

The Use of Modern Software Solutions in the Recognition of Rights to Unlawfully Occupied Land Plots and to Buildings and Structures Constructed thereon

Ixtibar Tuychiyeva, Gullola Kutumova, Albina Nizamova

Tashkent State Technical University after named Islam Karimov, Tashkent, Uzbekistan
gullolakutumova4@gmail.com

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Abstract

This article examines one of the most pressing issues in the field of cadastre: arbitrarily occupied land plots, the buildings and structures constructed on them, the legal procedures for granting rights to such properties, and the role of specialized software in accelerating and simplifying these processes. The study highlights the increasing relevance of this topic in connection with ongoing land reforms and the growing need for transparent and efficient land administration systems.

To ensure comprehensive coverage of the subject, the article makes extensive use of modern GIS technologies and high-resolution satellite imagery. These tools enable accurate identification of unauthorized land occupation, assessment of existing structures, and verification of land use patterns. Using advanced geospatial techniques, the article provides an in-depth analysis of the process of “Recognition of rights to arbitrarily occupied land plots and buildings and structures built on them,” demonstrating how digital technologies contribute to improving the reliability and efficiency of cadastral workflows.

Aerial photography materials from 2018, which provide full coverage of the entire territory of the Republic of Uzbekistan, serve as one of the key data sources in the research. These images were used to study, compare, and analyze land occupancy dynamics and to validate the accuracy of cadastral records.

Furthermore, the article provides detailed information on the concept of cadastre, the structure and purpose of state cadastres, and the procedures for their maintenance. It discusses existing challenges in the cadastral sector, including issues related to data integration, outdated records, and technological limitations. The paper also outlines current advancements and solutions that are being implemented to address these challenges and improve land management practices.

Overall, the study emphasizes the importance of integrating modern GIS tools, satellite data, and advanced software platforms into the cadastral system, highlighting their critical role in supporting transparent, reliable, and efficient recognition of property rights to arbitrarily occupied land plots and the structures located on them.

1. Introduction

In recent years, the Republic of Uzbekistan has devoted significant attention to the development of the fields of geodesy, cartography, and cadastre, creating extensive opportunities for professionals in these domains. A major emphasis is placed on the adoption and integration of innovative techniques and technologies, which serve as key drivers for modernizing cadastral operations. For instance, the compilation of cadastral documentation increasingly relies on digital data derived from satellite imagery, enabling the generation of accurate territorial maps and the efficient processing of spatial information [1].

The land cadastre serves as a foundational tool for the registration of land and other real estate objects, the collection and organization of data related to such properties, the regulation of property rights, and the resolution of related legal and administrative issues. Data obtained from the national land cadastre are instrumental in calculating land taxes, determining land use and development plans, and administering land lease procedures.

To streamline and enhance the accuracy of these processes, modern geoinformation systems (GIS) and satellite data are actively employed. The integration of high-resolution remote sensing imagery, aerial photography, and spatial analysis tools enables the precise identification of land boundaries, patterns of land use, and the physical characteristics of buildings and structures located on the territory. These technologies significantly reduce the likelihood of human error, accelerate

data verification procedures, and facilitate the monitoring of changes in land occupancy over time.

Within this context, the present work focuses on the recognition of legal rights pertaining to arbitrarily occupied land plots, as well as buildings and structures erected on such plots. The study examines the methodological and technological foundations that underpin the process of transforming de facto land use into officially recognized property rights. Particular attention is given to the integration of geospatial datasets with cadastral information systems, which allows for more objective and transparent decision-making by authorized state bodies.

Furthermore, the research highlights the growing significance of GIS technologies in the cadastre, geodesy, and cartography sectors, particularly in relation to property rights recognition based on satellite-derived spatial data and advanced software applications. The use of such tools not only enhances the efficiency of cadastral operations but also supports the broader objectives of land administration reform, including the formation of accurate state land registers, the standardization of spatial data, and the establishment of reliable mechanisms for monitoring land resources. These technological advancements contribute to greater transparency, improved public trust, and the creation of a more robust legal and institutional framework for managing land and property rights [2].

