Local Investments Site Selection and the Behavior of the Real Estate Market – Case Study in Poland

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Abstract. One of the main tasks of real estate management in the area of the municipality is making decisions concerning the location of investments on a local scale. These decisions should be taken with the principle of sustainable development. For such an action obliges Poland's membership in the European Union. Poland as a member of the EU is obliged to implement the rules in force in the Member States. Bearing in mind that any investment impact directly or indirectly on the economic development of the municipality, is therefore a significant impact on the local real estate market. Investments that have a negative impact on the environment can contribute to a reduction in the activity of the local real estate market. While performing tasks related to the economic development of the region and the increase in quality of life, increases the activity of the local real estate market. The work was carried out research on the dynamics of changes in the local real estate market in the area of the municipality Skrzyszow in the Malopolska province in Poland, in connection with the construction of the reservoir.

Keywords: public investment, site selection, land management, real estate market, reservoir.

Conference topic: Technologies of geodesy and cadastre.

Introduction

Real estate management is a set of actions aimed at arranging socio-economic relationships at local, regional and central level. The leading role in the real estate management play public administration authorities. In Poland, it is required by the applicable legislation in this area, and in particular by the Act of 21 August 1997 on Real Estate Management. The Act (Ustawa z dnia… 1997) in its content sets out the principles of proper management of real estate, clarifies the concept of public purpose, public interest and public utility. Fundamental importance for the topic undertaken in this work is the principle of the public purpose investment. These investments are the activities of local, regional and national scale. Investments at local level cover the area of a commune, regional investments have the district or provincial range, while the national range investments include international and trans-regional investments.

Article 6 of the Act (1997) gives a list of public purposes, which include the acquisition of land and construction and maintenance among other of such objects as:
- public and cycling roads, waterways, railways,
- airports and the equipment and facilities to handle air traffic,
- public equipment used for drinking water supply,
- public equipment used for the waste storage, recovery and disposal,
- *environment protection equipment, reservoirs and other water equipment designed for water supply, regulation of flows and protection against flooding,*
- equipment for transmission or distribution of electric energy, liquids, steam, gases,
- premises for the authorities, administration, courts, prosecutors' offices, etc.,
- buildings for state universities, public schools and kindergartens,
- premises for public health facilities, social care homes, childcare centers and sports facilities.

In terms of mentioned public purposes, real estate management can be understood as a set of legal, technical and economic actions aiming to achieve the optimum condition of the property. To make this possible it is necessary to integrate real estate management with the spatial planning, cadastral, the Land and Mortgage Register systems, and the infrastructure of the spatial data (Wilkowski *et al.* 2006; Sobolewska-Mikulska *et al.* 2014; Kwartnik-Pruc *et al.* 2015; Siejka 2016; Mika, Salata 2015).

Decisions on planning and land use have a significant impact on the investment capabilities of land. Each investment intention is characterized by a range of impacts, which in turn results in the local real estate market activity. The real estate market is defined as a set of mechanisms, through which the rights to the property are being transferred and their price is determined. This often results in a change of land use (Cellmer 1999; Kucharska-Stasiak 2006; Cellmer *et al.* 2014).

The impact of investments on the behavior of the local real estate market is inextricably linked with one of the features of the property which is the stability of the site. This feature entails legal and economic effects. The legal effects include the lack of possibility of the real estate movement in order to avoid obligations arising eg. from the provisions related to spatial planning. The economic effects include, among others: burden of taxes and the sensitivity of real estate price to changes in its environment. The research in this area was led inter alia by: Correll *et al.* (1978), Crompton (2005), Millward and Sabir (2011), Zygmunt and Gluszak (2015). They showed that residential property prices are correlated with the distance from green areas in cities.

Investments that have a negative impact on the environment can contribute to a reduction in the activity of the local real estate market, and thus the price level. While performing tasks related to the economic development of the region and the increase of standard of living of inhabitants, may result in increased activity of the local real estate market and in rising of prices. Therefore the aim of this work is to verify the hypothesis: Did the construction of the reservoir in the area of the commune Skrzyszow in Malopolskie voivodship in Poland, contribute to an increase in the activity of the local real estate market.

