USING QUANTUM GIS TO IDENTIFY THE WRITING ERRORS IN THE PROPERTY TITLES WITHIN CADASTRAL WORKS

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Abstract: This paper presents a model of identification, accurate and fast time of registration errors property titles in cadastral works and those of parceling plans. The development model has as informational support "xls" data base with property titles and scaned, geo-referenced and digitized cadastral plan existing in each administrative teritorial units.

Keywords: cadastral works, Quantum GIS, cadastral identifiers, property title.

1. Introduction

Cadastral activity in Romania is limited mainly to **the realisation of the cadastral sporadic workings**, which refers to the undefinable character registration in the Land Register of documents and legal facts reffering to the properties. Legal and regulatory support for this category of works is the *Order of 634/13.10.2006* approving *the Regulation regarding the content and the elaboration of the cadastral documentation for the registration in the Land Register, Cadastre and Real Estate Advertising Law no. 7/1996*, amended and supplemented.

Through technical documentation of the sporadically cadastral works performed to **identify, measure and description of properties** at the time of their establishment, and ensure registration of acts and legal facts concerning them, for this is necessary to go through **the following steps**: identifying the property location, the analysis existing technical and legal documents, execution of field measurements to collect information graphics and alphanumeric content and processing phase cadastral office, developing cadastral documentation, receipt of documentation and entry in the Land Register. If, in achieving this objective, cadastral information acquisition and processing is an easy one, given the high technical level reached, however, the major problems are the compilation of acts of ownership, especially the property titles, and accurately identify the locations of properties located in the outfield of administrative units.

Property titles issued under the *Land Law no.18/1991,* in a large proportion contain multiple misspellings of names of owners, especially cadastral identifiers (numbers of cadastral sectors and of the parcels use categories of parcels, neighbors etc. Such a situation creates obstacles in making the entry in the Land Register of properties, requiring a revision of property titles, either legally through the court or administratively. Identification of the writing errors of cadastral identifiers is based on an analysis based on property titles and existing cadastral plan. Trough this working the authors offer a experimental model of

identification easily in a short time, **the writing errors of cadastral identifiers and neighborhoods from the property titles**, through the development of Quantum GIS applications, with the informational support of the database information support in. xls property titles, created at the level of municipalities, and cadastral plans overall scanned, georeferenced and digitized. **In the management of the territory**, the current trend is to use Open Source products because they are open and accessible, free licenses offered due to the lack of significant costs in acquiring such products.

Open Source platforms can be used profitably due to the high degree of customization. Open Source approach offers several advantages over commercial approach, such as the increasing number of local expertise and the ability to share development solutions at no cost. Open Source solutions are a viable alternative to commercial platforms, both economically and from a technical standpoint. In addition, there are other social and economic benefits using Open Source solutions such as:

• viable alternative to commercial platforms;
• high degree of customization;
• supports various data formats;
• independence from provider.

Quantum GIS (QGIS) is an Open Source GIS software package. It has a pleasant graphical interface, easy to use. QGIS has functions and characteristics with those of other known programs. The aim initially was to provide a GIS data viewer. QGIS is used freely under the GNU General Public License (GPL). From a functional perspective, QGIS displaying **six major domains** on the main screen (Fig. 1.1):
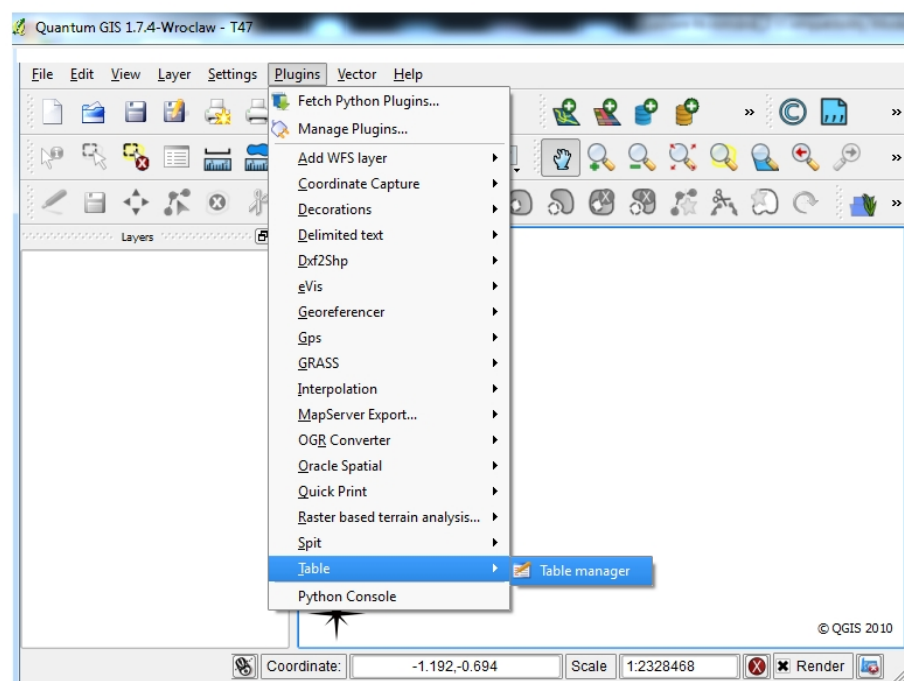