In addition, it should be emphasized that the accelerated development of Uzbekistan’s national cadastral system is driven not only by internal socio-economic demands but also by

contemporary international trends in land administration and spatial data management. In the context of rapid urbanization, the expansion of large-scale infrastructure projects, and increasing requirements for the accuracy and reliability of geospatial information, government agencies are faced with the need for continuous updating of cadastral records and the enhancement of mechanisms for their maintenance.

An important direction of state policy is the establishment of a unified digital spatial data infrastructure that ensures the integration of interdepartmental information systems, the standardization of data formats, and the application of high-precision territorial monitoring tools. The transition to electronic services and automated data-processing platforms provides opportunities for more efficient delivery of cadastral services to the population and reduces administrative burdens in the sphere of land relations.

Particular significance is attributed to the development of the regulatory and legal framework governing the use of remotely sensed geospatial data, the procedures for conducting geodetic surveys, and the mechanisms for legalizing informally occupied land parcels. The improvement of legislation strengthens the legal protection of citizens and organizations, enhances the effectiveness of state oversight, and minimizes land-use conflicts.

Thus, the introduction of innovative technologies into the fields of cadastre, geodesy, and cartography is viewed not only as a means of improving data accuracy but also as a key component in building a modern, transparent, and socially oriented land administration system. This, in turn, provides a foundation for sustainable territorial development, the rational use of land resources, and the establishment of an efficient real estate market in the Republic of Uzbekistan.

2. The Role and Importance of Modern Software in Uzbekistan's Cadastral Sector

Software is defined as a structured set of instructions (codes) that directs the functioning of a computer or electronic device to execute user-defined tasks. In conjunction with hardware, modern software enables the automation of operations, enhances user interaction, and facilitates efficient data management.

Modern software, developed using advanced technological platforms, allows for the optimization of work processes across multiple sectors. In the context of cadastre, its role is increasingly prominent due to its capacity to digitize records, manage land resources, ensure legal oversight, and provide public services in a streamlined and transparent manner. Uzbekistan has made notable progress in digitizing this sector, leading to enhanced operational efficiency and administrative transparency.

The core functions of modern software in the cadastral field include:

- Data Digitization:** Documents related to land plots and real estate properties are converted into digital formats, thereby minimizing paperwork and ensuring rapid and secure data storage.
- Integration of Geoinformation Systems (GIS):** Advanced mapping and spatial analysis tools provide accurate visualization of land boundaries and property locations. Commonly utilized software includes ArcGIS, QGIS, AutoCAD Map 3D, and Google Earth Pro.
- Implementation of Automated Cadastral Systems:** An example is the Land Resources Management Information System

(YRBAT), which consolidates information on land, buildings, and structures into a unified electronic database as part of the national cadastral infrastructure [3].

d) **Development of Online Public Services:** Key cadastral services—such as land allocation, issuance of cadastral documents, and assignment of cadastral numbers—are now accessible through official portals including my.gov.uz, kadastr.uz, and the platform of the State Tax Committee (Table. 1) [4].

Advantage	Explanation
Speed	Receive information on land or buildings and structures in a few minutes.
Transparency	The land allocation and registration processes are transparent, reducing the risk of corruption.
Document Security	Data is stored digitally and the risk of loss is reduced.
Geographic Accuracy	By working with maps, land boundaries are clearly defined.
Integration	Connecting to tax, court, banking systems

Table 1. Advantages of modern software in the cadastre

3. Real Projects and the Role of Modern Software in Uzbekistan's Cadastral System

Uzbekistan has launched a series of digital innovations in the field of land administration and property rights registration, with the goal of increasing transparency, improving efficiency, and strengthening public trust. Among the most significant of these initiatives are:

- “Land Plots Are the Only One” Platform – a unified electronic platform designed for land allocation and the registration of property rights;
- Electronic Cadastral Maps – currently utilized by regional cadastral departments for efficient visualization and recordkeeping;
- Cadastral Mobile Applications – which enable on-site property registration through GPS-based geolocation tools.

