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Innovations in the implementation of integrated territorial development projects: Russian and global trends

The paper discusses Russian and international solutions in the field of innovation in integrated development projects. It provides an analysis of the application of innovative solutions in the field of urban planning and the creation of a comfortable urban environment. Technological solutions of software systems in the field of business intelligence, which allow for the identification of problems and the proposal of solutions that help businesses to implement integrated development projects more effectively, are becoming increasingly relevant in the context of public-private partnership projects. The author's detailed analysis of the structure of integrated development projects helps to apply an innovative approach to each part of the project with maximum economic benefits. The integration of energy-efficient solutions, organizational and technological reliability assessment methods at all stages of the construction project life cycle, weather control systems, and green technologies into territorial development projects creates a positive economic effect from the innovative approach to the design and development of existing new territories. According to the author, innovations in legal regulation have a positive impact on the final implementation time of large-scale infrastructure projects. Smart cities and comfortable environments become centers of attraction for people, which helps to achieve the initial and main goals of implementing integrated territorial development projects.

Keywords: *integrated development, urban planning, urban environment, innovations in construction, smart city, energy saving*

The concept of "integrated territorial development" (hereinafter referred to as ITD) is fixed at the legislative level in the Urban Planning Code of the Russian Federation, which also defines the goals, types and some features of ITD projects. In the modern world, such tasks of the ITD come to the fore as:

- quality of the urban environment;
- efficiency of use of territories (both built-up and only planned for development, both residential and non-residential territories within urban and rural settlements);
- increasing the investment attractiveness of ITD projects;
- comprehensive infrastructure development;
- formation of objects of economic activity of the population within the projects of the ITD;
- other tasks.

The Urban Planning Code defines the ITD as "a set of measures carried out in accordance with the approved documentation on the planning of the territory and aimed at creating favorable living conditions for citizens, updating the living environment and common areas of settlements, urban districts"¹.

According to the author, the integrated development of territories is the most important strategic mechanism for the formation of the urban environment, its transformation, modernization and adaptation to modern requirements imposed by society and the state on cities and settlements. Infrastructure and energy within the ITD projects are becoming drivers, points of growth and attraction for the best

technologies and innovations. As in many, especially in high-tech sectors of the economy, which can fairly include urban planning, an innovative approach to the integrated development of cities and settlements is becoming a leader.

Innovations in the implementation of ITD projects play a crucial role in both the Russian and global economies. There are a number of global and domestic trends, and Russian innovations are leading in a number of industries interacting within the framework of the ITD. Thus, innovations in the ITD include:

- development and application of the latest technological solutions in construction, including new energy-efficient materials and resources, energy-saving solutions such as an "energy-efficient closed-loop house" using earth's heat;
- development and application of the latest methods of urban planning design, including the use of digital twins;
- inclusion of new environmental approaches and solutions in the requirements for the ITD;
- the use of digital technologies, including through the use of emerging opportunities in the field of artificial intelligence and big data analysis;
- innovative optimization solutions in the field of construction object life cycle management;
- innovative technologies in the field of organizational and technological reliability of construction at all stages of the life cycle of the facility;
- innovations in the use of technically complex construction facilities to provide energy-efficient energy resources for ITD projects;

¹ Urban Development Code of the Russian Federation of December 29, 2004. No. 190-FZ (as amended on July 31, 2025). URL: https://www.consultant.ru/document/cons_doc_LAW_51040/ (rus.).