Fig. 1.1 - Software interface of Quantum GIS (QGIS)

2. The experimental model to the writing errors of cadastral identifiers and neighborhoods from the property titles, using Quantum GIS

To validate the working model proposed, was taken for analysis **field 47**, unincorporated area of Holboca commune, Iasi county. Mentioned cadastral unit area is
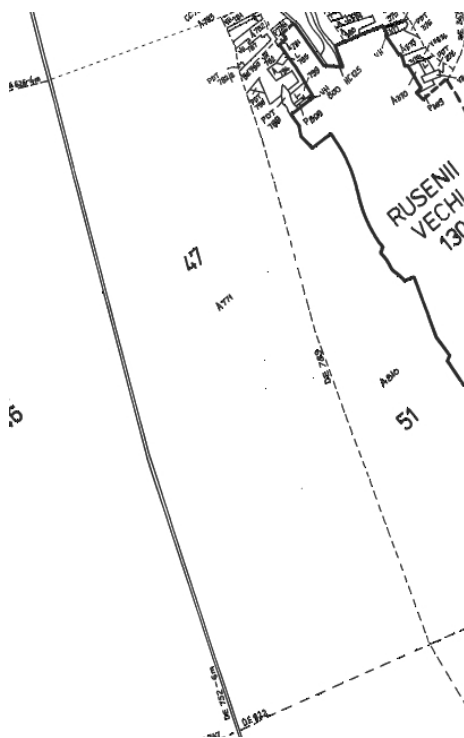
located in the west of the Holboca commune, with an area of **130.91 hectares** and a total of 165 properties. In the cadastral plan at scale 1: 10000, elaborated in the cadastral land works,was identified in the cadastral sector 47, parcel 771, with arable land use category.

2.1. Necessary data for experimental model

In the present study, was used different types of data, materials used as the basis for working being different. In the study stage of the existing topo-cadastral base, the aim was assimilation and ordering of informations, on existing raster materials database from the city hall and those obtained from the Office of Cadastre and Real Estate Iasi. For the fulfillment of the objective of the topic, it was necessary to obtain the following specific materials:

a. Graphical database

- the cadastral plan, scale 1:10000, Holboca commune developed between 1987 to 1989 and completed in 1989 (Fig. 2.1);
- partition plan of the cadastral sector 47, elaborated in the AutoCAD Map (Fig. 2.2).

Fig. 2.1 - Extract from the the cadastral plan   Fig. 2.2 - Extract from partition plan

b. Textual attributes

- agricultural register from 1989;
- property titles emitted under Law no. 18/1991;
- parcel register elaborated in 1989.

