the land dividing. Namely, the land division can be made when it is in accordance with the arrangements of the local plan. Local spatial development plans for individual countries and cities should be generally available and open to the public. We can acquire and expand knowledge about them thanks to legal bases and map information portals. The legal basis for information sources in Poland and throughout Europe is Directive 2007/2/EC establishing an infrastructure for spatial information in the European Community – INSPIRE (Directive, 2007). This document introduced to the European Union countries free public access to spatial data services. In Poland, access to open geospatial data began in 2011 (Act, 2010). Since then, the publicly available resource available at www.geoportal.gov.pl has been successively expanded (Balawejder et al., 2016).

In Poland, as well as in the city of Rzeszow, the most popular source of information is the National Geoportal. For planning purposes, a special tab called – INSPIRE has been created. Thanks to it, it is possible to show local spatial development plans. Unfortunately, the studies are not introduced systematically and their frequency in Rzeszow is very low. On the National Geoportal, we can also display a study of the conditions and directions of spatial development (Fig. 3). Their studies also concern the areas around the borders of the city of Rzeszow.

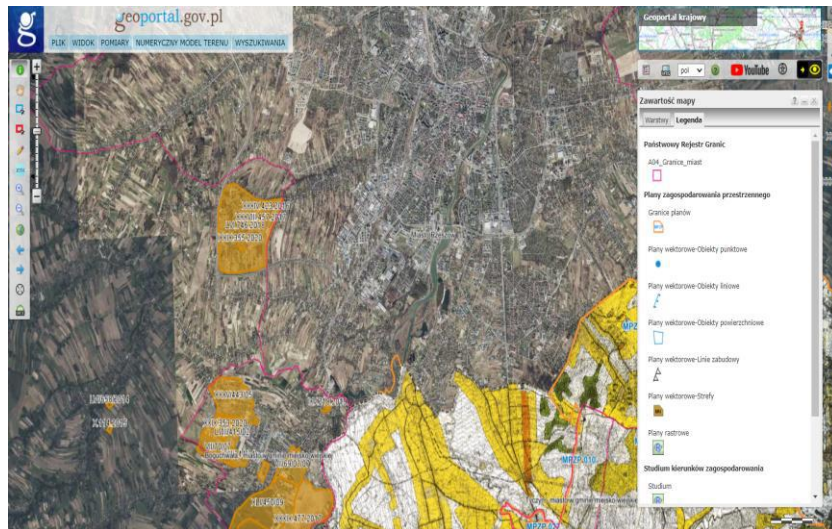


Fig. 3. Presentation of data on spatial order on the basis of the National Geoportal
Source: www.geoportal.gov.pl

Focusing on the area of the city of Rzeszow, the main source of obtaining spatial information should be the Geoportal of the City of Rzeszow. His data concern the city limits. Unfortunately, on this website, the data regarding local spatial development plans have not been updated and introduced to the public. There is no possibility to choose the appropriate layer that would be displayed on the map background. The Rzeszow City Geoportal focuses mainly on records and the spatial location of elements in the field. A fragment of such development is shown in Figure 4. The map shows the location and numbers of plots and buildings, streets, utilities, as well as numbers of individual precincts.

