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INTRODUCTION OF THE SMART CITIES MODEL AS ONE OF PRIORITIES OF SOCIAL AND ECONOMIC DEVELOPMENT OF TERRITORIES

Об'єктом дослідження є перспективна модель створення міст комфортного проживання населення під назвою «Smart cities». Дана модель на сьогоднішній день є ефективним і передовим рішенням проблеми розвитку регіонального та міського господарства.

Одним з найбільш проблемних місць триваючого зростання міст і прискорених темпів урбанізації територій є поява нових умов використання дефіцитних ресурсів на тлі зростаючих потреб населення. Найважливішим завданням муніципалітетів в сучасних умовах є пошук рішень для створення населенню регіону з комфортними умовами проживання. Зростаючі темпи урбанізації визначають сукупність таких умов використання енергетичних і водних ресурсів, елементів соціальної інфраструктури, які б в повній мірі відповідали б потребам суспільства. Тому важливість застосування критерію ефективності, з точки зору задоволення потреб соціального і економічного характеру, і обмеженості наявних ресурсів, зростає.

В ході дослідження використовувалися методи наукового аналізу, за допомогою яких стало можливим проаналізувати найрізноманітніші інтерпретації поняття Smart city і підходи до його формування. Статистичні дані, використані в ході дослідження, показали, що ефективність соціально-економічного розвитку регіонів і країни так чи інакше передбачає формування «розумних міст» і приведення всієї міської і регіональної інфраструктури відповідно до норм Smart city.

За результатами дослідження отримані дані про те, що в якості вирішення виникаючих в ході урбанізації проблем може бути застосована одна з інноваційних концепцій, що передбачає розвиток міської інфраструктури та підвищення ефективності використання ресурсів – «Smart city».

Завдяки цьому забезпечується можливість окреслити конкретний набір унікальних характеристик, якими повинен володіти регіон або місто, щоб мати право називатися «Smart city», і визначити основні фактори, що впливають на їх формування.

Ключові слова: регіональна економіка, регіональний розвиток, Smart city, пріоритети регіонального розвитку.

1. Introduction

The idea of the Smart city is being realized all over the world in the form of a variety of projects implemented by both developed and developing countries. Examples of cities where large infrastructure initiatives have already been implemented are Amsterdam, Vienna, Barcelona, Santander in Europe; Beijing and Shanghai, the cities of Singapore, India, South Korea in Asia. And also other territories, projects in which are different in the way of implementation of the idea and content.

According to the program of spatial development of Russia, special attention should be paid to the development of cities and their management on the basis of advanced technologies, including the Smart City model. This model assumes a wide application of digital technologies and the use of modern technologies in housing and communal services.

The program of spatial development of Russia should be large-scale, it will include tasks for the development of all components of the region – cities and settlements. The implementation of such program requires adequate financial resources, so that in the next six years its costs will be doubled. Spatial development involves the

allocation of three levels depending on the subject of management:

- 1) federal level;
- 2) city level;
- 3) municipal level.

A whole series of approaches to the management of urban development needs to be radically revised, as serious economic, social and environmental problems grow in large cities year after year. To solve these problems is necessary already in the conditions of transition to the Smart City model, which requires the introduction of modern technological solutions and the digitization of all control systems.

Therefore, it is urgent to study the possibilities of forming the Smart city on the basis of the advanced regions of the country, as well as to identify the main factors and conditions that ensure their effective creation.

2. The object of research and its technological audit

The object of research within the framework of this work is the concept of the Smart city as one of the priorities of the social and economic development of the

territory. The idea of «smart city» is interpreted differently in different countries, but still you can formulate a general approach to understanding the content of the «Smart city». It can be defined as an innovative city in which information and communication technologies are used to improve the quality of life, the comfort of using the city's various services by the city's inhabitants and enhance the competitiveness of the region. However, some experts are more critical of this concept and consider this idea utopian, caused by the problems of urbanization of the 21st century.

If we talk about the ideal model of Smart cities, then it should be noted that in this case the tasks of ensuring environmental safety come to the fore, even the term «ecosystem» is used instead of the region, and all tasks for digitalization are subordinated to this main goal. All elements of urban infrastructure in a smart city represent a single system that meets the needs of residents, meeting the conditions of safety of life and health, corresponding to the challenges of sustainable development of the region.