2.2. Realisation of the experimental model using Quantum GIS

For this purpose, the following steps were was covered:

a. Defining and attaching projection Stereographic 1970

QGIS provides cartographic projection of each vector layer. This detail allows the display of layers with different coordinate systems, ensuring proper overlap. The projection is defined before achieving raster image georeferencing. Georeferencing is the process whereby raster image is brought into its spatial position. This step is very important in terms of accuracy and continuity of graphical information. Georeferencing process is automatic.

b. Defining the workspace

QGIS can save a project file workspace state. Load saved projects is a similar process. Information saved in a project file are: added layers; layer properties, including symbology; projection plans in raster format; last extension visualized. Project file is saved in .XML format so that it can be edited outside QGIS. Some changes may require program restart, before the final. Windows system settings are stored in a registry.

c. Loading dates into QGIS

- **Loading graphical database**

Graphic informations can be loaded either as a raster image, or by inserting the file exported from other programs, in which have been made the digital plans (for example, AutoCAD Map, file with the. shp extension). Multiple layers can be loaded simultaneously both raster images and digital plans into other programs. Thereby, was loaded in the QGIS, cadastral plan of the unincorporated area of Holboca (Fig. 2.3) and partition plan done in AutoCAD Map (Fig. 2.4).

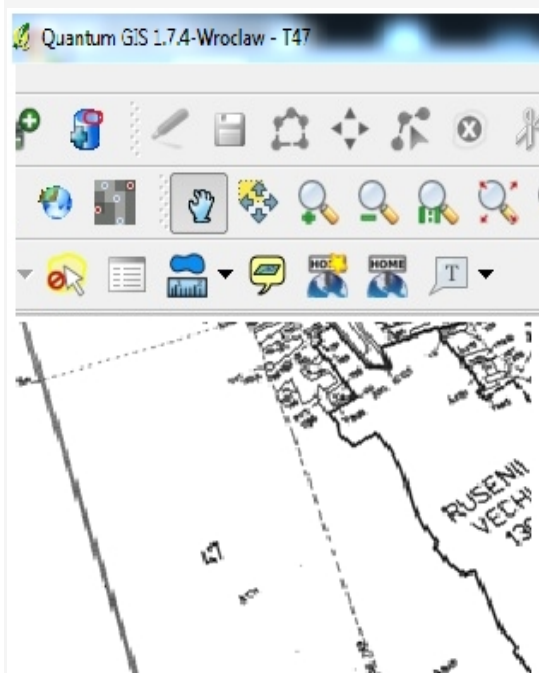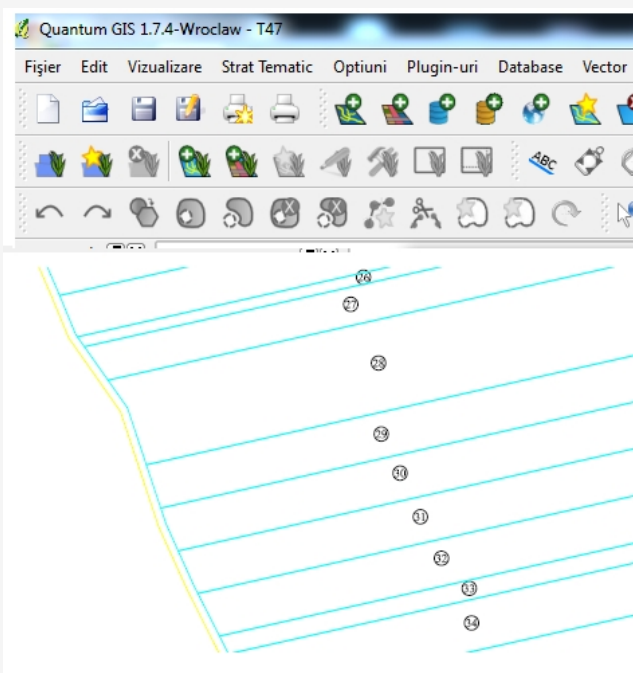
Fig. 2.3 - Insertion of the raster image

Fig. 2.4 - Insertion of the partition plan

Uploading a exported file from AutoCAD Map, is made by adding a vector layer from the toolbar. The same is done to any format supported by QGIS. It opens up a standard dialog that allows to navigate through folders and choose the desired file. Select a file in the list, and the file is loaded into QGIS.

