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The Cadastre System, Which Ensures the Security of Property Rights, Is the Cornerstone of Economic Development

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ABSTRCT/ANNOTATION

The main goal of this study is to increase the positional accuracy of the coordinates of the border points of cadastral parcels by adjusting large digital parameters. Experimenting with ways to improve the positional accuracy of cadastral maps and their integration with third-party geographic information in land management systems is a topic of worldwide interest. The demands and challenges arising from the creation of spatial data infrastructures make the coordination of disparate data increasingly necessary. Geometric improvement and the integration of data obtained in land information systems have been described in a number of reference documents, with the improvement of effective methodologies and standards in a number of countries. Improved positional quality and geometric integration of stored land data layers will enable more accurate positional integration with more accurate overlap across multiple databases, which is beneficial to public sector operations.

Key words: Cadastre form, System, Cadastre map, Soil structure, Land management, Information systems, Land Management Domain Model (LADM), Aggregate composition, Processes erosion.

INTRODUCTION

Establishing and maintaining an effective land management system is considered essential to all states as an important government activity. This typically includes cadastral surveys to identify and divide land, land registry systems to support the purchase, sale, mortgage and lease of land, and land information systems to facilitate access to relevant information. Cadastre forms the basis of a Land administration system that ensures territorial integrity and security of ownership, and unique land identification that supports effective land trade.

Land Registry and Cadastre are different institutions. Land registries are offices where real estate information is registered and made public. Conducting cadastral land surveys is a foundation that plays a key role in providing cadastral information, as well as legal information related to real estate.

The integration of two institutions is a management model of particular importance. A cadastral map provides the location or location of many activities in the built environment. Cadastres enable the geocoding of property identifiers and, in particular, street addresses. While the land market function of cadastres is important, their ability to provide spatial coverage to the community proves to be as important as, or more than, the land market function. In particular, spatial affordances enable governments to more easily ensure sustainable development (economic, environmental, social and governance dimensions) by defining key government objectives.

A properly designed cadastral system is actually the backbone of society. Peruvian economist Hernando de Soto put it this way: "Civilized living in market economies is not simply about greater prosperity, but about the order brought about by formal property rights." Therefore, the cornerstone of economic development is connected to a Cadastre system that ensures the security of property rights.

Human-land relations are dynamic and change over time in response to the general trends of society's development. Likewise, the role of cadastral systems changes over time, as the systems underpin these social development trends. In our modern era, when land resources are depleted, the role of cadastral systems increases the protection of property rights, assessment, taxation, control of land use planning.

In our country, the cadastral system is simply accepted, and the directions of the creation of an efficient land market and the establishment of efficient land use management of this system are not taken into account. Therefore, despite the passage of a long time, the cadastral system that responds to the daily demands of neither ownership nor other fields has not been created yet. When we say other fields, forest, water and urban planning cadastres are meant here. many difficulties arise.

The transition from the cadastral system of the single property form to the creation of the cadastral system for the newly formed types of property in Azerbaijan was observed with a number of difficulties. Since the management of large farms was based on administrative mechanisms during the period of state ownership, the management of the cadastral system was not so difficult.

After the Republic of Azerbaijan gained its independence, the main economic development of the country, which developed in the direction of multiple ownership, required the formation of an efficient cadastral system.

In the initial phase of the cadastral map existence, it was managed by keeping it on a paper map. Since the stage of land reform coincided with the development of computer technology in the country, ca required the process of transformation of the map into digital form. Modern information technologies shape the new role of cadastral systems. "cadastre" should now be considered as "an enabling infrastructure for the implementation of land policy and land management strategies to support sustainable development". The term "land management" represents a more holistic system that encompasses the policies and processes by which land, property and natural resources are managed. This includes decisions on access to land, land rights, land use and land development.

Modern technological development and increasing social demand require continuous development of land management systems. Appropriate land management is the starting point for conflict resolution, sustainable development and land use planning anywhere in the world. There is no time to waste in starting this important work.

Appropriate land management can be defined by four aspects. First and foremost, users' requirements should be the starting point, not professional or technological standards. After the user requirements, three more important aspects must be fulfilled: the existence of quality Information systems, the collection of accurate data, and the development of an efficient and fast registration system.

