

constant despite extreme fluctuations in external temperature. These innovations illustrate how studying natural processes can lead to breakthroughs in sustainable architecture.

How is AI changing urban development? AI-powered tools can optimize energy consumption, predict climate-related risks, and improve the overall efficiency of smart cities. This technological integration not only enhances sustainability, but also improves the quality of life of urban residents by reducing pollution and increasing green spaces.

The push toward zero-energy buildings is another major milestone in modern architecture. These buildings produce as much energy as they consume, using solar panels, wind turbines, and advanced insulation technologies. The concept of passive design, which maximizes natural light and ventilation, is also gaining popularity, reducing the need for artificial heating and cooling.

In general, recent advances in architecture and engineering contribute to the creation of sustainable and energy-efficient buildings that minimize environmental impact. The use of biomimicry, intelligent materials and zero-energy technologies confirms the importance of an ecological approach in urban planning and adaptation to climate change. These innovations not only reduce the negative impact on the environment, but also increase comfort and quality of life, optimizing the use of resources. They are the key to a sustainable future, where technology and nature coexist harmoniously, ensuring a safe and efficient environment for future generations.

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METHODS AND MEANS OF ASSESSING THE DEVELOPMENT POTENTIAL OF TERRITORIAL COMMUNITIES

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Assessing the development potential of territorial communities is a crucial tool for determining strategic priorities for regional development. It is based on a comprehensive analysis of economic, social, environmental, and institutional factors that define the community's resilience, its capacity for innovation, and its integration into national and international economic processes.

One of the key methodological approaches to assessing the potential of territorial communities is economic and mathematical modeling, which allows for forecasting socio-economic development, evaluating the financial stability of a community, and identifying optimal development scenarios. Among the quantitative methods used for assessing community potential, the most widespread are statistical analysis, multidimensional assessment methods, index methods, and econometric models. These methods provide an objective measurement of community development levels, track dynamic changes, and enable adjustments in governance decisions [1].

Statistical analysis is one of the simplest methods for assessing the development potential of communities. It includes analyzing absolute and relative indicators such as employment levels, average income, investment volumes, and community economic structure. The main advantage of this method is its accessibility and the availability of a large amount of open statistical data. Multidimensional analysis methods allow for a comprehensive assessment of community potential while considering the interconnections between different socio-economic indicators. These methods include principal component analysis, factor analysis, and cluster analysis, which are used to classify communities based on their level of development.

Index methods are based on calculating aggregated indicators that integrate multiple socio-economic characteristics into a single coefficient. The most commonly used are the Human Development Index (HDI), the Regional Competitiveness Index, and the Innovation Development Index. These methods enable a simplified assessment of community development potential and facilitate comparisons with other communities. Econometric models are applied for forecasting community development and analyzing dependencies between different development factors. They include regression analysis, time series modeling, and stochastic methods. These approaches provide a high degree of accuracy in assessment but require large volumes of data and complex calculations [1].

Expert evaluations are used in cases of data scarcity or when assessing qualitative aspects of community development. Such evaluations involve specialists in regional development, representatives of local authorities, and civic activists.

Modern information and analytical systems play a crucial role in the process of assessing the potential of territorial communities. These include geographic information systems (GIS), monitoring dashboards, and Big Data analytics platforms.

GIS technologies enable spatial analysis of communities, assess the location of strategic facilities, and plan infrastructure development. They are used for analyzing environmental conditions, transport accessibility, and the availability of social services for the population.

Big Data and machine learning are applied for automatic analysis of large datasets, allowing for the identification of hidden patterns in community development and the forecasting of socio-economic trends.

The level of citizen participation in community governance plays a significant role in the assessment process. Implementing tools such as participatory budgeting, public consultations, and online platforms for regional monitoring helps improve governance transparency and engage citizens in decision-making.

The assessment of a community's environmental potential is an essential component of comprehensive development analysis. The key indicators of environmental conditions include water and air quality, pollution levels, and the presence of protected natural areas. The use of environmental indices, carbon footprint calculations, and energy efficiency analysis helps develop sustainable development strategies.

Developing integrated indices enables a comprehensive assessment of community development based on multidimensional data. The use of multifactor analysis, factor models, and index-based approaches facilitates obtaining generalized assessments that can be used for strategic decision-making.

Thus, the assessment of the development potential of territorial communities is a multifaceted process that requires the use of both quantitative and qualitative analysis methods. The application of modern information technologies, the involvement of expert communities, and the enhancement of citizen participation in community governance will contribute to the development of effective strategies and ensure the sustainable growth of regions.

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TRENDS IN THE DEVELOPMENT OF THE ROLE OF GEOINFORMATION TECHNOLOGIES IN SPATIAL PLANNING

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Geographic information technologies (GIS) have confidently taken their place in modern spatial planning. They provide efficient collection, analysis and visualisation of geospatial data. The year 2025 will continue the general trends in GIS development that have been laid down before, and this will have a significant impact on approaches to planning and management of territories.

One of the key aspects is the integration of GIS with Building Information Modelling (BIM) technologies. This combination allows to create