doi 10.15826/recon.2017.3.1.004
UDC 338.1: 330.322: 332.05

O. O. Komarevtseva
Srednerussky Institute of Management Russian Academy of National Economy and Public Administration (Orel, Russian Federation; e-mail: komare_91@mail.ru)

SMART CITY TECHNOLOGIES: NEW BARRIERS TO INVESTMENT OR A METHOD FOR SOLVING THE ECONOMIC PROBLEMS OF MUNICIPALITIES?

The purpose of the study is to determine the degree of readiness of urban municipal entities of the Russian Federation for the implementation of Smart City technology. The author proposes a methodology for determining the level of preparedness of cities for the introduction of Smart City technologies, selecting those municipal projects (Smart-projects) most relevant to the present level of readiness and identifying the main barriers to their implementation. The study used structural and graphical analysis methods, overall assessment and ratings as well as the group method of data handling (GMDH). The study yielded the following conclusions: The majority of cities comprising administrative centres of the Subjects of the Russian Federation are not ready for the implementation of Smart City technologies. The main problems hindering the implementation of Smart Technologies are the municipalities' low energy efficiency and high dependence on borrowed capital. The methodology proposed by the author for assessing the readiness of municipalities for the implementation of Smart City technologies will quickly and optimally identify metropolitan areas suitable for the implementation of Smart-technologies. The field of application of the obtained results is sufficiently extensive. These results will be of interest to practitioners, representatives of state and local authorities, as well as for researchers in the fields of urban economics and urban studies. The main direction for future research consists in the provision of an underlying rationale for problem solving through launching Smart-projects in depressed and economically stagnating municipalities.

Keywords: smart city technologies, investments, municipal formation, smart projects, urban models, digital economy, innovation, creative technologies, stakeholder, Big Data

Introduction
Theoretical aspects of the research into the Smart City concept

In the current conditions of tough competition between cities, both within the country and beyond its borders, the issue of introducing digital economy technologies is particularly relevant. In the midst of rapid development, cities become economic and cultural centres that stimulate new economic changes. The combining of technologies, government agencies and public institutions into a single entity empowers people to create safer, more environmentally friendly and economically competitive cities. At the same time, urban municipalities are experiencing a lot of problems. They face the task of ensuring equal access to digital systems as well as attracting investment and highly skilled professionals. The solution of these problems can be achieved through the implementation of Smart City technologies.

The theoretical importance of research into the Smart City concept is elaborated in the works of scholars such as L. Anthopoulos, M. Janssen, V. Weerakkody [1], J.K.D. Barriga, C.D.G. Romero, J.I.R. Molano [2], M. De Domenico, A. Arenas, A. Lima, M.C. González [3], R. Khatoun, S. Zeadally [4]. Thanks to the research carried out by the abovementioned authors, it was possible to summarise the best practices for the management of "smart cities", as well as to clarify the basic concepts and tools for the implementation of Smart City technologies in the digital environment of large conurbations. Practical features of "smart city" technologies are described in the research papers of A. Medvedev, P. Fedchenkov, A. Zaslavsky, T. Anagnostopoulos, S. Khoruzhnikov [5], C. Öberg, G. Graham [6]. At the same time, an increasing amount of practical research is concerned with the adaptation of cities to Smart City technology. Russian researchers who have studied the problems of implementing Smart City technology include V.A. Baburova [7], A.S. Koroleva [8], A.N. Nikushina, A.D. Sarafanova [9], A.A. Rumyantsev [10], V.V. Sergeeva [11]. Unlike their Western counterparts, whose studies are more focused on best practices and technological tools for Smart City urban management, Russian scientists have tended emphasise the process of constructing a system of "smart cities" that takes Russian realities into account. Let us note that the currently available studies are mainly devoted to analysing the history of Smart City technologies, the development of corresponding systems and the role of rating estimations of the largest cities in the world in the implementation of smart technologies. In this connection, the problem of the readiness of Russian cities for the introduction of Smart City technology is yet to be adequately investigated by researchers. In view of the above-mentioned circumstances, a methodology for estimating the readiness of Russian cities to the introduction of Smart City technology was validated in this study.