These technologies collectively contribute to enhancing the precision and speed of land and real estate accounting, reducing opportunities for corruption, and reinforcing public confidence in government institutions. Moreover, they have emerged as strategic tools for state asset management, contributing to broader goals in governance, the economy, education, healthcare, and everyday public services [5].

In recent years, the accelerated pace of digitization in Uzbekistan has elevated the demand for software to a national strategic priority. Particularly within the cadastral sector, modern software tools now facilitate the execution of large-scale and complex tasks with greater convenience and reliability.

4. Implementation of the Law on the Recognition of Rights to Arbitrarily Occupied Land

A key focus of current reform efforts is the implementation of the Law “On the Recognition of Rights to Arbitrarily Occupied Land Plots and Buildings and Structures Built on Them.” One of the central technological components supporting this law is the UZCAD system (Integrated Information System for Cadastre and Real Estate Registration).

Since August 25, 2022, UZCAD has served as the official State Register for real estate rights and as a unified electronic database

for cadastral and property data, with the authenticity and reliability of information guaranteed by the state.

UZCAD is the Unified Information System for Cadastre and Property Registration of the Republic of Uzbekistan, designed for the centralized management, storage, and updating of data on land plots, buildings, structures, and property rights. The system integrates cadastral, geodetic, and legal information within a single digital environment, providing a reliable tool for state land administration and real estate management.

The platform operates on the basis of modern geoinformation technologies and enables automated data exchange with more than twenty governmental agencies. This allows for timely access to up-to-date information regarding property rights, restrictions, land categories, and the objects located on them. UZCAD supports electronic registration of rights, generates cadastral maps, and provides capabilities for spatial analysis and data visualization.

One of the key functions of UZCAD is to enhance the transparency and efficiency of procedures related to the registration and management of land and real estate assets. The system plays an important role in the implementation of land reforms, including the recognition of rights to arbitrarily occupied land plots, the legalization of buildings, the maintenance of the state land cadastre, and the development of an accurate national real estate registry. Owing to its high degree of integration and automation, UZCAD contributes to reducing administrative barriers, minimizing errors, and improving the quality of public services in the field of cadastre and real estate.

The most pressing task today is the regulation of relations in the field of real estate. For this purpose, the UZKAD system was launched — a unified database in which the state guarantees the accuracy and legal validity of information on real estate. It contains data on all buildings and structures. As of 2025, the system includes information on 150,000 residential and 707,000 non-residential premises, as well as 44,000 apartment buildings.

It has also been noted that in many regions there is a significant discrepancy between cadastral and actual market values of real estate, which leads to inconsistencies in legal relations and on the market. In this regard, in accordance with the Presidential Decree of March 5, a mass property valuation system is being implemented. For this purpose, the National Center for Mass Real Estate Valuation was established under the Cadastre Agency. The Center has been allocated 40 billion soums, qualified specialists have been recruited, and practical work has begun.

The UZCAD system provides the following major functions:
State Integration: UZCAD is interconnected with over 20 government information systems, including: The Pledge Register, The “Notary” Automated Information System, The Unified Address Register of Real Estate, The Unified State Register of Business Entities, The Unified Register of Taxpayers, The “State Property” Information System, Registers of Non-Governmental Non-Profit Organizations, Licensing and Permit Systems.

These integrations enable real-time exchange of data regarding land and property rights [6].

Automated Registration Without Application:

If, during data synchronization, it is discovered that a real estate right is registered in paper form or another legacy information

system, and is not yet included in UZCAD, the right is automatically registered in UZCAD within three days, free of charge and without requiring an application. The property owner is then notified accordingly.

Legal Authority and Access:

All real estate transactions and official state registrations are conducted based on UZCAD data. Other property information cannot be requested outside this system, and the state guarantees the authenticity of the information—except in cases specifically provided by law. Entries made in the UZCAD register, including the “property history”, are publicly accessible for individuals and legal entities for a fee via the Unified Interactive State Services Portal, excluding state secrets and data protected under the Law of the Republic of Uzbekistan “On Personal Data.”

