Costs of Urbanisation in Poland, Based on the Example of Wrocław

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Abstract. The paper deals with the issue of charging communes with the costs of realisation of the provisions contained in local spatial development plans. When such local spatial development plan enters into force, it leads to economic consequences. In Poland, these consequences are specified in the forecast of the financial impact, which contains a prognosis of own revenues as well as of costs incurred by the budget of the commune. The research consisted in the analysis of the costs of urbanisation of land located in Wrocław, in the southern part of the Krzyki district (Poland). This area is undeveloped to a major extent, consisting mainly of agricultural land, and its development requires the construction of technological and social infrastructure facilities. The expected costs of the realisation of local spatial development plans that are binding for the southern part of Wrocław demonstrate significant costs of the construction of sewage network and municipal roads. The planned development of residential districts is not supported by the existing infrastructure. Additionally, the development of new areas will require the city of Wrocław to take over the real properties on which public goals are planned to be realised. The estimated costs of land acquisition for the realisation of public goals amount to EUR 3 728 500.

1. Introduction

In Poland, the manner of land management and development is determined on the local level, in form of the local spatial development plan. This document is adopted in the course of a multi-faceted process that should be preceded by relevant analyses and forecasts. An important factor in the development of the local spatial development plan as well as of any planning documents is the ability to predict the consequences of their adoption, in order to envisage the need to change the planned assumptions. Spatial planning in Poland plays a key role in the anthropogenic transformation of space. Spatial policy determined by the smallest unit of territorial government (commune) constitutes the basis for preparing a local plan and for accomplishing an undertaking [1, 2].

When such local spatial development plan enters into force, it leads to economic consequences. In Poland, these consequences are specified in the forecast of the financial impact. It estimates own revenues as well as the costs incurred by the communal budget with respect to the realisation of the tasks of the commune. On the other hand, access to technological infrastructure facilities, in particular to cultural, educational and sports services, influences the quality of life of local residents [3].

Financial encumbrances that result from the adoption of a draft local spatial development plan may be of various nature. They manifest themselves at different times and to different extents, depending
on the provisions of the plan and the development stage of the investment process [4]. The preparation of a financial impact forecast document is obligatory for each draft local spatial development plan. The commune should be aware of the financial consequences of the adoption of the given spatial development plan already in the draft stage, before the plan is published, commented on and negotiated [5], so that it is able to verify the economic feasibility and to adjust the adopted planning solutions and thus to reduce the expenses of the commune that result from the adoption of the plan.

Costs incurred by the communal budget are of various nature, depending on the provisions of the local spatial development plan. They may be related to the realisation of public goals, the construction of technological infrastructure, negative consequences affecting real property or handling of the investment process [6]. Although the forecast of plan realisation costs is a rough estimation, such study proves very useful, as it gives a general insight into the provisions of the local spatial development plan and influences the choice of its final version [7].

The forecast of the costs of realisation of the planning provisions rationalises the planning process and determines the decision-making process with respect to the selection of an optimal version of the plan in terms of economics. Thus, such forecast is an important strategic document prepared for the draft local spatial development plan. It should be prepared sufficiently in advance, in co-operation with town-planners and property valuators as the persons who are responsible for estimating the economic impact [6]. Many studies undertaking the topic of evaluation of area development level adopt indicators from the group of: urban land cover, or urban extent, are typically measured by the total built-up area (or impervious surface) of cities [8-12], for example, define and measure sprawl as the quantity of land converted to urban use [13].

The main objective of this study is to analyse the economic consequences that may be caused by local spatial development plans that are binding for the southern part of the city of Wrocław, district Krzyki (Poland). The research referred to the costs of realisation of the provisions of local spatial development plans that may encumber the budget of Wrocław commune in connection with the land development.

2. Methodology
The research was based on direct and indirect observation methods. Information about the area subject to research was obtained from the disclosed planning documentation, i.e. local spatial development plans, master maps of the area and maps from the Wrocław Spatial Information System.

