

UDK: 347.235:004.8
DOI: 10.5937/PDSC24731S

Marina Šimić Karaula, mag. iur.

*Upravni odjel za investicije, fondove Europske unije i imovinu, Odsjek za investicije
i imovinske poslove, Grad Vinkovci*

email: marinasimi@gmail.com, 00385981769085

POVEĆANJE EFIKASNOSTI UPRAVLJANJA NEKRETNINAMA U VLASNIŠTVU GRADOVA PRIMENOM VEŠTAČKE INTELIGENCIJE

Sažetak:

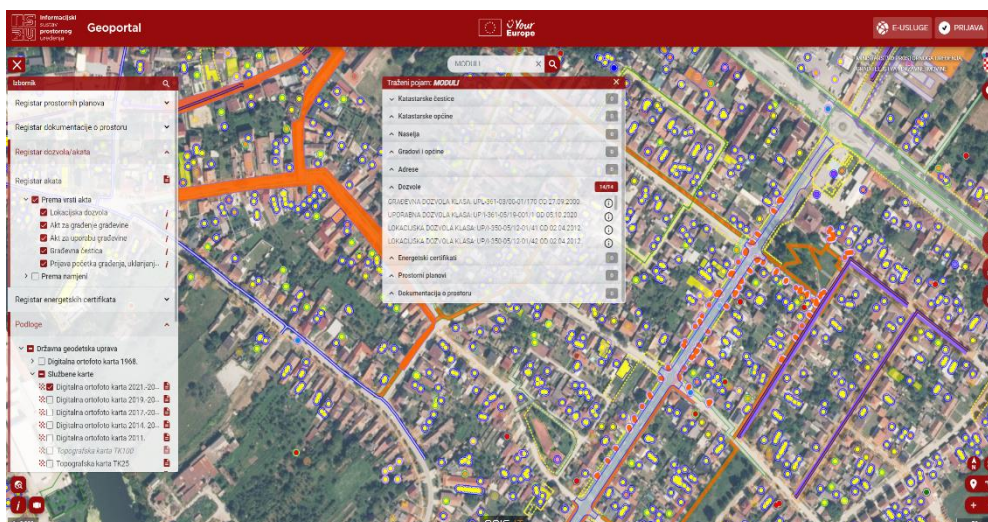
Danas, u vreme ekspanzije razvoja računalnih sustava i digitalne transformacije javnopravnih tijela, a posebno poslovanja gradova kao jedinica lokalne samouprave u Republici Hrvatskoj, veštačka inteligencija je pojam koji se sve češće koristi. Izazov svakog grada je da svaku imovinu u svom vlasništvu učini funkcionalnom i da poveća efikasnost upravljanja. Da bi se to postiglo, grad mora imati tačne podatke o svakoj nekretnini. Ovi podaci se odnose na oznaku katastarske parcele, površinu, tržišnu vrednost, namenu u kojoj se nalazi prema važećim prostornim planovima, vođenje eventualnih sudskih sporova, tereta i sl. Upravo je veštačka inteligencija ta čija bi upotreba gradu omogućila da neku nekretninu stavi u funkciju koja će ju maksimalno „probuditi“ i rezultirati maksimalnim povećanjem prihoda te smanjenju troškova održavanja. U ovom radu govorimo o tome šta je veštačka inteligencija, kako njena primena utiče na upravljanje nekretninama u vlasništvu gradova i koje su sve zamke i nedostaci u njenoj primeni.

Ključne riječi: grad, umjetna inteligencija, nekretnine, upravljanje, učinkovitost.

