

Discussing the concept of smart city: perspectives from Russia

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Abstract. The paper focuses on the concept of “smart city”, its main approaches, and essential features. The authors state that the concept is still not well defined and there are many perspectives on it in the scholarly literature. The total of five essential characteristics of “smart cities” are discussed: “smart environment”, “smart economy”, “smart mobility”, “smart management”, and “smart people”. The authors also review the necessary infrastructure a city should have in order to be considered “smart”.

1 Introduction

Ambitious and amazing infrastructural projects are realized in many cities of the world with the use of the latest information and telecommunication technologies, which contribute to the qualitative development of cities and agglomerations around them. The concept of integrating information and communication technologies and the Internet of things for city management was called “smart city”. Nevertheless, in scientific literature there is no universally accepted concept of “smart city”. Different researchers offer completely different interpretations of this phenomenon and emphasize completely different details.

The purpose of this article is to analyze the main approaches to the concept of “smart city”, to consider the qualitative characteristics of “smart cities”, and to give recommendations on the directions of further scientific research in this field.

2 The concept of “smart city”: main perspectives

As noted above, there is no universally accepted concept of “smart city”; numerous approaches highlight various aspects of this phenomenon and cannot develop a single concept. One can agree that different city actors have different expectations from the urban environment and urban management, so balancing actors, taking into account their opinions and preferences is a very important aspect of the development of the “smart city”.

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As a rule, city authorities make their emphasis on ensuring public safety, effective management in emergency situations, providing quality educational, medical and other services, monitoring the state of the environment in the city, etc. In turn, city management companies (including organizations supplying resources to different areas of urban economy) focus on the uninterrupted supply of resources to customers, the provision of proper infrastructure, the collection of meter data and billing, the planning of technical repair of outdated infrastructure, etc. Ordinary residents of the city are interested in the rapid qualitative reception of services from state and municipal bodies, the state of transport, educational, medical infrastructure, good ecology, etc. All these factors have a serious impact on urban development, including within the framework of the "smart city" concept.

One of the most popular approaches to the definition of the concept of "smart city" is the following: "smart city: is a single city system that includes a range of important characteristics such as "smart environment", "smart economy", "smart mobility", "smart management", and "smart people" [1, 2]. Let's look at the details of these characteristics of the "smart city".

Firstly, the "smart environment" is an essential component of the "smart city" and includes a healthy environment within a single urban space, i.e. that part of the objective and spatial environment that is important to the city's society and is included in it. "Smart environment" includes the natural environment created by nature (forests, rivers, lakes, hills, fauna, etc.) and an artificial environment created by humans (architectural plan of the city, location of residential buildings, industrial enterprises, etc.). Clean ecology is an indispensable attribute of the "smart environment" of any "smart city".

Secondly, "smart economy" is based on the criteria of economic efficiency of economic entities. This is characteristic of the "smart economy" in order to stimulate the increase of the efficiency of economic activity in completely different spheres of municipal economy in order to achieve a high level of economic efficiency within the economy of the whole city. This concerns especially the state and municipal enterprises which are very often economically inefficient with low susceptibility to innovations in technologies and management methods.

Thirdly, "smart mobility" implies an effective organization of urban space using information technology and the Internet of things. Of course, the transport infrastructure is an obvious example of the organization of "smart mobility" in the city. Nevertheless, the effective distribution of electrical energy, water, heat, etc. is also an important aspect of "smart mobility" in the "smart city". Thus, we must analyze not only the mobility of people in the city ("clever" distribution of the flow of cars and public transport and), but also the mobility of all other resources using modern information and communication technologies.

Fourth, "smart management" of the city is one of the most serious challenges of modern cities. Of course, the city is a very complex structure that should be effectively managed using reliable information and reliable means of communication. A striking example of "smart management" is the creation of electronic databases that allow you to receive information online and effectively manage various aspects of city life. In our opinion, the experience of Moscow "renovation" is worth attention [5, 6, 7, 8].

Fifth, "smart people" are residents of the "smart city: and have a high level of education and intelligence that allow them to create "smart technologies" and actively use them. Non-standard and creative thinking, high intellect, and a desire to work in innovative sectors of the economy are also an indisputable attribute of "smart people" living in a "smart city".