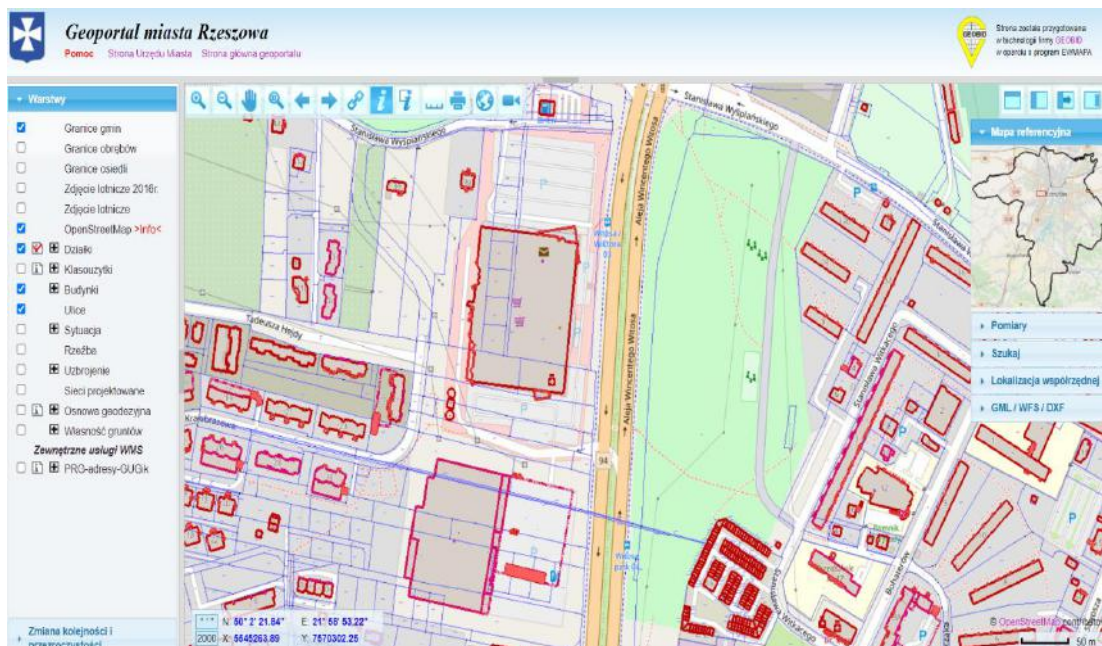


Fig. 4. View of the development along Wincentego Witosa Street
in the Geoportal of the city of Rzeszow
Source: www.osrodek.erzeszow.pl

In the case of the spatial order issue, the most up-to-date and accurate information turned out to be on two information portals. The first is the website of the Rzeszow City Development Office – www.brmr.erzeszow.pl/mapa (Fig. 5), while the second is the Spatial Information System of the Rzeszow City Hall – www.mrzeszow.e-mapa.net (Fig. 6).

In the map service of the Rzeszow City Development Office, the data is devoted to local spatial development plans (Fig. 5). It contains information about the studies carried out in the years 1998–2020. The collected materials show the boundaries of the areas where there are spatial development plans and information about these projects. After selecting the area of interest, a comment about the plan in force and a link to the approved document appears. It is the most developed database. Its scope is constantly modified and supplemented with new studies.

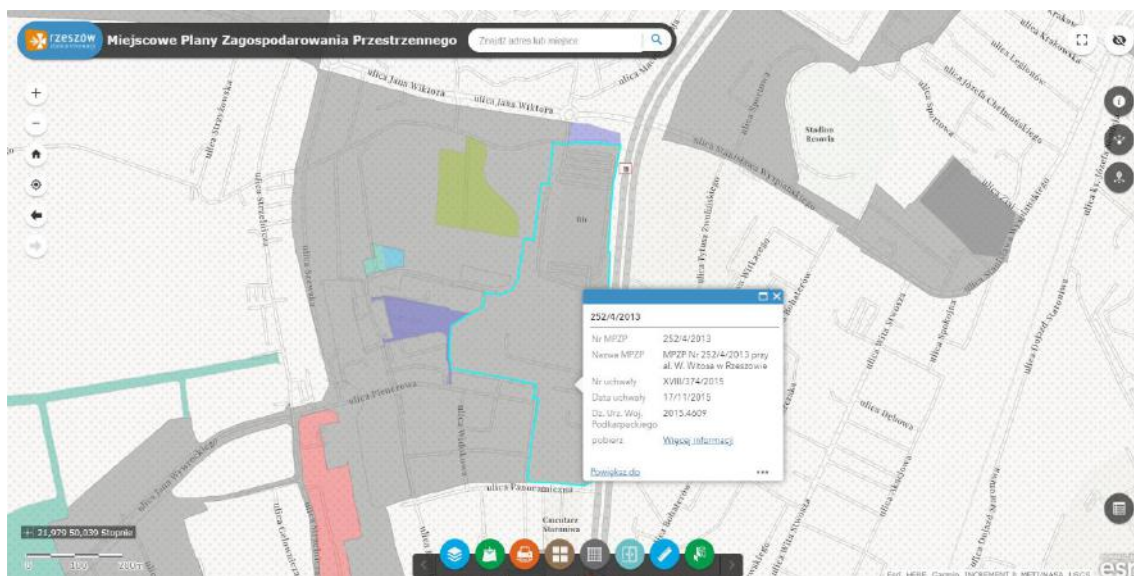


Fig. 5. View of the obtained spatial development plan along Wincentego Witosa Street in Rzeszow
Source: www.brmr.erzeszow.pl/mapa

