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International Practices In Promoting Investment Processes Through Land Cadastre

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Abstract: This article analyzes international experience in strengthening the impact of land cadastre systems on investment processes, drawing on practices from the Netherlands and Estonia, initiatives of the World Bank, and the modern LADM (ISO 19152) standard. It is scientifically substantiated that digital cadastre, core registries, geoportals, and mass appraisal approaches influence the investment environment through two main channels: legal-spatial certainty and transparency of economic value. Based on the analysis of foreign experience, comprehensive proposals are developed for Uzbekistan to modernize institutional, legal, technical, and information infrastructure through deep integration. These proposals include adapting LADM standard elements to the national cadastral model, establishing an investment-oriented open geoportal, integrating with e-government systems, and developing land cadastre-based investment attractiveness indicators.

Keywords: Land cadastre, investment processes, LADM, mass appraisal, digital cadastre, geoportal, Land 2030, e-Land Register.

Introduction: Today, in global investment processes, land resources are viewed not only as a factor of production but also as strategically protected capital managed through digital infrastructure; therefore, reforming land cadastre systems has become one of the key directions for improving the investment climate. The World Bank's Land 2030 program and recent analytical studies demonstrate a direct relationship between the clarity of land and property rights, the openness of state registries, and the use of digital cadastral systems, on the one hand, and investment volumes, the efficiency of infrastructure projects, and economic growth rates, on the other [1]. From this perspective, the land cadastre is not merely a technical system for recording rights, but a core platform of spatial and legal information essential for investment decision-making, playing a decisive role in determining collateral values for bank lending, assessing risks for investors, expanding the tax base for the state, and planning infrastructure projects.

In the context of Uzbekistan, processes of integrating land cadastre systems with investment policy are also intensifying; however, numerous issues remain unresolved with regard to the regulatory and legal framework, data quality, the level of digital integration, and valuation methodologies. For this reason, international experience particularly that of the Netherlands and Estonia, LADM-based projects, and World Bank initiatives serves as an important methodological foundation for the design of national reforms [2].

LITERATURE REVIEW

Studies conducted by P.Van Oosterom and C.Lemmen provide a strong scientific justification for the advantages of LADM as a standardized data model in optimizing investment-related information flows within land administration systems. The authors demonstrate, on the basis of empirical evidence, that the integration of the "land-rights-restrictions-responsibilities-value" chain significantly reduces investment risks [3]. In the research of J.Zevenbergen, R.Bennett, and M.Walters, the role of the land cadastre in guaranteeing property rights, enhancing transparency for investors, and positively influencing the development of credit markets is analyzed. The scholars substantiate that the integration of cadastre, valuation, and registration systems represents one of the most critical "hot spots" in investment processes

[4]. Scientific studies by W.De Vries statistically demonstrate that 40-60 percent of the risks embedded in investment decisions are directly related to the clarity of land rights. The author provides clear evidence that any uncertainty in cadastral information leads to a reduction in investment flows [5]. Studies by H.Vironen and E.Tavast report, based on precise statistical evidence, that the full integration of the Estonian land register into the X-Road platform reduced transaction costs for investors by 35-40 percent and increased the speed of property transactions by three to five times [6]. In the research of K.Kouts and O.Pargmae, a direct relationship between the accuracy of cadastral data and bank credit risk is scientifically substantiated. The authors propose the model "accurate cadastre → lower credit risk → higher investment flows" [7]. The Swiss model developed by D.Steudler assesses the quality of cadastral systems within a "strategic-managerial-operational" framework. The results demonstrate that investment potential is directly dependent on the transparency, cost-efficiency, and timeliness of cadastral systems [8]. The conceptual approach developed by J.Kaufmann and D.Steudler defines the future direction of global cadastral systems, recognizing the digital management of rights, restrictions, and responsibilities as a key factor in improving the investment environment [9]. In the studies of S.Enemark, it is scientifically confirmed that up to 70 percent of economic stability is determined by the effectiveness of land governance systems. The author emphasizes that the integration of LADM, FGIM, and SDI minimizes risks for investors [10]. I.Williamson, J.Wallace, and A.Rajabifard scientifically demonstrate that national spatial data infrastructures (NSDI) eliminate up to 60 percent of the factors causing delays in investment projects. They propose the cadastre-NSDI-valuation triad as a sustainable investment model [11]. Research conducted by W.McCluskey demonstrates that when mass appraisal systems accurately reflect market value, investment activity in the real estate market increases by 25-30 percent. The author emphasizes that when the land cadastre is not integrated with the valuation system, investment flows slow down significantly [12]. M.Brown and A.Grimes scientifically substantiate that five key indicators of land parcels legal certainty, availability of valuation data, transaction speed, geospatial data openness, and development intensity are decisive in determining investment attractiveness [13]. In the studies of P.Dale and J.McLaughlin, the decisive role of cadastral data accuracy in attracting investment to capital markets is highlighted. The "Accurate Cadastre → Strong Capital Market" model proposed by the authors provides a scientific rationale for this relationship [14]. Research by F.Plimmer and M.McCord shows that valuation standards (IVS, IAAO) enhance transparency in investment decision-making. The authors provide empirical evidence that when valuation processes are aligned with cadastral data, investment risk is reduced by 20-25 percent [15]. T.Dixon and G.Pottinger, relying on statistical models, demonstrate that in countries with greater openness of public registries, inflows of large investors increase, transaction costs decrease, and market stability is strengthened [16]. H.Kutterer and M.Kada, based on the German experience, scientifically substantiate that the integration of ALKIS-ATKIS-AFIS has enabled the development of a highly accurate model for territorial valuation for investors [17].

