



Emerging Markets Queries in Finance and Business

Usage of location analysis software in the evaluation of commercial real estate properties

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Abstract

As mentioned by the specialized media, in Romania, in the recent years the banking system and the companies are facing a massive reduction of the values for the commercial properties developed or acquired before the crisis. It is widely known that the value of the commercial properties is directly linked by their location. Considering these elements the current paper focuses on combining specific financial and accounting valuation techniques with location analysis techniques for a better assessment of the values for the commercial real estate properties. While the financial and accounting techniques use methods of calculation established according to the International Valuation Standards, on the other hand this task can be highly simplified if it uses land property management systems or information systems such as the GIS (Geographical Information System). The main function of the land property assessment system, is to define the quantitative and qualitative assessment of the property in order to assess the market price while the main function of GIS based systems is to use economic and cadastral information in coordination with other elements such as: physical factors, social factors, taxation, infrastructure, pollution and noise, economic factors and legal factors in order to facilitate a good assessment of the value of an industrial property. The paper analyzed both the economic factors: based on the International Valuation Standards and also the locational factors of a property valuation and identified the common factors which are used in both methods and which can provide excellent solutions in property valuation.

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1. Introduction

Affected by the crisis the value of the properties all over Romania witnessed a significant decrease in the last four years. This effect was mainly felt by the banking system, the companies or by some local authorities which are facing a massive reduction of the values for the commercial properties developed or acquired before the crisis. As an effect of these negative changes most Romanian companies reduced the values of their assets in their financial reporting documents. For the Romanian companies which are registered and traded on the Bucharest Stock Exchange the effect was witnessed as negative corrections to the total assets of the companies. In the same time it is widely known that the value of the commercial properties is directly linked by their location in the first place and is linked to the value of the future income in the second place. Considering these elements, the current paper focuses on combining specific financial and accounting valuation techniques with location analysis techniques for a better assessment of the values for the commercial real estate properties.

Determination of the market value for a commercial property must respect the techniques from the International Valuation Standards (ANEVAR, 2014). These standards are established by the International Valuation Standards Committee (IVSC) and when used to establish the value of particular property the valuation method is chosen depending on property category and considering of the scope of the valuation.

Since the experts defined differently the value of a commercial property the International Valuation Standards, 2013 considers the most common to be:

- Market value is considered according to IVSC, 2013 to a value exchanged on a specific date between two parties, each of them aware of the market advantages and disadvantages and without any compulsion.
- Net present value of a cash-flow, which is generated by the assessed property for a specific owner and for a special use. This value might be below or above the market value, according to the specific conditions of the market, economy, etc.
- Terminal or liquidation value is the value of a property which is assessed in case of forced liquidation and usually is way below the market value since it assumes that the commercial property is in bankruptcy
- The investment value is considered to be the value which is important to a specific investor. This value might be or might not be upper than the market value of a commercial estate. This value is influenced also by the particular motivation of the investor.

After establishing the type of valuation needed can be selected the proper evaluation methods to be used in any particular case (The European Group of Valuers' Associations, 2012):

- The comparative method - considers the market value as the same with the real price recently paid in a transaction for a comparable property. The main difficulty is to establish what the market recognizes to be recent or alike.
- The income-method - is another approach based on comparisons which argues that the market value of a property shall be identical to the current value of the income (which is calculated as gross income minus overheads) should come in the future of asset
- The cost method – considers the construction/entrepreneur method. It supposes that the cost for substitution, minus depreciation applicable, shall be the same to the value.

Since the goal of this paper is to assess the usage of location analysis software in order to value commercial real estate properties the method tested will be the comparative method for which an important factor is the type of the property, location of the property and its connections to other elements such as public services, pollution, so on. Real estate market values may differ in a large extent depending on the type of fiscal and functional areas, reputation and popularity of the quarter, position of the plot in relation to the functions within the town/village, the existence within the area of utilities (electricity, water, phone, heating, gas, etc.), access to additional services (health, education, leisure, recreation, commercial, etc.), and crime rate in the region or possible ecological issues.