The last source on the basis of which the comparative analysis was carried out is the Spatial Information System of the Rzeszow City Hall (Fig. 6). Unfortunately, the data presented on the website is not official. There are very few marked areas in this study, which were included in the local spatial development plan. They have an area contour and an abbreviation for recognition of the area. For detailed information, please find the approved study in a given location. It will have the same graphic part as can be found on the map background of the portal. It is not an optimal system of data acquisition, but it may prove helpful in some situations.

Table 2 presents examples of the designation of local spatial development plan projects. These places will show the same location in two equal map portals.

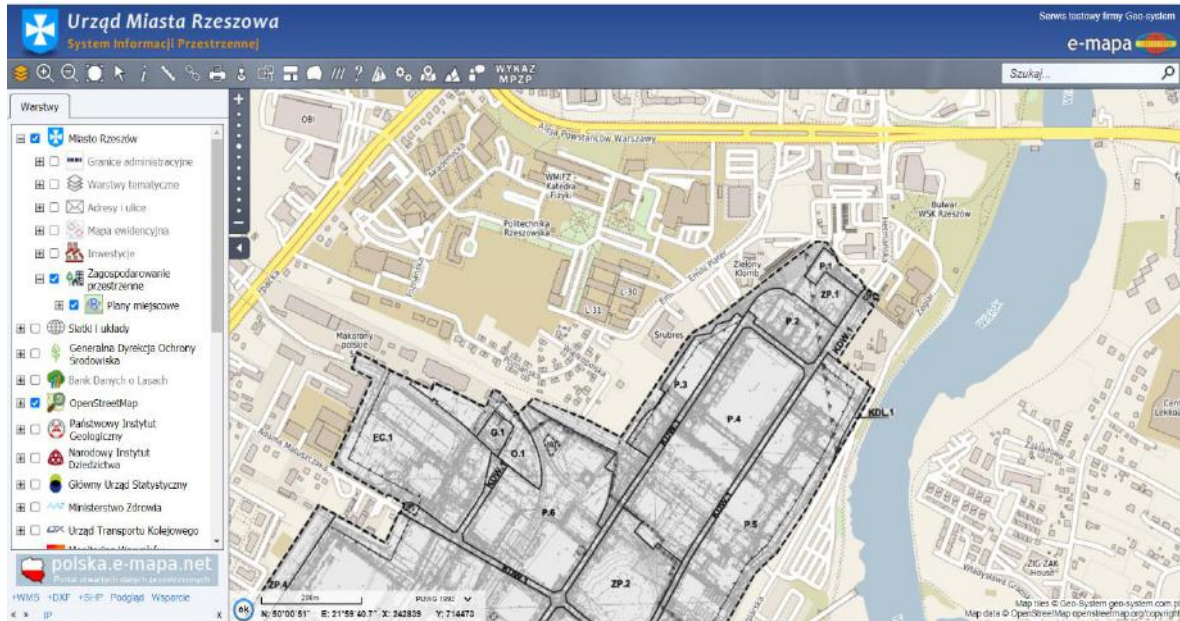


Fig. 6. Presentation of the spatial development plan on a map background
 Source: www.mrzeszow.e-mapa.net

Table 2. Comparison of local spatial development plans yielded on two different map portals

Source:	https://mrzeszow.e-mapa.net/	https://brmr.ereszow.pl/mapa/
Name	MPZP Nr 137/8/2006 Zawiszy Czarnego – 1 in Rzeszow	
Location:		
Description of the area	The plan covers an area located in the south-western part of the city of Rzeszow, located along Przemysłowa Street, Magazynowa Street and the railway area. In the neighboring surroundings, there are production, service and warehouse areas.	

Source: own study

Table 2 shows at what stage of disseminating and making available to the public the data on spatial order in the city of Rzeszow. The most reliable source and intuitive portal is the map service of the Rzeszow City Development Office. This shows how important

and time-consuming it is to introduce local spatial development plans to the public information. Greater access to this type of material will certainly be helpful at every level of planning work. It will facilitate the work of both people creating complex and multi-surface projects as well as people applying for a building permit and implementation of an investment in the smart city Rzeszow.