• **Loading textual attributes**

Textual informations can be loaded at the same time achieving raster vectorisation, after setting the workspace. Another possibility is that, to import a database made in another program (eg. Mircosoft Access program, file with the extension. .dbf). Save the original database in the format supported by QGIS, in order for it to read and interpret data. In QGIS database is loading easiest way with the help of command drag & drop (Fig. 2.5).

For the present study, the database is divided into 15 columns with technical and legal informations related to properties in cadastral sector 47. Thus, the following informations are displayed:

- property technical informations: parcel number, surface from property title, surface from partition plan , category of use, neighborhoods;

- number of the property title and owner of the property.

Nr. crt	No. property title	Owner	Field	Parcel	Surface from the property title	Sufrace from the parcelling plan	Category of use
1	70240	POSTUDOR I. ION	47	771/1	3600	3600	A
2	69895	ZAHARIA I. GHEORGHE	47	771/2	3600	3600	A
3	69525	COPACEANU I. DUMITRU	47	771/3	3245	3245	A
4	69889	ZAHARIA V. DUMITRU	47	771/4	10000	10000	A
5	69795	PAMFIL GH. GHEORGHE	47	771/5	5000	5000	A
6	68964	STEFURAC I VASILE	47	771/6	8800	8800	A
7	70456	CUCIREVE D-TRU MARIN	47	771/7	8500	8500	A
8	260180	ABABEI GH. NECULAI	47	771/8/1	5000	5000	A
9	70610	PASCARU C. MARIA	47	771/9	6800	6800	A
10	68961	ONICA GR MARIETA	47	771/10	6200	6200	A
11	68965	ROTSU I IOAN	47	771/11	7100	7100	A
12	69662	ROSU I. DUMITRU	47	771/12	3200	3200	A
13	70691	DONCILA C. MARIA	47	771/11/1	5400	5400	A
14	69163	ROTSU H IOANA	47	771/13	12100	12100	A
15	70765	STOIAN P. JAN	47	771/14	5000	5000	A
16	70532	ANICAI V. PETRU	47	771/15	5000	5000	A
17	68970	ZACORNEA I PETRU	47	771/16	3600	3600	A
18	69885	CIOPEICA P. V. MARIA	47	771/17	3200	3200	A
19	-	DURA ELENA	47	-	-	5900	A
20	70093	PERIAN GHIORGHI	47	771/19	10005	10005	A
21	-	PAMFIL GHEORGHE	47	-	-	3600	A
22	68963	TOFAN AUREL	47	771/21	6300	6300	A
23	68960	NEAMTU ZOITA	47	771/22	3200	3200	A

Fig. 2.5 - Extract from textual database introduced in the QGIS

d. Exploitation and query of the database

Using Quantum GIS, there have been made a number of queries. By using the **advanced search menu** that allows the user to perform queries SQL - Structured Query Language. The selection displayed as well attribute table, and on the digital plan. For better management of the selection, in the attribute table, the software the options it offers, the user can move the selection of the head table, to display only selected items, etc.

Based on the informations registered in the database, were done a number of queries on existing properties in the cadastral sector 47, as follows:

- queries regarding technical informations of the properties (the surface, cadastral identifiers, neighborhoods)

- queries on informations related to the owner and the property title.

Using existing informations in the database, have resulted in a several conclusions.

• It notes differences on parcel number in property title, to the partition plan, and changes to this location of it. However, there are a significant number of **errors of the cadastral identifiers in the property titles**. Thereby, 9 of the 153 titles have wrong the parcel number (eg. 711/154 instead of 771/154, or 39/771 instead of 771/39), and 2of the 153 titles were the number of the cadastral sector wrong (eg. 7 instead of 47) (Fig. 2.6).

