

# ASPECTS REGARDING THE NECESSITY OF A UNIQUE DIGITAL CADASTRAL PLAN FOR A TERRITORIAL-ADMINISTRATIVE UNIT

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**Abstract:** *With the rapid development of the information technologies and the up-to-date methods of measurement, it became necessary to upgrade the services delivered to the citizens and to automate the processing. The existing cadastre, consisting of paper map/plans and land registers, is now becoming insufficient. One of the best solutions at the local level is the creation and development of a digital plan and a database, as an implemented instrument used to sustain the institutional capacity, the local planning and progress, able to contribute when taking decisions for everyone's benefit. A digital cadastral plan can be the basis for additional thematic layers, successively converting it into a complex system for management of administrative units. The aim of this paper is to research the advantages of digital cadastral plan and its uses in implementing a Cadastral Informational System for sustainable development.*

**Key-Words:** cadastre, database, digital plan, Land Information System, properties.

## 1. Introduction

International Federation of Surveyors (FIG) published statement on the cadastre (FIG, 1995) defines the cadastre as: "A Cadastre is normally a parcel based and up-to-date land information system containing a record of interests in the land (e.g. rights, restriction and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, and often the value of the parcel and its improvements."

Countries in the world that have maintained some form of cadastral plans are now proceeding to a full digital representation of these cadastral plans with the ultimate aim of having country wide coverage at an accuracy level consistent with current technology in Geographic Information Systems (GIS) and surveying (Effenberg, 1997, Williamson, 1997).

One of the advantages of storing information related to cadastral services in digital format, due to the fact they have a

common or compatible structure/format, is that they can be used in different network analysis for the purpose of accomplishing multiple tasks.

The general objective of our study is to create a relational database as the central element of the Cadastral Informational System (SIC), representing a structured collection of data and information, which is, in the same time, necessary and sufficient for satisfying the informational needs of their beneficiaries and users.

To achieve this Cadastral Informational System we need a digitalised cadastral plan and digital cadastral specific data. The advantages of digital use are incomparable. The most important are:

- the stored data for the digital plan are positive and can be easily preserved; they can be displayed whenever we want on any scale;
- the plans made this way allow a complete decision to solve any problem for any type of work (for studies, projection, application);
- cadastral files can be easily used, being

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capable to respond to all interrogations in a very short time.

To be able to use this cadastral digital data within the Cadaster Informational System, they must be integrated in a database. This database will allow the Cadaster Informational System to solve a series of problems in the current cadaster and real estate advertising activity.

Our country does not own a clear and up to date evidence and as a result it has to be introduced according to the 7/96 Law and some Technical Norms (2007 edition). The importance of this action, the necessity of a modern, informatised cadastre, doubled by a real estate advertising in the funcial book system, is unanimes recognised as a base of the law state, a real democracy and a conquest market economy (Boş, 2010, Palamariu, 2010).

## 2. The advantages of using digital cadastral plan in local public administration

The cadastral system is the basis used for the protection of the property by means of title registration and cadastral plans. Each parcel and its owners are registered and all the spatial structures consisting of location, boundaries and contents are described in a cadastral plan. Therefore, the cadastral system is seen as a land information system affording information on real estate of a property. In rural areas, the claim to ownership increases the investment in agricultural lands and the property business. Then an appropriate cadastral system should be designed and established by and for a particular zone (Elayachi, 2001, Semlali, 2001).

In the light of the evolving digital technology, traditional cadastral plans on paper are not enough flexible and not suitable for the needs of the society. Moreover, the emerging new satellite technologies and high speed computing and processing capabilities have completely changed the face of the earth.

The data resulting from the classical model of land cadastre are now becoming insufficient. In the course of economic development the demand for more varied information items becomes increasingly pressing. Data stored in traditional cadastral systems fail to meet

requirements connected with supervision, management, decision-making, forecasting and development planning.

The *first necessary step* can be made by uniting all forces involved in creating and promoting informational systems in the local administration, in order to convince the decision factors of the advantages of using informatics, starting from the opportunity of using these applications and from the qualitative and quantitative advantages that can be obtained after exploiting such systems.

Therefore, a successful cadastral system has to have some of the following characteristics:

- to be flexible to legal and technical modifications;
- to protect and to guarantee the property right;
- to be simple, clear, accesible;
- to provide up-to-date and trustful information at a low cost (Sălceanu, 2009).

