

## THE APPLICATION OF MODERN TECHNOLOGIES IN THE FIELD OF CADASTRE AND THE ANALYSIS OF FOREIGN COUNTRIES' EXPERIENCE

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**Annotation.** *This article examines the integration of modern technologies in the field of cadastre, focusing on the digital transformation of land registration, geospatial data management, and mapping systems. The study analyzes how countries such as the Netherlands, South Korea, and Estonia have successfully implemented technological innovations like GIS, remote sensing, UAVs, and blockchain-based land registries. Additionally, it explores the current situation in Uzbekistan and identifies practical ways to adapt international experience to improve cadastral efficiency, transparency, and data accuracy.*

**Keywords.** *Cadastre, GIS, remote sensing, digital transformation, land management, blockchain, geospatial technologies, land registration, international experience.*

### INTRODUCTION

The cadastre system plays a fundamental role in the effective management of land resources, taxation, and spatial planning. As societies move toward digital governance, traditional cadastral processes—once based on manual mapping and paper documentation—are being replaced by digital and automated systems. Modern technologies such as Geographic Information Systems (GIS), remote sensing, Unmanned Aerial Vehicles (UAVs), and blockchain-based registries are revolutionizing the accuracy, accessibility, and transparency of land data.

In Uzbekistan, cadastral reform is a strategic priority aimed at improving land administration, ensuring transparency in ownership, and facilitating economic development. However, challenges such as outdated databases, insufficient integration of systems, and limited use of modern geospatial tools still hinder full digital transformation. This research aims to analyze international practices and identify suitable technologies that can be efficiently applied to the Uzbek cadastral system.

## LITERATURE REVIEW

The modernization of cadastral systems has been widely discussed in global research. According to Williamson et al. (2010), the evolution of land administration is closely linked with technological progress and institutional reform. Kaufmann and Steudler (1998) introduced the concept of the Cadastre 2014 vision, emphasizing digital data management and interoperability.

European countries such as the Netherlands and Sweden have achieved full digitalization of cadastral data, integrating GIS and online access platforms for public and government users. Estonia has adopted blockchain technology to secure land records, ensuring immutability and transparency. South Korea uses UAV-based mapping and AI-powered spatial analysis for monitoring urban and agricultural lands. China and Singapore have developed 3D cadastre systems that visualize land parcels in multi-level urban environments.

In Uzbekistan, several studies (Tashkent Institute of Architecture and Civil Engineering, 2021–2024) have highlighted the ongoing digitization of the State Cadastre, including the use of GIS and remote sensing for agricultural monitoring. However, a comparative analysis with advanced international practices remains underdeveloped.

## METHODS

The research methodology is based on comparative analysis, qualitative evaluation, and case study methods. Data were collected from scientific journals, government reports, and cadastral databases from different countries. The study focuses on identifying key technological trends, analyzing implementation mechanisms, evaluating Uzbekistan's readiness, and proposing a roadmap for digital transformation.

**Results and Discussion.** GIS and Remote Sensing enable real-time land monitoring, topographic mapping, and automated data updates. UAV (Drone) Mapping provides high-resolution imagery and rapid data acquisition. Blockchain Technology ensures secure, transparent, and tamper-proof land transactions. Artificial Intelligence (AI) is used in classification of land cover and detection of illegal constructions. 3D and 4D Cadastres are used in urban areas to manage vertical property ownership.

**International experience.** Netherlands – Integrated GIS & e-Governance: Fully digital, open-access cadastral system.

Estonia – Blockchain registry: Secure and transparent land transactions.

South Korea – UAVs & AI: Automated urban monitoring.

Sweden – Cloud GIS services: Efficient data sharing across institutions.

Georgia – Blockchain & digital ID: Corruption-free land registration system.

The case of Uzbekistan. Uzbekistan has made significant progress in recent years: the State Cadastre Chamber introduced digital cadastral maps and remote sensing data from satellites. However, integration between institutions and public accessibility remain limited. To align with international standards, Uzbekistan should develop a national geospatial data infrastructure (NGDI), implement blockchain integration, and encourage training in GIS and data analytics.

### CONCLUSION

The global shift toward digital cadastre systems demonstrates that technology significantly enhances land management efficiency, accuracy, and transparency. Countries that have embraced GIS, UAVs, and blockchain technologies experience faster land registration, reduced corruption, and improved spatial planning. For Uzbekistan, adopting these technologies can strengthen economic development and good governance.

### RECOMMENDATIONS:

1. Establish a centralized digital land information platform.
2. Integrate blockchain technology for transparent property rights.
3. Promote UAV-based mapping for regular land monitoring.
4. Implement capacity-building programs in geospatial education.
5. Foster international cooperation with Estonia, the Netherlands, and South Korea.

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