



The attributes of sustainable urban development – identification and analysis on the example of Olsztyn City

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Abstract

Urban space is an important place in the context of ongoing changes and their impact on the surrounding environment. Urban area is subject to constant and extremely dynamic transformations. It is influenced by environmental (proximity of leisure objects – lakes, forests, parks, etc.), legal (regulations on both local and strategic levels), technical (spatial barriers or lack of development of the technical infrastructure, transport availability, etc.), social (demographic structure, facilities and quality of social infrastructure) economic factors (the existence of large companies, the level of unemployment, the dominant industrial branches) and other ones not classified above.

There are many measures of urban development, but the authors want to test the hypothesis whether real estate transactions can indicate the most favorable locally areas from the point of view of real estate buyers. Indication of these areas will help to define attributes of sustainable urban development.

The case study research was carried out on the basis of transactions recorded on the real estate market in Olsztyn City (Warmia and Mazury Province, Poland) for properties designated for residential purposes in 2011–2012. The authors conducted a statistical analysis of transaction prices and geo-spatial analysis performed with GIS tools. The attributes of sustainable urban development were identification and their analysis led to identification of particular areas with the biggest amount of them in Olsztyn City. Data for statistical analysis derived from the Register of Real Estate Prices and Values (RCiWN).

Keywords: attributes; urban space; real estate market; sustainable development.

1. Introduction – Development of urban space

Spatial structure of each city, municipality, region is characterized by the presence of different areas, more or less developed and more or less dynamic. That diversity is affected by many geographical and environmental features, heterogeneous factors leading to the situation when different areas have different economic or ecological situation or different levels of development and growth.

Regional development is dependent on the potential of society living on particular area. The potential are factors influencing the development of a particular space. [19] distinguishes two types of factors affecting regional development:

- developmental factors that enable a harmonious and long-term development,
- limiting or even eliminate the pro-development trends factors – barriers.

Conditions of socio-economic development and the factors of this development are closely linked together, but should not be equated. [19] by the terms of the development (or management) understands the media resources of the regions, such as the natural environment, population, assets (investment state in the region).

Driving force of these conditions (opportunities) is given by the actions of the interregional and intraregional socio – economic policy that starts and turns these potential opportunities into growth factors. Analysis of the development of the region gives a picture of the current state and development opportunities.

From represented in the literature [13] classification of regional conditions (factors of socio-economic development) one can assume the following set:

- geographic – shaped by nature (environment) and human (artificial environment), related to the place of particular activity,
- science and technology – related to the achieved level of knowledge, the development of working tools and skills to use them,

- demographic – related to the number and structure of the population of the area in which the activities are or can be carried out
- socio – economic – due to the nature of economic and social relations, as defined by the achieved level of economic development,
- deriving from external environment.

In each country, and a certain region, next to factors stimulating economic and social development, there are many factors disturbing the existence of that process. The so called barriers can have long-lasting and objective character. Effective overcoming barriers depends on the potential and resources used for this purpose.

[13] argues that development barriers can occur in the following three circumstances:

- when process of entering the path of accelerated development is started,
- when excessive pace of development is forced,
- when there are tendencies to carry out radical changes in currently implemented development strategy.

One can assume that the reduction of the negative effects of a particular term can lead to sustainable and balanced regional development.

2. Property market

Urban or rural development always requires a spatial reference. Spatial functions and elements of management are specified for a particular location, but users also need space to live and perform their activities. Specifying the terms of the effective functioning urban area, according to [8], one should adopt the following assumptions:

1. The existence of limited urban space,
2. The principles of ownership and possession of private goods,
3. Law of urban authorities (local government) to co-determination of the spatial character of the city, including the planning of its development, imposing decisions on individuals and controlling the execution of these decisions,
4. The need of existence of a set of public goods,
5. The need for co-existence of different social groups,
6. Law of urban authorities to integrate the spatial realities of business entities in a conflict situation between the interests of the public and private sectors.

