Optimization of planning of territorial systems in the context of strategic tasks of advanced development

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Abstract. The human life environment formation is carried out in the context of the sustainable spatial development current paradigm. When implementing this paradigm, the vectors directions are taken into account: inertial development and advanced development. The novelty of the research lies in establishing the definition dependence of the general concept, methodology, toolkit on the direction of these vectors under the uncertainty conditions in the external factors appearance. Formed aggregate is a condition for the development goals achievement by territorial systems. The advanced development model accompanies the territorial systems polarization processes. Its development is associated with the justification and formalization of priorities, types, forms and the socio-economic activities promising types spatial organization features. It has been established that localization effects are characterized by the activity spatial consolidation certain methods in strictly fixed points of the territorial system. The innovation factors complex impact transforms the existing methodology and improves the traditional methods of functioning territorial entities reorganizing. As part of this study, the directions for optimizing territorial systems and increasing their controllability are justified by integrating space digitalization processes into the production intensive type implementation. The territorial systems optimization presented method reveals the principles of forming the mechanism of advanced multi-level adaptation within the territorial systems management developed concept framework.

Introduction
The problems urgency of forming the human life material-spatial environment is constantly increasing. They are traditionally the scientists and specialists professional research subject united by scientific interests in the field of existing territorial systems urban transformations. In these studies overwhelming majority, the shaping territorial systems prospects dependence on their historical context, geographical location, available natural, social and economic resources for the historical, ethnic and cultural characteristics development is determined [1, 2]. Some studies emphasize the inevitability of influence on social development, in general, and on urban studies, in particular, scientific and technological progress, objectivity of globalization and digitalization, assess their role in processes, discuss the importance of external and internal factors, the manifestations of potential risks in the 21st century [3, 4]. The transition of territorial systems to a new technological order is associated with an intensive stream of constant innovations in all the activity areas. They are able to drastically change the human environment due to the economic activity new types emergence, “smart” ways of organizing space associated with the integrated infrastructure systems development of transport and engineering communications, technologies, including communications and information, as well as management
systems for these processes [5-8]. In this regard, the issues of overcoming the strategic drift of globalization are becoming increasingly relevant, especially for Russia: the problem of a one-time and relatively uniform innovation of the territorial systems development exists objectively [9-12]. The Russian territorial systems spatial organization polarization reinforces this trend: they are not initially in equal development conditions, and their comparative analysis is difficult due to the unity lack of numerical estimates and formats for their presentation. The pronounced polarization negative consequences can be offset by the proposed methodology advantages for optimizing territorial systems [13, 14]. Within its framework, methodological approaches are determined for the formation of a mechanism for adapting territorial systems when transitioning to a new technological order, to developing differentiated and personalized reactions, properties, characteristics and features of new spatial entities and the forms proposed to belong to the typological group of development “advanced forms”.

The territorial systems advanced development strategic tasks decision as a condition for the living environment modernization

Prospects for the digital economy formation are associated with the formulation and solution of a new type problems: the living environment modernization defined by the territorial systems framework. The systems new target functions establishment transforms the sustainability concept due to the innovation manifestation signs in it [15-17]. In the global competition context, among the territorial systems development landmarks, the tasks of their priority development are highlighted [18, 19]. The territorial systems functioning traditional schemes reveal primarily the “inertial (catching up) development” formats and are not designed for a long term implementation. Adherence to the vector of “advanced development” predetermines the necessity of posing fundamentally new tasks, their formalization and solving ways on the basis of a systematic approach reflecting the competitiveness theory position at various levels. Its distinctive features, as applied to territorial systems, are the identification, classification and justification of their competitive advantages from the foresight analysis standpoint. The competitiveness requirement entails the need to identify the new factors of influence, processes, relationships, complexes, objects that are capable of forming material spatial environment corresponding prognostic estimates. The territorial systems management concept developed by the authors is aimed at implementing these requirements. It forms the environment for transition to a new technological structure, taking into account the life cycle stages, goals, concerns and resources, hierarchy organization levels, as well as individual characteristics. Within the concept framework, the authors have developed a method for optimizing territorial systems, which allows their balanced functioning with minimization of system deviations from a given state with the business innovative types active manifestation. Long-term forecasting is the optimization basis; therefore, it is important to use the development targets reflecting the dynamic changes in the research objects. The territorial systems “leading forms” content standardization allows to refer to the universal methodological tools. This does not exclude a typological variety of forms, determined by a combination of properties, characteristics and indicators. To improve the new forms compliance accuracy with the specified objective functions the combinatorics techniques are used, which allow to obtain the most adequate options for a particular territorial system. In developing the optimizing territorial systems method, the influence identified pattern on their reorganization strategy content, the production type, the existing factors complex, the method of localizing the process and the principles of structure formation is used.