Analysis of local spatial development plans for the Smart City of Rzeszow

The current coverage of the city of Rzeszow, applicable and being under development with local spatial development plans, is shown in Figure 7 from the Public Information Bulletin.

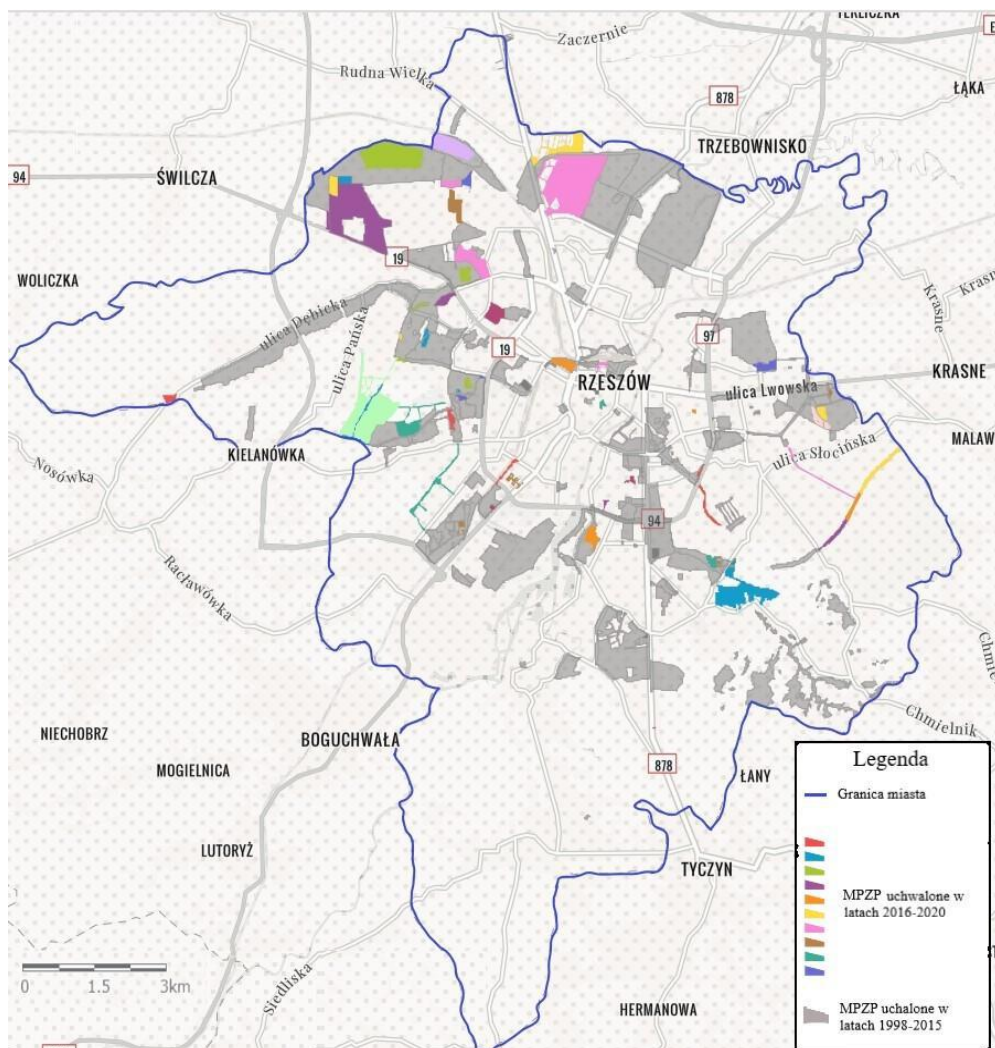


Fig. 7. Areas of the city of Rzeszow covered of the local land development plan
Source: www.bmr.erzeszow.pl

Figure 8 shows the number of resolutions of local spatial development plans in the area of smart city Rzeszow in the years 1998–2020.

