Smart city sustainable configuration

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Abstract. The paper shows that sustainable development is the goal of most modern socio-economic systems of different levels, countries, regions, cities. It is shown that the basis for the development of modern society is the balance of interests in the economic, environmental, social spheres, without which it is impossible to achieve the goals of sustainable development. Sustainable development requires the introduction of new models of territory management. The paper notes that a promising tool for the sustainable development of the territory is the smart city model, the main element of which is modern digital technologies. The paper considers the main elements of the smart city configuration that affect the sustainable development of the territory. The toolkit of a smart city for the implementation of sustainable development goals in the context of the formation of a digital society is presented.

1 Introduction

Cities are examples of modern processes of urbanization of territories, which have both positive consequences and negative aspects of the poorly controlled growth of urban spaces. On the one hand, urbanized territories act as the main centers of economic development, are places of concentration of various types of resources, which creates opportunities for increasing labor productivity, creating new jobs, and improving the quality of life of the local population. Such features of the functioning and development of modern urban spaces are increasingly being considered in the framework of the study of territorial socio-economic systems, in the context of the study of the urban economy. On the other hand, the poorly controlled growth of urban space leads to a number of problems associated with high population density, a critical load on infrastructure, and increasing differentiation in the social environment. In addition, a significant part of the problems of urban development is associated with insufficient planning, weak control and lack of strategic development. In general, it can be noted that most of the problems of urban development are associated with the lack of coordination of interests of various groups of the local population that form the urban community, which leads to an imbalance in certain areas of urban development. The growth in the number of urbanized territories actualizes the subject of their system analysis, identification of dependencies, factors and limitations of their sustainable development. Despite the existence of a large number of works devoted to the sustainable development of the urban environment in the context of digitalization, a small number of works are aimed at

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studying the optimal configuration of a smart city that contributes to the sustainable development of the urban area. By smart city configuration, we mean a set of characteristic components that make the urban environment smart. Based on this, the purpose of this study is to identify the components of a smart city that affect its sustainable development, to identify the features of these components in the framework of the sustainable development of the urban environment.

2 Theoretical background of SC sustainable configuration

In modern economic literature, the problem of urban development is given increasing attention, since it is cities that become centers of economic development. For a long time, the study of cities was based on the functional features of cities as centers of the industrialization of the economy, the development of large industrial enterprises. Production in such conditions was most often associated with the intensive exploitation of natural resources, which caused environmental degradation. In modern conditions, the development of cities is based on the ideas of sustainability, balancing the priorities of economic, social, and environmental development [1]. In this regard, the structure of the urban economy is changing significantly, shifting towards the production of services.

In the context of the active development of the digital society, the formation of a new economic structure, largely based on the values of the post-industrial society, the paradigm of the development of urban space is being significantly transformed. Landmarks related to the development of a convenient urban environment, the creation of conditions for the versatile implementation of the needs of the urban population, the formation of favorable opportunities for the development of various groups of the urban population come to the fore. In this regard, an important factor in the development of modern cities is the formation of new ideas and principles for managing the urban environment, taking into account the possibilities and limitations of the digital society [2].

The implementation of successful ideas in a particular territory requires well-considered decisions, taking into account territorial features, opportunities and limitations. The development processes of modern cities in a post-industrial society have certain features, among which one can note the transformation of local governments into structures that provide services to local communities, the need to search for interactions between local and state governments, and the search for mechanisms for interaction of all stakeholders in solving problems of municipal development. The main tool of urban management is the coordination of the efforts of the local community and entities operating in the city. The subject of city management is the corporate interests of the joint residence of citizens: the joint use of local resources, the formation and development of municipal property, the regulation of public relations, the establishment of a favorable social climate for joint coexistence [3]. New conditions require a transition from the usual forms of leadership to innovative models of territorial management. In modern conditions of development of global economic systems, cities are points of attraction for various kinds of resources, centers for generating innovative solutions, places that have cultural potential [4].