Materials and methods

The commune Skrzyszow is a rural commune, located in Malopolskie voivodship, in the Tarnowski district (Fig. 1). The seat of the Commune Office is the village Skrzyszow, 6 km away from Tarnow. The studied commune consists of only five villages: Ladna, Lekawica, Pogorska Wola, Skrzyszow and Szynwald. The neighborhood of the city Tarnow determines the suburban character of the commune. Good location, as well as other favorable economic factors caused that area of the commune is attractive for potential purchaser of the property as a residential area, as well as for entrepreneurs conducting business activity. This is due, inter alia, to the good transport links to major cities of southern Polish as: Krakow, Tarnow, Debica, Rzeszow and Nowy Sacz. At the present time, there is a trend to settle the population in suburban and rural areas. It is associated with a well-developed technical infrastructure and education, as well as the health care.
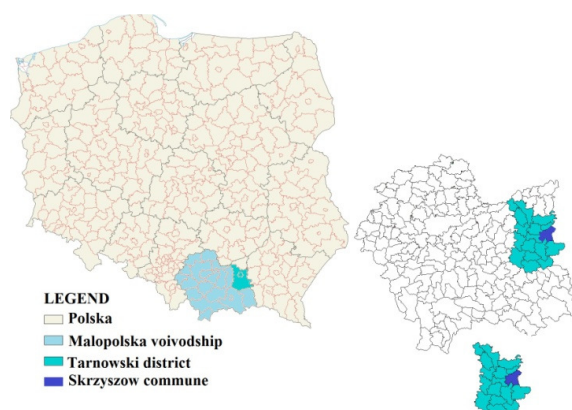

Fig. 1. Location of the Skrzyszow commune

The Skrzyszow commune has an agricultural character. Nearly 75% of the commune is the agricultural land. In the structure of the land most of the area is occupied by arable land, then permanent grassland and orchards. Agriculture in the municipality is characterized primarily highly fragmented, which is caused by history, tradition and agrarian culture. Over 90% of households have an area from 1 to 5 hectares.

In recent years, in the commune Skrzyszow area more and more frequent floodings with increasingly rapid course were observed. This intensification of floods was caused mainly by human activities. Land development, which often interferes with the natural directions of the flow of rainwater, as well as changes in the land use, lead to disorders of water circulation and acceleration of the surface runoff (Mika, Siejka 2014). In the commune Skrzyszow for several years, were plans to introduce a system, which would protect against the effects of flooding and would ensure people's safety. The turning point was the flooding in 2010 very costly in consequences for the whole country. Then the decision was made to start the construction of a small retention reservoir in the commune of Skrzyszow.

Skrzyszow is the lowest located village and therefore most vulnerable to floodings and water damage. The reservoir was built in the framework of a project financed by the EU – ",Skrzyszow reservoir on the Korzen stream in Skrzyszow commune", the aim of which was to improve flood safety of the commune and the district. The project had to significantly reduce the risk of flooding for Tarnow and Skrzyszow. It covers an area of the most vulnerable terrains, located in the vicinity of Korzen and Watok streams which are tributaries of the river Biala Tarnawska. This investment was carried out in the years 2010–2014. In the years 2010–2012 the procedure associated with the purchase of land was carried out. The start of construction took place in May 2012.

In addition to flood protection the reservoir serves recreational and sports function. Around the reservoir the bicycle tourism is developing. Eventually, the possibility of the use of land adjacent to the reservoir as recreational area is planned. It creates opportunities for the region's development in the direction of agro-tourism. Location of the investment, which in this case is a water reservoir, contributed to the socio-economic development of the commune. In addition, there has been an increase in the attractiveness of areas located in the vicinity of the reservoir. As a result an increase in the activity of the local real estate market is expected.

The collected material included transaction prices of undeveloped land properties (272 data). The study period is the years 2011–2015. It is one year before the start of construction, the construction period and one year after completion of the construction. The data were obtained from the Register of Real Estate Prices and Values maintained by the District Office in Tarnow. These were the lands with functions of agricultural land, and the residential development and recreational functions. The distribution of the number of transactions in the analyzed period and the level of prices were analyzed. The study period was divided into 3 parts: Before the start of the construction (until May 2012), during the construction (until October 2014) and after completion of the construction (from November 2014 to the end of 2015). In addition, an attempt was made to examine the relationship between the unit price and the distance of the property from the reservoir. The matrix of coefficients of total correlation was created for all combinations of unit prices and selected features determining the differentiation of prices in the collected database. On the basis of the correlation matrix, the correlations weights specifying the amount of the influence of the selected feature on the diversity of individual real estate prices have been determined.