«Smart city» is now becoming a universally accepted international project, but due to the fact that this term originated from abroad, it is necessary to determine the terminology before the start of the research and understand what exactly is meant by this term in the Russian Federation (RF). In most foreign European countries, financial and managerial decisions are made by municipalities, since it is the municipalities that accumulate most of the financial resources. Therefore, for them the term «Smart city» means the municipality. But in the Russian Federation with a three-level model of budgeting, the municipal level occupies lower positions than the regional one, therefore, taking into account the Russian specifics and geography, the term «Smart region» will be more correct for the Russian Federation. In this let's use the term Smart city in the sense of a smart region, and not just a single city.

Thus, the concept of Smart city is treated broadly and in different ways, however, in any approach, the key role is given to information and telecommunication technologies. They help to ensure the current processes of urban life and effectively solve emerging problems through the involvement of citizens, businesses and authorities in these processes.

3. The aim and objectives of research

The aim of research is assessing the possibilities of applying the concept of Smart city in the Russian conditions at the current stage of development. To achieve this aim, the following objectives were set:

1. To define the conceptual apparatus, to identify the main approaches to the definition of «Smart city» and the possibility of applying the concepts «Smart city» and «smart region» as equivalent in the territory of the Russian Federation.
2. To analyze the foreign experience of development of the «Smart city».
3. To analyze the approaches to the transition of Russian cities to the «Smart city» model.
4. To identify the main ways to improve the legal and regulatory framework necessary to move to the «Smart city» model.

5. To develop a hierarchy of goals for creating a «Smart city» for all levels of government: federal, regional and municipal.

4. Research of existing solutions of the problem

Studies [1, 2] confirm the fact that the number of urban population increases over time with increasing rates, as well as urbanization processes.

In the studies of specialists in regional economy [3], a detailed description of the Smart city concept, which implies the introduction of new tools for public administration of the region, is given. Analysis of the existing set of modern interpretations «Smart city» [1–3] allows to say in general terms that this concept is aimed at ensuring a high quality of life and economic growth through the active introduction of innovative technologies into life support processes. However, in studies of foreign authors, as well as Russian authors, there is no uniform approach to understanding the essence of a smart city.

In work [4] the authors give their arguments in favor of the correctness of consideration within the term Smart city not only of the concept of «Smart city», but also of «Smart region». During the preparation of this work, the ideas of the concept of building a «Smart region» using the example of the Sverdlovsk region were used. Nevertheless, the question remains whether there are any differences in the concept of building a smart city and a smart region, and whether it is possible, for example, to create a smart city in a region that does not meet the characteristics of smart.

According to experts [5], the analysis of the approaches to the definition of the Smart city allows to conclude that the innovation factor is the main trend in the development of territories at the present time. However, it remains unclear whether the innovation region can be recognized as «smart» or for which additional factors are necessary. It should be noted that in determining the degree of correspondence between the cities of the Russian Federation, the concept of innovative development must be based on the generally accepted characteristics of the European approach to the development of urban areas.

The analysis shows that the Smart city concept is included in the list of mechanisms within the official program for the development of research and technology in the countries of the European Union, as well as in the current development strategy of the European Union «Horizon 2020». This underlines the awareness of the European countries of the need for the formation of territories of this type [6]. However, the limited number of European smart cities created to date, only emphasizes the complexity of this process, even for developed countries and regions that are able to allocate for this volume of resources and attract highly qualified personnel.

The Memorandum of Understanding [7] provides for the creation of open platforms for smart cities, but it can't be said that the goals set for 2018 were realized, since the single market for these platforms has not been fully formed. The fact that the formation of smart cities is a lengthy process that requires significant time and other resources to prepare the ground for profound transformations is confirmed by other studies [8]. Here we are talking about the introduction of fundamentally new business models that interact with each other and with society in their own specific ways.

It is the complexity of the creation of the Smart city that motivates the critics of «Smart cities» (for example, [9]) to speak of the weak elaboration of the methodological and conceptual components of this concept. And also point out the lack of deep empirical research on «Smart cities» projects and a comparative analysis of their development.

Of great importance in the creation of Smart cities is public-private interaction as the basis for the implementation of projects of this kind [10], which in the Russian realities acquires special significance, even in spite of the extreme limitations of such experience among the regions.

Thus, the results of the analysis allow to conclude that recent studies on the regional and urban economies are increasingly paying attention to the prospects of forming the Smart city. And they consider this a necessary process against the background of accelerated rates of urbanization.