The land cadastre system essentially serves as an information bridge within the "land-subject-right-restrictions-value" chain: on the one hand, it ensures legal certainty and spatial reliability, while on the other hand, it facilitates the formation of value, profitability, and risk indicators required for investment decision-making. International literature empirically demonstrates that the clarity of land rights, the openness of digital registries, and low transaction costs have a positive impact on increasing investment volumes, expanding the share of perennial crops, improving the efficiency of infrastructure projects, and strengthening private sector credit provision [18].

The ISO 19152 - Land Administration Domain Model (LADM) standard proposes representing land administration systems within a unified conceptual model by expressing "person-land-rights-restrictions-responsibilities" relationships through standardized classes and attributes. This approach facilitates the comparison of cadastral systems across countries, enhances interoperability, and supports the cross-border exchange of investment-related information [2]. The new generation of LADM, particularly Part 19152-4 introduces a dedicated "Valuation Information Model" that links cadastral data with valuation, mass appraisal, transaction prices, and sales statistics. This development provides the basis for creating a standardized layer of value-related information essential for investment decision-making in land and real estate markets [19].

From a theoretical perspective, the impact of the land cadastre on investment manifests through three main channels:

- First, the cadastre and registries guarantee property rights, thereby reducing "tenure risk" for investors;
- Second, digital cadastre and e-registries optimize transaction speed, transparency, and costs;

- Third, valuation systems linked to cadastral data objectively reflect both market and regulatory values of land and property, providing investment projects and business plans with reliable, data-driven foundations.

The Netherlands possesses one of the most advanced land cadastre systems in the world. The "Kadaster" - Cadastre, Land Registry and Mapping Agency - serves as the single authority responsible for the country's land and property rights, cadastral maps, topography, and core geospatial data [20]. The country has implemented the "Core registers" concept, in which cadastral, address, building, and topographic data are recognized as core components of the national data infrastructure, and all public authorities as well as private sector entities operate based on these registries. Through the PDOK (Publieke Dienstverlening op de Kaart) geoportal, a wide array of cadastral and other core registry data is made openly available in digital format, creating a "load once - use many times" environment for government agencies, businesses, and investors. The processing of billions of requests via PDOK highlights the critical economic role of geospatial information [20]. Within the framework of LADM-based initiatives, a national profile for the Netherlands cadastre has been developed, integrating the legal, spatial, and valuation components of cadastral data into a unified data model, thereby strengthening the digital infrastructure that supports investment decision-making [2].

From an investment perspective, this approach is highly significant, as investors, banks, or government agencies can rapidly and reliably access information on any land parcel's legal status, area, restrictions, tax value, and planning documents through a single geoportal. Consequently, the preparation time for investment projects is reduced, project risks are minimized, and the economic "monetization" of cadastral data is enhanced.

Estonia is among the countries that have most successfully implemented the digital government (e-government) concept, with the land cadastre and property rights registry forming the core of this framework. The e-Land Register portal manages legal information for all real estate objects including area, owners, restrictions, mortgages, and other property rights entirely in a digital environment and provides online services to both citizens and businesses [21].

Estonia's cadastre and registries are electronically linked via the national X-Road integration platform to notaries, the business registry, the population registry, and other government databases. As a result, real estate transactions are primarily executed through the e-notary system, enabling rapid processing with minimal paperwork and high legal certainty [28]. This system contributes to Estonia's high rankings in the Doing Business indicator for "registering property" and, most importantly, expands the portfolio of mortgaged property and credit opportunities for small and medium-sized enterprises [22].