UZCAD (Unified Information System for Cadastre and Property Registration) is a unified electronic platform designed to ensure reliable and transparent state registration of land management and property rights in the Republic of Uzbekistan.

The main purpose of the system is to maintain accurate and reliable records of land and property rights, simplify the provision of services to citizens, and enhance the quality of public services.

Core Features of the UZCAD System:

- Unified Electronic Database UZCAD maintains a centralized registry of land plots, buildings, structures, and associated rights. It offers a comprehensive digital record of the legal status of all real estate assets in Uzbekistan;
- System Integration UZCAD is fully integrated with national tax, notary, judiciary, and other institutional systems, allowing for real-time legal and administrative data exchange and eliminating bureaucratic delays [1,7];
- GIS Capabilities The platform includes a Geographic Information System (GIS) that provides geospatial mapping of property boundaries and coordinates. This ensures high accuracy and transparency in managing land resources [8].

The UZCAD system is integrated with more than 20 government agencies and information systems, enabling real-time exchange of data on land and property rights.

The system automates the process of recognizing rights to unlawfully occupied land plots. Documents submitted by citizens and organizations are entered into the system, after which the Ministry of Justice verifies their legality and completeness. Citizens who receive a positive conclusion are notified by the Cadastre Agency, while individuals who make a one-time payment have their rights recognized quarterly by a decision of the Regional Council of People’s Deputies.

As of today, UZCAD contains information on 150,000 residential and 707,000 non-residential premises, as well as 44,000 multi-storey buildings. The system provides a complete register of land plots and the buildings and structures constructed on them.

As of April 1, 2024, 43.2 million hectares of Uzbekistan’s total land area (44.9 million hectares) have been mapped electronically, representing 96%. Of this amount, 40.3 million hectares are under state accounting.

Since August 5, 2024, the process of recognizing rights to unlawfully occupied land plots has been carried out through the UZCAD system. Owing to its high degree of integration, data accuracy, and transparency, UZCAD ensures an efficient and reliable implementation of this procedure. It has created the

necessary conditions for citizens and organizations to legalize their rights, thereby strengthening the guarantee of property inviolability. The development and implementation of modern cadastral software in Uzbekistan, particularly through platforms like UZCAD, exemplify a forward-looking national strategy aimed at enhancing land governance, protecting property rights, reducing administrative burdens, and fostering transparency. These innovations play an essential role in the broader digital transformation of public administration and reflect Uzbekistan's commitment to building a reliable, efficient, and citizen-centric cadastral infrastructure (Table 2).

Region name	Statistical data (as of 02.06.2025)			
	Number of sites under consideration	Number of sites under consideration	Number of sites under consideration	Number of sites under consideration
Republic of Karakalpakstan	31	1223	383	24
Andijan region	4	271	266	59
Bukhara region	29	519	55	26
Fergana region	55	1353	433	23
Jizzakh region	61	456	143	21
Namangan region	25	638	404	51
Navoi region	25	182	38	10
Kashkadarya region	79	1714	893	42
Samarkand region	99	1851	1051	74
Syrdarya region	3	201	123	6
Surkhandarya region	27	1521	246	62
Tashkent region	3	2882	183	27
Khorezm region	8	747	446	51

Table. 2. Based on the "E'tirof" automated information system, rights were recognized based on the following table

In the Yangiyul district of the Tashkent region, a total of 29 land plots have been officially declared for public awareness. Through the "E'tirof" Automated Information System (table. 3), members of the public can access comprehensive cadastral information regarding each land plot. This includes data on the cadastral number, land category, type, designation, geographic location, address, intended use, total land area, area of unauthorized occupation, registered area, construction area, inventory size, and other related attributes. Additionally, the system provides the functionality to visualize the location of the property directly on a digital map (figure 1), thereby enhancing transparency and accessibility of land-related information for citizens [9].

The availability of such a digital tool is particularly important in the context of implementing the Law of the Republic of Uzbekistan No. 937 "On the Recognition of Rights to Arbitrarily Occupied Land Plots and the Buildings and Structures Constructed on Them."