As shown in Figure 8, in the city of Rzeszow, 216 resolutions of local spatial development plans were adopted in 1998-2020. Most 17 MPZP were adopted in 2007,

and at least 3 in 1998. From 2014 until now, the number of resolutions of the Local Development Plan has not fallen below 10. Figure 9 shows the areas of the adopted and implemented local spatial development plans in individual years.

As shown by the data in Figure 9, in the years 1998–2015 a local development plan was adopted with an area of 19.08 ha. However, in the years 2016–2020, a local development plan was adopted with an area of 1,188.69 ha. Based on the analyzed data, it can be concluded that the total area of the local spatial development plans is 1,207.07 ha. Considering the area of the entire city, it is a small area. With the continuous development and expansion of the borders of Rzeszow, its area currently amounts to 12,900.96 ha. The approved local spatial development plans amount to only 9.4% of the area of the entire city. This proves a large number of plans in continuous development or places that do not have such a study. On the basis of the map attached below, it can be noticed that so far no spatial development plans have been made in the southern part of the city.

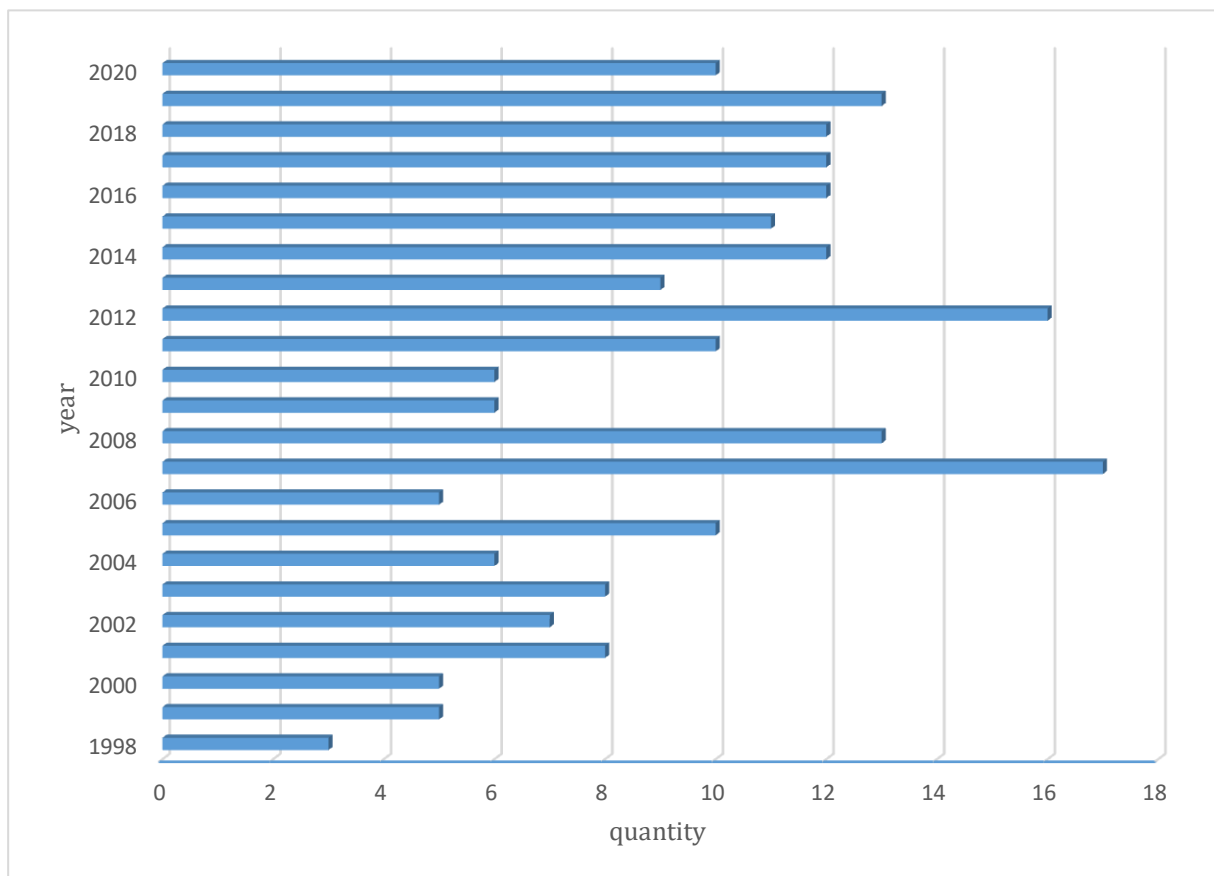


Fig. 8. Number of resolutions of local spatial development plans in the years 1998–2020
 Source: own study based on the data of the Rzeszow City Development Office

