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The Effectiveness of Cadastre Updating in Poland

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Abstract. In developed societies cadastre is fundamental and reference system on land for other land information systems. It protects the legal boundaries of the properties. It is also significant from the point of view of property taxes, urban planning and development of real estate markets. It is important that cadastre reflects the current status on the ground. Any changes in both the physical and legal space relating to real estate should be immediately updated in the system. The article presents the study on the effectiveness of cadastre updating in Poland. The effectiveness of updating cadastral data was examined from the point of view of determined criteria as a case study on the example of two municipalities. The research has shown that the current process of updating cadastre in Poland is far from ideal. The repair solutions were suggested.

Keywords: cadastral systems, update, automation, integrated land information systems.

Conference topic: Technologies of Geodesy and Cadastre.

Introduction

The Polish real estate cadastre runs in a computer system in accordance with the Act on Geodesy and Cartography (1989) and Regulation on the real estate cadastre (2001). It is based on the computer databases created with the needs associated with carrying out tasks of spatial planning, economic planning, tax assessment public statistics, the determination of real estate in the land and mortgage register, property management, register of farms, taking into account the existing country division based on the three-tier state territorial division.

The cadastral databases are an integral part of the National Geodetic and Cartographic Stock, and the fundamental part of national spatial data infrastructure.

Due to the high practical importance of the real estate cadastre, the system still is a subject of modernisation (Buśko, Meusz 2014). The directions of these changes arise from the legal and organizational requirements of the public administration access to spatial data. Cadastre also evolves due to the rapid advancement of information technology (Dawidowicz, Źróbek 2014), where cadastre should be characterized by the following determinants:

- digital technology supply data (electronic data transmission), storing, updating and sharing;
- processes automation of data collection and updating;
- the software should allow integration of graphic and descriptive data, and imaging any content in any format (2D, 3D, 4D);
- inclusion of GIS technology to share cadastral data in spatial information infrastructure (SDI) and for open spatial analysis;
- mobile cadastre through mobile devices and desktop (such as mobile phones, tablets, notebooks and other);
- cadastre in Cloud Computing.

Introduced new legislation in recent time (Inspire Directive 2007; Act of 4 March… 2010) aims to creation the National Spatial Data Infrastructure (SDI). The new rules set out the principles of data exchange between cadastre and other public registers, and standardization (harmonisation) of data format. New development concepts and regulations provide the basis for the conduct of subsequent modernization works. As a result, usability of the cadastre increased by improving and expanding the information content of the system, which resulted in a widening range of users.

Cadastral data such as cadastral parcels, buildings, object identifiers, land use, etc. integrated in common SDI create a fully versatile, multi-purpose Land Administration System so important for the sustainable development of land. The functionality of cadastral systems was therefore fundamental to the existence of Spatial Data Infrastructures (Dawidowicz, Źrobek 2016). Interrelations are strong and clearly targeted in this connection.

SDI emerged as the basic network infrastructures, as well as platforms to achieve the perspective of spatially enabled society (FIG 2012; Onsrud 2010). Education of people in the spatial awareness of land is in any case very important (Dudzińska, Kocur-Bera 2015). From the point of view of spatially enabled society, significant is access to

complete and updated information on real estate. Therefore, the study of the effectiveness of cadastre updating is important.

On the basis of interviews in two selected cadastral offices obtained information, which is subjected to a comparative analysis. The results were used to determine the quality of the system. Opportunities, threats, strengths and weaknesses of the cadastral system have been identified. The results showed what problems faced by entities conducting cadastre in Poland.

Research methodology

The effectiveness of updating cadastre is affected by many factors. Their multiplicity is determined by the complex nature of the system. Any associated study of the cadastral system's complex nature should be "comprehensive, taking into account various aspects of the cadastral system and leading to the determination of the dominant factors in a given situation and the most important relationships between them" (Gaździcki 1995). 'Cadastre' is defined in alignment with J. Gaździcki (1995) as "interrelated elements or components, where each element represents the various aspects of the system". Hence, we propose a following algorithm:

$$\text{Cadastral system} = \{C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_8, C_9\ C_{10}, C_{11}, C_{12}\},$$

where: $\mathbf{C_1}$ Legal Framework, $\mathbf{C_2}$ Organizational framework, $\mathbf{C_3}$ Economy, $\mathbf{C_4}$ Model of reality, $\mathbf{C_5}$ Geodetic and cartographic works, $\mathbf{C_6}$ Data, $\mathbf{C_7}$ Functionality, $\mathbf{C_8}$ Procedures, $\mathbf{C_9}$ Technology, $\mathbf{C_{10}}$ Standards, $\mathbf{C_{11}}$ Staff, $\mathbf{C_{12}}$ System surroundings.