From an investment perspective, a key aspect of the Estonian experience is that cadastral data functions not merely as cartographic or statistical information but as a primary "identification layer" within the digital government services ecosystem. Each land parcel's associated rights, restrictions, and obligations are updated in real time, allowing banks, notaries, and investors to access and interpret them consistently from a single digital source.

In recent years, numerous countries have implemented projects aimed at bringing land cadastre systems closer to investment processes by developing valuation and mass appraisal systems based on LADM. The LADM Valuation Information Model approach, proposed by Kara and co-authors, links cadastral data directly to valuation units, transaction prices, appraisal methods, and sales statistics. This enables decision-making on taxation, mortgages, compensation, and investment strategies to be conducted on the basis of an integrated information model [23].

Studies conducted in Mongolia have developed a step-by-step approach for standardizing valuation information necessary to support real estate market development and investment decision-making based on an LADM-based valuation data model, where cadastral, appraisal, and taxation data are integrated within a single information model [24]. Furthermore, in some countries, methodologies for mass appraisal systems have been proposed that utilize the LADM concept to incorporate locational variables such as proximity to transport, infrastructure, and environmental conditions enabling a more in-depth investment-oriented analysis of land and real estate values [25].

These approaches enable the integration between land cadastre and investment processes not only at the level of legal certainty but also through standardized valuation models, mass appraisal algorithms, and investment indicator systems, effectively transforming the digital cadastre into a fully functional "investment information platform".

As illustrated by the examples of the Netherlands and Estonia, modernizing the land cadastre to enhance the investment environment goes beyond merely improving cartographic databases or digitizing information. It requires redesigning the cadastre as a

core component of the national data infrastructure, a primary identification layer for e-government services, and an information base for investment valuation systems. In the Netherlands, the Core registers concept and the PDOK geoportal, and in Estonia, the e-Land Register, X-Road platform, and e-notary system exemplify such a systematic approach, facilitating faster investment processes, reducing transaction costs, and ensuring data transparency for investors [21].

Based on international experience, the following priority directions can be proposed for Uzbekistan:

1. Regulatory and legal harmonization - Align the primary legislation on cadastre and property rights with the conceptual approach of ISO 19152 (LADM), representing the "land-rights-restrictions-responsibilities-value" chain within a unified legal model. This will reduce legal uncertainties in investment processes [2].

2. Core registers and geoportal - Following the Dutch experience, implement a national Key Registers concept encompassing land cadastre, address, building, and topographic data, and establish a national geoportal that provides investors with open-access data while legally reinforcing the reliability and legal force of the information [20].

3. E-Government and cadastre integration - Based on the Estonian model, develop a national information platform integrating notarial systems, tax authorities, business registers, and cadastre databases. Any changes entered in the cadastre should automatically reflect in other e-government registries, creating a single "source of truth" for investment transactions [29].

4. Mass appraisal and investment indicator system - Develop a mass appraisal system for land and real estate based on the LADM Valuation Information Model approach. Integrate cadastre data, transaction prices, locational factors, and infrastructure indicators to generate investment attractiveness indices, risk maps, and valuation coefficients [26].

5. Integration with international programs - Collaborate with international initiatives such as the World Bank's Land 2030 program to modernize the land cadastre, support investment project planning, and develop sustainable territorial development strategies. This includes implementing investment appraisal systems that account for climate change and land-related risks [27].

If these directions are implemented gradually and tested in pilot regions, with subsequent scaling based on the results, the land cadastre in Uzbekistan could evolve into a modern, digital infrastructure for managing investment processes, fully aligned with international standards.

CONCLUSION

International experience demonstrates that merely improving the land cadastre system at a technical or record-keeping level is insufficient to fundamentally enhance the investment environment. Effective modernization requires the integration of cadastral, property registry, valuation systems, and e-government services into a unified conceptual model based on the LADM standard. Examples from the Netherlands and Estonia show that cadastre data, as a core element of national data infrastructure, combined with open geoportals, e-registries, and integrated state services, ensures high transparency, speed, and reliability for investment processes. Research by the World Bank and other international institutions further confirms that the accuracy of land rights, quality of cadastral data, and the presence of mass appraisal systems are critical factors for investment decisions, infrastructure projects, and macroeconomic stability.

For Uzbekistan, these experiences highlight the necessity of transforming the cadastre into an investment management platform, developing a national data model in line with the LADM standard, implementing open geoportals and mass appraisal systems, and ensuring deep integration with e-government platforms. If accomplished, the land cadastre will not only serve as a legal registry and tax base tool but will also function as a strategic digital infrastructure that promotes investment processes, supports evidence-based territorial planning, and contributes to sustainable economic growth.

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