Methods for assessing readiness for the introduction of Smart City technologies

At the present time, assessment of readiness for the introduction of Smart City technology is based on a sustainable development ranking of cities of the Russian Federation, which includes 30 statistical indicators that characterise cities against criteria including the state of the economy, municipal services, the social sphere, as well as environmental conditions. The composition of the sample comprises urban and administrative centres of subjects of the Russian Federation. A feature of the ranking is that achieving a leading position is not necessarily associated with high values across all indicators. Rather, what is of primary importance is their extent to which they are in harmony. Each year, the leading positions in this rating are occupied by Moscow, St. Petersburg and Ufa[1], which show high values of socio-economic development indicators. However, in the author's opinion, the preparation of this rating methodology is unnecessarily complicated and the utilised indicators are rather formal, as well as not always being relevant for the assessment of Smart City technology. For example, what relation does the introduction of these technologies have to the indicator "availability of pre-school education" or even to indicators of population growth?

In our opinion, the indicators for the assessment of the readiness of Russian cities for the implementation of Smart City technology should reflect the principal tracks across which Smart City technologies apply. Areas that are of key importance for assessing the readiness of municipalities for the implementation of Smart City technology are considered in terms of tracks. These include: TechNet (projects in the field of intelligent manufacturing), Creative Industries (new media, entertainment, social entrepreneurship); Finance & Banking Technologies (financial decisions concerning spatial problems with respect to stability and independence), Power & Energy (energy solutions and the development of personal sources and energy storage). Corresponding valuation indicators are proposed for each of the tracks. The choice of indicators is driven by the need to assess the level of infrastructural and technological development of the city. Then, by summing the values obtained, the readiness of each of the subject to the implementation of Smart City technology was determined. We shall now proceed to the main indicators used in this methodology.

1. In the context of implementing Smart City technology, producibility consists in determining the ratio of the aggregate quantity of registered enterprises in the municipal area to the objects of the technology sector that underwent modernisation within 10 years, 5 years and 1–2 years. The calculation of the indicator appears as follows:

$$T_p = \frac{p_{<10} + p_{<5} + p_{1-2}}{p_n}, \quad (1)$$

$$T_{<10} = \frac{p_{<10}}{p_n}, \quad (2)$$

$$T_{<5} = \frac{p_{<5}}{p_n}, \quad (3)$$

$$T_{1-2} = \frac{p_{1-2}}{p_n}, \quad (4)$$

where T_p is the general producibility indicator of the municipal formation (potential), $T_{<10}$ is the indicator of producibility of enterprises that underwent modernisation no later than 2007, $T_{<5}$ is the pro-

[1] Rating the sustainable development of cities of the Russian Federation for 2013–2016 [electronic resource]. URL: http://city-smart.ru/info/80.html. (Date accessed: 11/01/2017).

ducibility indicator for companies that underwent modernisation by 2012, T_{1-2} is the producibility indicator of enterprises that underwent modernisation before 2015, p_n is the total number of enterprises in the municipality, $p_{<10}$ is the number of enterprises that underwent modernisation no later than 2007, $p_{<5}$ is the number of enterprises that underwent modernisation before 2012, p_{1-2} is the number of enterprises that underwent modernisation before 2015.

2. Evaluation of innovation infrastructure. The value of this indicator is calculated as the sum of the amount of work carried out on the innovation infrastructure to the volume of work required to replace the city's entire infrastructure and the volume of issued innovative products to the volume of total output at the enterprises of the particular municipality:

$$I_i = \frac{O_{iv}}{O_{nv}} + \frac{T_p}{P_p}, \tag{5}$$

where I_i is the innovation infrastructure indicator (potential), O_{iv} is the volume of work performed on the replacement of objects of innovation infrastructure, O_{nv} is the amount of work required for the replacement of the entire infrastructure in the territory of the municipality, T_p is the volume of innovative products manufactured in incubators, technology parks and other innovative enterprises of the municipality, and P_p is the volume of products manufactured at all enterprises located in the municipality.