Thus, the following requirements will be aimed:

- a. The improvement of the buildings register system and it's operational speed by implementing the database at the institutional level;
- b. Diminishing the gap between our country and the European Union by developing a modern idea in a most important domain;
- c. Developing a favourable partnership with the interested institutions in order to modernize the cadastral domain;
- d. To improve Romania's capacity to have competitive partners according to the European Union requirements.

Creating a cadastral digital plan and a database for the estates in an administrative territory represents a complex project which:

- facilitates the juridical circulation of the estates on the estate market and guarantees citizens property right;
- stimulates economical, logistical and social development, by improving the land register system for all the estates, with a high operational speed;

Related to the relevance of the theme, according to European research and interest, we

must point out the fact that modernising and developing the Cadastre represents an European Union requirement also, and that making such a project in our country is in consonance with Romania's specific objectives.

Continuing this project and reaching the targeted objectives we contribute at the developing of an important domain. In the economic and strategic equation of a country, the Cadastre represents a fundamental institution on the basis of which the property right over the real estates is guaranteed and their patrimonial value is determined (Racovicean, 2005).

#### *Digital cadastral plan*

The digital cadastral plan is the fundamental component of any cadastral system. However, the digital cadastral plan is not a plan in the traditional sense. The plan is not stored in any conventional sense; nor is it an image or view of a geographic area. Instead, the data are stored, from which it is possible to draw a desired view to suit a particular purpose.

Although it can be displayed and printed at different scales, in different projections, and with different colours, it is in fact an analytical tool. Its major advantage is that it displays the spatial relationships between features depicted on it. There are two basic types of map information:

- spatial information, which describes the location and shape of geographic features and their spatial relationships to other features;
- descriptive information about the features.

*The justification for creating a digital cadastral plan and a database is given by:*

- the high volume of information contained in the cadastral plans and the existing documentations at the public administration level;
- the perishability of the information analogic support and the difficulty to manipulate them;
- high personal expenses when it comes to obtain statistical reports and data;
- difficulties in interpreting and analysing these data, in the case they are not very clear.

*The specific objectives of the study* can lead to obtaining a database for the estates from a specified administrative territory, implementing the database into the interested institutions, using and interrogating the database, the automatization of the operations related to cadastral maintenance, and also technical assistance when implementing the database for the final users.

*The expected results after using a digital cadastral plan assure:*

- the management and quick access to all the relevant information about the territory;
- a high degree of security for the data;
- a superior basis for territorial development;
- basic data for other applications;
- basic information for territorial planning and administration.

*The economic impact of the project* consists in the significant reduction of costs when making a cadastral specific evidence, the opportunity to transfer information between institutions and also a transfer in the cadastral operations modern management domain, in conformity with the experience other countries with excellent performances in this domain have acquired and the European Union requirements.

*The social impact of the project* guarantees the people property right, better working conditions for the employees of the institutions involved in the project, learning and training opportunities and also the creation of new jobs.

In conclusion, it can be mentioned that the creation of an optimised database will have a remarkable impact due to the complementarity of the approached domain and the directions we are willing to develop, and also knowing the informatic vacuum in this domain.

### **3. Case study**

In this study we have chosen, as a research area, a number of approximately 105 parcels from six cadastral sectors from the cadastral plan. For this area the digital cadastral plan for the two periods of time, the years 1989 and 2005, has been made and we also created the corresponding database using the existing information at the Holboca town hall.

Necessary data for the project:

*a. spatial data:*

- the cadastral plan of Orzeni village, Holboca commune, made in 1987-1989 and finalized in the year 1989;
- orthophotoplan made in 2005-2006 and the restored digital plan. Thus have been realised photogrammetric flights with digital equipment (ADS40 camera, ULTRACAM, LIDAR SCANNER camera) which has captured high resolution aerial digital images (GDS 5-7,5 cm), the resulting pixels having 7,5 -10 cm. The captured images bands have a stereoscopic overlap of up to 90% , and the digital processing of the aerial photogrammetric images had the following result: automate aero-triangulation, automate DTM (digital terrain model), automate orthophotoplan with a high degree of precision, interpretation of the elements from the photograms.

*b. Text data:*

- the rural land register from 1989 and 2005;
- owners register;
- property titles.

The first step was to collect and analyze the information the local administration had at its disposal.