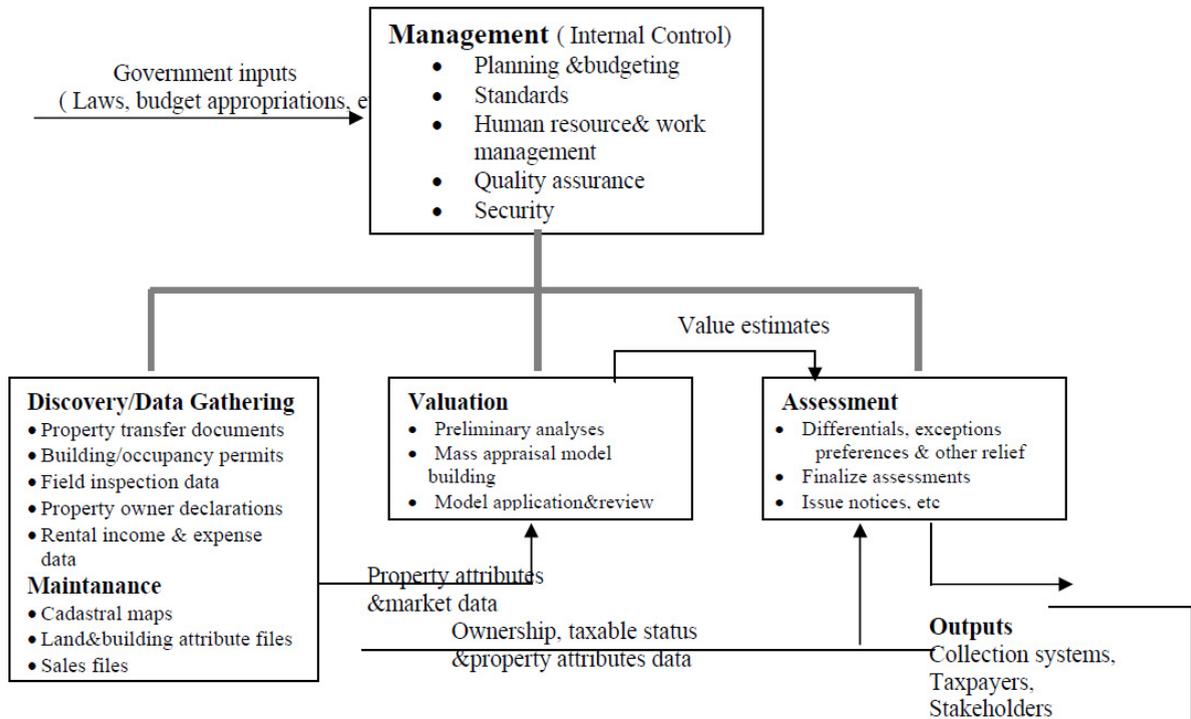


Fig. 1. Commercial real estate valuation system (source Droj G. et al, 2010)

As we presented before, the main function of the evaluation system of ownership, is to establish a quantity and quality assessment of the property and in order to estimate the proper market value. The upper figure shows the internal control, discovery/data gathering and maintenance. Also it shows the market study and the assessment and valuation roles of a real estate valuation system. Management evaluation program should be economic. Real estate valuation is depending on data that which are have the following characteristics: "relevant, accurate, timely, and economical to maintain" (International Valuation Standards Committee, 2013). The relevant data reflect the criteria which make an estate wanted or unwanted in the property market. These criteria are highly relevant in order to select a certain valuation method. All maps/plans and documentations covering data related to the commercial property assessment and taxation of property is considered to be the "fiscal-cadaster" Building, maintenance list and database attributes are the main and therefore most time consuming and costly aspects of assessment and property tax system.

Data management tasks include analysis of needs for data collection and also the strategy for choosing custom based data back-up and recovery facilities. Working steps related to creation and administration of good database properties are including (Droj G. et al, 2010):

- *Development of cadastral maps and parcel identification numbers.* The new created maps must be electronic, because they constitute the main component of a GIS system. A comprehensive and updated package of cadastral maps is ensuring the most efficient approach to register the properties. The thematic maps are detailing the position, profile, and are measuring each plot, being the main factors in determination of the value of the property. Cadastral numbers must exclusively recognize a distinct parcel, and allows linking of surveying data, cadastral data and taxation information. Each time a plot is separated or joined with a different plot, the plot identification number which was initially allocated to identify the plot, will not be used again. A new cadastral number or identifier must be allocated to the plot and the previous identifier must be removed. Otherwise, suffixes might be attributed to a "parent" identification

number to show if a change has been made. If the plot identification numbers are not exclusive, the market analysis can be confused, taking to unclear tax obligations.

- *Permanent conservation of plot and construction alphanumeric attribute records.*
- *Permanent upkeep of transactions registration.*
- *Permanent updating of the register of ownership and its link to taxation.* Fiscal cadaster should include updated information about the people responsible for assets taxation and the eligibility for tax absolutions or other types of asset tax aid.

2. USING GIS IN LAND VALUATION PROCESS

In recent years, there has been many studies which were done regarding the use of statistical models for valuation of residential properties. The most extensively used statistical model in investigating the relationship between the real estate value and real estate characteristic is the hedonic based regression model (Sibel 2008, Watcher 2005, Lisi 2013). The main motives for this widespread application are investigating domestic demand for the attributes of the properties as well as the index of the construction prices for residential properties (Sheppard, 1999).