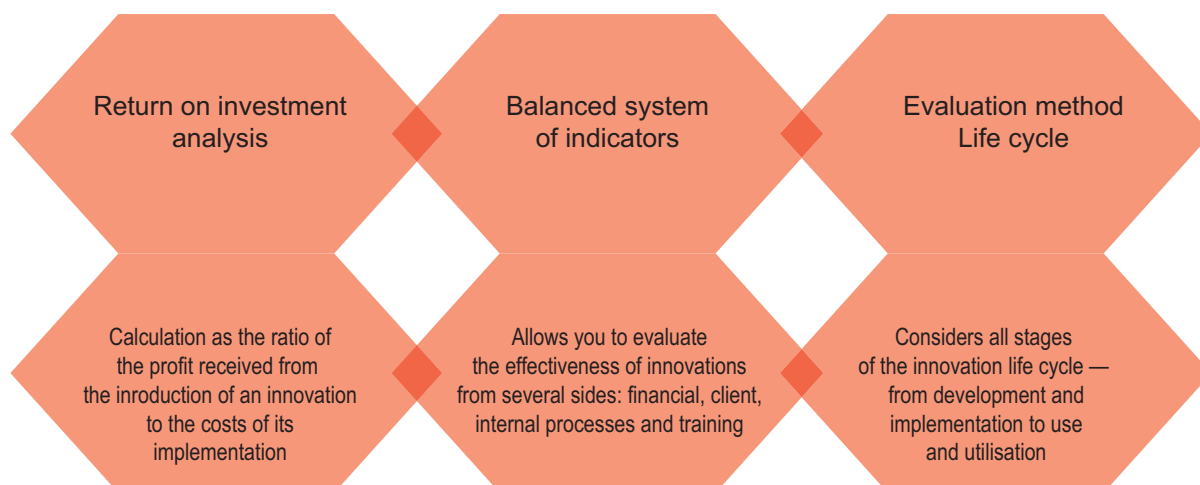


Fig. 1. Assessment of the effectiveness of the innovation process in ITD projects

- innovations in legal issues related to taking into account the interests of all participants and owners of territories and facilities within the boundaries of the ITD-project;
- other innovative solutions, including those under development.

Let's take a closer look at the opportunities offered by modern ITD projects, taking into account the application of an innovative approach. The widespread use of technological and technical innovations in the form of artificial intelligence capabilities in the analysis of regulatory and project documentation makes it possible to significantly reduce the time spent on primary analysis of project databases.

The direction of innovations in energy efficiency opens up a wide range of opportunities to increase the economic profitability of ITD projects, both at the design and construction stages and at the operational stage.

For example, weather control systems for temperatures inside construction sites relative to the external environment are becoming particularly in demand in regions with abnormally cold or hot climates. For regions with a temperate climate, such systems bring effective checks on a relatively smaller scale, but along with other innovative methods of optimizing operating costs, they cannot be ignored in the design.

Digital twin technologies of urban environment objects are becoming indispensable in the implementation of ITD projects. Such technologies allow:

- based on a virtual copy of the city, recreated on the basis of real data, to simulate the state of the urban environment and, based on the accumulated data, make predictive development plans, help to formulate a dynamic approach to the ITD;
- design a management system for the infrastructural elements of the urban environment, including one that allows for real-time regulation of its operation;
- monitor the occurrence of failures and malfunctions online and receive requests for repair and restoration work;
- collect databases for subsequent analytics, while multifactorial models for data analysis actually become plastic material for obtaining certain conclusions about the work of urban systems;
- identify certain patterns in the functioning of all systems included in the ecosystem;

- predict the development and set goals for achieving the key indicators of the systems.

In the presented analytical material, the author systematizes, analyzes and offers solutions in the field of application of innovative approaches in complex processes within ITD projects, taking into account Russian and international experience. It should be noted that an integrated approach to territorial development can be an innovation in itself.

This approach is becoming innovative, used for the first time, for those locations that have not yet been built up or were not supposed to be built, and do not have developed planning documentation that meets modern requirements for comfort and quality of the urban environment. This situation can be typical for both residential and non-residential, including industrial buildings. Here, however, the economic feasibility of an infrastructure construction project comes to the fore in terms of the amount of financial resources spent and the beneficial effect per unit of investment.

The author proposes to systematize the methods of assessing the effectiveness of innovations in ITD projects in the form of a diagram (Fig. 1).

Analyzing current trends in innovative development within a comprehensive approach to territorial development, the author proposes the following systematization of innovations based on their impact factors.