The costs incurred by the commune budget were identified basing on the provisions of local spatial development plans. Costs of realisation of local spatial development plans were determined considering the division most commonly used in literature, according to the following groups [4, 6]:

- financial charges for negative consequences affecting real properties (compensations specified in Art. 36, item 1, point 1 and item 3 of the Spatial Planning and Management Act),
- financial charges connected with purchasing real property for the realisation of public goals,
- financial charges connected with the costs of the construction of infrastructure,
- financial charges connected with handling the investment process.

The analysis of costs incurred by the commune for the realisation of own tasks connected with the payment of compensations and acquiring real property for the realisation of public goals required the authors to determine average transaction prices basing on data contained in the Real Property Price and Value Register, obtained from the Land Surveying, Cartography and Municipal Cadastre Office in Wrocław. Information about existing communication networks and utility networks obtained as a result of the analysis of master map enables us to identify the necessary investment related to infrastructure. The cost of realisation of planned construction works and infrastructure facilities (the construction of roads, land utility networks, development of green areas and construction of educational facilities) was obtained from price catalogues of construction objects and building, structure and landscaping elements valuation indicators.
The analysed area is located in Wrocław, a city with powiat rights, the fourth largest city in Poland, being at the same time the capital city of the Lower Silesian Voivodeship. The city area is 292.9 km² while the analysed area is approx. 38.00 km². The analysed area is located in the southern part of the Krzyki district. This area is undeveloped to a major extent, consisting mainly of agricultural land, and the remaining part is occupied by detached and semi-detached housing estates.

3. Results and discussions

Poland is currently facing the problem with oversized new land areas designed for residential development in local spatial development plans and spatial policies. New development areas require significant financial expenditures to enable their development and then to organise services for local residents. According to the Report on the Economic Losses and Social Costs of Uncontrolled Development in Poland [15], local spatial development plans would provide accommodation for additional 62 million people throughout Poland. If we add the provisions of spatial policies, the estimated population capacity falls into the range of 167 - 229 million people. This is 4 - 6 times more than the current population of Poland.

The said Report [15] estimates that urbanisation costs amount to EUR 15,45 billion (according to the Ministry of Transport, Construction and Maritime Economy as of the end of 2012) or even to EUR 29,76 billion (according to the so-called Koziński and Olbrysz Report of 2011). The costs exceed the financial capacity of numerous local territorial self-government units. Their amount, estimated to reach tens of billions Polish zloty by the said, independent sources, is a threat of bankruptcy for many communes and to the stability of public finance. Costs of claims filed in courts by owners of real properties that should be taken over by communes, by virtue of law, reach hundreds of millions Polish zloty (this applies mainly to planned public roads).

Increased social awareness results in a growing number of Wrocław residents filing demands for compensation in connection with the fact that their use of property was limited by the local spatial development plans. Since 2009, the number of motions for the payment of compensation filed has ranged from 3 to 10 per year (Table 1).

| Year of submission | Number of motions filed | Claim amount [ EUR]   |
|--------------------|-------------------------|-----------------------|
| 2001               | 1                       | 149 489               |
| 2002               | 1                       | 1 348 215             |
| 2003               | 0                       | -                     |
| 2004               | 0                       | -                     |
| 2005               | 1                       | 53 853                |
| 2006               | 2                       | 1 684 789             |
| 2007               | 0                       | -                     |
| 2008               | 1                       | The applicant did not state the amount of claim |
| 2009               | 4                       | 328 293               |
| 2010               | 3                       | 361 057               |
| 2011               | 4                       | 888 557               |
| 2012               | 9                       | 1 788 163             |
| 2013               | 5                       | 14 698 979            |
| 2014               | 10                      | Data not available    |

The filed motions refer to situations, when using the real property in the way it had been previously used has become impossible or significantly limited because of the adoption of a local spatial development plan. The change in the function of the land introduced by the spatial
development plan usually results from the necessity to realise a public goal (such as public transport or environmental protection). However, sometimes there are certain errors that result in ill-considered solutions (provisions) of the local spatial development plans.