1. INTRODUCTION

In the Republic of Croatia, cities as local self-government units own a certain number of properties. Most of these properties were acquired by cities through legal succession from the former municipalities that existed in the Socialist Federal Republic of Yugoslavia. According to the principle of territorial division, they became the owners of those properties that were located on their territory at that time. Additionally, some properties were acquired by cities as escheat property, assets without heirs, or because the heirs renounced the inheritance due to generally high monetary debts. A small portion of the properties was acquired by cities through purchase or donation. However, most of these properties are not "active," meaning they are not utilized in a way that would allow the city to maximize revenue and minimize maintenance costs, ultimately leading to more successful performance of tasks within their self-governing scope. Upon joining the European Union, the Republic of Croatia was granted access to financial resources from European funds. Thus, a significant step towards the digitalization of monitoring spatial conditions and data related to property status was made through the creation of the Information System for Spatial Planning (ISSP) and its modules. This system allows for the entry, verification, public disclosure, and exchange of spatial data. The value of this project was a total of 17.5 million euros, with the largest percentage funded by the European Regional Development Fund under the Operational Program of Competitiveness and Cohesion 2014-2020. The SIS encompasses several modules such as GEOportal, ISSP-locator, eRealEstate, eCatalog, ePlans, ePermit, eArchive, eEnergy Certificate, eSpatial Inspection, and eConstruction Diary, and is continually being upgraded. All modules can be interconnected. The entry of high-quality and accurate property data into such a system with all its associated modules enables artificial intelligence to determine the best and most efficient function for each individual property. In other words, an intelligent algorithm can select the most suitable purpose for each property based on the specified characteristics and predict what will happen to it in the future on the real estate market, providing not just a bunch of written data but also a concrete visualization of it in its actual state.

Picture 1. Display Information System for Spatial Planning (ISSP)



Source: Official website ISSP, Geoportal

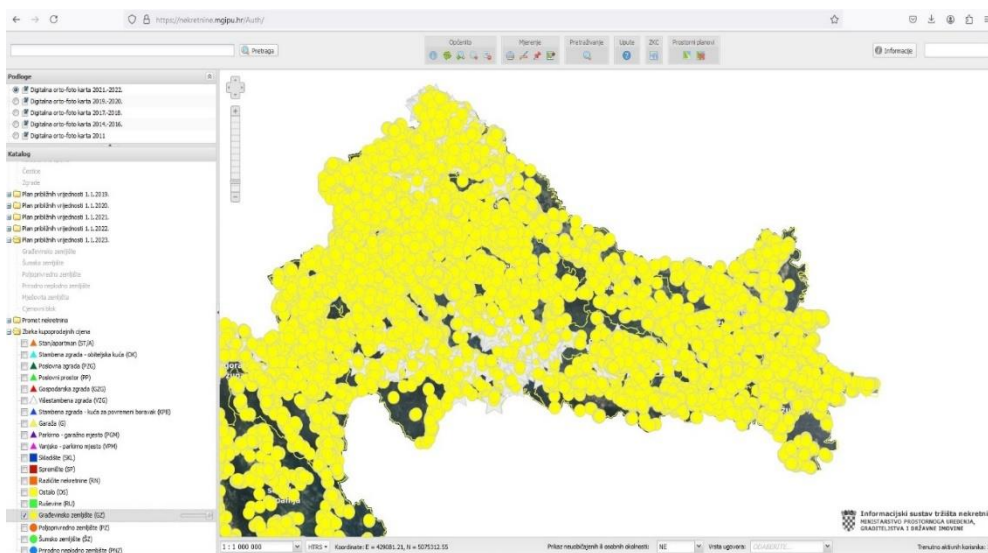
2. THE ROLE OF ARTIFICIAL INTELLIGENCE IN REAL ESTATE MANAGEMENT

To manage city properties as efficiently as possible, employees in the administrative departments responsible for these properties are required to analyse each individual property before making decisions about its use. These processes are time-consuming and require specific knowledge and skills. The analysis involves visiting the relevant cadastral office, visiting the land registry department, waiting for the urban planning office's assessment of the property's designation according to the urban plan, visiting the state archive, preparing an appraisal report to determine the market value of the property, conducting field visits, and many other tasks. Additionally, the city is required to know which properties it owns and maintain an accurate, updated, and high-quality real estate register. With the gradual development of digitalization, cities can create such a real estate register with all the necessary data using specific software solutions. This register categorizes properties into portfolios such as apartments, undeveloped building land, communal infrastructure, sport and cultural facilities, and so on. The process of obtaining information about each individual property has been reduced from months to days or even, in certain situations, hours and minutes.