Therefore, the efficiency of updating cadastre will be examined in the context of legal aspect and the work of the staff.

In Poland there is a three-tier administrative division of the country, where the regions (Voivodeships – 16) are the largest surface of local government units (Fig. 1). The smaller units are counties (poviats – 380), and the smallest are municipalities (2479) (data from National Register of Boders (NRB 2016)). Cadastre is conducted in Poland at the level of counties, thus 380 entities are responsible for updating the cadastre on their territories.

The entities leading cadastre in counties Wąbrzeźno and Brodnica were the objects of the study (Fig. 2). Areas of counties covered by the cadastre adjacent to each other and are located in the same region of Kujawsko-Pomorskie. Counties are different from each other. The reason for choosing these two areas was a significant difference in the surface areas, neighborhood, and locatation in the same region. In addition, this region does not stand out anything from the rest, and it can be taken as a representative.

The main difference in the two counties is their area – district Wąbrzeźno is almost half the size of the county Brodnica. It follows that the number of population and municipalities is also smaller in this district. The data obtained shows that Brodnica county covers an area of 103,983 hectares. The population is 78,102 people. District consists of ten municipalities – one municipal (Brodnica), two urban-rural (Górzno, Jabłonowo Pomorskie) and seven rural (Bartniczka, Bobrowo, Brodnica, Brzozie, Osiek, Świedziebnia, Zbiczno), (data from the Central Statistical Office www.stat.gov.pl). While the area of the county Wąbrzeźno is 50,195 hectares. The number of people living in the area is 35,034. Wąbrzeźno county is comprised of five municipalities: one city (Wąbrzeźno), and four rural municipalities (Dębowa Łąka, Książki, Płużnica, Wąbrzeźno), (data from the Central Statistical Office www.stat.gov.pl).

Fig. 1. Administrative division of Republic of Poland. The division into regions and counties. Source: own elaboration on the basis of National Register of Borders (NRB 2016).

Fig. 2. Counties in the Kujawsko-Pomorskie region. Source: own elaboration on the basis of National Register of Borders (NRB 2016).

The examination of effectiveness of Polish cadastre updating was to check the quality and quantity of changes introduction to the system, taking into account key determinants like area, staff and time-consuming works. Thanks to this, the distinguishing features affecting the differences between the selected cadastral units were identified. To conduct the study probing method was used. The data obtained in direct contact based on our personal interview. The questionnaire included questions that concerned, among others on time in which workers make the changes, number of applications that come during the day or in the whole calendar year, the number of staff responsible for making changes to cadastre, as well as the surface of counties.

The collected data enabled comparison the two administrative units conducting cadastre in the context of effectiveness of databases updating. During the analysis we were focused mainly on examining the effectiveness of staff works.

The rules of cadastre updating by Polish law

Cadastre must include current information to be able to properly perform its function. Changes resulting from legal relations and facts must be immediately entered into the system.

The change in the cadastre is any change of the factual or legal status related to parcels, buildings or premises to regard the data covered by the registration. The authority, which is responsible for the cadastre records request in the official notifications of changes in the system. Notification requires written form. There is no charge for accepting the reported changes. Any change in the register should be introduced immediately, and in case of the need for investigation, not later than 1 month from the date of documents service causing this change.

The authority conducting cadastre contacts with client through correspondence mostly in paper form, although there is also the possibility of electronic communication. This is a convenient way for both the authority and the petitioner, and additionally is easy to archiving. However, the exchange of correspondence has an effect on the processing time of the case, as it must be taken into account the duration of official document edition, the date of its giving and the time required for delivery. Delivery is a particularly important element. It is also possible to communicate with client orally, but it should be drawn up corresponding memo (Rymarczyk *et al.* 2012).

In the case of changes made by the owners there is the necessity of their declaration and the introduction of these changes to the cadastre. Guidelines for updating cadastre includes Regulation on real estate cadastre (2001) and Technical Instruction G5.

The documents required to update the data are mainly notarial agreement on the establishment and transfer of ownership or perpetual usufruct and the establishment of separate ownership of premises.

There are many public records conducted on the basis of separate regulations, such as Land Register, Register of Economic Entities (REGON), Population Register (PESEL), official register of the territorial administration division (TERYT), national register of producers and agricultural farms and the register of applications concerning subsidies (KSEP) as well as other public records, records of public roads, water cadastre, in which any changes to the database also cause changes in the real estate cadastre.