Properly defined urban realities allow the functioning of urban space and its inhabitants. Each entity is looking for location, the most optimal from his point of view, due to the nature of the performed activities, determinants of quality of life (for residents) and manufacturing technology products and services (for companies). Proper location and selection of functions may contribute to the social activation and influence the development. It should be emphasized that both the residents and businesses are associated with a particular city, district or street. The subject comparisons are mostly properties, the characteristics of which are transferred to the image of the owner, tenant, tenants and leaseholders.

Individual properties located within boundaries of particular cities form the local real estate market. The real estate market (REM) is an area forming relationships and dependencies between entities (stakeholders) / and objects (real estate), a multi-dimensional space of events of different nature, in which a process of transfer of property rights (shaping prices, the number of transactions, etc.) takes place [15].

In terms of philosophy, real estate market could not function without being distinguished naturally or artificially, from space (the universe, world, country, region, city) by the market entities, valuing it according to the criterion of usefulness and usability – for a particular purpose. [16]

The system of real estate market can be seen as a spatial layout, occurring in a specific area, in a strictly specified time. The smallest element of this system is the property that determines the spatial boundaries of socio-economic use, taking into account the fact that the ownership of land extends above and below its surface [11]. Thus, the recognition of the legal act indicates that the property should be treated as a spatial object.

Following that trace of thought, the real estate market is a place of transfer of property rights, and consists of infinitely many (due to the possibility of division) individual properties, which make it also a spatial object. According to the definition of the real estate market is a multi-dimensional space of events, following the interaction of entities, objects and places (real estate) [15].

Market analysis enable recognition of structures of spatial development of cities and regions. Many scientists performed market analyses for particular purposes for example: [3, 6, 12, 20, 22]. The growing importance of the behavioral aspects of market analysis are emphasized in the scientific literature [4, 5].

The authors of the paper undertook the verification of the hypotheses whether one can indicate on the basis of property transactions the most suitable locations from the point of view of real estate buyers.

3. Characteristics of the Olsztyn City area

The subject of market analysis was the city of Olsztyn, located in the north-eastern part of Poland. It is the major economic, educational and cultural center of Warmia and Mazury province and the location of local government and institutions of the region. Olsztyn is a central city of agglomeration of Olsztyn. Total population of the city according to the Central Statistical Office [21] is 175 482, and the area covers 88.33 km².

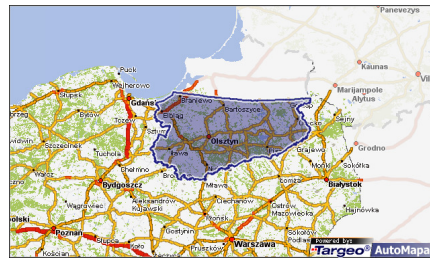


Fig. 1. Location of the city Olsztyn in the Warmia and Mazury Province
Source: www.targeo.pl

The lowest level of local government unit in Olsztyn are 23 districts, in which there are separate smaller areas. For the purposes of property registration Olsztyn is divided into 160 cadastral districts. Favorable environmental conditions should also be underlined. Within the administrative boundaries of the city there are 15 lakes (representing 8.15% of the city), a large complex of urban forests (21.2% of the city) and urban green areas (Parks, Squares and Place) that represents more than 6% of the city. In addition, three rivers flow through the city- Lyna, Kortówka and Wadąg.



Fig. 2. Cadastral districts Olsztyn division
Source: own study in ArcGIS 9.2

4. Characteristics of the Olsztyn City area

The subject of research are market transactions recorded in the Register of Real Estate Prices and Values (RCiWN) [17] for the city of Olsztyn conducted during the period from 1 January 2012 to 19 July 2013. The analysis covered market transactions for premises intended for residential purposes.

The structure of the entities acquiring properties presents the picture 3. The dominant group of buyers are legal entities (44%) and individuals (36%). Legal entities typically purchase properties for the purpose of professional activities, and individuals usually to meet housing needs. The vast majority of purchase-sale transaction takes place on the open market and equals 73% (Picture 4).