3. MARKET VALUE OF REAL ESTATE

The market value of a property is the starting point for its management. Before any disposition of a property, including sale, purchase, lease, establishment of building rights, and establishment of easements, cities are required by the Law on Real Estate Valuation (Official Gazette No. 78/2015) to obtain the market value from an authorized court expert for real estate valuation. This also includes the amount of compensation for the established easement or building rights. An integral part of every valuation report is an extract from the collection of sale prices, which is issued from the eNekretnine web application, a component of the Information System for Spatial Planning (ISSP) module. The data in eNekretnine is publicly available and subject to data protection regulations. It is stored electronically in a manner that allows for finding, processing, analysing, displaying, and interoperability of processed data. This system consists of a collection of sale prices and a plan of approximate values (Urlih & Majčica, 2016). The collection contains all sales contracts realized throughout whole territory of the Republic of Croatia.

Picture 3. Screenshot from the app eNekretnine traffic display
building land



Source: The official website of the system eNekretnine

Additionally, as per the law, every valuation report must be confirmed by the competent Appraisal Commission. However, although the market value and compensation assessments are conducted by authorized court experts based on data from the eNekretnine application and reviewed by the Appraisal Commission, there is the possibility of human error or bias. The appraiser, when preparing the valuation report to determine the market value of a property or compensation for established easement or building rights, may choose the wrong assessment method, incorrectly mark the valuation date and quality, fail to consider unusual circumstances related to the property, mislabel the land category, or misuse adjustment coefficients and make other errors. These valuation processes are generally time-consuming, often lasting a month or more. Artificial intelligence, using machine learning algorithms, prevents such errors. Machine learning is a subfield of artificial intelligence that involves machines learning from data without being explicitly programmed (Florkin, 2024). Machine learning algorithms can find the required data and use this information to make predictions or perform tasks. By analysing large amounts of data quickly from multiple sources, including construction dates, current property conditions, achieved sale prices for similar properties, and energy ratings, artificial intelligence can assess and obtain accurate and reliable market values for properties within minutes. Artificial intelligence relies solely on data entered into public registers and information systems that record sales, real estate transfer taxes, types of properties, land-use plans, and more. The speed and efficiency offered by artificial intelligence in property valuation mean that cities can make quick decisions regarding disposition, such as: Sell or retain a property? Lease it? Establish building rights or easements? Apply for funding under EU projects?

4. FUTURE TRENDS IN THE REAL ESTATE MARKET

By analysing past and current data, artificial intelligence can predict trends in the real estate market. It can forecast whether market prices will rise or fall in the future and what types of properties will be most sold. For instance, based on the number of residents in a particular city and the number of household members, data maintained by the Croatian Bureau of Statistics based on population censuses, Artificial intelligence can predict whether 40 m² or 100 m² apartments will be more in demand. Will rental prices rise or fall? If a state road (highway) is planned for construction on certain properties and a location permit has been obtained and entered the ISSP system - ePermits module, artificial intelligence can accurately predict market price trends for these and neighbouring properties, thus guiding future buyers or sellers on how to maximize profits. For a city, this means predicting the budget allocations for specific purposes. It also facilitates the city's preparation of the Annual Property Management Plan and the Property Management Strategy, crucial strategic

documents. The real estate market is constantly changing and depends on local and global politics, economic and economic changes. Artificial intelligence's capability lies in continuously monitoring and analysing market conditions and mitigating any crisis. It enables real-time real estate market monitoring and decision-making based on the latest data, thereby minimizing possible fraud and speculation.