3 Infrastructure of “smart cities”: transport, ICT, intellectual buildings

The infrastructure of the “smart city” helps the communal sector, enterprises, and households to increase economic efficiency, reduce the burden on the environment, ensure the comfort and safety of residents and visitors of the city. This is achieved through a system of links between modules of transport and engineering systems, the creation of ergonomic control loops, as well as increasing the level of awareness and efficiency of city services. A single network of sensors regulates the functioning of the city’s basic life support systems, monitors the movement of vehicles, monitors the condition of structural elements of buildings, supplies dispatch points with both visual and statistically processed information [4].

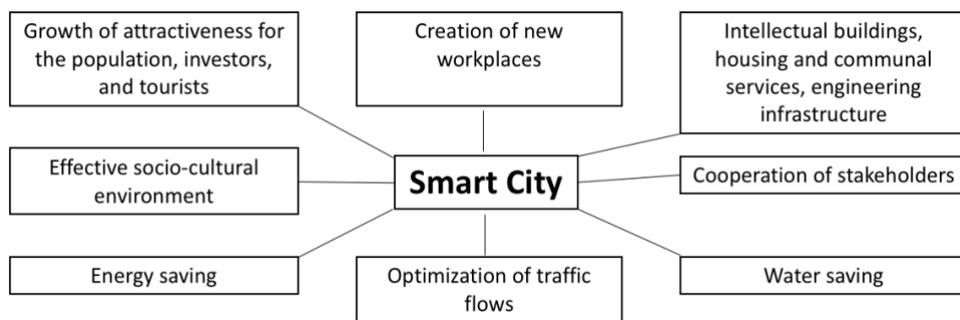


Fig. 1. Infrastructure of a “smart city”.

Information and telecommunication technologies have proved to be one of the most effective means of solving urban problems. To this end, the various components of urban development must be integrated into a single system. Today, it is possible to record the total of five major trends related to information and communication technologies and capable of seriously changing the face of cities in the near future: (a) remote access to all types of services and services; (b) “smart” urban infrastructure; (c) implementation of solutions to ensure public and information security; (d) the “Internet of things”; (e) the development of wireless communication technologies [2].

Transportation in the “smart city” is based on an intelligent transport system. This means the integration of operational management of all modes of transport and the ability to respond to events in real time. It is important that the transport system is an integral part of the entire “smart city” system and therefore should have a user-friendly interface within which it is possible to find and use a variety of services, from the hint to which parking to send the car to the notification of the arrival time of the local public transport.

In modern conditions, there is a need to use the network infrastructure in order to improve economic efficiency and ensure social, cultural, and urban development. The term “infrastructure” in this context indicates the development of business services, housing, recreation, lifestyle and ICT, and highlights the idea of a “networked city” as the main model of development and coherence as a source of growth. This highlights the crucial role of high-tech and creative spheres of activity in the long-term growth of cities [3].

Efficient use of energy resources is becoming one of the main integral indicators for achieving economically justified resource efficiency at the current level of technology and technology development and compliance with environmental protection requirements [1, 2, 3]. The increase in energy efficiency also implies the creation of conditions for the development of alternative methods of production and supply of energy and municipal

resources in the city, the expansion of the list of options for obtaining a utility or service by its end user.

4 Conclusion

“Smart city” is an effective tool for transforming our economy into an intensive and sustainable one, it is an opportunity for a peaceful solution to the conflict between the artificial and natural habitat. In this sense, the “smart city” is the only possible version of our future existence in the technogenic age.

References

1. R. Paola Dameri, C. Rosenhal-Sabroux, *Smart city: how to create public and economic values with high technology in urban space* (Springer, Berlin, 2014)
2. R. G. Hollands, *City*, **12**, 3 (2008)
3. R. Kitchin, *GeoJournal*, **79**, 1 (2014)
4. H. Ahvenniemi, A. Huovila, I. Pinto-Seppa, M. Airaksinen, *Cities*, **60**, Part A (2017)
5. V. N. Chernyshov, *Vechernaya Moskva* (<http://vm.ru/news/2016/12/05/doroga-k-rodnomu-domu-nachinaetsya-s-soglasiya-sosedej-342589.html>)
6. V. N. Chernyshov, *RIAMO* (September 28, 2017)
7. V. N. Chernyshov, *RBC* (<https://realty.rbc.ru/news/598478429a79473d6b86ebbe>)
8. V. N. Chernyshov, *Novye Izvestia* (<https://newizv.ru/news/city/03-05-2017/kasaetsya-kazhdogo-ni-publikuyut-ekspertnoe-zaklyuchenie-po-renovatsii>)