Results and discussion

The first stage of the study included the verification of activities of the local real estate market in terms of the number of transactions in studied groups and in the determined three intervals. The first group includes the land with agricultural functions (Group 1), the second includes land with the residential development and recreational sports, functions (Group 2). The comparative analysis showed an increase in activity of the real estate market for both groups of real estate (Figs 2 and 3). In the case of land with agricultural function before the construction of the reservoir started, in 2011 – 20 transactions were concluded and they were spread out evenly over the year. After the start of the construction, i.e. in 2012 and 2013 – 28 and 38 transactions were respectively concluded. In 2014 there was a slight decline to 27, and already in 2015, after the construction was completed – a sudden increase to 47 transactions.

On the other hand, in the case of land belonging to the second group, the number of transactions in the analyzed period is smaller (112 transactions), but their distribution is similar. In the year 2011, i.e. before construction 26 transactions were concluded, in 2012 this number increased to 30. In the course of the investment it dropped to 15 in 2014. However, after the completion of the project it increased by 50%.
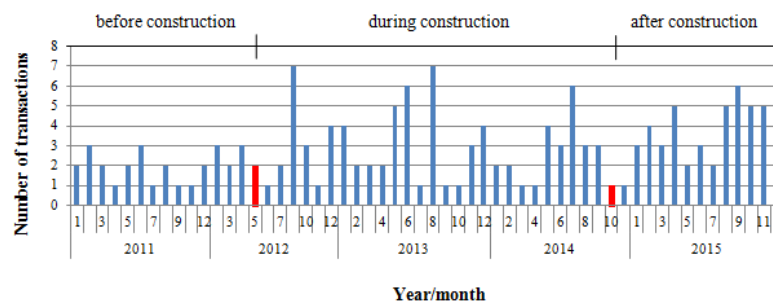

Fig. 2. Distribution of the number of transactions for land with agricultural function
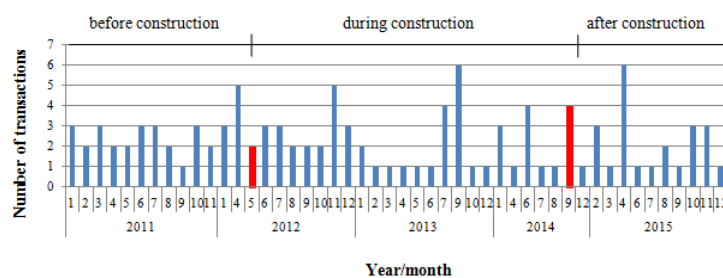

Fig. 3. Distribution of the number of transactions for the land with function of residential development and recreational sports

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In further studies the analysis of the distribution of unit transaction prices was carried out relative to the features characteristics of the real estate to be traded. In Figures 4 and 5 it can be seen clearly that in the case of the group 1 of real estates, the unit prices are showing an upward trend, while real estate prices in the group 2 – remain at an even level. For both groups of studied real estate higher unit prices reach properties with smaller areas (Figs 6 and 7). The last studied factor was the distance from the water reservoir. From the dependences shown in the Figures 8 and 9, it can be seen clearly, that the transaction prices in group 1 grow as the distance from the reservoir increases. While in the group 2, the properties located closer to the reservoir achieve higher prices.
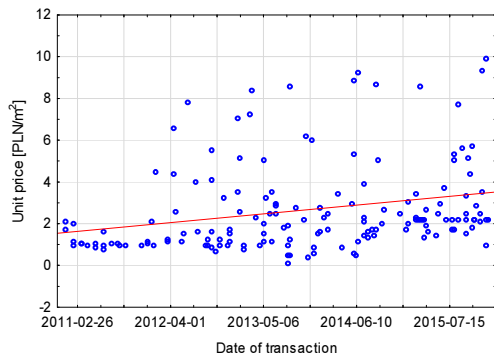
Fig. 4. Distribution of unit transaction prices
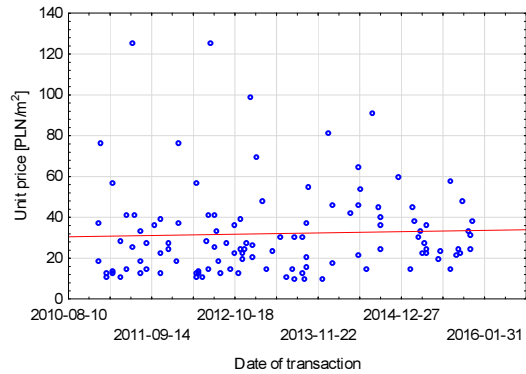in 2011–2015 – Group 1