In connection with the adoption of local spatial development plans in the analysed part of the city of Wrocław, the communal authorities are obliged to realise certain communal investments (public goals). The following investments, whose costs are borne by the communal budget, have been identified to be constructed: These are:

- construction of sanitary sewage and rainwater drainage systems,
- construction of the water supply network,
- construction of the gas supply network,
- construction of power supply network and street lighting,
- construction of public roads,
- construction of walkways and bicycle roads,
- construction of walkways for pedestrians,
- arrangement of green areas,
- construction of public education facilities.

The adoption of local spatial development plans for the southern part of Wrocław has led to the necessity to construct new communication routes to provide access to the planned newly created residential and service areas. The expected costs are affected by the choice of construction materials used for the realisation of communication infrastructure network. The provisions of the spatial development plan do not contain a specification of investment parameters, so data provided in the Uniform Standards for the Valuation of Buildings and Structures [14] were used for the purposes of this paper. Road construction costs have been estimated basing on the assumption that the paving will be made from 5 cm thick asphalt concrete, with an 18 cm thick concrete base course, a 15 cm thick drainage layer and concrete kerbside. The construction cost of a road of such parameters is approx. PLN 20115.00 (EUR 4657.00) per 100 m². The cost of pavement construction was estimated for asphalt concrete paving with a 10 cm thick base course and 5 cm thick asphalt concrete paving, of a realisation cost of approx. PLN 8910.00 (EUR 2063) per 100 m².

The course of technological infrastructure network is foreseen along the planned communication routes. It was assumed that the designed water supply network will be constructed from PVC pressure socket pipes PN10 SDR26 (fi 90 SDR21) manufactured by Wavin, mounted with use of push-fit assembly and rubber gasket, in 2.0 m deep excavations, in category 3 soil. 3. Excavations will be made by a mechanical backhoe excavator, 0.40 m³, with soil disposed to temporary deposits, excavation reinforcements, 20 cm thick sand ballast, sand covering layer up to the height of 30 cm above the top of the pipes. PVC pipe networks of a diameter Ø 110 mm. The realisation cost of 1 linear metre is: PLN 330.00 (EUR 76.00).

It was assumed that a sanitary sewage network of a total length of 15 000 m will be constructed. The route of the network was estimated basing on the provisions of local spatial development plans. The cost of construction of such sewage network depends, among others, on the materials used. Basing on the study [15] it was assumed that sewage network will be constructed from vitrified clay pipes of a diameter of 200 mm, laid at the depth of 2.2 to 4.07 m, on a 15 cm thick concrete slab manholes of a diameter of 1200 mm made from concrete rings of a diameter of 200 mm and the assumed costs amount to PLN 1940.00 (EUR 450.00) per 1 linear metre. Due to the above, the construction of the network, after the application of the multiplication factor for the Lower Silesian Voivodeship (0.8) will cost PLN 1550.00 (EUR 360.00) per 1 linear metre. The rainwater drainage network made from PVC pipes of 200 mm flow capacity will cost approx. PLN 650.00 (EUR 150.00) per 1 m [15]. The realisation costs of basic technological infrastructure facilities and commune roads have been estimated in Table 2.
Table 2. Realisation costs of technological infrastructure facilities and commune roads

| Type of investment                                      | Length of network/road to be constructed [m] or land surface area [ha] | Construction cost [EUR] |
|--------------------------------------------------------|------------------------------------------------------------------------|-------------------------|
| Construction of commune roads                          | 25 300 m                                                               | 7 945 300               |
| Construction of sanitary sewage system                 | 15 000 m                                                               | 5 400 000               |
| Construction of rainwater drainage system              | 16 000 m                                                               | 2 400 000               |
| Construction of water supply network                   | 14 700 m                                                               | 1 117 200               |
| Arrangement of public green areas                     | 25.60 ha                                                               | 209 540                 |
| Public services (construction of educational facilities)| 5.50 ha                                                                | 3 808 530               |
| Total:                                                 |                                                                        | 20 880 570              |

The realisation costs of local spatial development plans that are binding for the southern part of Wrocław demonstrate significant costs of utility infrastructure. The planned development of residential districts is not supported by the existing infrastructure. On the other hand, in Germany, the spatial development of any given town or village is possible only within the capacity of existing utility networks or provided that such networks are developed appropriately [16].