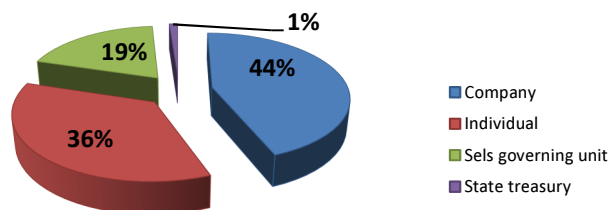


Fig. 3. Subject structure (buyers)

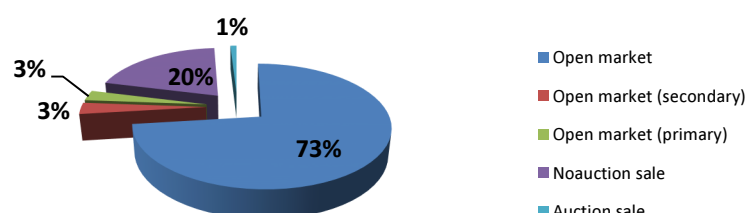


Fig. 4. Generic structure of the transaction

The highest number of transactions was recorded in December 2012 – more than 350 (Picture 5). This is due to the effect of the end of the year, when, theoretically, the market entities have lower transaction cost. In January, the average rate of return is relatively high, often represent the highest average rate of return per year [7]. One ought to pay attention to the effect of the spring, which is observed in late March and early April. This is the period of highest number of transactions in the first half of the year. One can also observe the effect of year when the summer months there is a small amount of a purchase transaction – the sale. [5] conducted a study of seasonality of real estate market based on purchases and sales of real estate in Olsztyn, in the years 2004–2011. The quantitative study showed a trend observed in the real estate market. From the buyer's perspective the most attractive in terms of investment month is March, then February, November and December, while the least attractive months are September and June and October. On the other hand, from the point of view of the seller, the most attractive in terms of investment month is September, June and October, the month of March is the least attractive. May is equally attractive month both to the buyer and the seller, that is why one can say that this is the neutral month. Calendar effects exist on the real estate market and they have a dual nature. Some effects (July effect) can be explained by the fundamental principles govern the market That and its environment (low trading volume in summer months), Whereas others have behavioral Explanations [4].

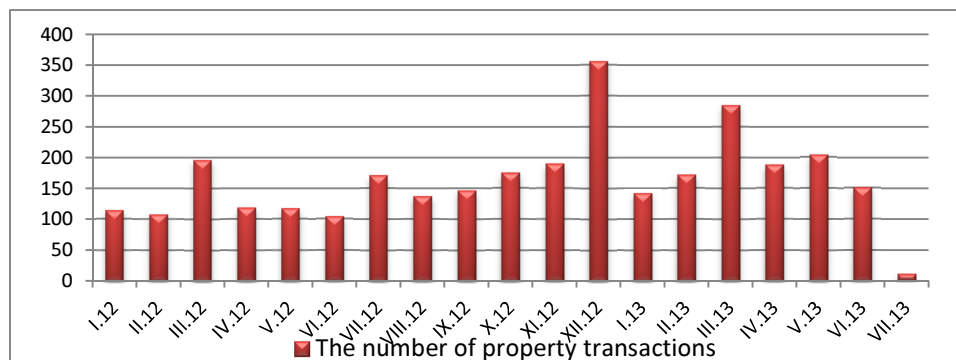
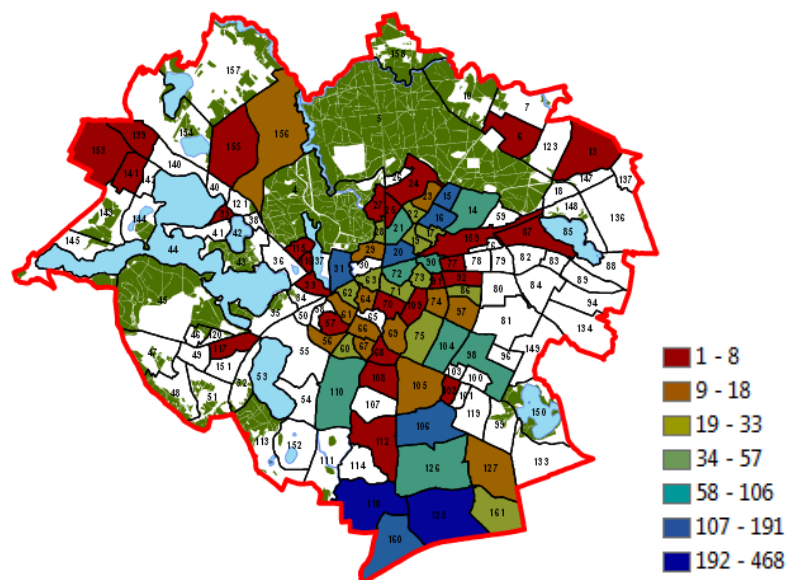