3. The Internet penetration of the city indicates access of Internet providers to different parts of the municipal area. Due to the fact that the basic concept of Smart City technologies is constructed on the assumption of full connectedness across the area, cities are selected by criterion range of readiness to implement these technologies will include only those which will have a value of at least 0.6:

$$I_n = \frac{W_i(W_f)}{100\%}, \tag{6}$$

where I_n is the indicator of the city's connectedness (potential), W_i is the indicator of full Internet coverage of the area[2], W_f is the indicator of partial Internet coverage of the area.[3]

4. The indicator of the innovation activity of residents focuses on the number of intellectual products created by students and educators. "Intellectual products" refers to the number of innovative products developed, patents registered, competitions won and grants received:

$$I_r = \frac{I_p + P + G_p}{n_0}, \tag{7}$$

where I_r is the indicator of the innovative activity of residents (potential), I_p is the number of created innovative products, P is the number of registered patents, G_p is the number of competitions won and grants received, and n_0 is the total number of developments.

5. The indicator of financial independence approximates to the indicator of the potential debt. With respect to Smart City technologies, this indicator serves as a criterion for the implementation of a transition to a new technology-led economic paradigm using municipal funds. For this, it is necessary that the level of municipal debt does not exceed budgetary revenues by more than 40%.

$$F_n = \frac{M_d}{D_b}, \tag{8}$$

where F_n is the indicator of the financial independence of the municipality (potential), M_d is the municipal debt, and D_b is the revenues of the municipal budget.

6. The energy efficiency indicator is one of the key adoption factors in the Smart City technology system. Energy efficiency involves not only the rational distribution of resources among the population of the municipality, but also the consumption of fuel and energy components in the production of goods, works and services.

$$E_f = \frac{R_t}{P_r} + \frac{S_r}{N} \tag{9}$$

[2] Full coverage of the area by Internet networks consists of a distribution zone of Internet wireless networks in the range of 95 to 100% of the entire municipal area.

[3] Partial coverage area by Internet network comprises a distribution zone of wireless networks in the range of 50 to 60% of the entire municipal area.

where E_f is the indicator of the energy efficiency of the municipal formation (potential), R_t is the consumption of fuel and energy by enterprises, P_r is the products (goods, works, services) produced and shipped as the consequence of the energy resources expended, S_r is the cost of energy consumed by the population, and N is the population of the municipal formation.

7. The indicator of the implementation of creative technologies as one of the Smart City tracks includes an assessment of media resources, entertainment industry projects and social entrepreneurship created over the past 3 years. Creative technologies comprise the first step in the transition to a creative economy based on the constant realisation of ideas.

$$K_t = \frac{M + Ir + S_p}{s_b} \quad (10)$$

where K_t is the indicator of the introduction of creative technologies (potential), M is the number of media resources created in the past three years, Ir is the number of entertainment industry projects implemented over the past three years, S_p is the number of social entrepreneurship entities registered over the past three years, and s_b is the number of registered business entities in the last three years. All aggregate indicators consist of potentials. The end result of the evaluation of the readiness of Russian cities to implement Smart City technologies is a grouping of the cities based on the following criteria:

— ready to implement Smart City Technologies (criterial range 3,7(−0,2) < n) n — value of the summary indicator of the group of cities according to the degree of readiness for the implementation of Smart City technologies;

— Average readiness for the implementation of Smart City Technologies (criterial range 3,7(−0,2) < n < 2,5(−0,3)) n — value of the summary indicator of the group of cities according to the degree of readiness for the implementation of Smart City technologies;

— adequate readiness to implement Smart City Technologies (criterial range 2,5(−0,4) < n < 1,95(−0,4)) n — value of the summary indicator of the group of cities according to the degree of readiness for the implementation of Smart City technologies;

— not ready to implement Smart City Technologies (criterial range 1,95(−0,5) > n) n — the value of the summary indicator of the group of cities according to the degree of readiness for the implementation of Smart City technologies.

