

# Influence of geoinformation technologies to sustainable development of territories

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**Abstract.** In the course of the study the features of application of geo-information systems and technologies in the management of territories are disclosed. The definition of territorial information management systems as information systems for management of territories that provide processes for the development of optimal spatial solutions is based on the use of up-to-date, reliable and complex geo-information necessary for the implementation of the functions of management of the territory by local authorities. It has been established that geo-technologies, "GIS + Internet", transform geographic information into a universal, economically and socially significant subject of consumption. Today it becomes obvious that the use of geo-information systems and technologies at the local level significantly reduces the cost of maintaining a register of spatial information (land, real estate, engineering communications) and significantly increases the accuracy and relevance of spatial information through centralized management and correct editing of spatial data.

**Keywords:** geographical information technologies, geographical information systems, geospatial data of the territory, sustainable development, Public administration. Public authorities.

## 1. Introduction

The growing importance of information and communication technologies for sustainable development and in the life of modern society raised the issue of using geographic information technology (GIT) in the field of public administration as one of the priority areas of state policy. The need to solve management for sustainable development, planning, inventory and utilization of engineering communications issues in the territories of settlements more effectively leads to the introduction of geographic information systems (GIS). After all, the introduction of a unified policy of information provision and the creation of multi-purpose information subsystems on the basis of GIS is one of the conditions for solving the problems of modern information and communication provision of management in public authorities. All mentioned above determines the relevance of this problem and its compliance with time requirements.

## 2. Problem statement in the general case

The influence of information and communication technologies for sustainable development of territories is actualized by the development of e-government systems, intensive deployment of works in Ukraine on the formation of the National Geospatial Data Infrastructure (NIGD) and legislative requirements for ensuring the access of a wide range of citizens to the public information resources of the state and urban development and other specific cadastres as well as to the results of monitoring of the state of the natural environment and engineering infrastructure of the country's territories on the of sustainable development principles. The availability of integrated, carefully planned GITs helps to ensure timely and sound decision-making in the field of urban planning, widespread investment in all spheres of management, and the implementation of large-scale innovative of sustainable development projects.

The information and management systems are closely linked with storing and delivering information systems, and with systems that provide information exchange in the management process. A distinctive feature of geographic information systems is the presence in their composition of specific methods of spatial data analysis, which together with the means of input, preservation, manipulation and presentation of spatially coordinated information form the basis of the GIT and sustainable development approaches.

### 3. Literature review

This problem is in the sight of many scholars. The analysis of the various technologies and techniques is used in creation of digital maps, the study of geoportals and the development of the national geospatial data infrastructure are devoted to the scientific works of scientists: S. Andreev, V. Belenkov, B. Biletskiy, N. Hlebova, T. Honcharova, A. Ishchuk, A. Kasyanova, Y. Karpinskiy, S. Markov, A. Mishchenko, S. Mogilny, L. Pavlenko, Yu. Palekhi, T. Chepigi and others.

Paying attention to the theoretical coverage of domestic researchers, it should be noted that the study of the use features of GIT in the management of territories requires further research.

### 4. The main purpose of the study

The main purpose is theoretical justification of the basic principles and practical ways to implement the latest approaches to the regional policy of regulating the processes of social and economic changes aimed at the system of assessment of the sustainable development of Ukraine in the context of the latest geopolitical realities.

### 5. A statement of the basic material

The evolution of GIT is based on a number of fundamental GIS characteristics, taking into account the trends in the development of computer technology and the Internet technologies. By the level of public administration, automated information systems are divided into territorial (regional) information systems (TIS) and city information systems, which are high-level information systems in the management hierarchy.

TIS are intended to solve informational tasks of management of administrative-territorial objects, located on a specific territory. These systems carry out work on information processing, which is necessary for the implementation of functions of regional management, reporting and issuance of operational data to public authorities and economic entities.