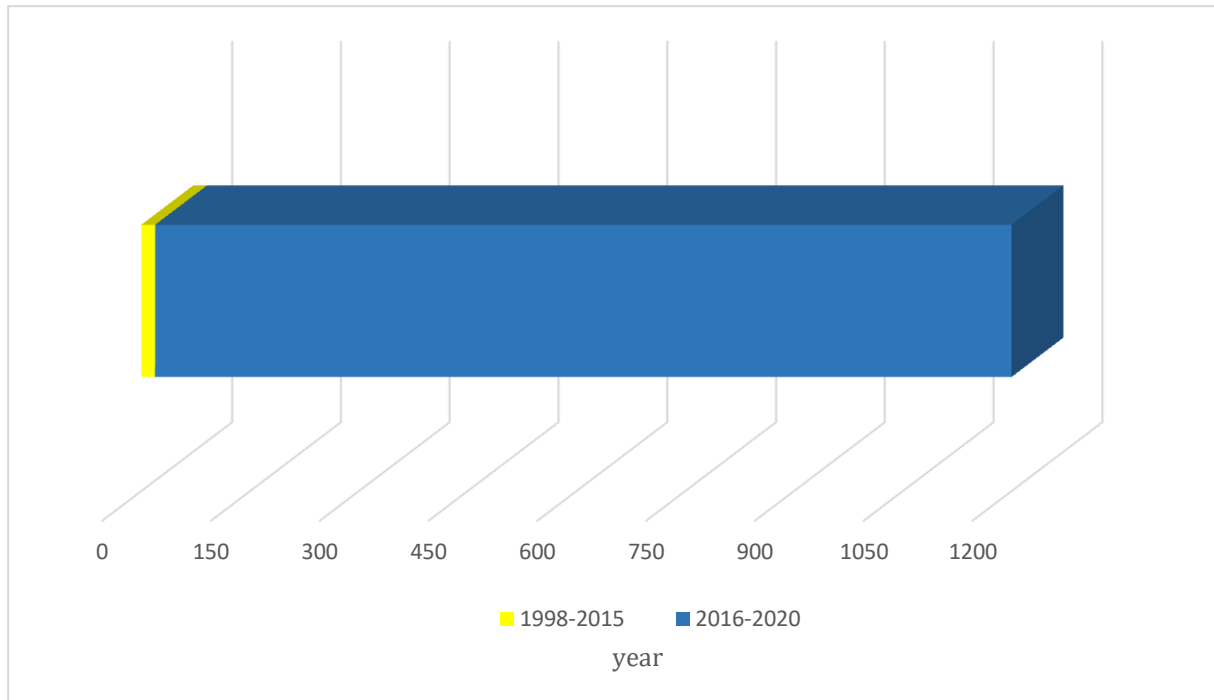


Fig. 9. Areas of the adopted and executed local spatial development plans
Source: own study based on the data of the Rzeszow City Development Office

Analysis of issued decisions on development conditions in the Smart City of Rzeszow

A decision on development conditions (WZ) is a necessary element to obtain a building permit, if there is no local spatial development plan (MPZP) established on the plot of land.

The issued decision on development conditions has provisions showing whether the planned investment may be allowed on a given plot and how the house will be developed with connections: water, energy and sewage disposal. It also specifies the conditions for shaping the spatial order, regulations on the protection of the environment, cultural heritage and agricultural and forest land. It also concerns sanitary and fire regulations.

In smart city Rzeszow, applications for a WZ decision are submitted to the City Hall. Their examination and issuance of a decision takes place within two months from the date of submitting the application. In Rzeszow, decisions on development conditions are much more compassionate than the local spatial development plans that are passed. It was thanks to the WZ decision that several investments were created that contributed to the inclusion of the City of Rzeszow in the Smart City. In order to implement the given investments, a WZ decision was needed, because there were no local spatial development plans in these places.