The realisation of the aforementioned tasks requires the commune to purchase real properties that are not owned by it, where the realisation of public goals is planned. The value of such real properties has been estimated basing on local real property market analysis. Identified areas to be purchased are commune roads, park green areas and educational facilities. The surface areas and land purchase costs are listed in Table 3.

Table 3. List of the costs of land purchase for the purposes of the realisation of public goals

| Land designation for the realisation of public goals | Surface area of land designated for the realisation of public goals [ha] | Land purchase cost [EUR] |
|------------------------------------------------------|--------------------------------------------------------------------------|--------------------------|
| Public communication areas – commune roads and walkways/transport routes | 25.30                                                                    | 2 560 000                |
| Public park green areas                              | 25.60                                                                    | 992 000                  |
| Areas of public educational services                 | 5.50                                                                     | 176 500                  |
| Total:                                               |                                                                          | 3 728 500                |

The highest costs are connected with the purchase of land for the purposes of the realisation of public roads. The total amount that the commune may pay for purchasing land for public roads in the given area is approx. EUR 2 560 000.

In Germany, betterment levies are charged, considering the real cost of the construction of infrastructure facilities, while in Poland the basis for the calculation of the fee is the increase in real property value. Pursuant to § 128 BauGB [17] in Germany, the costs of realisation of local infrastructure include:
- the acquisition and preparation of land for the realisation of infrastructure;
- expenditures on the construction of the given investment;
- expenditures on adapting the existing facilities to the local technological infrastructure system [18].
In England, all investors are also charged with infrastructure fees, based on uniformly applied indicators [19]. Apart from those levies, planning obligations and technical infrastructure conditions are binding.

Poland is currently planning to change the regulations related to co-financing of development costs. The betterment levy that is obligatory in Poland with respect to the construction of technological infrastructure facilities is charged occasionally, arbitrarily and raises objections among those obliged to pay it. Meanwhile, investors, including developers, often do not bear any costs of the development of technological infrastructure facilities. Moreover, they never bear the costs of the construction of social infrastructure. The expenses related to the construction of educational, cultural, sports and leisure facilities on local level are borne by the commune budget.

4. Conclusions
It should be stated clearly that the costs connected with the realisation of the own tasks of the commune cannot be avoided in the light of the existing legal regulations in Poland. However, they may be slightly mitigated by choosing a more beneficial version of the solution basing on the forecasted revenues and expenditures resulting from the realisation of the adopted local spatial development plan.

The highest infrastructure construction costs on part of the Commune are connected with the construction of roads and of sanitary sewage system. One of the possible ways to reduce the costs connected with the construction of communication network is to foresee internal roads instead of public roads in the local spatial development plans, as the construction of such roads does not belong to the duties of the commune and thus it does not encumber its budget. However, the solution consisting in co-owners being responsible for the construction and maintenance of the road is contradictory to the principles of proper spatial organisation (in particular if the number of co-owners of the road exceeds 100).

Other significant costs are the compensations for taking over land for the construction of technological infrastructure facilities and public services (roads, park greenery, educational services). Further large costs may also be connected with the potential payment of compensation as a result of decreased real property value resulting from the adoption of local spatial development plans. For the purposes of this study, they were determined for cases considered throughout the area of Wrocław. The increase in claims for the payment of compensation is a source of concern.

Basing on the example of selected local spatial development plans one may notice that the costs of the realisation of the provisions of the local spatial development plan depend not only on the area covered by such plan, but also on the degree of development and management of the given area. The planned changes in Polish legal regulations might ensure the co-financing of costs connected with urbanisation.

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