The above ranges were formed in accordance with the highest and lowest values for each parameter involved in determining the final value. The maximum and minimum levels of indicators used in the study are presented in Table 1.

Table 1.

Maximum and minimum values of the indicators used to determine the readiness of municipalities for the implementation of Smart City technologies

Indicators	**Ready for implementation**		**Average readiness**		**Adequate**		**Indicators**
	max	**min**	**max**	**min**	**max**	**min**	**max**
Producibility (+)	1	0.6	0.6	0.3	0.2	0.2	0.2
	1	0.6	0.4	0.4	0.4	0.3	0.3
Evaluation of innovation infrastructure (+)	1	0.6	0.5	0.3	0.3	0.3	0.3
	1	0.7	0.5	0.3	0.3	0.3	0.3
Internet connectedness (+)	1	0.2	0.8	0.3	0.4	0.2	0.2
	1	0.6	0.5	0.4	0.4	0.3	0.3
Innovative activity of residents (+)	1	0.6	0.6	0.4	0.4	0.35	0.35
	6	3.7	3.7	2.5	2.5	1.95	1.95

We note that these ranges can be determined not only based on the test variations but also using the PyQt program. PyQt is a set of "anchors" of the Qt graphic framework for the Python programming language, implemented as a Python extension.

Models for the economic development of municipal entities

These figures show the summary evaluation of the readiness of cities for the implementation of Smart City technologies. The municipality is considered to be at the requisite level of “readiness for implementation” only when the final value of the capacity is greater than 3.7 (without the “financial independence” indicator). The application of the criteria for assessing the degree of preparedness for the implementation of Smart City technologies on the part of cities / administrative centres of RF subjects, gave the following results (Fig. 1). For intermediate cities, corresponding to different levels of readiness for the implementation of Smart City technologies, are: the city of Voronezh, Ulyanovsk (without the indicator “financial independence” constituting the criterion — “ready for implementation”, taking into account — “average readiness”); Krasnodar (without the indicator “financial independence” comprising the criterion — “average readiness”, taking into account — “adequate readiness”); Smolensk (without the indicator “financial independence” comprising the criterion — “adequate readiness”, taking into account — “not ready for implementation”).

The findings showed that only 7% of municipalities (from the given sample) are ready for the introduction of Smart City technology. The graphs presented in Fig. 1 show the elements of readiness assessment for the introduction o Smart City technologies. Thus, 1 — producibility, 2 — innovation