Law No. 937 represents a significant normative legal act aimed at regulating issues related to the unauthorized occupation of land plots and the construction of real estate objects without the required permitting documentation. Its adoption is driven by the need to eliminate legal uncertainty in the sphere of land use, to establish a transparent mechanism for legalizing existing de facto

objects, and to ensure full protection of the property rights of citizens and organizations.



Figure 1. Location on the map

In this regard, the law serves as an instrument of formalization, enabling such land plots and buildings to be incorporated into the national cadastre, thereby allowing their lawful use, transfer, inheritance, and engagement in other legally significant transactions.

The law defines key terms, including "arbitrarily occupied land plot" and "unauthorized construction." An arbitrarily occupied land plot refers to land used without the legally required documentation at the time the use began. Unauthorized construction denotes a real estate object built without the necessary permits or in violation of established procedures.

The law applies to all categories of land plots except those with a special legal status, such as sanitary protection zones, nature conservation and water protection territories, and areas of strategic or defense significance. These exclusions are intended to ensure compliance with urban planning, environmental, and sanitary-epidemiological regulations, as well as to prevent risks to public safety and critical infrastructure.

The law grants the right to apply for recognition of rights to any natural or legal persons who, at the time of the law's entry into force, are in actual possession or use of such land plots or constructions. This provision broadens the scope of eligible applicants, including those who have used land for many years but were previously unable to formalize their rights due to the absence of legal mechanisms or bureaucratic barriers. Special attention is given to socially vulnerable groups, reflecting the state's commitment to minimizing conflict and promoting social fairness throughout the legalization process.

The application procedure is organized primarily through electronic information systems, which aligns with Uzbekistan's

strategic commitment to digitalizing public administration. Applicants are required to submit documentation proving their factual use of the land or property—such as data on the commencement of use, plans, diagrams, photographs, technical specifications of buildings, and other relevant information.

	
Land Plot Information	Individual's Information
Note: <i>According to legislation, if the actual occupied area exceeds the documented area, the land plot and the building(s) constructed on it are recorded (Article 5).</i>	Last name: Nazarova
	First name: Muxabbat
	Father's name: Usmanovna
Cadastral number:	11:15:42:02:02:0351
Old cadastral number:	11:15:10:05:01:0051
Object category: Residential	
Object type:	Individual residential house
Object name:	Individual residential house
Location:	Tashkent region, Yangiyul district, Ko'kalamozoq Makhalla
Address:	175 Mustaqillik 10 yilligi Street
Land fund type:	Land allocated for sanitary, transport, defense, and other special purposes
Location:	Tashkent region, Yangiyol district, Ko'kalamozor Makhalla
Address:	175 Mustaqillik 10 yilligi Street
Land fund category:	Land designated for industrial, transport, communication, defense, and other special purposes
Subcategory of land fund:	Land occupied by individual residential houses
Types of use:	Residential construction
Type of permitted use:	Construction of an individual residential house
Total land area:	903 m ²
Area occupied without authorization:	103 m ²
Registered area:	800 m ²
Construction area:	373.16 m ²

Table. 3. “Etirof” Automated Information System

The submitted materials undergo verification by the Ministry of Justice and related agencies. The review process includes determining the legality of land use; assessing compliance of structures with urban planning, fire safety, and sanitary standards; analyzing potential infringements on the rights of third

parties; and conducting geodetic and cadastral data verification. The expanding use of digital solutions, including integration with UZCAD and other state registries, enhances data accuracy and shortens processing times.

Decisions on the recognition of rights are made by Regional Councils of People's Deputies. This distribution of authority creates a balance between centralized regulatory control and localized assessment that accounts for regional land use characteristics and urban development priorities. A positive decision forms the basis for the official state registration of rights to the land and the structures erected on it. Following registration, the object is incorporated into the unified state cadastre of real estate, which ensures legal certainty and enables the conduct of civil-law transactions involving the property.

Moreover, the law encourages more rational and legally compliant use of land resources, which is important for infrastructure planning, optimizing the national tax base, and promoting sustainable territorial development.

