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BORDERS OF LAND PARCELS ON ASPECT OF COHESION OF TECHNOLOGICALLY - LEGAL AREA

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Abstract

Course of borders of lands parcels should be perceived in technologically – legal area, which consists of technological area (connected with surveys and capability to unequivocal recovery borders of lands) and legal area (connected with legal approval borders of lands). Cohesion of technologically – legal area is understood as a common area of both areas. This article presents results of analysis of incoherence and estimation of coherence of technologically – legal area of parcels recorded in Austrian, Czech, Dutch and Polish cadastres.

1. Introduction

Location of borders of land parcels is presented in the cadastre basing on documentation, which is developed in the course of survey-and-legal works related to establishment of location of existing border points (eg. during delimitation of real estates or as a result of works aiming at modernisation of the cadastre), or in the course of works concerning delimitation of location of new borders of parcels (eg. As a result of division of real estates). Location of borders of cadastral parcels should be considered in the technological-and-legal area, the cohesion of which is the area being the common part of the technological sub-area and the legal sub-area (Figure).

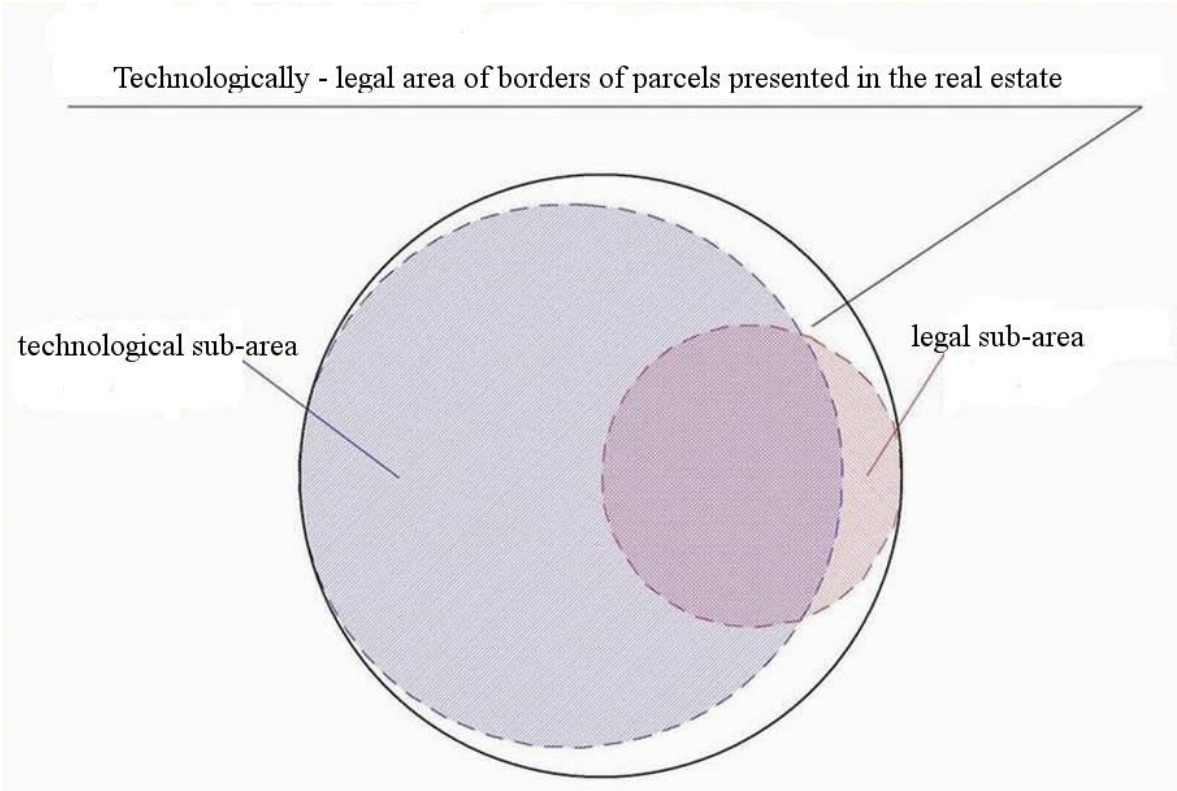

Figure: The technologically - legal area, developed by the author [Łuczyński, 2009]

The technological sub-area is a set of border points, specified by surveys and appropriate documentation, which allows for explicit restoration of field location of border points, which X,Y co-ordinates have been determined following the rules of uniformity of surveying and cartographic works. The uniformity of surveying and cartographic works is understood as a uniform system of measures, the uniform, state spatial reference system and uniform technical standards. The legal sub-area is a set of administrative and legal procedures, resulting in legal confirmation of a specified location of border points and lines.