• An important analysis is related to the **neighborhoods of the properties** registered in the property titles. From the query that use the columns in whichare registered the neighbors of the properties, shows that 7 of the 153 property titles have the neighbors represented by linear details wrong (in this case, DE 789, East and DE 752 ,West). This query can be done and using the column *Observation*s from the database, that contains this informations (Fig. 2.7).
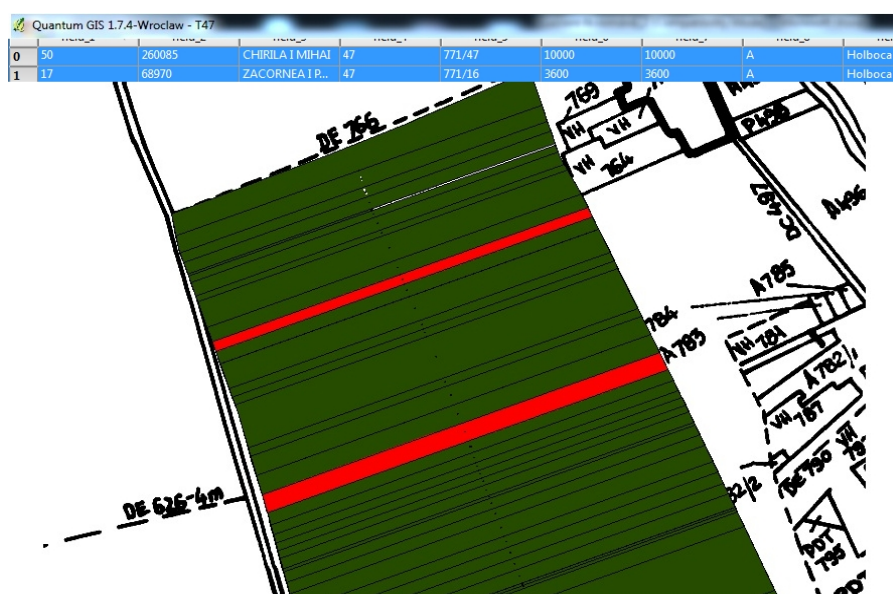

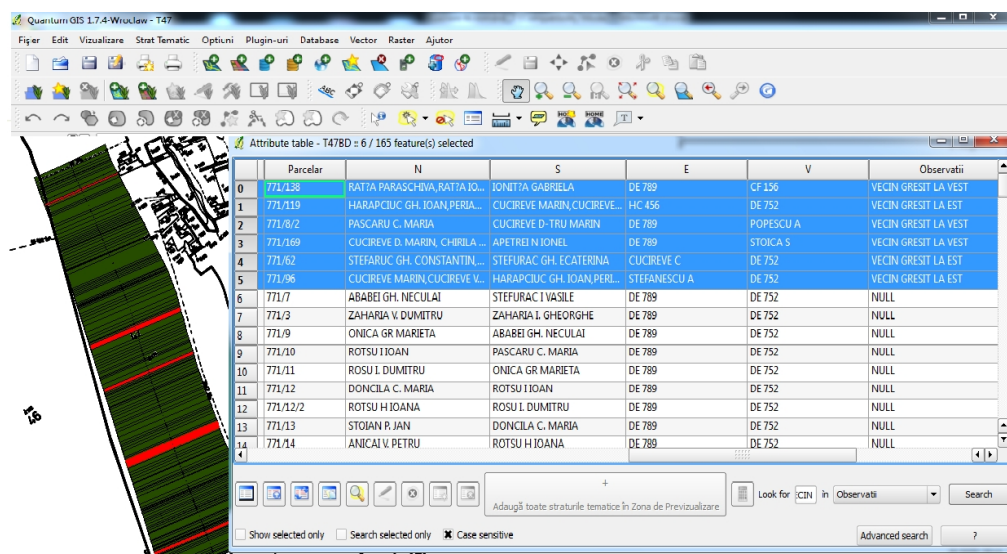Fig. 2.6 – Enquiry about the wrong cadastral identifiers of the property titles

Fig. 2.7 – Enquiry about the wrong neighborhoods of the properties titles

• Regarding duplicates of property titles for the study area were determined **3 property titles with the same parcel, same owner and same area**.

• Concerning the differences between the areas included in the property titles and the partition plan analyzed, it is noted that 17 of the 165 properties have **surface from the property title different that from the parcelling plan**, with reference that the majority of surfaces are in the partition plan higher than in the property title.

• The total surface of properties resulting from the summation of all the property titles is **120.65 hectares (1206498 sqm)** and the partition plan is **130.91 hectares (1309098 sqm),** resulting in a difference of 10.26 hectares. This is due to the fact that 12 properties have not emitted property title, but also for some property titles were emitted for other surfaces of the parcelling plot.