Fig. 5. Structure of the transactions in the coming months
Source: Authrs' own study



Picture 6. Spatial distribution of purchases and sales of real estate premises in Olsztyn in the period 01.01.2012 – 19.07.2013
Source: own study based on data from RCiWN in ArcGIS 9.2

Spatial distribution of the city is unique because of the water conditions (nearly 11% of the city is under water) and environmental conditions (and wooded forests, parks and green areas cover almost 25% of the area of Olsztyn). It should also be remembered that agricultural lands occupy nearly 26% of the city. Thus, residential areas, industrial components and equipment designed for services represent a small proportion of the urban area.

In the past, in the city there were more lakes than as a result of the investment have been subjected to drying and developed in order to maximize the benefit of investors.

Olsztyn forests cover more than 1,800 hectares. More than half of this form the complex Municipal Forest (1050 ha), acting primarily recreational features and leisure facilities and tourist sightseeing, located in the northern part of the city.

Forest City is a barrier to the development of the city and the expansion of land for housing. It is true that individual transactions can be observed around the forest, but they demonstrate the need to exploit new areas for residential purposes.

A small amount of the transaction is recorded also in the city center (Picture 6) around the oldest part of the city. There are, single transaction, however these can be attributed to the role of the so-called “seals” which fill the existing buildings.

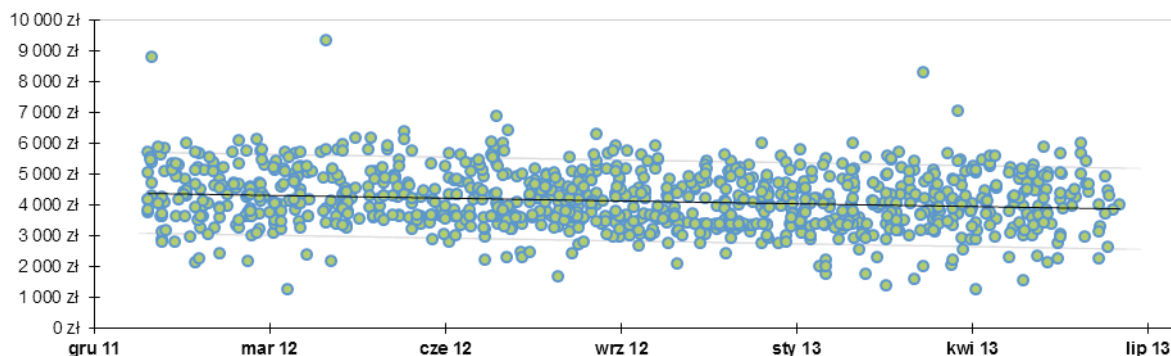
Significant amounts of the transactions appear in the region of the railway line. Probably this is due to limitations of space, and hence, spatial adaptation of existing relatively low standard properties, in order to meet the housing needs. Areas in the vicinity of traction are also characterized by a central location in relation to the urban space, which are well connected to the entire city.