The main regulations and guidelines distinguish particular objects that shall be updated in the cadastre. The list of cadastral objects includes: units of country division, parcels, the contours of land use, the contours of soil science classification, buildings, premises, border points, borders.

Typical changes in the geometry of cadastral objects arise from:

1) property division,
2) land consolidation and exchange,
3) land consolidation and division,
4) the delimitation of the property,
5) determining the line edges of public waters,
6) changes to the boundaries units of country territorial division,
7) determining the parcels boundaries in accordance with the legal provisions,
8) updating the manner and contours of land use,
9) renovation soil science classification of land,
10) geodetic inventory of new buildings,
11) supplementary and control measurements

Updating cadastre is carried out by introducing only documented changes. Updating is done an ex officio basis of:

- documents provided by entities having the legal and administrative character: the final administrative decisions, deeds, final judicial decisions, including entries in the land registers;
- disposals included in the normative acts;
- documentation from the geodetic measurements attached to the state geodetic and cartographic stock, containing lists of appropriate changes to cadastral data, such as: inventory after the construction of the building; lists of land changes for updating land use, for the adoption of geometric surface instead of the

cadastral surface where the geometry surface is calculated taking into account the coordinates obtained from measurements instead of coordinates from the digitization of aerial photographs or other maps.

At the request of reporting entities, the change from the office may also include:

- the addresses of residence,
- entries tenants,
- changes resulting from wills,
- disclosure of information about the premises independent,
- changes in the data relating to the reconstruction of registered buildings.

Cadastral Office shall inform about changes made by:

- entities that requested the change,
- district courts maintaining land registers if the changes lead to update the land register in section I,
- the tax authorities,
- units of public statistics in the case of making changes in the property ordinal numbering, as well as the disclosure and removal of buildings from the register.

The data changes in the cadastre can be made by workers who have received proper authorization and password to access the system.

The effectiveness of updating cadastre – case study

Carried out interviews during the research in the cadastral offices gave a view on cadastre operation from the inside of the system. The received responses were aggregated in Table 1, which clearly highlights the staffing situation.

Table 1. The status of cadastre updating in selected Cadastral Offices. Source: own study

Criterion	How is updating cadastre in the Cadastral Offices?									
	County Wąbrzeźno					County Brodnica				
Surface area	50,195 hectares					103,983 hectares				
Number of inhabitants	35,034					78,102				
The way to make changes	manual					manual				
Number of people responsible for making changes to cadastre	3					4				
The average daily number of requests for changes	4					19				
Number of changes made to the system annually	2011	2012	2013	2014	2015	2011	2012	2013	2014	2015
	1130	1377	1220	1186	1266	4530	4600	4780	4820	4973
Time to one change	15–20 minutes					15–20 minutes				
Daily number of changes per one employee	1,3					4,7				
Software for real estate cadastre	the descriptive and the graphics part of cadastre are conducted separately in two cooperating programs					the descriptive and the graphics part of cadastre are conducted separately in two cooperating programs				

During the interview the cardinal questions were asked: “Do you update the cadastral data in a regular basis?” In both cadastral offices responded that employees shall update the cadastral data immediately. Employees of Brodnica cadastral office can update up to 19 requests to the system during the day, the situation is worse in the Wąbrzeźno county. This shows, that it is necessary to do some research in this regard in other offices. It would reduce the disparities between workers and the entrusted duties.

The analysis of the personnel work circumstances enabled to determine the strengths and weaknesses of the system, as well as the opportunities and threats for its correct functioning (Fig. 3). The weak point is the low work efficiency in the cadastral office in Wąbrzeźno. The team of employees has not been reduced since past five years, while the number of changes decreased. For one employee there is only one change to introduction per day. This is especially, economically unfavorable situation for the real estate cadastre, which is maintained by all taxpayers. The time to introduce a change as referred in the interview is from 15 to 20 minutes. There are significant disparities in competence. Employees working in cadastral office in Brodnica perform almost four times more work from the employees of cadastral office in the Wąbrzeźno. There is a chance to reduce the obligations of cadastral workers and the elimination of unnecessary workplaces thanks to transfer of some part of the obligations associated with the cadastre updating to notaries, because there is a technological possibility.

The interview conducted only in 2 of the 380 cadastral offices clearly demonstrates that the effectiveness of changes in the cadastre is varied. The main problem to solve, which was a specific objective of the study, was to determine the degree and directions of this differentiation, as well as to find the causes of the existing disparities between cadastral offices.