1. Innovations that, at comparable costs, affect the quality of the urban environment, including residential and non-residential buildings. These innovations and their implementation results allow the developer of a ITD project to increase the efficiency of the investment funds invested in the project. This is achieved through:

- resource savings;
- increased user loyalty to the brand;
- increased sales rates and volumes within the project;
- energy security and energy efficiency.

2. Innovations that affect the efficiency of financial and non-financial resources by optimizing a number of processes within the ITD project (flow-based work methods, logistics management within and outside the project framework).

3. Innovations in energy efficiency and green construction for ITD projects that affect the savings of various types of energy resources.

4. Innovations that affect and enable the achievement of sustainable urban development in ITD projects, which aim to create

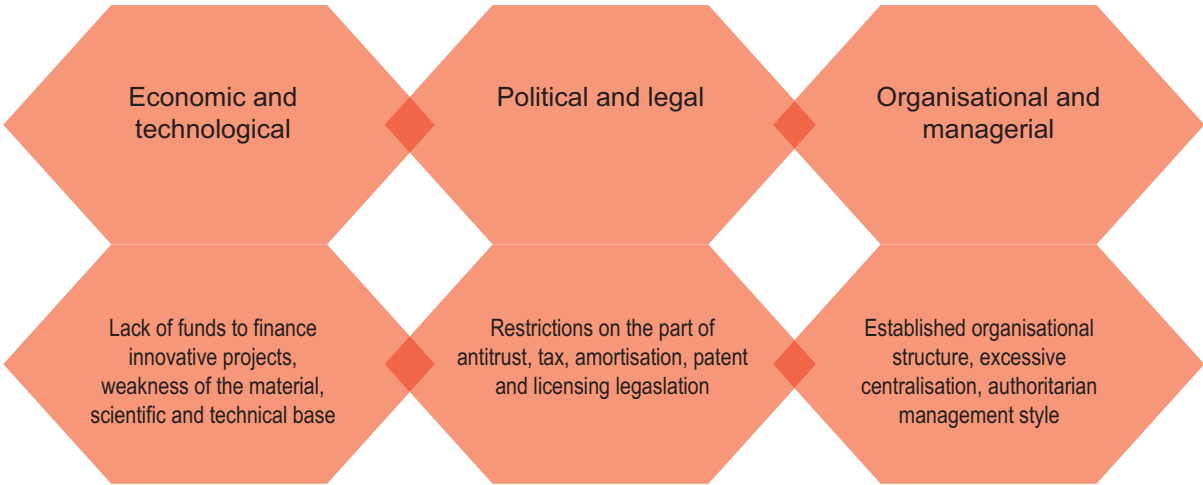


Fig. 2. Factors that influence the structure of the innovation process in ITD projects

construction facilities within ITD that harmoniously interact with the environment and have minimal negative impact on nature and the existing ecosystem throughout their entire life cycle. The sustainability of architecture and the development of innovations in this field are the most important areas of modern urban planning on an international scale, due to global environmental problems and the need to rapidly create a comfortable urban environment in the context of the ever-growing population of our planet.

5. Innovations that affect energy security. Thus, an example of research in this field of innovation is the global implementation of nuclear power projects in already built-up areas and newly built-up locations and scalable on the basis of innovative nuclear power plant projects “already implemented in some countries of the world (Turkey, Bangladesh, Hungary, etc.) (hereinafter referred to as NPP), incorporating ecosystem and infrastructure solutions, including renewable energy sources (hereinafter referred to as RES), smart city technologies, integrated infrastructure development of territories (hereinafter referred to as IIDT), when the bright idea... is that it is the small-capacity nuclear power plants (up to 200 MW) that can become the central axis of the urban planning ecosystem and remove the infrastructure constraints for the development of the economic and social spheres through the use of nuclear carbon-free energy, as well as replace outdated coal, fuel oil, and gas-fired power plants with increased CO₂ emissions into the atmosphere, transferring the projection of the Reimers ecosystem approach [1], where the central role is given to the Sun, to the modern eco-sustainable City, Agglomeration, State, and World” [2].