The low level of professionalism of researchers and land management specialists against the background of strengthening land management is also a cause for concern. A good, fast and cheap land management system should be achieved for the next generation.

With the development of Geographic Information System (GIS) and data sharing campaign, the need and accuracy of integrating spatial data from different sources has increased dramatically. This process is critical so that data sets of varying precision can be combined and analyzed together. This process requires a systematic approach to minimize the problems discussed above.

As in the countries of the developed world, the cadastral system in our country is complete with real-time digital cadastral maps. However, because the geometric accuracy of the data in this system is extremely flawed, plots of land are not correctly associated with their actual locations and street addresses. As a result, even the smallest property owners lead to serious unfounded lawsuits, ineffective training of state structures, and citizens become hostages of the army of workers.

At the same time, it fails to provide the spatial capacity of government and wider society in almost every aspect of human endeavour, from supporting land markets to environmental management, policing, recreation and emergency response.

The projects implemented in this direction failed because it was impossible to migrate the results of multi-passage accounting works, which were compiled on the basis of physical boundaries without the basis of the appropriate standards, to the Cadastre map.

Appropriate standards are required to define both paper-based cadastral systems and computerized system elements. For the most part, standardization in existing land offices and land registries is generally limited to the region or jurisdiction in which the land office operates.

Just as social issues benefit from proper land management, land management systems benefit from appropriate ISO 1952 data standards. After more than ten years of development, the land management domain model (LADM) under

ISO TC211 was adopted as the ISO 19152 international standard in 2012. A flexible system like LADM is the manifestation of perfect standardization. This system not only defines the elements that form the basis for building any land administration, but also defines them in such a way that they can be applied anywhere in the world.

ISO (International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). ISO works closely with the International Electrotechnical Commission (IEC) on all electrotechnical standardization issues.

International standards are prepared in accordance with the rules given in Part 2 of the ISO/IEC Directives. Drafts of International Standards adopted by technical committees are sent to member bodies for voting. Approval of at least 75% of the voting member bodies is required for publication as an International Standard.

Developed by ISO 19152 Technical Committee ISO/TC 211, Geographic Information/Geomatics.

Standardization of land management includes alignment with the ISO 19000 series of standards: previously TC211 standardizes domain neutral: geometry, topology, temporal aspects, reference systems, metadata, etc. creates the basis for Based on these TC211 standards, both commercial and open source software can be used to manage query data, geo-DBMS, GIS, geo-web services, etc. prepared for processing.

LADM is, first of all, the basic information of land management is a reference domain model that includes its related components. This means an abstract, conceptual model that includes the following data sets:

This International Standard defines the Land Management Domain Model (LADM). LADM is a conceptual model, not a data product specification (in the sense of ISO 19131).

The goal of LADM is not to replace existing systems, but rather to provide a formal language to describe them in order to better understand their similarities and differences. This is a descriptive standard, not a prescriptive standard.

Land administration is a large field; The focus of this International Standard is on that part of land management concerned with rights, duties and restrictions affecting land (or water) and its geometric (geospatial) components.

The International Standard provides an abstract, conceptual model of land management with four main interrelated packages.

1. people and organizations;

2. main administrative units, rights, duties and restrictions (property right);

3. spatial units (gardens, legal area of buildings and utility networks);

4. spatial sources (cues) and spatial representations (geometry and topology);

It determines the directions of modeling of land management processes.

The research carried out in Mammadli village of Absheron region suggests the preparation of new data in the direction of creating a comprehensive transformation system in the transformation of old cadastral data sets into a more accurate new database with reference to international standards. The study describes three main components, data tracking, GPS-based adjustment, and geometric accuracy.

Based on the proposed methodology and previous evidence from previous research, this method is more flexible and cost-effective to transform the cadastral database from low-accuracy legacy datasets to high-accuracy datasets and vice versa.

Full and accurate knowledge of natural land resources is important for progressive economic development. Cadastral maps are the best tool for obtaining, registering and analyzing such knowledge. These maps are necessary for the efficient and planned exploitation of natural resources.