Therefore, TIS can be represented as a geographic information system, designed to provide processes for the development of optimal spatial solutions based on the use of up-to-date, reliable and complex geographic information and methods of geographic information processing [1]. Information content of TIS is substantiated by the necessity of informational representation of the territory from the standpoint of the needs of its sustainable development, functioning of the economy, life support of the population. The main directions of using TIS in the course of activities related to the management of territories include the study of their: socio-economic status, ecology, resources and nature management, transport and communication, utilities and construction, agriculture, health care, education and culture, socio-political status. Functional use of the territory is expressed in planning restrictions, as territory is a spatial resource of urban development that has a number of features which distinguish it from among other natural resources.

The current state of formation of geographic information resources and the provision of geo-information services in Ukraine is characterized by a number of problems and negative events, including: 1) inadequate level of activities coordination of public authorities and their implementation of measures such as collection, requirements of composition and quality of geospatial data; 2) limited access to geospatial data accumulated in the departmental funds; 3) the discrepancy of legislation in the spheres of geodesy and cartography, state secrets, certification, licensing, information and GIT to the current ever-increasing level of development of science and technology, the requirements of public authorities, business entities and citizens to the quality and efficiency of access and obtaining geospatial data; 4) the lack of accessible metadata for geodetic and cartographic works and the geospatial data created on their results; 5) insufficient financing of geodetic and cartographic works of national importance, as a result of which state maps and plans are not updated in time, and 80% of the materials and data of the State Cartographic and Geodetic Fund doesn't meet the established norms for compliance with the state of the area; 6) the lack of proper activity of organizational structures and network of geographic information centers, authorized and responsible for the creation and maintenance of geospatial data bases at national, regional and local levels, etc.

In general, an analysis of these and other problems suggests the need to improve public policy in the field of the formation and use of geographic information resources in Ukraine on the basis of the establishment and sustainable development of the National Geospatial Data Infrastructure. Recently, in separate regions of Ukraine, work on the creation of systems of city-building cadastre on the basis of the ArcGIS server was carried out, and the Ministry of

Regional Development, Construction and Housing and Communal Services of Ukraine by Order of August 14, 2015, No. 193 approved a list of classes of urban development objects cadastre, which significantly contributes to the unification of data and the implementation of GIS in the area of planning and management of the territory.

Thanks to the widespread adoption of information technology, the technical support of local authorities in urban planning and architecture has recently improved significantly. Implementation of the GIT promotes the efficiency and effectiveness of the use of communal real estate objects; practical solution of the urgent problems of the city, connected with ensuring the stable filling of the local budget with finances, development of small and medium-sized businesses, optimization of investment attractiveness of the territory; opens up full-time and seven days a week an opportunity for direct provision of public services to consumers; ensures the functioning of communal facility management bodies in real time, and also makes the daily communication of the citizen with the official institutions as simple and accessible as possible [2, p. 543–550].

Examples of GIS include: maps of settlements connected with information on communal property objects, in particular schools, hospitals, transport objects, trade infrastructure, etc; plans of industrial complexes with the reflection of engineering networks (plumbing, sewage, gas pipelines, fire systems, etc.). The necessity of using GIS is due to the lack of comprehensive representation of local authorities on the objects created in the territory under the jurisdiction of the last time. After all, the topographic and cartographic basis of maps and plans of the area, including digital ones have the special feature to lose relevance with each newly built new building or new industrial object installed by a new kiosk, paved road, etc. However, these changes are important and significant at the level of the entire settlement, as well as, at the level of the individual resident level and owner or specialist of territory servicing. The discrepancy of the management system of communal property complexes of cities with the modern trends of urban economic development constrains the resolution of the urgent problems of the cities, that is ensuring the life of the territorial community, improves the quality of life of the population and public services (educational, informational, communal, transport, medical care, cultural development, security, etc.).

Therefore, due to the lack of reliable and complete information from local authorities and the lack of their constantly updated single planning and cartographic basis, local budgets are losing considerable financial resources. GIS enable managers to make adequate, economically sound decisions, to respond promptly to the needs of the dynamically changing of internal and external environment of the territory development [3, p. 124–127]. In modern GIS there was the possibility of three-dimensional representation of the territory. Three-dimensional models of objects introduced into the 3-dimensional landscape, designed on the basis of digital map data and remote sensing materials, it allows to improve the quality of visual analysis of the territory and provide the adoption of weighted decisions with greater efficiency.