This paper will discuss issues related to determination of location of borders of parcels in the Dutch, Austrian, Czech and Polish cadastres. At the beginning, results of investigations related to analysis of incohesion of the technological-and-legal area in those cadastres will be discussed and then the evaluation of the incohesion levels within border areas will be presented.

2. Results of analysis of incohesion of the technological-and-legal area

In the Dutch cadastre co-ordinates of border points, presented on a digital cadastral map (LKI) originate mainly from digitised analogue maps [Gaździcki, 1995]. Therefore the accuracy of determination of co-ordinates of border points on the cadastral map is the derivative of the accuracy of the original data and the digitising accuracy. The map accuracy is influenced by the permitted error of length of a border section on the map [Wakker et al., 2003]. It is the relative error of length, independent from the accuracy of location of particular border points. Its value - mD, referring to sections between border points, cannot exceed the value:

- $mD \leq \sqrt{2} \cdot 20$ cm – in urban areas;
- $mD \leq \sqrt{2} \cdot 40$ cm – in rural areas.

Surveying documents concerning location of borders – as, among others, sketches and outlines, are stored in an archive. In the case of division of real estates owners of surrounding real estates are not invited for field visits and location of external borders is not delineated; they are assumed basing on the cadastral map. The team responsible for cadastral surveys does not delineate external borders of the parcel being divided in the field; it only determines (measures) the newly established borders. Then, intersections of new borders with borders obtained from the map (LKI) are calculated. Thus, modification of geometry of the cadastral map does not occur with respect to external borders being divided. Only to co-ordinates of new borders are entered basing on field surveys. In the Netherlands the responsibility to take care of landmarks and knowledge concerning their field location has been shifted towards owners, the successive generations of which are taking care of landmarks. Delineation of location of borders may be performed, for a specified fee, in the course of recovery of landmarks, which is not based on the cadastral map, but is performed basing on original data acquired from the archive [Zevenbergen, 1998].

The issue of surveys of borders of parcels and their presentation in the Austrian cadastre are regulated by the federal act of 1968. Its objective was to create appropriate legal protection of border reliability [Höflinger, 1998]. After location of borders is approved by owners of neighbouring parcels, they are measured and entered into the cadastre of borders. Border points and their co-ordinates in the state co-ordinate system are legally binding, i.e. they are legally protected by the state. Data concerning owners, included in the cadastre of borders, reflect records included in land registers. Prescription of a part of a parcel, which has been entered into the cadastre of borders is impossible. Remaining borders, which are not introduced into the cadastre of borders, are disclosed in the land fiscal cadastre, until they are not permanently fixed, measured and legally approved (i.e. until they meet the criteria of the technological-and-legal area). Specified surveying services are responsible for the technological subarea; they are obliged to measure the borders according to obligatory technical standards. Basing on the federal act of 1994, measurements are performed in such a way, that – assuming the mean accuracy of network point location (triangulation points: +/- 5 cm, densifying points: +/- 7 cm) the mean accuracy of location of measuring stations: +/- 10 cm and border points: +/- 15 cm is not exceeded. The procedure of entering a parcel into the cadastre of borders, in the case of division of real estates, is as follows:

1) the surveyor invites interested parties to participate in the hearing concerning borders,
2) the surveyor conducts hearing concerning borders,

3) in the case when the location of borders, proposed by the surveyor, is accepted, the surveyor passes all documents concerning the parcel division to a local cadastral office and the parcel is introduced to the cadastre of borders.

