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DEVELOPMENT OF THE TERM "SMART CITY" IN ECONOMIC RESEARCH

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Abstract

Modern problems of the socio-economic and environmental nature of the urban environment, associated with trends in globalization and urbanization, are increasingly capturing the attention of scientists from various fields of research in the field of cultural studies, demography, economics, and sociology. Issues of security, social cohesion, sustainable development, efficient use of limited resources of cities come to the fore in the implementation of urban ecosystem development programs. One possible answer to the growing problems is the use of digital technology in various aspects of the urban economy. In this regard, the use of modern digital technologies is increasingly seen as a means of solving the economic, social and environmental problems of the city. In the current situation, cities feel the need for digital technologies as a factor in the development of an active social, economic and cultural sphere. Thus, concepts in the field of digitalization of the urban environment attract more and more attention. One of the most effective concepts in this regard is the concept of a smart city, widely implemented in developed countries. Currently, the term "smart city" has a rather vague interpretation, many definitions and definitions. The aim of this work is to study the evolution of the term "smart city" in domestic and foreign literature, as well as to analyze the most famous interpretations of this concept to form the theoretical basis of economic research in the field of digitalization of the urban environment.

1. Introduction

One of the most important trends of our time is the increase in the number of urban residents and urbanization of territories. This phenomenon has both positive and negative consequences. On the one hand, an increasing number of people are improving their quality of life, finding work, and providing themselves with educational and health services. On the other hand, in conditions of urbanization and uncontrolled growth of cities, such problems as a deterioration of the environmental situation, an increasing load on the infrastructure, a lack of resources and other problems of an economic and social nature are manifested. One of the promising areas for solving these problems is the introduction of digital technologies in various areas of the urban economy.

Digitalization of the urban environment began to be implemented in the 90s of the last century. In the scientific literature, in order to describe the trends in the digitalization of the urban environment, such concepts as a digital city, a sustainable city, a city of knowledge and other concepts have begun to be used. The most widespread in the framework of digitalization of the urban environment is the concept of a smart city. Until now, there is no single definition of a smart city, but in a broad sense, a smart city can be described as an innovative urban space, the purpose of which is to achieve sustainable development to ensure an acceptable quality of life for citizens (Al Nuaimi, Al Neyadi, Mohamed, & Al-Jaroodi, 2015).

Currently, the systems of "smart cities" are based on three components: instrumental, communication, intellectual. The instrumental component suggests that it is possible to measure the efficiency of urban systems using sensors and other devices. The communication component implies that all systems exchange data by means of wired and wireless systems. The intellectual part includes software for modeling, forecasting and substantiation of decisions (Angelakis, Tragos, Pöhls, Kapovits, & Bassi, 2016).

The modern stage of development of smart cities is based on the formation of a digital space embedded in the physical space of cities. In such conditions, "smart cities" become the object of future research in the field of socio-technological innovation, offering a wide range of experiments on the interaction of man with technology in the context of digitalization. The most important resource for the development of smart cities in the context of digitalization is big data. Of decisive importance are systems for collecting, storing, transmitting data. In such conditions, it becomes necessary to provide data on time, to ensure data processing and obtaining results in real time. Data becomes a resource for creating innovation in urban environments (data-driven innovations). At the same time, it is necessary to create open innovative models that contribute to the transformation of ideas into specific services and solutions. An example of this approach is the concepts of LivingLab, Citilab, cluster development of the urban environment (Cagáňová, Stareček, Horňáková, & Hlásniková, 2019; Curry, Dustdar, Sheng, & Sheth, 2016).

2. Problem Statement

Despite the significant interest of the scientific community in the issue of digitalization of the urban environment and the development of a smart city, at present there is no unified approach to the definition of this phenomenon in the scientific environment. Almost all researchers see the key role of

digital technologies in the development of smart cities, since the level of their development determines the effectiveness of information and knowledge flows (D'Asaro, Di Gangi, Perticone, & Tabacchi, 2017). In this context, a smart city is an innovative space in which digital technologies are used as a means of improving the quality of life of citizens and increasing the efficiency of the urban environment, taking into account the needs of existing and future generations in economic, social, environmental and cultural development. As the experience of digitalization of socio-economic systems shows, this process is evolutionary in nature. Thus, the research problem is to study the evolution of the term smart city in the context of the formation of a digital society (Engel, Berbegal-Mirabent, & Piqué, 2018).