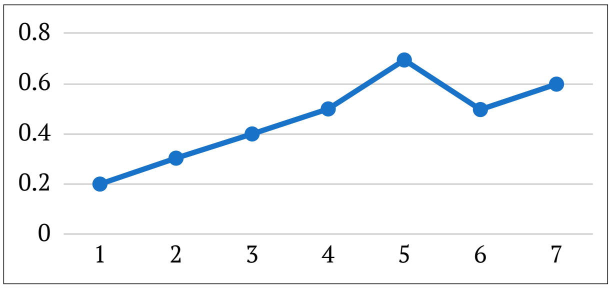
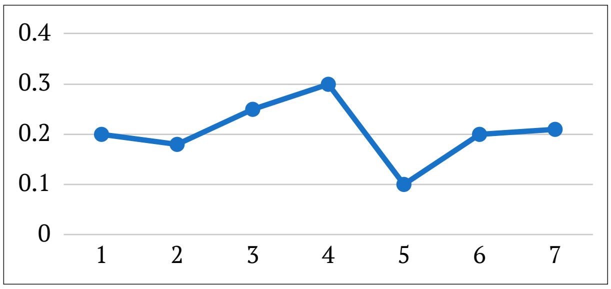
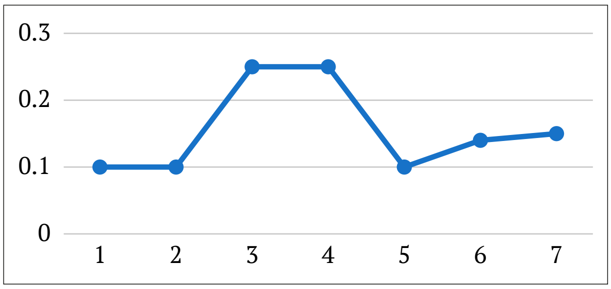
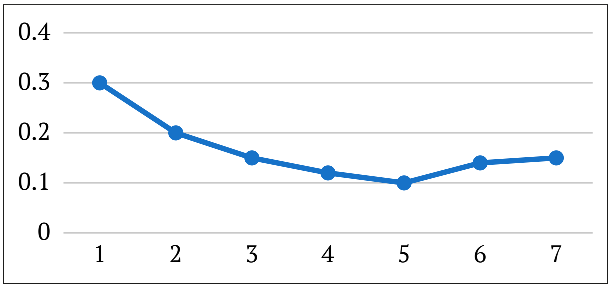
Ready for the implementation of Smart City	Belgorod, Ekaterinburg, Kazan, Kaluga, Moscow, St. Petersburg	
	Voronezh, Ulyanovsk	
Average readiness to implement Smart City	Arkhangelsk, Irkutsk, Krasnoyarsk, Nizhny Novgorod, Novosibirsk, Omsk, Perm, Rostov-on-Don, Tomsk, Tula, Tyumen, Ufa, Chelyabinsk	
	Krasnodar	
Adequate state of readiness for the implementation of Smart City	Astrakhan, Barnaul, Blagoveshchenk, Bryansk, Veliki Novgorod, Vladivostok, Groznyy, Izhevsk, Yoshkor-ola, Kaliningrad, Kemerovo, Kursk, Lipetsk, Murmansk, Orenburg, Penza, Pskov, Ryazan, Saratov, Ulan-Ude, Khabarovsk, Khanty Mansiysk, Cheboksari, Chita, Yakutiya	
	Smolensk	
Not ready for implementation of Smart City	Abakan, Anadyr, Birobidzhan, Vladimir, Vladikavkaz, Volgograd, Vologda, Gorno Altaisk, Ivanovo, Kirov, Kostroma, Kurgan, Kyzyl, Magadan, Magas, Maikop, Makhachkala, Nalchik, Orel, Petrozavodsk, Petropavlovsk-Kamchatsky, Salekhard, Samara, Saransk, Simferopol, Stavropol, Syktyvkar, Tambov, Tver, Cherkessk, Elista, Yuzhno-Sakhalinsk, Yaroslavl	

Fig. 1. Results of the evaluation of the readiness cities for the implementation of Smart City Technologies (author’s methodology)

infrastructure, 3 — Internet connectedness, 4 — innovative activity of citizens, 5 — financial independence, 6 — Energy Efficiency 7 — introduction of creative technologies.

From an investigation of indicators of administrative centres of RF Subjects in 2015, it was revealed that the group of those ready to implement Smart City Technologies includes cities that have problems only with energy efficiency. The group with an average readiness for the introduction of technologies has inherent disadvantages in the field of innovation infrastructure and financial independence. Adequate readiness is manifested in a reduction in the value of the indicators of innovation infrastructure, innovative activity of citizens and financial independence. Recognised as not ready for the implementation of Smart City Technologies are cities having the lowest rates of innovation infrastructure, connectedness, innovation activity of citizens and financial independence. Without full connectedness, it is impossible for an area to make the transition to even the most basic Smart City technology. Considering the values of the indicators of municipalities ready for the introduction of technology, it can be noted that the socio-economic development exceeds the national average. Further strengthening of these areas on the basis of Smart City technology will create an even bigger gap between the economically developed areas, on the one hand, and depressed or underdeveloped municipalities, on the other.