The hedonic pricing model calculate the value of a real estate property by decomposing into characteristics like number of bedrooms, number of stories, size of lot and summing the estimated the prince per characteristics. These method was easily automatized but in this case two similar real estate properties with similar characteristics: distance to the centre, size of lot, building material, number of bedrooms, similar surface has closer value. The main criticism for the hedonic model is the price dispersion of the real estate market based on spatiality.

In the property market, it is a well-known fact that the value of a commercial property is essentially created by the location. Therefore introduction of GIS technology into statistical real estate assessment models has been considered to be highly efficient.

The geographical informational system is usually used to improve the efficiency of the real estate statistical valuation models in different ways. Wachter et all(2005) proposed an improvement of the Hedonic based Automated Valuation Models (AVM) based on maximum likelihood algorithms. (Wachter et all, 2005) taking in consideration the medium price of neighboring properties, for diverse distances. This solution is calculating the price of a real estate property as an interpolation algorithm. This model has also limitation because two properties in the same neighborhood can be very different as structure and characteristics in order to correct this limitation a “residual” value is added.

We consider that the hedonic statistical valuation models should be improved as spatial decision support systems. The usage of decision making system, which is able to realize spatial analysis, in property valuation is used for supporting the judgment for vendors and buyers and is becoming more and more popular. We propose to extend the functionality of spatial decision support systems in assisting the valuation process too.

The spatial analysis decision making in property market is a GIS based decision support instrument which is established on a systematic and automatic basis, and which can improve manual procedures in the commercial property valuation activity.

In order to evaluate a commercial property, the spatial decision support system must fulfil two types of analyses:

- An analyses regarding the physical and social environment of the property;
- A financial assessment of the properties.

While the financial assessment of the property can be done with hedonic regression methods, or based mainly on the experience of the expert, to analyze the physical and social environment is taking in

consideration the following indicators:

- **Physical factor:** Slope and aspect of the land, vegetation, parks, rivers, natural parks, agricultural potential, landscape, soil conditions,
- **Social factors:** commercial areas, schools and nurseries, hospital and health centers, entertainment possibilities theaters, leisure areas, car parks, open areas, criminality, neighborhood, ;
- **Infrastructure:** road network, public transportation stops, railway stations, supplied basis services (sewage, water pipelines, electricity, gas, central heating, internet, cable, so on)
- **Environmental factors:** auto traffic pollution and noise, industry pollution, railway noise, airplane noise, pollutions caused by animal breeding ;
- **Economic factors** – price trends, taxes,
- **Legal factors** – permitted type of functionality, permitted number of floors, permitted construction area,

Since all these elements are included in a Geographic Information System based on the cadaster system, in the next part of the article, we will present the influence of each of the indicators over the value of commercial properties: buildings or land within the city of Oradea, Romania. First we will present the initiation phase: the raster containing the 3D model of the city.



Figure 2. 3 D model of the city of Oradea, Romania – Initiation Phase



Figure 3. Generation using GIS software of the cadastral information regarding a specific commercial property situated in the city centre of Oradea.



Figure 4. Generation using GIS software of the functionality classification (commercial, industrial, residential) of each building in an area situated in the city centre of Oradea

As can be seen, all these factors are having a decisive influence over the value of a certain industrial and commercial property within the city. It cannot be denied that a prime influence over its value can be directly considered to be the function of the building: residential, industrial or commercial and its compliance with the zoning of the city. It is definitely certain that an industrial building situated in wrong area of the city where through the zoning regulation it is forbidden heavy traffic or pollution and noise has a degraded value in comparison with a similar building located in a special designed industrial area which has also proper infrastructure. The same situation is met when analyzing other factors such as the social factors in case of valuation of leisure or commercial property.

3. CONCLUSIONS

The current paper tackled the issues regarding the calculation of a value for a commercial property located within the city of Oradea. As can be observed a good assessment of the property value can be obtained by

integrating economic and building construction information with the spatial analysis. Since the GIS can deliver accurate and objective information regarding the characteristics of a certain parcel the specialized valuers can use this system to better assess the value of the proposed commercial property. Since GIS is frequently used for cadaster administration and in the last years for taxation it can also be introduced fairly easy through simple technological and database investments as a good instrument in order to select a relevant comparable in the valuation process when using the comparison methods. By usage of the GIS to access information previously existing and easily obtainable from the electronic archives an assessor can easily approximate and later justify precisely how he estimated the value of a property and which factors are influencing it in a direct and indirect matter. If this information is combined and integrated with economic, financial and accounting information of a commercial property than some elements of the property valuation process can be automated, shortening the process and ensuring a more accurate estimate of the market value.

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