5. Methods of research

In the process of writing this work, the following research methods were used:

- analysis – study of the study «Smart city» subject
- by mental or practical dismemberment of it into the constituent elements that make up the components of a smart city in the case under consideration: infrastructure, accessible urban environment, etc.;
- synthesis – the method of studying the object in its integrity, in the unity and interconnection of its parts was applied at the stage of research of the smart system as an innovative city endowed with a set of unique characteristics;
- analogy – the method of scientific inference by which knowledge of certain objects and phenomena is achieved on the basis of their similarity to others was applied at the stage of analysis of foreign experience in the creation of smart cities;
- measurement – a method of scientific research of the process of determining the numerical value of a certain quantity by means of a predetermined unit of

measurement, was applied in the process of calculating the main results of economic development and the pace of urbanization;

– modeling – was applied at the stage of formation of the hierarchy of goals for the creation of «Smart city» for all levels of government: federal, regional and municipal.

6. Research results

The idea of a smart city is based on the assumption that the urban infrastructure and the «daily life» of people should be optimized through the introduction of information technology. Such innovations are quite radical, which causes flexibility and creativity in decision-making, as well as the existence of a certain set of competencies necessary to implement large-scale and very complex projects. The concept of «Smart city» implies the introduction of new instruments of public administration, as well as the application of effective methods of using budget funds and private investors' funds. Fig. 1 shows the system of smart priorities for the levels of state power, as well as the main development programs, the implementation of which will contribute to the development of smart cities.

Cooperation with business structures, as a rule, is a partnership in the framework of a joint project – private corporations take on a significant role in designing, equipping and servicing equipment that is being introduced into the urban infrastructure. In addition, they often collect, process and analyze data, which is an important part of the project.

In Europe, the idea of «Smart city» today is especially popular. The implementation of the concept in one form or another can be seen in all countries of the European Union (EU). Leading positions are held by Great Britain, Spain and Italy, with the largest concentration of projects observed in Italy, Austria, Denmark, Norway, Sweden, Estonia and Slovenia. The idea of «Smart city» can actually be called a global trend, the adherence to which has a significant impact on the level of social and economic development of the territory.

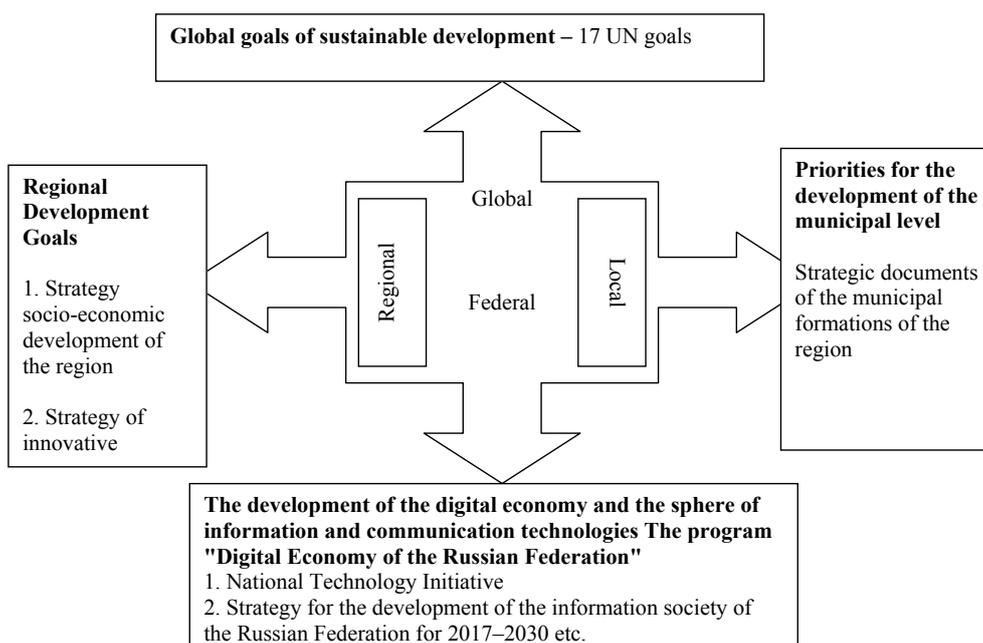


Fig. 1. Basic smart priorities for levels of government

Of the 28 largest cities in the European Union, more than half have already implemented or are preparing to implement the «Smart city» project. In this situation, the so-called «phenomenon of big cities» manifests itself, consisting in the fact that large cities often come up with the initiative to implement the «Smart city» project, the smaller the territory. But even among these cities only half of the «Smart city» passed the stage of initiation and passed to the stage of actual implementation.