To avoid the implementation of Smart City technology becoming an additional factor in the differentiation of municipalities, it is proposed to use a multi-stage approach to the implementation of Smart City technology projects. Recommended types of Smart projects modified according to the degree of readiness of municipalities for the implementation of Smart City technology (Fig. 2).

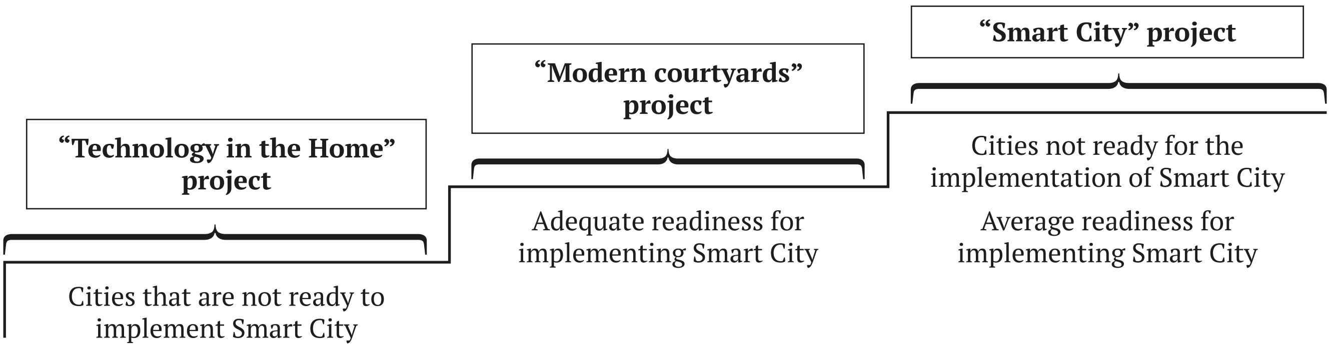


Fig. 2. Projects for the implementation of Smart City technologies for different models of readiness

The "Technology in the Home" project can be realised by cities that are not ready to implement Smart City Technologies. The main project supervisors consist of regional governments that are actively interacting with the owners of premises. The "Technology in the Home" project allows a number of municipal programmes to be combined, such as "Reform and modernisation of housing and communal services and municipal energy efficiency", "Municipal support for the development of territorial public self-government", "Improvement and development of water supply", "Energy saving and energy efficiency", etc. The basis of the project is the widespread introduction of elementary Smart City technology at the local level (public housing). To implement the "Technology in the Home" project, we propose using the following sources of funding: municipal budgets in the framework of targeted municipal programmes; contributions of homeowners under "communal facilities"; 1% of the amount of payments under "fee for utilities." An important condition is legislative consolidation at the municipal level to support the possible redistribution (no more than 3% of the amount) received by management companies for the implementation of projects featuring priority technologies for energy efficiency and security of residential property owners.

The "Modern courtyards" project is implemented by municipalities that have a satisfactory level of preparedness for the implementation of Smart City technology. The project involves the creation of technological infrastructure within the framework of street environments. The main supervisors of the project are the district organs of the municipal authorities, whose role is to ensure the functionality of area developments. The "Modern courtyards" project allows a number of municipal programmes to be combined, such as "Improvement of courtyards", "Repair of courtyard areas of apartment blocks and driveways to the yard areas of apartment buildings", "Renovation of entrances" "Overhaul repairs", etc. The source of funding for the "Modern courtyards" project appears as a municipal budget, within the framework of related routines and cost savings on major repairs of houses pledged to the implementation of the "Technology in the Home" project.

The "Smart City" Project is implemented for cities that are prepared for the implementation of Smart City technologies and for municipalities that are in a state of high readiness. The controlling entities of the project are the executive bodies of the local administration. The "Smart City" project combines a number of municipal and departmental programmes, including: "Construction and repair of roads", "Safe City", "Road Safety", "Social Assistance", "Energy saving and increase of energy efficiency", etc. Sources of funding for the project consist in investors' funds and accumulated income from savings in energy costs due to embedded technologies.