It characterizes the complexity of human relations with land represented by public, community and individual land rights. Large-scale maps, either graphically or digitally, are the only visual basis for such writing.

The main goal of the research was to carry out repeated alignments in order to obtain positional accuracy in the existing cadastre. It is the process of improving the position of the geometric coordinates of a feature in a geospatial dataset to represent its actual position. Positional accuracy can be classified as an upgrade from a low-accuracy legacy dataset to a more accurate database.

METHODOLOGY

Improving cadastral accuracy A potential alternative to restore old datasets at a reasonable cost is the process of converting an existing old dataset into a new high-precision database. This method is widely used in cadastre improvement. However, most previous studies refer to the need for new measurements to be correlated with old measurements in this process. For such cases, it is very important to ensure that the old measurements are free from gross errors and systematic errors so that the integration adjustment can be accepted. In principle, adjustment of measurement data is focused on random errors, where gross and systematic errors are identified and eliminated.

Cadastre data validation focuses on three main steps, data tracking, angle-based least-squares adjustment, and data fit parameterization. The first stage is the tracking of data, which is the basis of the regulation of the cadastral block.

1. Analysis of the factors that caused landslides, consistent monitoring of cadastral parcels according to the dimensions of the reform map and land distribution schemes in the archive. As discussed above, data traceability is an important component of cadastral data integrity. By eliminating the defects of the coordinate system update process that changes based on the current demand, then the cadastral database is also developed to be dynamic in the future. To support this dynamic data, the adjustment of the cadastral block must be aligned with the new precise

coordinate system and allow for proper conversion to any new coordinate system. Thus, information on control points is necessary and recommended in the study conducted.

2. Cadastre validation Global Navigation Satellite System (GNSS) research and implementation is recommended by improving as follows.

Table 1: Guidelines for GNSS Applications in cadastral validation

Problem	**Proposals**
Validity of N-RTK	1. CORS inter-distances to better place the accuracy of network corrections everywhere ***2.*** *Regional atmospheric models. Improving network corrections by applying.* 3. RTK provides a good network geometry with appropriate quality control error correction.
GNSS and instrument calibration	1) The best way to check are RTK observations associated with CORS. 2) implement ISO 17123-8:2015 procedures for verification.
GNSS reference station accuracy	To maintain compliance of national geocentric data with international standard i.e. ITRF.

3. Calculating Improved Estimates for Unknowns. Detection of gross errors by observation elimination, indirect adjustment with the Cholesky algorithm; neighborhood adjustment with the Gauss least square method (proximity matching membrane model with Huck's method); Comparison of coordinates at control points The development of a spatial adjustment engine based on the least squares method was applied to increase the accuracy of cadastral data. International experiments presented a three-step workflow used to increase the spatial accuracy of digital cadastral maps: global transformation from the old local system to the GPS-based WGS-84 system; transformation of the rubber layer to change the boundary corners to adapt to the existing soil characteristics; and LS adjustment with stochastic constraints to include additional cadastral information and geometric terms.

A Least Squares (LS) fitting problem includes the observed parameters, observations, observation errors, and often some other unknown parameters. Moreover, the behavior of errors and observations is described by the same stochastic model.

Another method for data integration is the least squares method, in which topological relationships are modeled as inequalities and optimal placement solutions are obtained while maintaining spatial relationships between features. It is clear that the positional accuracy of the old dataset needs to be improved in order to match the existing spatial data requirements. For this, research with the application process of Global Navigation Satellite System (GNSS) is inevitable.

The process of improving the positional accuracy of cadastral maps is organized in the stages of preparation and correction. Neighbor-adjustment methods with proximity matching were also applied to determine whether their data could be improved to high accuracy.

This methodology is based on a triangulation approach, taking into account the established principles of affinity matching. The geometric context described by the triangulation approach provides a rich data structure for defining topological and proximity relationships between spatial objects on a map. Two objects are considered neighbors when they are connected by a common edge in the triangulation network.