3. Research Questions

The main scientific issue of this study is the study of the evolution of the term "smart city" in the context of socio-economic research. In addition, the identification of the main aspects of the concept of a smart city, identifying trends in the development of the term "smart city" is also a question of this study.

4. Purpose of the Study

The purpose of this work is to study the evolution of the term "smart city" in domestic and foreign literature, as well as to analyze the most famous interpretations of this concept to form the theoretical basis of economic research in the field of digitalization of the urban environment.

5. Research Methods

We use the standard methodology of economics based on dialectics and logic: analysis and synthesis; induction and deduction; comparison and analogy; method of scientific abstraction. The explored data are scientific studies reflected in the periodical press.

6. Findings

In order to analyse a trends in the formation of smart cities, we will consider some of the most common definitions of a smart city and, accordingly, the evolution of the very concept of a smart city in more detail (table 1).

Table 01. Smart city concept evolution

Description	Year
"A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens" (as cited in Chourabi et al., 2012, p. 2290).	2000
"A smart community is a community that has made a conscious effort to use information technology to transform life and work within its region in significant and fundamental rather than incremental ways" (as cited in Chourabi et al., 2012, p. 2290)	2001

"A city that applies ICT-based smart platform to cities. It collects, analyzes, and utilizes city data that is used in administration by using platform to provide citizen smart service, in order to support economic value creation" (as cited in Giatsoglou, Chatzakou, Gkatziaki, Vakali, & Anthopoulos, 2016, p. 348)	2006
"A Smart City is a city well performing built on the 'smart' combination of endowments and activities of self-decisive, independent and aware citizens" (as cited in Hudec, 2017, p. 112)	2007
"Smart city is defined by IBM as the use of information and communication technology to sense, analyze and integrate the key information of core systems in running cities" (as cited in Giatsoglou, Chatzakou, Gkatziaki, Vakali, & Anthopoulos, 2016, p. 348-349)	2010
"Concept of a Smart City where citizens, objects, utilities, etc., connect in a seamless manner using ubiquitous technologies, so as to significantly enhance the living experience in 21st century urban environments" (as cited in Chourabi et al., 2012, p. 2290)	2010
"Smart City is the product of Digital City combined with the Internet of Things" (as cited in Chourabi et al., 2012, p. 2290)	2011
"A city to be smart when investments in human and social capital and traditional (transport) and modern (ICT) communication infrastructure fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance" (as cited in Giatsoglou, Chatzakou, Gkatziaki, Vakali, & Anthopoulos, 2016, p. 348)	2011
"Smart City is a city in which it can combine technologies as diverse as water recycling, advanced energy grids and mobile communications in order to reduce environmental impact and to offer its citizens better lives" (as cited in Chourabi et al., 2012, p. 2290)	2012
"A smart city is a well-defined geographical area, in which high technologies such as ICT, logistic, energy production, and so on, cooperate to create benefits for citizens in terms of well-being, inclusion and participation, environmental quality, intelligent development; it is governed by a well-defined pool of subjects, able to state the rules and policy for the city government and development" (as cited in Ingwersen & Serrano-López, 2018, p. 1211)	2013
"A city that uses Information & Communication Technology (ICT) to improve city with competitiveness and quality of life and pursues urban sustainability, though it differs depending on the economic level and the city policy of the country" (as cited in Hudec, 2017, p. 112)	2015
"The effective integration of human, physical and digital systems with the aim to built environment which can deliver sustainable and prosperous future for its citizens" (as cited in Ingwersen & Serrano-López, 2018, p. 1211)	2016

Research and analysis of the definitions of a smart city shows that at the beginning of the emergence of the concept of a smart city, the concept of a smart city was understood as the development of an urban environment, where the main feature is the introduction of digital technologies, i.e. the main emphasis was placed on the technological factor of digital innovations that can improve the quality of the urban environment. It should be noted here that in early studies the term "smart city" was often regarded as a synonym for the term "digital city", "broadband city". This technological approach was based on the belief that the introduction of digital technologies in various areas of the urban environment can improve the quality of urban management (Jadoul, 2016; Nicolescu, Huth, Radanliev, & De Roure, 2018; Okwechime, Duncan, & Edgar, 2017).