### 3.1. Scanning and Vectorizing

Scanning, as a process of high efficiency, makes graphics or digital photo, raster, as accessible information technology. Scanned image quality, by decomposing the pixel resolution depends on scanner and monitor, in number of distinguished points per unit area (approximately 500 points/mm<sup>2</sup>).

Vectorization involves transforming raster images data into a vector system using appropriate software and generating vector data lines, surfaces or polygons. Vector representation of contours and shapes rendered topographical details - in this case the linear nearest reality (Boş, 2010, Palamariu, 2010).

We decided to scan the original plan sheets in the appropriate \*TIFF format and vectorizing them. After the scanning of the originals we obtained images from the vectorizing on which the working coordinate beginning of the digital

model was Stereo 1970. While starting the work on the vectorizing of the scanned images. We used the necessary cadastre signs. These signs are being divided in specialized tables i.e. "linear" and "pointed" and represent in themselves the library of the conventional signs, as devised for the used software. After entering the linear and the pointed sites, we undertook the vectorizing of the real estates of the cadastre.

### 3.2. Projecting the alphanumeric database

Using external databases in SIC environment allows us to work with a large volume of information.

The projection of the alphanumeric database is made in Acces environment and consists of:

- organizing the data into tables in order to eliminate their redundancy;
- defining the attributes of the table fields and the type of data in every field;
- relating the tables;
- loading the data into the tables.

In digital plans spatial relationships are depicted using topology. Topology is a mathematical procedure for explicitly defining spatial relationships. Topology expresses different types of spatial relationships as lists of features (e.g., as area is defined by the lines comprising its border).

Spatial data are linked with non-geographic (descriptive) information about a particular feature on a plan. The information is stored as attributes of the geographically represented feature. Those attributes may have the form of labels (tags) attached to the graphic elements and are stored in vector files or as tabular data, on which certain analyses can be conducted.

The values of those attributes are:

- quantitative, measured and expressed with units of length, area, time etc.;
- qualitative, when each attribute may assume only one value out of a set of values, determined before, such as names, addresses, colours etc.

The power of the system lies in its ability to link the two types of data (spatial and descriptive) and maintain the spatial relationships between the map features.

### 3.3. Results and Discussion

After the 1989 Revolution, The Real Estate Law No. 18/1991 repairs some of the abuses the private property over the agricultural and forest terrains has suffered during the communist regime, but the repairs are partial because the Law restores to the former owners or their successors only up to 10 ha from the agricultural terrains and up to 1 ha from the forests.

In return, it legalizes the expropriation without certificates for the surfaces that exceed the statute limits. The Law no. 169/1997 and the Law no. 1/2000 for retroceding the agricultural and forest terrains repair the Law no. 18/1991 and statute the restitution of agricultural terrains for up to 50 ha and of the forests up to 10 ha. In order to apply the Law no. 1/2000 the cadastre specialists have to make intense efforts to realize topo-cadastral measurements for the purpose of making the entitled persons receive their possessions.

Based on the stipulations of article 11 from the Real Estate Law no. 18/1991 (article 12 from the republished Law), in order to establish the ownership right, through reconstruction or construction, to effectively assign the terrains to the entitled persons and release the property titles, in every commune, village or town has been formed, by prefect's order, a commission, conducted by the mayor. On the same ground, by prefect's order, in every district has been formed a commission. (Scrieciu, 2000).

The Real Estate Law stipulates that the reconstruction/construction of the property right over the terrain is made, on demand, by releasing a property title, in the limit of the surface every person or family has the right to be put in possession. The procedure of constructing or reconstructing the private property right over the terrains starts with handing in an application at the local council where the requested terrain is situated.

Registering the property right over the terrains obtained based on the Law 18/1991 in the Land Register has encountered some problems in time. Further on we will present some aspects regarding these problems:

a) because the emission of the property titles

has proved to be, in practice, a voluminous and laborious activity, which necessitated long time, in a first phase, the local and districtual committees have resorted to the emission of property certificates based on which the owners have entered possession, till the completion and handing over of the titles. These certificates are provisional, they cease to be valid once the property titles are emitted and hand over. Releasing these temporary certificates which stipulated the property right has had a big echo both in the juridical literature and juridical practice. (Anghel, 2006).