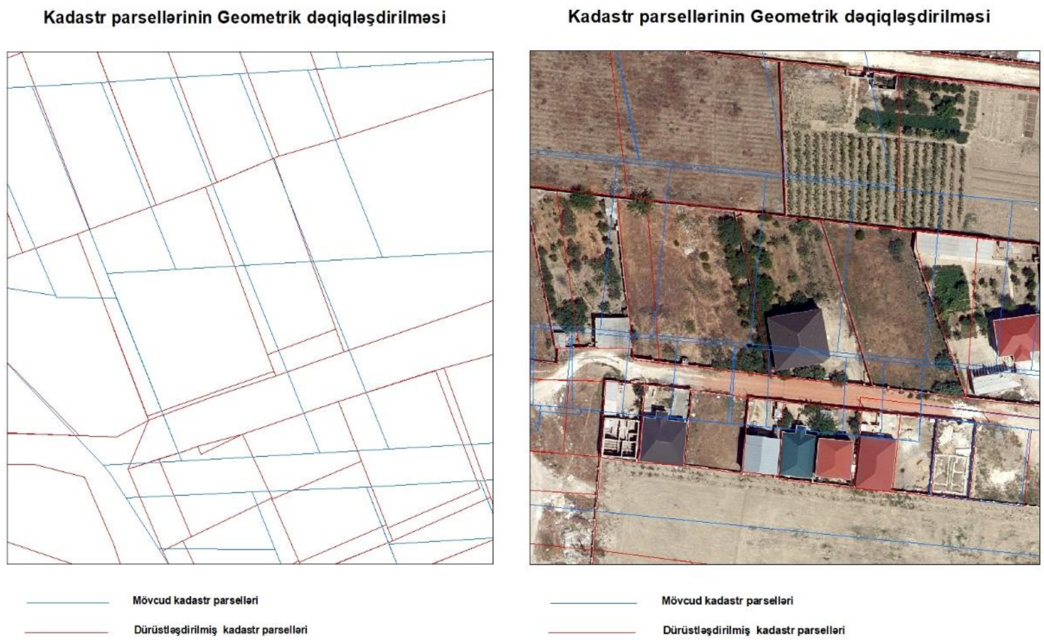
DISCUSSION AND CONCLUSIONS

In the present study, it is hypothesized that for certain accuracy classes, a significant improvement in the positional accuracy of traditional, land cadastral map coordinates is possible at locations located near higher quality datasets.

The purpose of the experiment was to determine whether it is possible to improve the positional accuracy of land cadastral coordinates. After checking for gross errors through a data inspection procedure, neighborhood adjustment, applying inverse distance-weighted interpolation with Hooke's law-based membrane model proximity matching methods, effectively improved the accuracy by reducing the RMSE from 2.4 m to less than 0.5 m. . Thus, 85% of the geometric errors in the field data were eliminated by bringing the 2-5 m standard deviation class based on obsolete measurements to the accuracy class of 0.3-0.7 m standard deviation.

9070 parcels of 1946 ha of land in the area were divided into gardens, 15 percent of which had geometric compatibility. In the correction, 9,000 parcels covering 1,821 ha of land area were geometrically specified. This is an indicator of the execution of 99% of cadastral parcels according to the accuracy of 0.3 m. The legal registration, which is not based on the plan and dimensions of the land area, made the situation even more complicated. rectification does not ensure the resolution of the unjustified documents.

Nevertheless, as a result of the transfer of corrected data to the cadastral registration system, the work of the system was adjusted by restoring the geometric platform of the cadastral system. Finally, the content of the research work is summarized and the development directions of the cadastre are proposed.



A proper Cadastre remains increasingly relevant as a key data subject that underpins and supports many development operations related to a country's economy. Therefore, the mission global players.

There is a need to study and apply appropriate policies, strategies, technologies, methodologies and practices for good management, monitoring and maintenance of land assets.The digital revolution, positioning technologies, smart phones and sensors all combine with and use spatial capabilities and cadastre.

Access to land, shelter, property security, land markets and gender equality are equally relevant around the world.

Although there are many challenges ahead, it is indeed an exciting time. Many countries are looking to the future to see how their cadastres can evolve to better meet the needs of society.

Against the background of today's rapid development, the biggest threat to the creation of efficient and effective cadastres is complacency. The pilot project, which was implemented at a time when we could not find a solution for reassurance, has many successes ahead of it.

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