The territorial systems functioning optimization

The territorial systems reorganization is based on strategic priorities determined: in the context of solving the problems of sustainable functioning; in accordance with the chosen vectors of spatial development: inertial or advanced; based on the existing resource potential comprehensive assessment results, which reveals the concept of “identity”. The territorial systems strategy substantiation reorganization and the subsequent completeness of the stated development goals realization are fraught with the risks caused, among other things, by the external and internal factors influence uncertainty. The
The proposed methodology is based on the systematic approach principles, which make it possible to most fully demonstrate the benefits of the “advanced forms” of development (see Fig. 1).

The territorial system reorganization strategy is formed on the basis of the process stages developed classification: stabilization development, point development, advanced complex development. The dominant feature of building a classification is the establishment of parameters for changes in territorial systems based on functional transformations, reflecting their adaptive abilities. This allows for a reasonable ranking of the territorial systems development formed “leading forms”. The condition for increasing the territorial systems stability and achieving its forecast indicators complex is the model of renewal, expressed in qualitative and quantitative changes, functional objects fixation and connections corresponding to the new types of economic activity, transformation of its structure and infrastructure. From the authors’ point of view, the territorial system striving to a sustainable balanced state can be accepted by it as an advanced development vector, provided that it innovates the forms, tools and mechanisms used and the management technologies developed. In this case, we are talking about the transition principle operation from the available resources rational use to their systemic production effectiveness at all the territorial system organization levels, which cardinally modifies the existing material and spatial environment.

This prepares the flow of a programmable optimization process using foresight technologies. Due to their use, the local systems are not represented as isolated elements, but as the innovative processes projections integrated into the territorial system. The diverse local territorial entities (systems) designing conceptual models modern world practice and their practical implementation is quite extensive. As shown by the results of its analysis, the most appropriate combination of universal and the developing local systems component methods, using the infrastructure approaches to their organization as the most fully revealing the reorganization innovative type. As a result, according to these processes impact results, the production process can be represented as an expanded production on a territory resource potential new qualitative basis with its territorial system further innovative use to increase the viability and ensure the necessary conditions, the level and quality of the population life.

The optimizing territorial systems proposed method takes advantage of innovatization as allowing to achieve dynamic change indicators set at the forecast stage. These indicators negate the methodological approaches inconsistency: the structural elements formation and the infrastructure support initiation. Ensuring their interaction can increase the territorial system viability and enhance its adaptability. Adaptability is manifested in the synchronization of innovative spatial forms with the territorial system stability framework in the expanded production process framework.

The territorial systems ensuring the manageability on the advanced multi-level adaptation principles basis