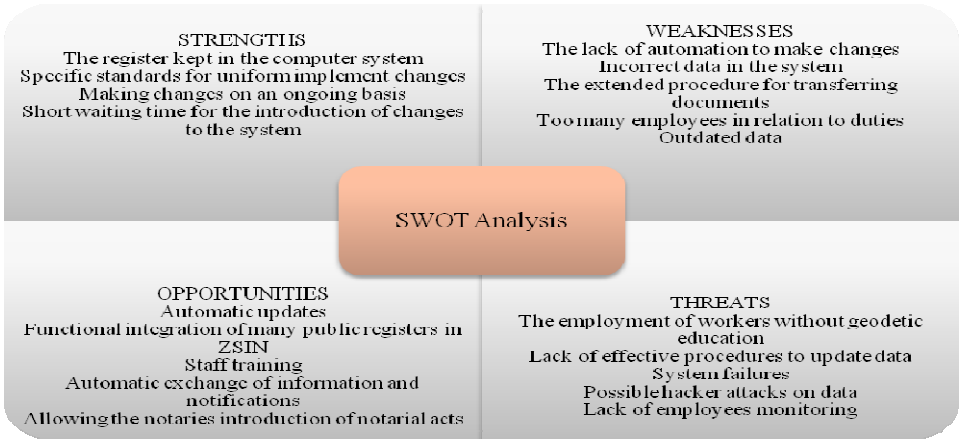

Fig. 3. SWOT analysis of cadastre updating (source: own study)

The strength of the cadastre updating in Poland is the introduction of changes in a regular way and in both cadastral offices is needed little time to make these changes. We can conclude that cadasrte in Poland is characterized by high accuracy, and compliance with reality.

After the SWOT analysis were identified the system threats. The most serious problem is poorly staffed workplaces and unsuited number of employees in relation to duties – the number of employees is similar while the recorded land surface is different by almost 50%.

The employees of cadastral offices in Brodnica and Wabrzezno make changes manually. A chance to increase the efficiency of system upgrade is the construction of the Integrated Real Estate Information System (The national project – from Polish: **Z**integrowany **S**ystem **I**nformacji o **N**ieruchomościach – **ZSIN**).

The introduction of an automatic exchange of data visibly improve cadastre and the cooperating systems.

The concept of Polish government is to create Integrated Real Estate Information System as national Land Administration System (Dawidowicz *et al.* 2013), which will be a multi-purpose system available for public authorities and individuals (Fig. 4). The ZSIN will functionally integrate the Real Estate Cadastre, Land Register, Register of Economic Entities (REGON), Population Register (PESEL), official register of the territorial administration division (TERYT), national register of producers and agricultural farms and the register of applications concerning subsidies (KSEP) as well as other public records through the functional specification of Integrating Electronic Platform (IPE) which will allow the viewing and data transferring between a number of public registers. ZSIN was introduced to the legal system by Regulation of Council of Ministers of 17 January 2013 on the Integrated Real Estate Information System.

Fig. 4. Public registers integrated in ZSIN (*source*: own study on
Council of Ministers Regulation of 17 January 2013 on the integrated real estate information system)

The threat for both the cadastre and for ZSiN may be intrusion of hacking attempts into the system that records data on valuable real estate, as well as system failures caused by external factors. It is particularly important to protect databases from malicious files and intrusions.

Conclusions

Analysis of the results obtained from the survey in two representative cadastral offices enabled to make an overall assessment of the effectivness of real estate cadastre updating in Poland and helped identify the problems. The analysis of the circumstances of updating real estate cadastre in only these two cadastral offices from among 380 has shown significant disparities in the efficiency of introducing changes in the cadastre. This situation may look worse in the range of whole country.

Improving the efficiency of cadastre updating is possible by launching the Integrated Real Estate Information System in Poland. The introduction of the automation system would reduce the problem of maintaining unprofitable workplaces and ensure a faster update procedure.

The study contributed to propose fallowing solutions and development directions:

- the Head Land Surveyor in Poland should appoint a quantitative standard to maintain workplaces for conducting cadastre.
- manual introduction of changes is the cause of typographical errors in database. This may be due to poor physical condition and malaise of employees.
- the cadastral system contains data on land, buildings and premises, as valuable goods is exposed to hacker attacks and enters the information into the wrong hands. It is particularly important to strengthen the security of the system,
- the lack of program for automatic changes creates real conditions for having outdated data.

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