If the neighbours do not agree for the location of borders, proposed by the surveyor, the surveyor also passes all documentation concerning the parcel division to the local cadastral office. That office send a registered letter to the interested individual (the neighbour who has not signed the division documentation) and calls him to come to the office and to get familiar with the documentation prepared by the surveyor. The interested neighbour may sign the documentation at the local cadastral office. If this is not done, the parcel division takes place, but the parcel is not introduced into the cadastre of borders. In a case when the interested neighbour does not come to the cadastral office, the parcel is introduced into the cadastre of borders [Hopfer, Wilkowski, 2007].

In the Czech Republic the uniform cadastral network exists (JTSK), which ensures the maximum linear deformations of 14 cm/km [Rydval, Tomandl, 2007]. The accuracy of determination of location of a border point, presented on the cadastral map, equals to 0.10 m [Mika, 2001]. If data concerning location of a real estate borders has been lost or if it became out of date or it does not meet the current accuracy requirements, the procedure of cadastre restoration takes place. Location of borders is investigated with respect to accordance with the cadastral documentation at the hearing, when interested parties are present. The border documentation is prepared by the surveyor basing on activities performed in the field. Besides specification of co-ordinates in the state co-ordinate system, border points are marked on the prepared ground sketch, with specification of their measured distances from topographic features. If the real estate border is the subject of conflict, it is specially marked on the cadastral map, and owners of the real estate are informed on the possibility to resolve the conflict. Border conflicts are investigated by courts only. The new state of the cadastral documentation is approved by an administrative decision. After restoration of the real estate cadastre parcel borders are fixed in the field, they are measured by the surveyor and approved by an administrative decision or by the legal decision. When the requirements of cohesion of the technological-and-legal area are met, this creates the opportunity to restore border marks in the case of their displacement or damage. The basis for such restoration is the cadastral documentation, concerning the legal status of the real estate (documents which confirms the property rights) and location of border points and lines in the restored cadastral documentation (the cadastral map with survey sheets).

In the Polish cadastre borders of parcels are presented basing on the documentation developed as a result of the following surveying-and-legal activities: delimitation of real estates, division of real estates, land consolidation works, consolidation and division of real estates and works related to establishing the land and building registers. At present, contemporary instruments and measuring techniques allow to meet the requirements of the technological-and-legal area together with the uniform, spatial reference system, obligatory in Poland, based on the EUREF-89 reference system and the rectangular co-ordinate system „2000". The accuracy of determination of location of border points and marks with respect to the nearest elements of the horizontal network cannot exceed 0.10 m [Technical Instruction, 1983]. The basis for uniformity of surveying and cartographic works is ensured by the ASG-EUPOS System, which has been operating in Poland since 2008 and which ensures the correctness of implementation of the state, spatial reference system [Adamczewski et. al, 2009]. However, borders of parcels which are presented in the cadastre basing on surveying-and-legal works, performed in the past, according to legal regulations which are not valid at present (as the decree of 1955), do not meet the requirements of the technological-and-legal area. Particular works, which are the basis for presenting the location of borders in the cadastre, are performed as administrative , legal or independent procedures (when the specified location of borders is not legally approved), depending on specified regulations. Thus, the existing legal and technical regulations do not ensure that the requirements of the legal sub-area are met for all surveying-and-legal, which are currently performed. Besides, the Polish cadastre does not assume any form of warning that the parcel borders do not meet the requirements of the border area, and, at the same time, it creates the possibility to delineate locations and to mark all border points, which are presented in the cadastre [the legal act of 1989].

3. Evaluation of incohesion of the technological-and-legal area

The Dutch cadastre is not the example of a solution which ensures the cohesion of the technological-and-legal area of parcels. The permitted, relative error of a border section on the cadastral map is used as the accuracy criterion, related to the technological subarea, independently from surveying technology and from the accuracy of border point location with respect to the reference system. The issue of the legal subarea has not been regulated.

The Austrian cadastre is the model example of a solution which ensures the cohesion of the technological-and-legal area of parcel borders. The technological subarea is related to the issue of meeting the accuracy criteria of location of border points, the co-ordinates of which are determined in the state, uniform co-ordinate system, basing on direct surveys. Owners are responsible for the legal subarea; in the presence of the surveyor they approve the location of borders of parcels in the field. When both requirements are met, the cohesion of the technological-and-legal area is ensured and this results in introduction of parcels into the cadastre of borders, which ensures the stale legal protection for presented borders of parcels.