The implementation of this law also carries broader socio-economic implications. It contributes to expanding the national tax base, as previously unregistered real estate becomes subject to formal taxation. Consequently, this is expected to increase revenues to the State Budget. Additionally, legalization enables access to essential public utilities—such as electricity, gas, and water—and provides citizens with lawful avenues for inheritance, mortgage, or sale of their homes in an officially recognized manner.

Existing legislation also establishes liability for the unauthorized occupation of land plots. However, an important nuance of Law No. 937 is that its provisions waive the general penalties for unauthorized construction, provided that rights to such property are recognized within the timeframes and procedural requirements set out in the law. This exception enhances public acceptance of the law and reflects a pragmatic approach to resolving longstanding property disputes.

The implementation of this law has several broader socio-economic implications. It contributes to the expansion of the national tax base, as previously unregistered properties are now subject to formal taxation. Consequently, this is expected to result in increased revenue for the State budget. In parallel, it streamlines legal access to utility services—such as electricity, gas, and water—and creates legal pathways for citizens to inherit, mortgage, or sell their homes in a formally recognized manner.

Current legislation also enforces liability for the unauthorized occupation of land plots. However, an important nuance of Law No. 937 is that its provisions override the general penalties for unauthorized construction, provided that the rights to such properties are recognized within the prescribed time frame and procedural framework outlined in the law. This exception enhances the law's public acceptance and reflects a pragmatic approach to resolving longstanding property disputes.

In the preparation of this article, a substantial portion of the data was drawn from the daily statistics available on the “E'tirof” digital platform, which tracks the recognition of property rights to arbitrarily occupied land plots and structures across the Republic of Karakalpakstan and other regions. The article also draws upon insights from public awareness efforts conducted by authorized bodies and ongoing developments in the field.

5. Conclusion

It is important to emphasize that modern technologies and software tools are playing an increasingly vital role across all sectors, including public administration and land management. In the field of cadastre, the integration of digital solutions has revolutionized traditional approaches, leading to increased efficiency, accuracy, and accessibility. The introduction of the UZCAD software system, in particular, has significantly facilitated the work of sector specialists by automating many previously manual processes, streamlining documentation procedures, and reducing bureaucratic hurdles that often hinder timely decision-making [12].

As a result of these improvements, citizens now have more straightforward and transparent mechanisms to resolve property-related issues, including the registration and legal confirmation of land and real estate rights. This technological advancement ensures not only convenience for users but also contributes to the establishment of a reliable, standardized, and interoperable cadastral system.

Furthermore, the effective implementation of such legal and technological frameworks plays a key role in mitigating corruption risks by minimizing human intervention and enhancing procedural transparency. It reinforces principles of good governance, promotes institutional accountability, and strengthens public trust in state authorities. In the long term, the continued modernization of cadastral systems through the application of GIS technologies, digital platforms, and legal reforms will serve as a foundation for sustainable development, efficient land use planning, and the protection of property rights in Uzbekistan.

It should also be noted that the successful digitalization of the cadastral system requires not only technological modernization but also the development of human capital. The training of qualified specialists capable of effectively working with modern geoinformation systems, satellite-derived datasets, and analytical platforms has become a strategic priority of state policy. Professional development programs, the introduction of specialized educational curricula, and the establishment of research centers in the fields of cadastre and geodesy ensure the sustainability and continuity of ongoing reforms.

Equally important is the expansion of international cooperation, the exchange of expertise, and the adoption of global best practices in land administration. Uzbekistan's integration into international professional networks contributes to improving the quality of national cadastral datasets, strengthening regulatory standards, and ensuring compliance with global requirements for spatial data management.

Finally, the digital transformation of the cadastral sector forms a solid foundation for the advancement of related fields—from urban and regional planning and architecture to agriculture and environmental monitoring. The use of high-accuracy spatial data enables more informed decision-making, promotes the rational utilization of natural resources, and enhances the overall efficiency of the national economy.

Thus, the further development of cadastral technologies and the refinement of legal and institutional frameworks not only enhance the transparency and reliability of property registration processes but also serve as key drivers of the country's sustainable socio-economic growth.

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