I would like to dwell a little more on the concept of a low-capacity ground-based nuclear power plant (hereinafter referred to as a LCGBNPP). In the global typology, LCGBNPPs are classified as nuclear reactors with a capacity of up to 300 MW (electrical) per power unit. This type of power generation has numerous advantages over large-capacity nuclear power plants, such as:

- the occupied area (which is crucial in historically established industrial zones);
- the cost of construction and operation;
- greater safety due to multiple safety redundancy;
- shorter construction time and increased service life;
- no need to modify the network infrastructure, etc.

The use of LCGBNPPs in industrial zones of urban agglomerations will significantly improve the energy balance of the metropolis

and make an unconditional contribution to achieving the goals of reducing carbon dioxide emissions into the atmosphere. In recent years, the United Nations has included nuclear energy in the so-called “green square”, along with renewable energy sources (hydropower, solar, and wind generation).

6. Innovations and ideas that affect the sociocultural component of ITD projects (Fig. 2).

A striking example of an innovative approach to solving the socio-cultural challenges facing the integrated development projects in Russian cities and settlements is the 200 Churches Programme, which is being implemented in the city of Moscow. In 2009, the Orthodox Diocese, represented by the Patriarch of Moscow and All Russia, proposed the idea of building two hundred churches within walking distance of the population in Moscow’s integrated development areas. Thus, the need for churches within walking distance was analyzed, and in 2011, the first foundation was laid under this programme, which is currently being implemented jointly by the Russian State and the Russian Orthodox Church² [3].

“New churches are not only religious, but also social facilities, as they have clubs and sports sections for children and adults, film clubs, and also implement charitable and volunteer programmes”, said Sergey Levkin, Head of the Moscow Department of Urban Development Policy² [3].

It should be noted that the role of the capital’s authorities is to provide territories within the framework of the ITD project for the construction of religious buildings. Territories are provided on the basis of legal acts issued by public authorities, including the quantitative criterion of “one church per 20,000 residents, with a walking distance of about 1 km”³.

As of the beginning of 2025, about 150 churches have been built, and, as Vladimir Resin notes, “in some districts of Moscow, such as the Southern, South-Western, Western, and North-Western districts, we have already reached the «equator» of our Programme. In the Eastern and North-Eastern districts, we are close to completion. However, Moscow is a city that is constantly growing. New residential areas are being developed, especially as part of the renovation and integrated development programmes. And in

² Orthodox church construction program in Moscow. Russian Orthodox Church. URL: <https://200hramov.ru>

³ “The 200 Temples Programme — Facts and Figures”. Pravmir magazine. 09.07.2015. URL: <https://www.pravmir.ru/programma-200-hramov-faktyi-i-tsifryi/?ysclid=mgthbzz16g101864963> (rus.).