The highest number of transactions is observed in the southern parts of the city. This is due to the expansion of the area for the buildings purposes. Cadastral districts 106, 118, 125, 126, 160 are called “Olsztyn’s bedroom”, and in this part the largest number of multi-family buildings is located. Existing buildings and the possible development areas, causing are the biggest reasons justifying the number of transactions.

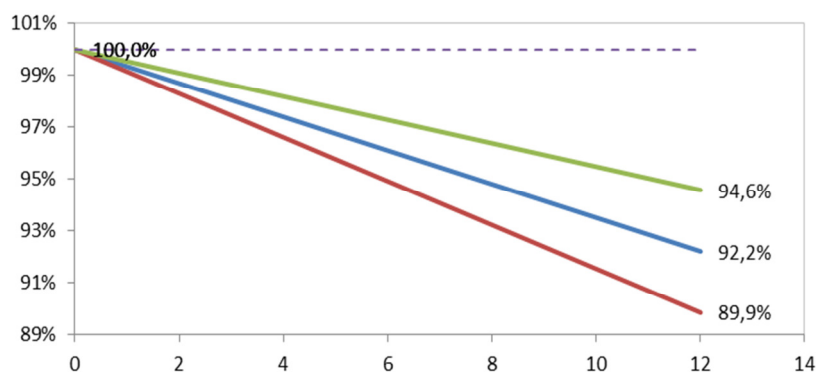
It should also be mentioned that the specificity of the urban part of the presence of the University of Warmia and Mazury, which manages significant areas of the city and at the same time forces large demand for living facilities for staff and students. Therefore investments whose purpose is to meet the housing needs of that group arise and this is done with attention to the immediate neighborhood, in relation to the university campus areas (cadastral districts: 54, 55, 111, 113, 152).

5. Trend of price changes due to the passage of time (the free market)

The determination of the size of the coefficient of the trend of prices involved the statistical analysis (linear regression).



The empirical value of the Student's t-statistic (emp.) amounting to 4.769 is greater than the value of theory. Student's t-statistics (theory, alpha, n-2) amounting to 1,441. The probability of occurrence of a false acceptance trend resulting from accidental data layout is approximately 0% and is at a level lower than the assumed level of significance amounting to 0.15. This means that for a given level of significance of 0.15 can be determined statistically significant incidence trend. Size relative trend (%) / year is about 7.8%, and you can define it as a slightly decreasing. The confidence interval for the calculated trend for the assumed significance level of 0.15, is approximately $\pm 2.4\%$. This means that the probability of the actual value of the trend of 0.85 falls within the range of -10.1% / year to -5.4% / year.



6. The factors of urban development

The dynamics of development of the city leads to the conclusion that it is subject to constant change of spatial functions size, the links and internal structure. A feature of cities is their ongoing quantitative and qualitative development. Observing the

development of cities, it is concluded that as population growth increases the amount of space occupied city. The development of the city takes place in jumps, which is related to the variation of space both in terms of natural features and those deriving from human activities [1, 2].

Properties are primary resources for determining activity in urban areas. They prejudice its many important features, including the contents of a set of users. Those having education, intellectual needs, financial resources, its own urban culture, openness to the world, etc. This translates to the characteristics of urban real estate, which they have. Contribute to the determination of the individual utility land, buildings and premises, but also give them specific aesthetic value, artistic, symbolic, etc. In this context, the responsibility of the property of their respective owners and administrators of creation by the image of the city [8].