Thus, the implementation of the proposed project allows a unified system of municipalities to be constructed. At the same time, the role of cities that are ready for the introduction of Smart City technology will become more and more significant. They will serve as "outposts" for effective urban development. The income from the implementation of Smart City technology will be invested in new developments that promote urban development. However, implementation of Smart City technologies cannot solve all urban problems. There is always resistance to change in the form of actors that impede the implementation of Smart City technology, forming a barrier to the realisation of Smart projects.

The main barriers to the implementation of Smart projects can include the following.

1. Duration and complexity of this type of project. The recent manifestation of economic crisis prevents municipalities from accumulating resources for the implementation of large-scale Smart projects. The logic of the municipal government is to ensure that necessary financial resources are available "here and now", rather than across some extended period of time.

2. Lack of powers on the part of the municipal authority. Despite the fact that the municipal authorities are independent of central government, the implementation of large-scale projects requires coordination with several departments and federal ministries. The situation is such that even to obtain funds for the renovation of basic infrastructure can take years. In this way arrayed, established administrative barriers sometimes act to prevent the development of their own underlying system.

3. Lack of skilled expertise and systematic understanding of the need for technological development of the territories. This problem is also related to the resource support of municipalities. The priority to attract "at least some kind of" investment led conventions to the institution of examination of projects. However, due to the fact that Smart projects are distinguished by their scale, high capitalisation and the need for careful study of proposed projects, qualified expertise is one of the key stages of their implementation.

4. High risks involved in the realisation of Smart projects. The main risk factor for these projects is the complexity of interlinkages between the interests of all of their stakeholders. First of all, the main problem is the inconsistency of the interests of big investors, state- and local government-established institutions (e.g. JSC CitizenProject, the Institute of System Projects, the Investment Promotion Agency, the Russian Direct Investment Fund, the Ministry of Investment and Innovation), businesses and the public. Each of the presented stakeholders focused on obtaining a concrete result. The successful implementation of Smart projects is dependent on the continued commitment of all the above actors. Thus, the lack of support from the authorities implies the establishment of administrative barriers; on the part of investors — under-funding of the project; on the part of the population — a loss of significance and necessity attached to the implementation of Smart projects.

5. Inability to process and analyse the information flow for the realisation of projects. Regional administrative bodies of the State Statistics Service publish data with a delay of between six months and two years. In this case, information provided by State Statistics Service may often be at considerable variance from the real situation in the economy. The implementation of Smart projects in this situation is not feasible. The Smart City implementation concept requires an immediate flow of information. The solution to this problem necessitates a review of the data collection and processing algorithm. The enormous volume of information coming from different sectors of the economy must be available to any person, primarily via statistical servers and Big Data databases.

Results and conclusions

The conducted research allowed the following conclusions to be drawn.

1. Currently existing ratings of sustainable urban development are increasingly reduced to the determination of the level of socio-economic status, rather than infrastructural and technological

development of cities. In order to address this problem, the author has developed assessed a methodology for assessing the preparedness of the Russian cities for the introduction of Smart City technologies. The evaluation is based on the summation of indicators relating to producibility, innovation infrastructure, the Internet connectedness of cities, the innovation activity of residents, financial independence, energy efficiency and introduction of creative technology projects at the level of the municipality. The obtained summary indicator is correlated with specific criterial ranges. The criterial ranges allow four groupings of urban municipalities to be distinguished: cities ready for the implementation of Smart City technologies, cities having an average level of preparedness, cities with an adequate level of preparedness, and cities that are unprepared for the implementation of Smart City technologies.

2. Having assessed 81 administrative centres of the Russian Federation, it was found that only 7% of the cities of this type are ready for the implementation of Smart City technologies. The main problems faced when implementing Smart City technologies are the low energy efficiency and innovation of the urban infrastructure as well as high financial dependence of municipalities.