Thanks to the information from the Local Data Bank of the Statistics Poland (BDL Statistics Poland), it is possible to graphically present the area under study, which is smart city Rzeszow. The period in which the analysis concerning the issuing of planning decisions was carried out was 2011–2019.

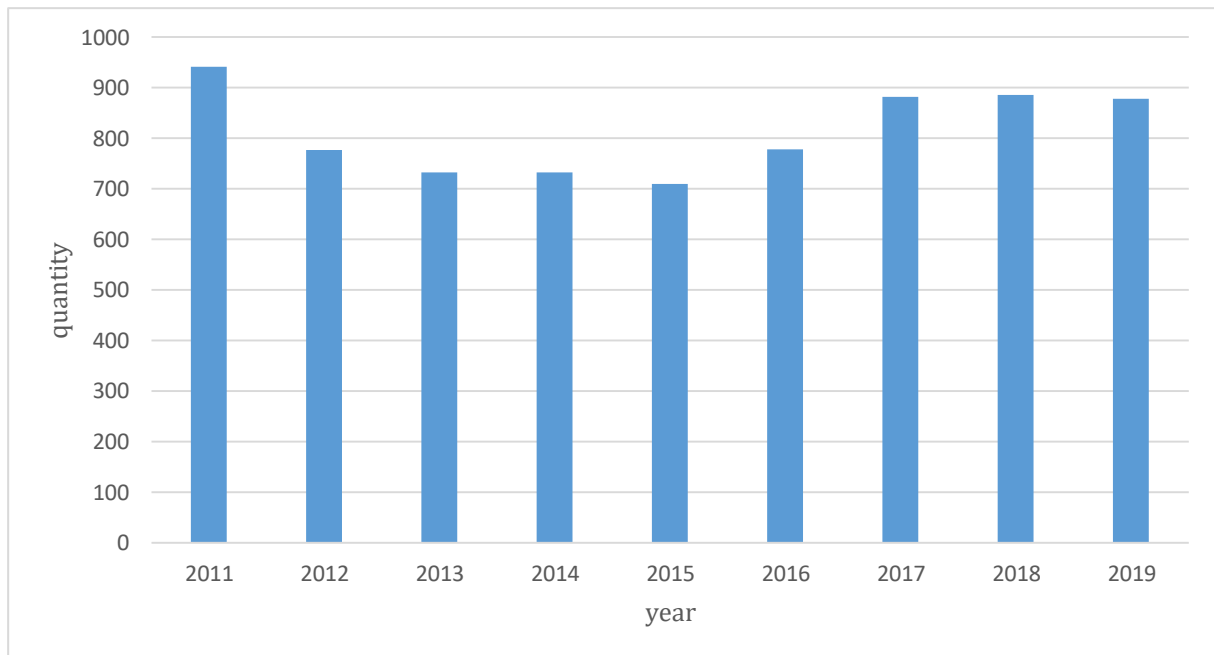


Fig. 10. Number of decision on development conditions (WZ) issued in 2011–2019
Source: own study based on BDL Statistics Poland data

Based on the information obtained from BDL Statistics Poland, the total number of decisions on development conditions issued in 2011–2019 is 7,318. Figure 10 illustrates this data. This time can be divided into two periods. In the years 2011–2015 there is a decrease in the number of GM decisions issued, and in the years 2016–2019 the number is increasing. The reason for this is that two areas have joined the borders of Rzeszow. In 2017, a town called Bzianka was connected, while in 2019 Matysówka and Miłocin northern joined Rzeszow. Thanks to the expansion of the borders, there were more areas ready for new construction investments. Their development contributed to the increase in the number of decisions on development conditions.