Graphical database and textual atributes is structured and maintained in two parts, spatial and textual, so that, in the operational phase and query, are obtained the main reports used in local public services.

• **Obtaining reports**. The types of reports, after the way of presentation, are:

- **graphical form**, such as cadastral plans;

- **textual form**, respectively cadastral registers (on the screen or printer) with content and structure required by the regulations;

- **mixed form**, respectively the graphics can be integrated into reports, tri-dimensional views, etc.

- **other reports** specific to domain which has been achieved (EXCEL reports, reports combined operational queries, etc.).

• **Obtaining digital plans**. Depending on the type of data contained in the space component database, obtained in the elabotarion of digital cadastral plan, or data obtained in the preparation of the plan cadastral index, can quickly be edited:

- basic cadastral plan;

- thematic plans at different scales;

- graphic support of the cadastral plan index.

These graphics products are necessary because the information transmitted through the plans are more suggestive than those sent by other methods, because, for example, to identify the position of a property is much simpler and faster on a plane, if it has only his address. These records are then completed, where appropriate, the elements necessary to obtain records of each information system in the field.

• **Obtaining specific reports**. According to field of activity established, its database can be queried to achieve different information in the form of specific reports, such as:

-**properties queries**, to identify properties that belong to the same owner or viewing the parcels from the same group cadastral;

-**parcels queries**, to highlight the same land use category, possibly depending on the initial destination.

e.Case study's conclusions

• From the analysis of 153 titles, it follows tthat there are some irregularities in the sense that they encounter errors such as:

- **writing errors in the property** titles occur, either due to lack of training of those who drafted them, or the lack of a structured database to city halls regarding the properties and the owners. As a writing error we can mention: misspelling the names of the owners, of the area included, neighbors, localities;

- **errors due to database unstructured and lack the necessary information**. For these reasons, errors occur on cadastral identifiers (lack of a cadastral identifier, or writing it wrong). Regarding the parcel stated in property title, such errors can occur: no parcel, parcel misspelled, misspelled field etc. Thereby, in the chosen study area were encountered cases where a parcel is recorded on two titles, or adjacent parcels have entered wrong neighbors in the property title.

- **errors regarding the written surface**, because the wrong writing, or the wrong evidences.

- **errors due to inconsistency of the parcellig plan and the property title** regarding the owner name, parcel or area.

• **Regarding the software used, Quantum GIS:**

- **it represents an viable alternative to commercial platforms**, both from the economic point of view and from a technical standpoint;

- can be used profitably due to **the high degree of customization**;

- **steps to achieve a SIC are considerably** reduced compared with those of Microsoft Access Software and AutoCAD Map. From here results time savings, personal, and cost;

- **it supports various data formats,** so that they can integrate into a single project, both raster images and digital plans related databases, that were previously made by other programs;

- the most important advantage of Open Source solutions is the independence from provider, the user having access to sources;

- Open Source solutions have better quality because they are developed and tested a whole community, **are relatively easy to use**, and are not necessarily free, but rather open and free, **open to information about the product version, the content and their requirements**, to everything is linked to the system.

3. Conclusions

The study made the following conclusions:

1. Number and percentage of property titles with errors is high, which means that owners are **unable to enroll in the Land Register**, a property owned, in short time.

2. Competent authority is required to take necessary steps to establish accurately the existing situation **writing errors in the property titles** to the administrative-territorial and national level.

3. **Regarding the impact of using Quantum GIS in public administration**, it is noted that may have a positive impact, as it may determine at any time the history of a property, existing errors and correct them easily in the database.

4. References

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3. *** *Ordinul 634* din 13.10.2006 pentru aprobarea *Regulamentulului privind conţinutul şi modul de întocmire a documentaţiilor cadastrale în vederea înscrierii în cartea funciară* şi *Legea cadastrului şi publicităţii imobiliare nr. 7/1996.*

4. *** *Legea cadastrului şi publicităţii imobiliare nr.7/1996, cu modificările şi completările ulterioare.*