It is important to say that in the European countries the main focus is to reduce the level of environmental pollution due to exhaust gases. As well as raising the level of energy efficiency of buildings, supply of electricity and the use of transportation technologies. In some countries, the emphasis on the environmental component is clearly traced in the implementation of a certain direction. For example, this approach can be observed in the projects Smart Transport (Smart Transport or Smart Mobility) in Austria, which is part of the Smart city.

According to the data of the specialized resource created to promote the «Smart city» initiative in Austria, every major city has its own concept that regulates the implementation of this project. A key aspect in this is the sustainable development of the region, for which special projects «Smart mobility» have been created, focusing, for example, on such environmental objectives as energy saving or reducing exhaust emissions by urban transport.

It should be noted that the implementation of the smart city model is one of the most important priorities for the socio-economic development of the territories also because it perfectly meets the challenges of sustainable development of the region. Sustainable development of the region assumes the achievement of economic, social and ecological well-being, and the realization of all these three directions should take place simultaneously and in interconnection with each other (Fig. 2).

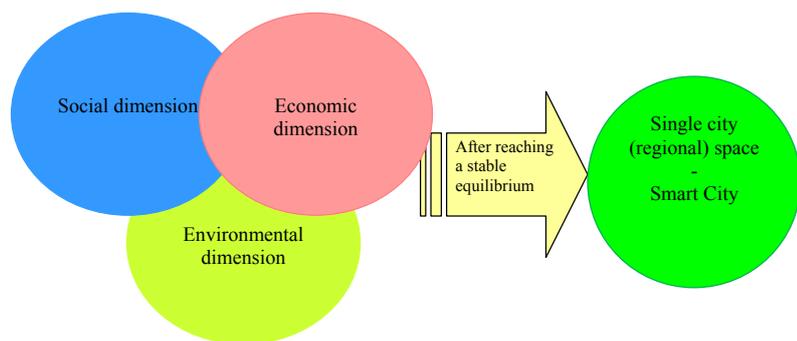


Fig. 2. The concept of sustainable development of the region

It should be noted that the development of the concept of projects in each region was carried out with the participation of various organizations whose activities are related to this topic. The interaction of research institutions, the public sector represented by regional authorities, city municipalities and departments specializing in urban development, transport and the environment, is aimed at creating a competent vision for the implementation of the announced initiative.

One of the main issues of transition to the digital city model is the choice of the model for such a transition. For this, it is possible use both centralized and decentralized models (Fig. 3).

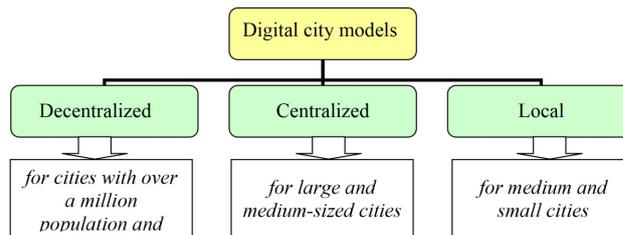


Fig. 3. Digital city model options

Decentralized model of digital transition is acceptable for such cities, for example, as Moscow and St. Petersburg, because the business community can take an active part in this process, and the technology market itself in large cities is very capacious.

The centralized model is better used for other large and medium-sized cities, since, although they have sufficient potential market for the implementation of new digital technologies, they have limited resources for development. Therefore, the processes of digital transformation should be carried out centrally under the control of local governments, which can attract the maximum amount of resources and involve a large number of residents, public organizations, business players, etc.

Secondary and small cities should apply a model of local actions, since these subjects of the Russian Federation have the opportunity to attract sufficient material and labor resources for digital transformation. Therefore, the transformation will be primarily in the infrastructure sectors or areas of the urban economy, the need for modernization of which is extremely important and already hinders the normal functioning of the urban or regional economy. Even such projects in small towns are often implemented in the course of the experiment, since the risks of an unsuccessful outcome here are quite high.

The creation of a smart city is impossible without institutional changes concerning changes at the federal level and at the level of regulatory regulation. Very important in this situation is the use of special legal regimes that enable all interested persons to introduce new technologies with minimal economic losses. Also, the primary task is the creation of special coordinating bodies, which will deal with all issues related to the development of «smart cities». In this regard, it seems expedient to consolidate the tasks of digital transformation of regions as priorities for social and economic development, which are now operating in all regions of the Russian Federation.