Fig. 5. Distribution of unit transaction prices
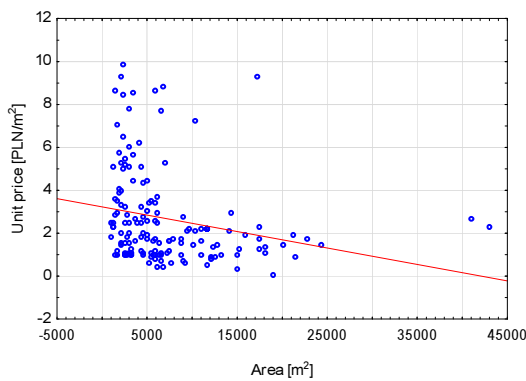in 2011–2015 – Group 2

Fig. 6. Distribution of unit transaction prices
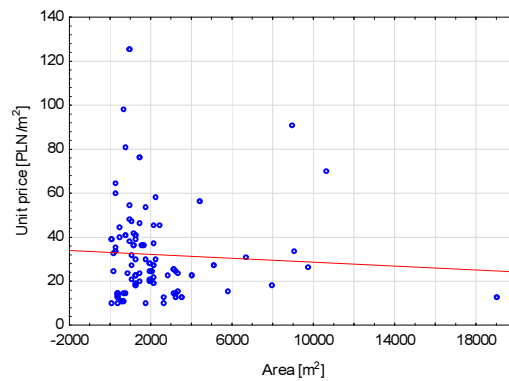relative to the area – Group 1

Fig. 7. Distribution of unit transaction prices
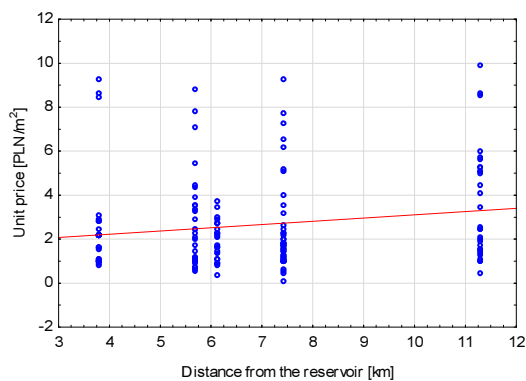relative to the area – Group 2

Fig. 8. Distribution of unit transaction prices relative
to the distance from the reservoir – Group 1
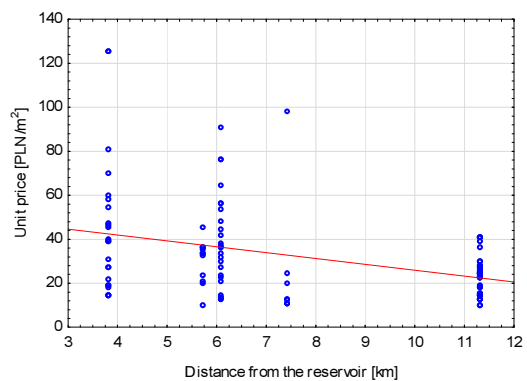
Fig. 9. Distribution of unit transaction prices relative
to the distance from the reservoir – Group 2

In order to indicate the relationship between the unit transaction prices characterizing the lands of agricultural function (Group 1) and land with residential development and recreational functions (Group 2), and the date of the transaction conclusion, the distance from the water reservoir and the area of sold real estate, the matrix of total

correlation coefficients for all combinations of unit prices and the selected features deciding on price differences in the collected database was created (Czaja 2001; Parzych 2009). On the basis of the correlation matrix, the correlations weights specifying the amount of the influence of the selected feature on the diversity of average real estate prices have been determined.

The following tables show the calculation results in the form of a matrix of total correlation coefficients for the random multidimensional variable, carried out in the STATISTICA program.