As a result, informatization and virtualization of modern society contributes to the formation of an entirely new social space which involves the design of new management strategies implemented in response to processes occurring in the external environment. This means that all information processes that determine the socio-economic development of the information society are interconnected and have a certain functional impact on each other.

## 6. Conclusions

Implementation of geo-information systems and technologies in the management of territories proves geographical information in modern conditions that has become an important strategic resource of public administration and the general social product of consumption. Accordingly, the main trends in the development of topographic and geodetic and cartographic activities in Ukraine are conditioned by the development of information technologies and the current growing needs of society in the actual geospatial data on the of sustainable development principles. Such an impact of information technology has determined the need for a transition from traditional cartographic infrastructure to the development of geospatial data infrastructure for their multiple and multi-sectoral use in geo-information systems, including the preparation of new forms and types of diverse cartographic materials.

Modern GIS with their developed analytical capabilities allow to visualize and comprehend information about specific objects, processes and phenomena in their totality; to discover interconnections and spatial relationships, support the collective use of data and their integration into a single information space. Digital maps or digital mapping with thematic layers are geospatial basis of GIS. They can connect databases of the real estate, land plots of organizations, monetary valuation of land, engineering structures, monuments of urban planning and architecture, geological information, history of development, etc. In the database you can also organize the storage of both graphic, and all technical, reference and other documentation.

In general, the use of geographic information systems, in particular urban, has a great importance for improving the management of the communal property complex of the city, as it provides the opportunity to receive accurate and

complete information about any communal object, its technical characteristics and users; reduce the time spent on obtaining such information; to analyze the receipts to the city budget for utilization of objects of communal real estate and land plots; identify debtors of the indicated payments; to identify unused municipal economic development communal property, objects requiring repair, reconstruction or technical re-equipment; carry out accounting and analysis of energy consumption of communal objects.

In Ukraine, in various fields, cadastre and information centers, public authorities at different levels, projects for the creation of GIS of various problem areas and territorial coverage are initiated and implemented. Objectively, geospatial data and public spending on their production, maintenance and use are increasing. In this context, Ukraine's active participation in international geo-information projects on global mapping deserves attention on the of sustainable development principles. It that has considerable scientific and technological production and technological potential for the creation of geospatial data using modern methods of remote sensing of the earth, digital methods of geodetic measurements, based on satellite technologies to implementing a technical assistance project on the creation of the National Geospatial Data Infrastructure in Ukraine.

Therefore, the question about the development of appropriate regulatory and institutional support for this process arises that is one of the key factors for the successful creation and development of geospatial data infrastructure. We are talking not only about the widespread introduction of new GITs, but above all new policies and new forms of legal and industrial relations in the field of sustainable development and ensuring the growing needs of society in geo-information products at all levels of public administration, sectoral, interagency, social and territorial coverage.

## References

- [1] Pitak, I. V., Nehadailov, A. A., Masikevych, Yu. H., Pliatsuk, L. D. ta in. (2012). Heoinformatsiini tekhnolohii v ekolohii [Geoinformation technologies in ecology]. Chernivtsi [in Ukrainian].
- [2] Chepiha, T. M. (2010). Uprovadzhennia informatsiino-komunikatsiinykh tekhnolohii v upravlinnia ob'ektamy nerukhomosti terytorialnoi hromady [Implementation of information and communication technologies in the management of real estate of the territorial community]. *Naukovyi visnyk Akademii munitsypalnoho upravlinnia*, 3, pp. 543–550.
- [3] Hrabovets, I. V. (2012). Informatsiini tekhnolohii v munitsypalnomu upravlinni: problemy ta shliakhy realizatsii [Information technologies in municipal administration: problems and ways of implementation]. *Hrani*, 1, pp. 124–127.