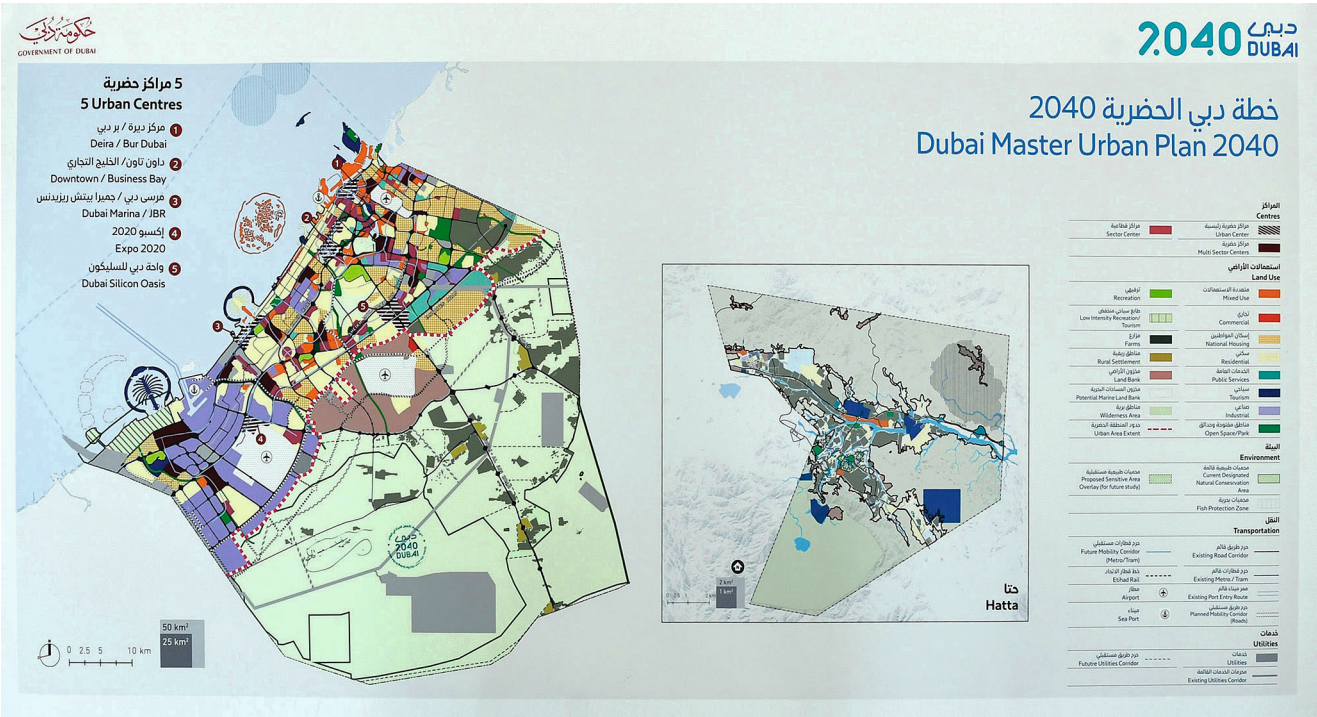


Fig. 3. Urban Planning Master Plan for the Emirate of Dubai until 2040

these new areas, people also want to have churches within walking distance”⁴.

As we can see from the analysis of the innovative approach to the integrated development of territories, innovations affect all areas of urban comfortable environment development. Of course, a separate line should be noted the creation of modern medical and educational clusters on the territory of the ITD projects. Currently, the analysis of the project experience of Russia and other countries using digital technologies and AI methods allows to include technically complex multifunctional construction and operation facilities in the ITD projects [4]. According to experts⁵ in the field of implementing ITD projects, “energy grid infrastructure, including heat and power grids, water supply, sanitation, and water treatment systems, as well as the use of alternative energy sources, becomes a driver for increasing the investment attractiveness of regions and territories when the network development is sufficient” [5].

In the international arena, according to the author of this article, the most striking and successful example of an innovative and comprehensive approach to territorial development is the creation of the United Arab Emirates in 1971. With a 54-year history, this project has a strong economic foundation based on oil revenues, combined with an innovative approach to development and the creation of high-quality infrastructure, as well as the development of territories that are not associated with residential functions, such as industrial and agricultural clusters and special economic zones.

Thus, the officially published master plan for the development of the Emirate of Dubai contains development intentions until 2040⁶. Essentially, the master plan is an investment map of projects for the specified period of the Emirate's life cycle (Fig. 3)⁷.

Thanks to innovative strategies and technological solutions, once-deserted territories are becoming oases for living and doing business. Innovations in construction technologies, safety, and, in particular, fire evacuations in high-rise buildings, digital climate systems that regulate cold supply and energy efficiency, technologies for rapid-build buildings and construction on the seabed, are being dynamically developed based on the existing global experience of such construction, including the use of blockchain technologies for the secure storage of digitized design and technical documentation⁸.