Due to historical circumstances, the Czech cadastre was mostly based on the Austrian solution. Accuracy standards are responsible for the technological subarea. Borders of parcels are presented on the cadastral map and their co-ordinates are calculated in the state co-ordinate system with the specified accuracy. Similarly to the Austrian cadastre, the legal subarea is related to statements of owners concerning the conflict-free location of parcel borders (marked in the field), expressed during the border hearing, performed by representative of the cadastral office and the municipal office. The border documentation, developed by the surveyor and signed by the parties, is the basis for approval of location of border points and lines, according to administrative or legal procedures. Parcel borders, agreed and marked in the field, meet the criteria of cohesion of the technological-and-legal area and they are protected by the state. In the case when border marks are damaged (under high financial sanctions), the procedure of restoration of border marks is applied in order to restore them.

The parcel borders, presented in the Polish cadastre, meet the requirements of cohesion of the technological-and-legal area at the limited level. This depends on the type and specific features of surveying-and-legal works, being the basis for presentation of locations of borders in the cadastre. Documentation, which was developed basing on the old legal and technical regulations, which are not valid at present, is gradually substituted as a result of successive surveying-and-legal works, which sometimes do not meet the criteria of cohesion of the border area.

4. Summary and conclusions

Methods aiming at determination of location of borders in the Austrian cadastre of borders and in the procedure of restoration of the Czech cadastre, are the model solutions, which ensure the cohesion of the technological-and-legal area. The cohesion of that area, related to border points and lines, presented in those cadastres, is the basis for particular protection by the state, which guarantees the safety of determined, conflict-free ranges of property rights.

Basing on investigations of the Dutch, Austrian, Czech and Polish cadastre the proposal of a universal model procedure concerning deterrnination of parcel borders might be formulated, which would ensure the cohesion of the technological-and-legal area in the case when external borders of the area, which is the subject of the process, do not ensure the cohesion of the border area:

- Commencement (application) of surveying works,
- Investigation of the legal status of a real estate with respect to documentation, which specifies the legal status of the real estate (determination of the parties),
- Review of documentation, which determines location of border points and lines and implementation of field measurements, which allow to restore location of external borders of the area being the subject of the process,
- Development of location of borders of cadastral parcels and field delineation of external borders of the area being the subject of the process, basing on existing evidence (documents, which specify location of border points and lines, border marks, geodetic monuments, geodetic traces and elements of land management related to location of borders) – in a way that allows to present the location of border lines to interested parties (marking with pickets, painting on permanent elements of land management etc.),

- Calling the parties to come to the field and to get familiar with location of the external borders of the area, which is the subject of the process, delineated basing on the existing evidence,
- Measurements of border points, the location of which has been approved by the parties; signing the documentation concerning location of cadastral borders,
- Development of technical documentation together with the design of delineation of border lines,
- Inspection of documentation and introduction of technical documentation (including documentation concerning location of cadastral borders, confirmation of return calling of the parties about activities aiming at delineation of borders in the field, technical documentation concerning the surveys of agreed location of parcel borders and documentation concerning the designed situation) to the geodetic and cartographic resources,
- Listing the co-ordinates of border points in the real estate cadastre – the administrative decision of the body which maintains the real estate cadastre and updating the records in the register concerning the legal status of the real estates (mortgage registers).

In the case when external borders of the area meet the criteria of cohesion of the technological-and-legal area, the model procedure will consist of the following stages:

- Commencement (application) of surveying works
- Development of location of borders of cadastral parcels and delineation of external borders of the area, being the subject of the process, in the field,
- Development of technical documentation including the design of delineated border lines,
- Inspection of documentation, which includes the designed conditions,
- Listing the co-ordinates of border points in the real estate cadastre – the administrative decision of the body which maintains the real estate cadastre and updating the records in the register concerning the legal status of the real estates (mortgage registers).

Implementation of the proposed solution, which ensures the cohesion of the border area, creates the opportunity to warrant the scope of property rights by the state, as the „public faith".

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