Modern problems of urban areas force us to look for new ideas for the sustainable development of territories. One of the most effective concepts in the context of the formation of a digital society is the concept of a smart city [5]. Smart cities are a response to the challenges of our time, being a symbiosis of the physical and social space of the city with new intelligent technologies [6]. In general, it can be concluded that the smart city model reflects the ideas of the concept of sustainable development, while digital technologies are a tool for achieving the goals of sustainable development. Modern solutions in the field of urban development, based on the intensive use of technologies, contribute to increasing the productivity and efficiency of urban management. Thus, the integration of technological

innovations, while taking into account social characteristics, contributes to improving the quality of life of citizens and creating new conditions for urban development [7, 8].

Among the main goals of sustainable development of smart cities are the following: improving the quality of life of its citizens; ensuring economic growth with better employment opportunities; improving the well-being of citizens by providing access to social and public services; implementation of an environmentally responsible and sustainable approach to development; ensuring the efficient provision of basic services and infrastructure such as public transport, water and sanitation, telecommunications and other utilities; ability to address climate and environmental change issues; provide an effective mechanism for regulation and local government that ensures a fair policy [9, 10].

In general, there are several stages in the formation of a sustainable development model for an urban area based on a smart city model. Firstly, it is an analysis of the existing experience of urban development in the implementation of the ideas of sustainable development. Secondly, the improvement of existing tools for implementing the ideas of sustainable development. Thirdly, it is informing about the results of the transformation of the urban environment within the framework of the concept of a smart city, the exchange of experience, the involvement of citizens in the processes of implementing sustainable development ideas based on the model of a smart city. Fourth, the implementation of change to ensure the continuity of the transformation process, stimulating the process of change through the creation of a new series of change activities aimed at realizing the long-term goal of shaping the sustainable development of the urban environment based on the smart city model.

3 Methods

As an object of study in this article, we considered the modern concept of digitalization of the urban environment in various manifestations of economic activity. The subject of this study is economic relations that are formed in various areas of economic application of digital technologies in modern cities. The analysed data is scientific research reflected in the periodical press, as well as the author's results in the framework of the study of the processes of digitalization of modern cities. The research method is a systematic logical analysis of various stages of digitalization and directions of development of modern cities.

4 Results

An analysis of approaches to modeling the sustainable development of territories based on the implementation of the ideas of a smart city forms an understanding of the general principles, stages in the field of building a configuration for sustainable development of a territory based on the concept of a smart city. The analysis of scientific literature allowed us to identify several components of the smart city configuration that allow the development of territories in a more sustainable way. Let us consider some components of such a configuration (Table 1).

Table 1. Smart city configuration components.

Component	Description	Tools
Digital infrastructure	The sustainable development of a smart city is associated with the availability of advanced digital infrastructure. Digital solutions are the basis for the development of smart cities, a factor in improving the efficiency of the urban environment in the environmental, social, and economic spheres.	digital sensors, information transmission networks, servers, controllers
Planning system	The planning system is the basis for solving the problems of sustainable development of a smart city. Formation of goals, objectives, planning of resource needs is a prerequisite for creating a sustainable configuration of a smart city.	smart city sustainability plans and strategies
Cooperative links and network structures	Cooperation and sustainable links between various stakeholders play a big role in the development of the territory based on the smart city model. The interaction of business, local authorities, the population, the scientific community and research organizations towards the development of a common approach to sustainable development based on digital technologies is one of the key success factors for the implementation of smart city ideas within a particular territory.	digital platforms
Governance	Reasonable management of the urban environment, based on the needs of the local population, taking into account the characteristics of a particular territory, its capabilities and potential, is a necessary condition for the sustainable development of the territory. With the widespread use of digital technologies, local governments must have additional competencies in the field of digital technologies sufficient to implement smart city projects.	e-governance services, digital platforms, decision making systems
Human capital	Human capital is the basis for the implementation of the ideas of smart development of the territory, the formation of a balanced model of sustainable socio-economic development of the territory. In the context of digitalization, skills in the use of digital technologies become important skills of the local population. Without an appropriate willingness to use digital solutions in the urban environment among the local population, digitalization projects will be ineffective.	living labs, lifelong learning
Information database	The information base, which combines information on a smart city, is the information basis for the implementation of smart development ideas. Such a database should be based on information about smart city projects, accumulated information from various sources on the state of the environment, and other data sets related to the smart city system.	databases (MySQL, MongoDB, Oracle)

When implementing sustainable development initiatives based on the smart city model, it becomes important to increase the ecological, economic, social potential of the territory, and create new tools for territorial development. Among the main factors contributing to the development of the potential of the territory, from our point of view, the following factors can be distinguished.