The principles of sustainable urban development are included in the urban planning agenda of all countries. For example, the development programmes of European countries include the following principles:

- Research and innovation;
- Information and communication technologies;
- Principles of competitiveness for small and medium-sized businesses;
- Plans for achieving low-carbon economy goals;
- Fundamental principles of urban development, etc.⁹

⁴ “First comes the community: Vladimir Resin, curator of the 200 Program, explains why the demand for new churches in Moscow continues unabated”. Foma Magazine. February 17, 2025. URL: <https://foma.ru/snachala-rozhdaetsya-obshhina-kurator-programmy-200-vladimir-resin-rasskazal-pochemu-v-moskve-ne-oslabevaet-zapros-na-novye-hramy.html?ysclid=mgthfahuva637941885>

⁵ Egorova A. Investments in tourism as a driver of sustainable development of territories. RBC news agency. 01.04.2025. URL: <https://companies.rbc.ru/news/u4N7Lsx3bY/investitsii-v-turizm-kak-drajver-ustojchivogo-razvitiya-territorii/>

⁶ Urban 2040 Master Plan. Dubai, 2040. UAE Beta. December 30, 2024. URL: <https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/transport-and-infrastructure/dubai-2040-urban-master-plan>

⁷ Urban Master Plan. Dubai, 2040 (Dubai 2040 Urban Master Plan). UAE Beta 12/30/2024. URL: <https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/transport-and-infrastructure/dubai-2040-urban-master-plan> (accessed: 11/17/2025).

⁸ Sharma P. The most exciting upcoming mega projects in Dubai & UAE (2025). 2024. URL: <https://www.novatr.com/blog/top-10-upcoming-projects-in-uae>

⁹ Sustainable urban development. European Commission. URL: https://ec.europa.eu/regional_policy/policy/themes/urban-development_en

Non-profit organizations, including those established with the participation of government agencies, such as URBACT¹⁰, play an important role in promoting innovation in the ITD projects.

Thus, it is impossible to overestimate Vernadsky's scientific concept of the noosphere, where the world of nature and society, where human innovative activity is decisive, and the information generated by all kinds of innovative sensors for accounting and monitoring all processes, is the noosphere, the smart biosphere, or the digital infrastructure innovations of the urban environment, which are developed by the ITD projects [6].

The international and Russian practice of introducing innovations in the field of integrated development of territories is rich in technological solutions, and the possibilities for implementing new ideas and startups with subsequent registration in patent offices are boundless in terms of their existential meaning. The multifaceted nature of the innovations surrounding us is of interest to investors and government agencies, and each innovation described in the article is effective and manifests itself in new projects and solutions in integrated development of territories.

¹⁰ URBACT helps cities develop a comprehensive set of measures for sustainable change URBACT-2025. URL: <https://urbact.eu>

Инновации при реализации проектов комплексного развития территорий: российские и мировые тренды

В статье рассмотрены вопросы российских и международных решений в области инноваций в проектах комплексного развития территорий. Приведен анализ направлений применения инновационных решений в градостроительной сфере, формировании комфортной городской среды. Технологические решения программных комплексов в области business intelligence, позволяющие выявлять проблемы и предлагать способы их решения, помогающие бизнесу реализовывать проекты комплексного развития территорий более эффективно, становятся интересны при реализации проектов по модели государственно-частного партнерства. Проведенный автором подробный анализ структуры проектов комплексного развития территорий помогает применять инновационный подход в каждой из частей проекта с максимальным экономическим эффектом. Встраивание в проекты территориального развития энергоэффективных решений, методик оценки организационно-технологической надежности на всех этапах жизненного цикла объектов строительства, систем погодного регулирования и «зеленых технологий» формирует положительный экономический эффект от инновационного подхода к проектированию и застройке существующих новых территорий. Инновации в правовом регулировании, по мнению автора, положительно влияют на итоговые сроки реализации крупномасштабных инфраструктурно-значимых проектов. Умные города и комфортная среда становятся центрами притяжения людей, что позволяет достичь первоначальных и главных целей реализации проектов комплексного развития территорий.

Ключевые слова: комплексное развитие, градостроительство, городская среда, инновации в строительстве, умный город, энергосбережение

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