The optimization methodology contributes to the identification and the local components subsequent shaping of territorial systems, facilitates the harmonization of the revolutionary, in fact, territorial systems development evolutionary processes. The local components appearance is an example of a resource-saving approach. It allows to move from traditional options for assessing the effectiveness and the system resources use intensity to the optimal schemes development for their production, while preserving and multiplying the resource potential. This determines the production intensive process differences from the extensive production. The intensive production basic provisions are set by the territorial administration authorities. They are required to form and implement a project strategy model, which is focused on the system solution of a relevant foresight objectives set for the territorial systems development. From the production intensive type implementation standpoint, the traditional activity on the territories development and the planning of their promising forms is modified, a characteristic strengthening of the urban activity expressed social aspect takes place. This most fully reveals the sustainable spatial paradigm development content in a digital economy. It does not diminish the maximizing value of the income expected from the total resources use and the investment schemes effectiveness used. It is proposed to overcome the existing contradiction by developing the effective mechanisms. The authors have developed and proposed to use the mechanism of the territorial systems
multi-level adaptation, personified to the “advanced development” processes pronounced heterogeneity conditions (see Fig.2). The proposed ranking of indicators in accordance with the accepted stages of dynamic changes in territorial systems. Their definition and subsequent monitoring allow not only to characterize the existing situation, but also to ensure the foresight development strategies development continuity.

Figure 1. Methodological scheme for the territorial systems optimization in the context of their advanced development
The main advantages of the mechanism are as follows:

a) the territorial system development continuity is achieved, ensuring the identification and preservation of the initially specified value properties and the territorial system characteristics, developing a personalized genetic code reflecting the individual features translation method at all the previous formation stages;

b) turbulence is reduced by randomness in the territorial system development as a result of the fundamentally new unique foresight forms emergence not having any prototypes.

The project strategizing functions are determined by “anticipatory forecasting”, which assumes the trends analysis and identification continuity in the territorial systems development under the influence of a complex external situation and consequences for the internal state. Since the required for the territory format is the balancing influences of factors, as opposed to unbalancing influences, each of them is proposed to be described by the appropriate quantitative indicators and identified by means of comparative analysis. Depending on the results obtained, adjustments are made to the descriptions of the territorial system state and appropriate means for their adaptation are developed, affecting the mechanism design. Thus, it is possible to achieve the most adaptive states enhancing the territorial system viability.

Summary
The study results showed that the territorial systems transition to a new technological structure is associated with the action of a set of factors for the human life environment modernization. These are: economic activity processes digitalization, methods and means of their implementation innovation, global competitiveness and identity requirements combination consistency, decisions adaptability on
the sustainable spatial territorial development, aimed at manufacturability, rationality and resource saving. As a result of their impact, the trends of “advanced development” appear. They differ from the “inertial development” by the processes intensity, infrastructural support and the ability to combine the negative consequences and positive advantages of the pronounced polarization. We are talking about the local territorial entities emergence as the systems components that can become the development drivers. The formation of stages is important for them: stabilizing development, point development, advanced complex development. Since the territorial systems have a pronounced polarity, it is necessary to take into account their dynamic characteristics when developing the strategies for their reorganization. The grouping of characteristics makes it possible to carry out a differentiated choice of a model for the reorganization of a territorial system that forms new spatial forms.

The scientific novelty of the study consists of the territorial systems optimization determination methodology provisions and their distinctive features. A method to optimize the territorial entities localization process, which reveals the ways to achieve the territorial systems development “advanced forms” typological diversity has been developed. It is based on the results of the active use of “smart” forecasting technologies, the creation and functioning of these components on their consistency principles, a combination of spatial network schemes and resource potential accumulation schemes. The territorial system valuable properties and characteristics identification and the strategic priorities assignment in the aggregate ensure the minimization of threats and risks in the process of the territorial systems successive development. The territorial systems reorganization strategy and tactics elements controlled combination, revealing the laws of their formation, systematizes the local foresight forms functioning process. To ensure the territorial systems development strategic local priorities controlled integration into the strategic management general system, it is proposed to use the developed advance adaptation mechanism. The mechanism is a real force capable of making a complex impact on the qualitative and quantitative indicators of changes in the state of the territorial system depending on the goal setting of its development. Its use for the material-spatial environment reorganization means a targeted impact on the system, in which the optimum ratio between sustainability and innovation is achieved, assessed by the deviation degree from the given (predicted) indicators of its changes. This is the territorial systems project strategizing conceptual provisions practical applicability enhancing their viability when they move into a new technological order by taking into account the life cycle stages, goals, concerns and resources, as well as the previous development specific characteristics.

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