First, it's infrastructure. The formation of sufficient infrastructure, the creation of a single ecosystem of a smart city that allows you to exchange data, coordinate the efforts of participants, analyze data and make effective decisions on this basis, allows you to transfer a

significant part of socio-economic activities to a digital format, which reduces the costs of interactions and increases the efficiency of functioning of smart city facilities. Secondly, it is a developed planning system that allows defining and formulating the main goals, objectives, planned results of the system of sustainable development of the territory. Thirdly, these are cooperative ties and network structures, including representatives of innovative companies, government bodies, the scientific community, and the local population, uniting the ideas of developing the territory based on sustainable development. Fourth is management. The management system of modern cities requires serious restructuring and reorganization in order to meet the goals of sustainable development. The main problem associated with the management of modern cities is that local authorities do not have sufficient resources to implement projects that aim to improve the quality of the local population. To a large extent, such resources are attracted through the implementation of regional and federal projects. Meanwhile, it is the availability of resources, the ability to implement projects at the local level, that is an important factor in increasing the potential of the territory and the quality of life of the local population. In addition, a significant part of projects at the federal or regional level are rather limited in time, which makes it difficult to plan the development of an urban area in the long term due to the uncertainty in the resource provision of such planning. Another problem in the management of modern cities is the inconsistency of development goals, as well as the desire to achieve short-term results without prioritizing the achievement of more significant, but long-term goals. At the same time, the achievement of short-term goals, as a rule, is associated with the implementation of projects in the economic sphere. For this, large investors, financial and industrial groups are attracted, the main goal of which is to make a profit, and not to achieve the goals of sustainable territorial development. Practice shows that during the implementation of short-term projects designed to generate profit, the balance of long-term development is often disturbed. Fifth, the development of human capital is important as the most important factor for transformations in society and the transition to a sustainable development trajectory. Sixth, it is an information base associated with the formation of a set of up-to-date information on economic, social, and environmental processes in a certain territory.

5 Conclusion

The ideas of sustainable development based on the smart city model are increasingly becoming dominant in the transformation of modern cities [11, 12]. Such trends are also observed in Russia, where the smart city model is being actively implemented in the capital, large and small cities. At the same time, it should be noted that different cities have different characteristics, development priorities and current results, based on which it is necessary to develop a particular city. The potential for the development of these cities based on the ideas of a smart city is associated with a number of circumstances. First, cities of this type have significant innovative potential, since they are centers of educational activity. Secondly, significant economic potential is concentrated here; such cities are centers of attraction for various resources. Thirdly, such cities have significant industrial potential, a place for creating innovative products. At the same time, despite the development of such cities, they also increasingly face problems of a diverse nature in the environmental, socio-economic spheres, in matters of transport infrastructure, housing and communal services.

Based on this, the result of a study conducted to identify the components of a smart city that affect its sustainable development, to identify the features of these components in the framework of the sustainable development of the urban environment, the following results were obtained.

First, it is shown that the concept of sustainable development is a priority for most modern socio-economic systems at various levels, including cities.

Secondly, it is substantiated that a promising tool for the practical implementation of the ideas of sustainable development of the urban environment is the smart city model, which is based on modern digital technologies.

Thirdly, a number of smart city configuration elements that affect the sustainability of the urban area are considered.

The theoretical significance of the study is to develop the ideas of sustainable development of territories based on the smart city model. The practical significance of the study lies in the formation of possible future studies of reasonable management in a digital society.

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