The main determinants (factors) of the city development are [14]:

- 1) Environmental Factors – it is commonly known that nature provides the necessary human, material conditions of its existence and is a huge area of his purposive activity. People need constant contact with nature. The quality of the natural environment and urban development has become a particular commodity that has a specific value. Areas of the best-preserved natural environment values are now legally protected [9];
- 2) Economic factors – the biggest economic factor is an industry constituting a synonym for the city's development.
- 3) Communication – accessibility means the ability to transport directions for the journey undertaken, or an existing network of communication between the permanent place of residence of the city's inhabitants and the purpose of his journey, and a system of communication links, trails and ski lifts (recreational), enabling day trips in within the selected area [18]. It can be defined using a variety of indicators such as:
 - The length of roads in km per 1 km² area of the municipality,
 - The number of stations per 100 km,
 - The number of registered cars per 10 thousand. residents.

Most important for communication is, from the point of view of the municipality, the availability of two types of transport: road and rail. With the increasing wealth of the society is becoming increasingly important road transport [10].

- 4) Investment Attractiveness – qualities of natural and cultural environment must be complemented by a team of tools and institutions, forming the base material and – organizational, without which these facilities would be unused and inaccessible. For this reason, extremely important that the area was not only the environmental-economic qualities, but also the resources representing that this is the area attractive to future investors. State of civilization, technical infrastructure, population relationships and finances allow municipalities to take investment decisions.
 - 5) Legislation and socio-political relations – the customs, religion, political system are the factors affecting the daily life and introducing order into their rhythm.
 - 6) Defence / history – the concept of defense is important from a historical point of view, because the towns and villages were located in places difficult to reach, with natural barriers.
- Composition – the result of human activity, on the basis of urban factors shaping the urban fabric.

7. Summary and conclusions

If the real estate market functions well and number of the carried out transactions grows, then the city develops. In a short time, sometimes a lack of a sufficient number of tenders supply this market as compared to the demand. The transaction prices of individual sites, buildings or premises determines the rank of the city, its neighborhoods and even streets. They contribute to spatial distribution of urban functions, including the designation of areas of use and service of industrial and residential markets. The real estate market is a cocreates urban space and the recipient of the consequences of its existence. Market participants live where they can afford it. Companies choose locations by the possibility of maintaining them. Size of public space reflects the wealth of local government and its residents. Real estate prices are an excellent measure of the social, environmental, economic, cultural, etc. realities of the city. The group of factors affecting property prices in urban areas should include [8]:

- 1) the demand for available land – both in the city and neighboring areas,
- 2) Characteristics of the property (usually physical), its suitability to perform a specific function,
- 3) The physical characteristics of the land,
- 4) Ecologic factors, conditioning the quality of operations in a particular place,
- 5) The size of the purchasing power of potential users of the property and the willingness to pay for the availability of urban space,
- 6) preferences of the population (population spatial behavior, perception of the image of the city, fashion city, district, street)
- 7) The existing structure of the city, possible to raise external effects (eg, benefits the neighborhood)
- 8) The policy of local authorities (administrative orders, intentions planning).

Development trends of the city announce the formation of new properties and upgrading existing ones. Urban functions are economically stronger than farming or forestry ones, that's why, developing city will absorb new areas of rural character. Barrier to the development of the city may be administrative orders, determining the fate of specific areas. Prohibitions of location feature and the resulting restrictions in shaping the map of urban externalities, effectively affects the market and property prices. The process of urbanization, spatial, that can confirm the specific investments, including the expansion of urban development on rural areas, is a confirmation of the forces of the city.

The complexity and diversity of the impact on transaction prices, causing that with the increase in the selling prices are rising. This relationship, is not only due to space capacity but also is associated with a greater number of transactions accidental or not rational from an economic point of view (there is a lot of transaction prices taking extreme size). It should be emphasized that the greater number of market participants (buyers and sellers) contribute to large fluctuations (amplitude) in the case of prices. Large surface-saturated areas are more natural and anthropogenic elements affecting the valuation space, and preferences of buyers. Economic growth, spatial development, higher density of population increases the demand for space and expansion into new areas [16].

Geospatial analysis of transaction data allowed to show the places preferred by buyers of real estate. They are located in areas “not saturated” city fibre, which allows to transform into more complex creations. At the same time due to the limitation of space development trends of urban space development following its areas are visible.

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