An important issue is the financial provision of changes related to the formation of a smart city. Since projects of this kind are projects of high risk and with a long payback, special attention should be paid to the sources of resource support for such reforms. In particular, regional development programs may provide for tax breaks or vacations, subsidies and subventions, state guarantee systems or other forms of state financial support.

Human capital plays a huge role in the formation of the smart city, therefore development of higher educational institutions of the region should also be considered as a priority task. If higher educational institutions are listed at the level of the country or even the county, this will undoubtedly

have a positive impact on the growth of the economy of this territory and will strengthen its competitiveness.

Approaches from the point of view of the vision of the implementation of projects and the choice of priorities can be different not only at the country level, but also at the regional level. This causes a variety of practical implementation of the general idea depending on the national and geographical context [10]. In this regard, despite the fact that the concept of a smart city has not yet received a single definition among scientists or experts, a single definition, in practice it has become quite widespread, even while in an experimental form. The transformation of a certain territory into a smart city actually means that this region has not only taken the path of innovative development, but has succeeded in this direction.

7. SWOT analysis of research results

Strengths. The advantages of a smart city are improving the standard of living of citizens and reducing the costs of work processes by automating activities that do not require the use of analytical skills.

Digital cities constantly improve their functions through continuous processing and updating of information. Integrated sensors collect information received from residents of the city and using electronic devices. After analyzing the collected data, optimization takes place, which solves the problems of inefficiency.

Table 1 presents seven main areas by which it is possible to determine whether the region achieves the task of creating a Smart city.

Table 1

The main directions of creating Smart city

Direction	Achievement
Smart economy	Formation of an enabling environment for innovation, including for the development of information and communication technologies
	Adjusted system of online hotel booking
Smart finance	Availability of ATMs
	Transparency of government tenders
Smart management	The smooth functioning of the communication system between residents of the city and representatives of the executive power, the information openness of the city administration
	Activity of citizens in the management of the city
	Relevance of the strategic planning documentation
Smart infrastructure	High attendance of official sites of the city administration
	Well-functioning Internet services for calling and paying a taxi
	Ability to monitor traffic on-line
	Presence of a network of fueling stations for electric vehicles
Smart residents	Service for the provision of services for card-making
	Activity and number of users of the World Wide Web
	Application of student electronic cards
Smart technologies	Availability of labor market data
	Availability of free Wi-Fi points, including public transport
	System of payment for travel by bank transfer
Smart environment	Functioning of mobile broadband networks
	Developed system for monitoring environmental security
	Participation of citizens and administration in eliminating the consequences of unauthorized waste disposal

Weaknesses. To the weak sides of the introduction into the Russian practice of the model Smart city is the almost complete lack of experience in the formation of such cities in the Russian Federation, which makes it difficult to widely use this model. Since Russia differs in its specificity both in terms of budgetary arrangements and in relation to regional management, the use of foreign experience is rather difficult and is possible only with the help of its full adaptation to the specifics of the Russian economy.

Opportunities. The question of possible options for implementing the Smart city model in Russian regions is still open. The choice of the optimal scenario depends to a large extent on the goals that the city itself or the main subjects of its development put before itself, as well as on the starting conditions for the development of digital technologies.

Threats. The main problem of the formation of the Smart city is not only the lack of readiness of the infrastructure of the vast majority of Russian cities, but also the complexity of the selection of a criterial basis for assessing the success of the introduction of the concept under consideration. To assess the effectiveness of creating smart cities can be using a very small but indicative set of criteria:

- improving the quality of life of the population;
- growth of competitiveness of business and the region as a whole (innovations, access to global markets, increase in labor productivity, lower costs);
- reducing the burden on the environment;
- solving the problems of strategic development of the region.

But as it is possible to see, most of these indicators and their components will have qualitative, not quantitative values. This makes it difficult to monitor and make effective management decisions for each stage of implementation of works on the implementation of Smart city elements in a particular region.

In addition, it is necessary to draw attention to the need for large-scale investment in the creation of smart cities, since the creation of such city requires a radical change in infrastructure, the introduction of the most advanced innovative technologies. The vast majority of Russian regions do not have such facilities. In this regard, further research in this area is promising in the direction of finding sources of funding for the creation of smart cities and the corresponding urban environment. This will be an extremely promising direction of the research, since, given the disproportions in the development of Russian regions, the problem of their financial provision is at the moment the most acute and requiring an operational solution.