5. VISUALIZATION OF PROPERTIES

An important segment in property management, besides market value, is the actual, current condition and appearance of the property. What does it look like in reality? The answer can be provided by a virtual tour. Artificial intelligence allows us to "move" through the entire interior and exterior of the property using photos and videos. This is crucial for selling properties. Cities sell and lease their properties through public written tenders based on the principle of "as seen" or "in seen condition." Visualizing each property on sale would eliminate certain uncertainties and give potential buyers insight into the actual condition, regardless of their geographical location. Visualizing a property in such a manner allows potential buyers to customize it, adding furniture, changing wall colours, or, in the case of undeveloped land, placing a desired object (house, garage, etc.). Such possibilities would undoubtedly speed up the decision-making process for purchasing as the buyer could connect with the property and imagine themselves as its owner.

6. IMPACT OF ARTIFICIAL INTELLIGENCE ON PROCEDURES FOLLOWING DISPOSITION DECISIONS

Once a city decides to dispose of a property, the process is not over. For instance, if the city sells its property, it must issue a Tabular Statement confirming that the buyer has paid the purchase price in full, notify the authorized electricity, gas, water, and telecommunications distributors, and handle other related matters. The buyer must register the sales contract in the land registry and record themselves as the owner and possessor in the cadastral office. In certain cases, the buyer would need to change their residence, and consequently, personal documents. The sales contract must also be filed with the relevant tax authority for the buyer to pay the real estate transfer tax. All these processes require time and incur additional costs. Artificial intelligence could automatically handle all these tasks quickly and, most importantly, without extra costs. In the case of leasing city apartments, artificial intelligence could instantly verify candidates. The city would immediately know whether the candidate meets all the conditions prescribed by internal decisions, such as continuous residence in the city for the past ten years, income levels, number of children and household

members, birth certificates, debt status towards the state or city budget, etc. Artificial intelligence could automatically, using data from public registers, provide an answer on whether the candidate qualifies for an apartment and suggest an apartment of suitable size, determining the monthly rent accordingly. The building manager, tenant representative, and authorized distributors of electricity, water, gas, etc., would be automatically notified. As artificial intelligence advances, it is certainly possible and likely that within the next few decades, machines will perform almost all routine physical and mental tasks more cheaply (Russell, 2022).

7. ADVANTAGES AND DISADVANTAGES OF ARTIFICIAL INTELLIGENCE IN CITY PROPERTY MANAGEMENT

Table 1. Advantages and disadvantages of artificial intelligence in city property management

ADVANTAGES	DISADVANTAGES
transforms properties from so-called 'dead capital' into properties that generate certain revenues for the City	the issue of transparency and protection of personal data
high speed of data integration and making decisions and conclusions	lack of human influence and potential misuse
determining the most efficient use of each individual property	potential bias due to algorithms being tied to data entered into public registers by human hands
quick and accurate determination of the market value of a property	technical complexity because the use of artificial intelligence requires specialized knowledge and skills of employees
automatic linking with other public registers	the use of artificial intelligence leads to a reduction in the number of employees
automatic updating of data after making a decision on disposition	high costs of procurement and maintenance
improves the efficiency of property management	operating based on predefined patterns