Conclusions

This article specifies the analysis of local spatial development plans for the Smart City of Rzeszow – based on a study visit to Poland. Rzeszow ranks 55th in the ranking of European Smart Cities (PLEEC project studies). The ranking includes 6 Polish cities, including the city of Rzeszow. Detailed research was conducted on 23 city districts of the City of Rzeszow. Such a large area covered by the analysis allowed for a precise interpretation of the phenomenon. The data was obtained from the Center for Geodetic and Cartographic Documentation in Rzeszow. The article focuses primarily on local spatial development plans directly affecting construction works that have an impact on the development of Smart City. The analysis covered the following projects: local development plan and building conditions and land development. These types of projects are needed before the implementation of all construction investments. Based on our own experience, literature and analyzes made during the creation of the article, we can formulate the following conclusions:

1. The period of creating and adopting a local spatial development plan is long and time-consuming.
2. The creation of a single information base in which all studies of local spatial development plans will be combined will significantly improve the structure of the city's functioning.
3. In the Smart City of Rzeszow, decision on development conditions constitute a much larger number (7318) than the local spatial development plans (107). This is because, the area of the development of the local spatial development plan is the entire design area, for comparison, the decision on development conditions applies only to the planned investment.
4. As can be seen in tables 3 and 11, since 2016 the number of completed local development projects, and especially the conditions of development and development, has been increasing. This factor indicates a large increase in geological and construction works (Balawejder et al., 2018). Therefore, surveying and construction works may contribute to a better result of the City of Rzeszow in the next European Cities survey.

Table 3. Comparison of the number of studies in Rzeszow in 2011–2019

Year	Number of issued resolutions of the local spatial development plan	Number of decisions on development conditions
2011	10	942
2012	16	777
2013	9	733
2014	12	733
2015	11	709
2016	12	778
2017	12	882
2018	12	886
2019	13	878
Suma	107	7318

Source: own study based on BDL Statistics Poland data

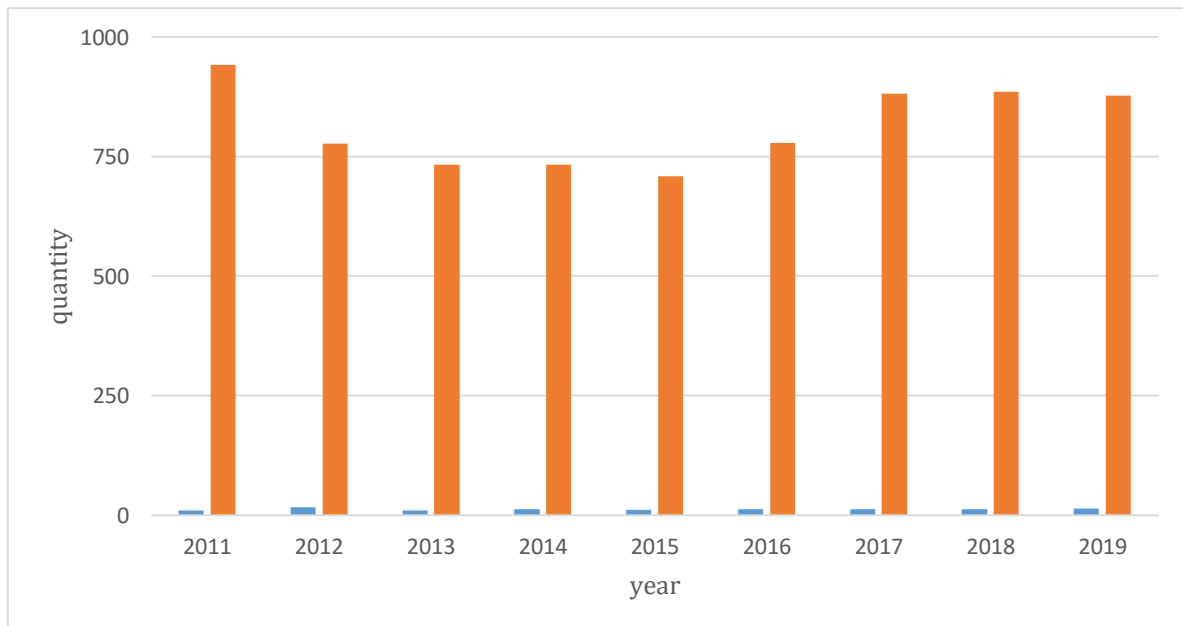


Fig. 11. List of issued resolutions of the local spatial development plan (blue) and decisions on development conditions (orange) in Rzeszow in 2011–2019
Source: own study based on BDL Statistics Poland data

In conclusion, on the basis of the presented data, it was found that the most design work was carried out in 2016-2019. This proves that Rzeszow Smart City is constantly developing. It constantly attracts new investors, and thus new investments are constantly being created, which has an impact on the development of Smart City.

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