From this analysis the feature reflecting the distance from the commune village was eliminated, because the correlation coefficient for this feature and the feature of the distance from the reservoir was 0.86, which means that those two features explain the same part of the price volatility.

Table 1. The matrix of correlation coefficients for the local market
of the Strzyszow commune – Group 1 (Source: own research)

Variable	Date of transaction	Distance from the reservoir	Area	Unit price
Date of transaction	1.0000	−0.0295	0.1188	0.2583
Distance from the reservoir	−0.0295	1.0000	−0.0991	0.1687
Area	0.1188	−0.0991	1.0000	−0.2333
Unit price	0.2583	0.1687	−0.2333	1.0000

According to the data in Table 1, calculated coefficients of total correlation in each pair take the values from 0.0295 to 0.2583. This is a weak correlation. The weakest link occurs between the unit price and the distance from the water reservoir. On the basis of the correlation matrix, the correlations weights and their standard deviations were calculated, as shown by the data of Table 2.

Table 2. The correlations weights of analysed features for the local market
of real estate in Strzyszow commune – Group 1 (Source: own research)

Variable	Correlations weights	Standard deviation
Date of transaction	0.2928	0.0739
Distance from the reservoir	0.1522	0.0737
Area	−0.2529	0.0742
Summary of the regression of dependent variable: $R = 0.400438$ $R^2 = 0.160351$		

The results of calculation presented in Table 2 show, that in the analyzed database significant influence on prices volatility has the date of the transaction and the area of the real estate. The influence of the feature describing the distance from the water reservoir is statistically insignificant.

From the analysis carried out for the group 2 the feature reflecting the distance from the commune village was also eliminated, because the correlation coefficient for this feature and the feature of the distance from the reservoir was 0.89, which means that those two features explain the same part of the price volatility (Table 3).

Table 3. The matrix of correlation coefficients for the local market
in the Strzyszow commune – Group 2 (Source: own research)

Variable	Date of transaction	Distance from the reservoir	Area	Unit price
Date of transaction	1.0000	−0.0877	−0.0439	0.0408
Distance from the reservoir	−0.0877	1.0000	−0.0588	−0.3648
Area	−0.0439	−0.0588	1.0000	−0.0674
Unit price	0.0408	−0.3648	−0.0674	1.0000

The coefficients of total correlation calculated in each pair take the values from 0.0439 to 0.3648 (Table 3). This is a correlation at the level from low to average. The weakest link occurs between the unit price and the date of

the transaction. On the basis of the correlation matrix, the correlations weights and their standard deviations were calculated, as shown by the data of Table 4.

Table 4. The correlations weights of analyzed features for the local market
of real estate in Strzyszow commune – Group 2 (Source: own research)

Variable	Correlations weights	Standard deviation
Date of transaction	0.0044	0.0900
Distance from the reservoir	−0.3696	0.0901
Area	−0.0889	0.0898
Summary of the regression of dependent variable: $R = 0.395537$ $R^2 = 0.141029$		

The results of the calculations presented in Table 4 for the real estate group 2 show that in the analyzed database significant impact on price volatility has the distance from the water reservoir. The influence of the other two features is statistically insignificant.

Conclusions

After accession of Poland to the European Union the rapid growth of investment in the technical infrastructure and environmental protection can be observed. They include the construction of roads, bridges, sewage treatment plants, retention reservoirs, etc. These investments often are created in rural areas, contributing to the changes in these areas. They concern the economic, social and environmental spheres of the contemporary village.

Studies conducted on the territory of the Skrzyszow municipality show that the construction of the retention reservoir had an impact on the activity of the local real estate market. The primary purpose of the construction of the reservoir is the protection against flooding, but investors have foreseen also the development of the recreation and sport functions. This resulted in the revival of the local real estate market. In both analyzed groups an increase in real estate transactions was observed. However, the variability of individual transaction prices of agricultural properties does not seem to be correlated with the characteristic of the distance from the reservoir.

A different rule was observed in the group 2 of real estate – properties of residential development and recreational functions. In this case, the volatility of the unit price is most strongly correlated with the feature of the distance from the reservoir, and the unit prices of land are higher for the properties located closer to the reservoir.

Further the works will include studies of the local real estate market in terms of price levels and the number of transactions after 2015. After several years it will be possible to determine unambiguously whether the revival of the local real estate market after the construction of the reservoir was permanent or temporary.

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