As a first opinion it has been assessed, in essence, that these certificates can be annuled or modified only when some normative stipulations have been violated, measure that can be a contentious business falling within the competence of the administrative courts. Another opinion says that the property certificates are provisional documents because they are not stipulated in the special procedures of the Law no. 18/1991, for establishing the private property right over the terrains. Hence, being ilegal, they cannot produce juridical effects and the persons that obtained them are considered to be possessors and obviously not owners (Frentiu, 2010). After the struggle between these two opinions, the first one has imposed itself, backed up by the argument that the property certificates are reproducing the final act of the jurisdiction activities of the committees for applying the Law no. 18.1991, purpose for which they have been created." (Motica,1999, Trăilescu, 1999).

Thus, the persons that have obtained such a property certificate cannot request their property right to be registered in the Land Register because the certificates grant them the title of possessors and not the title of owners.

b) the quality of authentic document of the property title over the the terrains confers a probative power regarding the date the title was made, which is valid till the evidence of false registering and the presumption of title validity, which becomes fully operative and dispenses its user of every proof, the contrary evidence has to be made by the complainant; is a solemn (formal) document that must respect the solemn

form stipulated by the law – it is in written form with a content explicitly stipulated by the law and signed by certain civil servants stated by law – *ad validitatem* required form;

Non-observance of the solemn form stipulated by the law, as for example the different title content, the fact that is not signed by a civil servants stated by law, the first name or last name of the owner is not mentioned, are sanctioned with total nullity; in these cases the property right obtained based on such kind of title cannot be registered in the Land Register.

c) the most often met problem in the case of registering the property right, owned based on the property titles, in the Land Register, consists in the errors made when writing them. These errors appear due to the lack of training of the persons who makes them or due to the fact that a very well structured database of the local councils regarding the buildings from the localities is missing.

After analysing the 40 property titles, we have found irregularities and errors like:

- Writing/drafting errors. This errors are caused by the lack of training of those who made the titles or by the fact that a well structured database regarding the estates in the locality is missing at the local councils.

As an example for such errors we can remember here the misspelling of the holders names (ex.), of the surface, neighbours, localities.

- the second type of errors are due to an unstructured database and the lack of the necessary information. Thus, the lack of cadastral and parcels plans, the lack of professionalism of the employees specialised in Cadastre from the local councils, lead to serious errors. - Errors regarding the surface due to incorrect measurements or to false evidence. Another problem appears when the estate is improperly entered within the built-up area when, in reality, it is situated outside the build-up area, and vice versa.

- Incongruity between the owners register and the property titles concerning the name, owner, parcel or surface.

Thus, in the study area we have found many first name errors: Coteț Ion entered in the

owners register instead of Coteț Ioan, entered in the property register; Blaga Costică entered in the owners register instead of Blaga Constantin, entered in the property register; State Alexandru entered in the owners register instead of State Alexandrina, entered in the property title.

- After analysing the juridical nature of the 40 titles, it resulted that three of them were emitted based on the Law 1/2000, and the rest of 37 titles were emitted based on the Law 18/1991.

- We can notice that between 1989 and 2005 in the case of 32 parcels there are modifications regarding their owners, for example, the parcels 199,200,201 which in 1989 belonged to Rotaru Domnica, and in 2005 to Stroia Vasile.

- Another resulting conclusion is that in the year 2005, 16 parcels from a total of 105 are in the administration of the local council of the Holboca commune, no property title being emitted for these areas.

- In connection with the buildings we can observe that in the year 1989, from 47 buildings, 15 are not registered in the Town hall evidences, and in the year 2005, from a total of 74 buildings, 14 are not registered. We have also noticed that from 1989 to 2005, the number of buildings has grown.

#### 4. Conclusions

When trying to solve the problems raised by the use of the digital cadastral plan and it's database it came clear that to obtain such a system was very expensive, and this is why the legislation must be improved in the future, so that the responsible institutions to allocate enough resources for personel training which is another critical problem in the present.

The importance and topicality of this work consists in the fact that only trough cadaster can be analyzed at any time the availability of resources, how they are used in compliance with the requirements and conditions imposed by sustainable development.

The tendency of developing the Cadaster Informational Systems comes from the necessity of using the terrain with maximum efficiency from an economical and urbanistic point of

view. We must stress the fact that the data from the SIC have an apparent temporal finality, because the continuous changing dynamics require that the data to be frequently /updated in the data basis, for a proper over time use.

In the future it is desirable to continue studying this theme, and also to carry, on a local level, a single plan and a database to serve it.

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