8. Conclusions

1. The conceptual apparatus has been clarified and the main approaches to the definition of «Smart city» and the possibility of using the concepts «Smart city» and «Smart region» as equivalent in the territory of the Russian Federation have been revealed. It is justified that the creation of a smart city can't be implemented «from above» and can't be realized only through the efforts of government bodies, without involving the business and the population in the project, and without involving a large number of specialists from a wide range of sectors of the economy.

2. In the course of the analysis of the foreign experience of the «Smart city» development, it is revealed that there are still not many smart cities in the world, although over time their number increases. This is due, first, to the need to master new profitable resources (since digital megacities bring a significant income in the development of the IT industry) and, secondly, the growth of the population of cities in which large industries is consolidated.

3. In the course of the analysis of approaches to the transition of Russian cities to the Smart city model, it has been established that the formation of a city space that meets all the criteria of a smart city is a very labor-intensive process that requires radical restructuring and modernization of all types of urban and regional infrastructure. Such transformations in the conditions of the Russian economy can be realized with the help of a centralized, decentralized and local model.

4. The main ways of improving the regulatory and legal regulation necessary for the transition to the Smart city model are identified. It is shown that for this purpose it is necessary to introduce special legal regimes, establish coordinating bodies, and search for sources of financial support for the changes that are being carried out in the region.

5. During the development of the hierarchy of goals for the creation of the «Smart city» for all levels of government (federal, regional and municipal), the main smart priorities for the levels of state power and the directions for creating the Smart city are defined. It is justified that in a smart city connections between regional authorities on the one hand and the business community and the population on the other hand are much easier: simplification of communications and the ability to make operational management decisions lead to an improvement in the quality of life in the region. That is why the creation of a smart city can't be implemented «from above» and can't be realized only through the efforts of government bodies, without involving the business and the population in the project and also without the

involvement of a large number of specialists from a wide range of sectors of the economy.

References

1. The Road toward Smart Cities: Migrating from Traditional City Management to the Smart City / Bouskela M. et al. Inter-American Development Bank, 2016. 7101 p. doi: <http://doi.org/10.18235/0000377>
2. A New Taxonomy of Smart City Projects / Perboli G. et al. // Transportation Research Procedia. 2014. Vol. 3. P. 470–478. doi: <http://doi.org/10.1016/j.trpro.2014.10.028>
3. Namiot D., Sneps-Sneppe M. On software standards for smart cities: API or DPI // Proceedings of the 2014 ITU Kaleidoscope Academic Conference: Living in a Converged World – Impossible Without Standards? 2014. P. 169–174. doi: <http://doi.org/10.1109/kaleidoscope.2014.6858494>
4. Kortov S. V., Tolmachev D. E. Kontseptsiya postroeniya «um-nogo regiona» na territorii Sverdlovskoy oblasti. Ekaterinburg, 2018. URL: www.midural.ru/download.php?id=_2018611109.pdf (Last accessed: 19.03.2018)
5. Zhertovskaya E. V., Yakimenko M. V. Vozmozhnosti i perspektivy ispol'zovaniya tekhnologiy SMART CITY dlya razvitiya turizma territorii // Fundamental'nye issledovaniya. 2018. Issue 2. P. 83–89.
6. Mapping smart cities in the EU / Manville C. et al. European Union, 2014. URL: [http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET\(2014\)507480_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET(2014)507480_EN.pdf) (Last accessed: 19.03.2018)
7. Towards Open Urban Platforms for Smart Cities and Communities. Berlin: Memorandum of Understanding, 2015. URL: <https://ec.europa.eu/digital-single-market/en/news/memorandum-understanding-towards-open-urban-platforms-smart-cities-and-communities> (Last accessed: 19.03.2018)
8. Vanolo A. Smartmentality: The Smart City as Disciplinary Strategy. Urban Studies. 2013. Vol. 51, Issue 5. P. 883–898. doi: <http://doi.org/10.1177/0042098013494427>
9. Shelton T., Zook M., Wiig A. The actually existing smart city. // Cambridge Journal of Regions, Economy and Society. 2014. Vol. 8, Issue 1. P. 13–25. doi: <http://doi.org/10.1093/cjres/rsu026>
10. Titov D. Smart Cities predlagayut vklyuchit' v strategii razvitiya territoriy // Ekonomika i zhizn'. 2018. Issue 25. P. 4.

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