Further evolution of the concept of a smart city shows that along with the technical aspect of digitalization, the concept of a smart city began to include such areas as economics, ecology, culture, healthcare, education. A comprehensive view of the digitalization of the urban environment has become dominant. Thus, it can be noted that from the technological concept, the smart city began to represent the socio-technological concept of territorial development. To date, a significant number of studies have been conducted on the formation of smart cities, the specifics of introducing certain social and technological drivers for the development of a digital society. The latter include: big data, cloud technologies, digital platforms, blockchain technologies, the Internet of things, crowdfunding, sharing economy and others (Peng, Nunes, & Zheng, 2017).

There are several aspects of the development of smart cities.

▪ The technological aspect. It is based on the use of digital technology to improve and transform life and work in the city accordingly. The technological aspect is associated with concepts such as digital, virtual, informational city.

▪ The social aspect. It is based on people, education, training and knowledge, because they are key factors for a smart city. The social aspect is close in content to such a concept as a city of knowledge.

▪ Institutional aspect. It is based on governance and policy, because collaboration between stakeholders and government agencies is very important for the development and implementation of smart city initiatives. This dimension may include the concepts of smart community, sustainable city, and green city.

▪ Environmental aspect. This includes such components as the atmosphere, soil, water, oceans and seas, biodiversity.

Thus, the concept of a smart city is a complex and multifaceted approach. An important step in the development of the concept of a smart city was the creation by B. Cohen of a model that describes the constituent components of a smart city. Such a model formed the basis of many experimental works that thoroughly study various aspects of the functioning of smart cities, as well as EU directives on the development of initiatives aimed at the practical development of smart cities. Cohen's Smart City Wheel reflects the interconnectedness and equal importance of the development of the following six components (Putra & Knaap, 2018; Streitz, 2019).

A smart economy implies the development of entrepreneurship and innovation, increasing labor productivity, as well as establishing the relationship between local and global levels of production. The formation of smart human capital is based on innovative education, inclusiveness and the development of creativity as the basis of innovation. A smart lifestyle is not possible without consumption with the help of online technologies, a high level of security, as well as a quality healthcare system. Creating a smart environment depends on the use of alternative energy sources, energy-efficient buildings and the rational planning of urban space. The principles of smart logistics imply the creation of a safe and balanced public transport infrastructure based on a competent combination of different means of transportation, an emphasis on green and non-motorized transport, and real-time digital flow management. Finally, smart government means transparency in the formation and spending of the city budget, electronic services to

the population (e-government), and the most efficient and economical management of the entire city infrastructure (TekinBilbil, 2017).

The model proposed by Cohen prompted many researchers to begin to study the various directions of the described components. Most of the literature published after 2010 is devoted to theoretical or empirical studies to determine the conditions for the formation of smart cities and the main determining factors, monitor the dynamics of changes, analyze the risks of introducing elements of smart infrastructure and identify the effects which were achieved (Trindade et al., 2017).

In Russian scientific literature, the discussion of the concept of a smart city began relatively recently. It should be noted that earlier studies related to the digitalization of the urban environment, the formation of a digital city among Russian researchers have also not been conducted. Based on this, some significant evolution of the concept of a smart city could not be traced. As a result of a study conducted to study the evolution of the term "smart city" in domestic and foreign literature, as well as to analyze the most famous interpretations of this concept to form the theoretical basis of economic research in the field of digitalization of the urban environment, the following results are obtained.

7.   Conclusion

As a result of research conducted to study the evolution of the term "smart city" in domestic and foreign literature, as well as to analyze the most famous interpretations of this concept to form the theoretical basis of economic research in the field of digitalization of the urban environment, the following results are obtained.

Firstly, the basic prerequisites for the development of digitalization of the urban environment and the formation of the concept of a smart city are considered.

Secondly, some definitions of the concept of smart city are presented, the evolution of this concept is investigated. It is shown that from the term, the main aspect of which is digital technology, the term "smart city" has evolved into a more comprehensive and systemic definition, covering both technological and environmental, institutional, social aspects.

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