3. To solve these problems it is necessary to implement the Smart-projects "Technology in the Home", "Modern Courtyards", "Smart City" in the municipalities. The choice of the type of project is based on the extent to which the city is ready for the implementation of Smart City technologies. Within the framework of the given projects, sources of funds and project supervision are proposed.

In conclusion, the methodology for assessing the readiness of municipalities for the implementation of Smart City technologies will allow: firstly, to quickly determine the development level of localities that are ready to introduce Smart technologies; secondly, to identify the main problems faced by the municipalities that are not ready for the introduction of Smart City technologies; thirdly, to make a choice of Smart projects corresponding to the city's level of readiness for the introduction of "Smart City" elements.

References

1. Anthopoulos, L., Janssen, M. & Weerakkody, V. (2016). A unified smart city model (USCM) for smart city benchmarking and conceptualization. *International Journal of Electronic Government Research*, 2, 77–93

2. Barriga, J. K. D., Romero, C. D. G. & Molano, J. I. R. (2016). Proposal of a standard architecture of IOT for Smart Cities. *Communications in Computer and Information Science*, 620, 77–89

3. De Domenico, M., Arenas, A., Lima, A., González, M. C. (2015). Personalized routing for multitudes in Smart cities. *EPJ Data Science*, 1, 1–11

4. Khatoun, R. & Zeadally, S. (2016). Smart cities: concepts, architectures, research, opportunities. Association for Computing Machinery. *Communications of the ACM*, 8, 46–57.

5. Medvedev, A., Fedchenkov, P., Zaslavsky, A., Anagnostopoulos, T. & Khoruzhnikov, S. (2015). Waste management as an IOT-enabled service in Smart City. Lecture Notes in Computer Science, 9247, 104–115

6. Öberg, C. & Graham, G. (2016). How Smart cities will change supply chain management: a technical viewpoint. *Production Planning and Control*, 6, 529–538.

7. Baburov, V. A. (2012). Umnye goroda: istorii uspekha [Smart cities: success stories]. *Otechestvennye zapiski [Notes of the Fatherland]*, 3 (48), 48–62.

8. Korolev, A. S. (2015). Smart city: teoriya i praktiki sozdaniya umnogo goroda [Smart city: theory and practice of creating intelligent cities]. *Upravlenie gorodom: teoriya i praktika [City management: theory and practice]*, 4 (19), 19–23.

9. Nikushina, A. N. & Sarafanov, A. D. (2016). Umnyj gorod kak vektor social'no-ekonomicheskogo razvitiya territorii [The Smart city as a vector of socio-economic development of the territory]. *Teoriya i praktika sovremennoj nauki [Theory and practice of modern science]*, 3 (9), 354–357.

10. Rumyantsev, A. A. (2015). Kak postroit' umnyj gorod i umnuyu ekonomiku [How to build a smart city and a smart economy]. *Sovremennaya nauchnaya mysl' [Modern scientific thought]*, 4, 119–129.

11. Sergeev, V. V. (2014). Smart city na open innovations expo [Smart city at the open innovations expo]. *Mir izmerenij [The World measurements]*, 1, 52.

12. Shelton, T., Zook, M. & Wiig, A. (2015). The 'Actually Existing Smart City'. *Cambridge Journal of Regions, Economy and Society*, 8, 13–25.

13. Landry, Ch. (2008). *The Creative City. A Toolkit for Urban Innovators. 2nd ed*. London: Comedia, 85.

14. Danzig, J. & Saaty, T. (1977). *Compact city. The project organization of the urban environment*. M.: Stroiizdat, 200.

Author

Olga Olegovna Komarevtseva — Post-Graduate student, Srednerussky Institute of Management Russian Academy of National Economy and Public Administration (5a, Victory Boulevard, Orel, 302028, Russian Federation; e-mail: komare_91@mail.ru).