Source: Created by the author

8. CONCLUSION

We cannot overlook and ignore the technological changes happening around us. Whether we want it or not, they are part of our everyday private and professional lives. The decisions that a city makes within its authority and jurisdiction directly impact our lives as citizens. From planning settlements and housing, spatial urban planning, utility management, childcare, social welfare, culture, physical culture, sports, and other tasks defined by the Law on Local and Regional Self-Government (Official Gazette No. 33/01, 60/01, 129/05, 109/07, 125/08, 36/09, 36/09, 150/11, 144/12, 19/13, 137/15, 123/17, 98/19, 144/20). One such task is the efficient management of city properties. Until a few years ago, cities did not maintain updated property registers in digital form but on paper. With the development of digitalization, things are changing, and cities are using computer programs to create quality and data-accurate property registers with all the data characteristic of each property, categorizing them into portfolios and linking them with other systems such as land registers, cadastres, and the Information System for Spatial Planning (ISSP). Such property records provide a starting point for artificial intelligence to use certain algorithms to obtain data, process it, link it with other public registers, and draw conclusions. This way, artificial intelligence enables cities to make better strategic decisions related to properties, especially those concerning the withdrawal of funding from European Union funds. However, although the application of artificial intelligence makes property management more efficient and minimizes errors, it requires significant financial investments, employee training, and, in some cases, employee layoffs. As artificial intelligence advances daily, it is expected to drive new innovations in the real estate market, increasing its transparency. All of this increases citizens' trust in the work of cities as local self-government units. It is up to us to follow the development of AI and master its use so that we have more time to address issues that AI cannot answer.

Marina Šimić Karaula, mag. iur.

*Administrative Department for Investments, European Union Funds and Property,
Section for Investments and Property Affairs, City of Vinkovci*

INCREASING THE EFFICIENCY OF MANAGING REAL ESTATE OWNED BY CITIES THROUGH THE APPLICATION OF ARTIFICIAL INTELLIGENCE

Abstract:

Today, in the era of expanding computer systems and digital transformation of public authorities, especially the operations of Cities as local government units in the Republic of Croatia, artificial intelligence is a term that is increasingly being used. The activation of each property owned by the City and the improvement of management efficiency are challenges faced by every City. To achieve this, the City must have accurate data about each property. This data includes the cadastral parcel number, area, market value, current usage according to valid spatial plans, any ongoing legal disputes, encumbrances, etc. It is precisely artificial intelligence that would allow the City to put a property to its best possible use, resulting in maximum revenue increase and maintenance cost reduction. This paper discusses what artificial intelligence is, how its application affects the management of properties owned by Cities, and what pitfalls and drawbacks its application may have.

Keywords: city, artificial intelligence, real estate, management, efficiency

9. LITERATURE

1. Croatian Encyclopaedia, online edition. Leksikografski zavod Miroslav Krleža, 2013. – 2024. Retrieved on 23. July 2024. From: <https://enciklopedija.hr/clanak/umjetna-inteligencija>.
2. Sustav eNekretnine. (Retrieved on: 14. lipnja 2024). From: <https://nekretnine.mgipu.hr/Auth/>.
3. Uređena zemlja, Nacionalni program sređivanja zemljišne knjige i katastra (Retrieved on: 24. July 2023). From: <http://www.uredjenazemlja.hr/>.
4. Urlich, Ž., Majčica, B. (2016) Priručnik za procjenu vrijednosti nekretnina, Zagreb, DGIZ-Društvo građevinskih inženjera Zagreb,
5. Law on Real Estate Valuation (Official Gazette of RH, no. 78/2015)
6. Law on Local and Regional (Regional) Self-Government (Official Gazette of RH, no. 33/01, 60/01, 129/05, 109/07, 125/08, 36/09, 36/09, 150/11, 144/12, 19/13, 137/15, 123/17, 98/19, 144/20).
7. Russell, S. (2022). Kao čovjek. Umjetna inteligencija-napredak ili prijetnja?, Zagreb, Biblioteka matrix.
8. Florkin, J. (2024). AI u nekretninama: 8 nevjerojatnih poglavlja o tome kako revolucionarizira vlasništvo (Retrieved on: 30. July 2023). From: [AI u nekretninama: 8 nevjerojatnih poglavlja o tome kako revolucionarizira vlasništvo \(julienflorkin.com\)](https://ai.unekretninama:8nevjerojatnihpoglavljaotomekakoirevolucionariziravlasnistvo/julienflorkin.com)

