Smart Cities: Necessity and Development Strategies

L.V. Shkvarya,
Doctor of Economics, Professor, Director of the Center for Asian Studies of the Peoples' Friendship University of Russia, Moscow, Russia.

A.S. Semenov,
Ph.D. in physics and mathematics, deputy head of the Department of industrial management, Faculty of Economics, Peoples' Friendship University of Russia, Moscow, Russia.

Abstract. In the twenty-first century different countries and cities are increasingly seeking to introduce quality improvements in their livelihoods, generate for its residents an environment that is called "smart city" on the basis of high technologies. The article shows that the emergence of a "smart" city is an objective necessity due to the rapid growth of cities in the present and in the future. "Smart" city is designed to solve life problems in cities and create conditions for the socio-economic development of cities and countries, and for a favorable stay of residents on its territory. There are a number of strategies to implement the concept of "smart", but it is important for each urban settlement to develop its own approaches and projects.

Key words: "smart" city, technologies, innovations, sustainable economic development, world economy.

«Умные» города: необходимость и стратегии развития

Л.В. Шкваря,
доктор экономических наук, профессор, директор Центра азиатских исследований Российского университета дружбы народов, Москва, Россия,
destard@rambler.ru

А.С. Семенов,
кандидат физико-математических наук, заместитель заведующего кафедрой управления промышленностью экономического факультета Российского университета дружбы народов Москва, Россия,
semenov.venture@mail.ru

Аннотация. В XXI в. на основе высоких технологий различные страны и города мира все чаще стремятся ввести качественные улучшения в свою жизнедеятельность, сформировать для своих жителей среду, которая получила название «умный город». В статье показано, что возникновение «умного» города — объективная необходимость в связи с быстрым ростом городов в настоящее время и в перспективе. «Умный» город призван решать жизненные проблемы в городах и создавать как условия для социально-экономического развития городов и стран, так и для благоприятного проживания на его территории жителей. Для реализации концепции «умного» существует ряд стратегий, однако каждому городскому поселению важно разработать свои подходы и проекты.

Ключевые слова: «умный» город, технологии, инновации, устойчивое экономическое развитие, мировая экономика.

DOI: 10.31432/1994-2443-2020-15-2-52-58

Цитирование публикации: Шкваря Л.В., Семенов А.С. «Умные» города: необходимость и стратегии развития / Информация и инновации. 2020.Т.15, № 2. с. 52-58. DOI: 10.31432/1994-2443-2020-15-2-52-58.

Citation: Shkvarya L.V., Semenov A.S. Smart cities: necessity and development strategies // Information and Innovations 2020.T.15, № 2. p. 52-58. DOI: 10.31432/1994-2443-2020-15-2-52-58.

Cities in the global economy

The evolution of the world economy at the present stage is based on high-tech development as one of the criteria and catalysts for socio-economic progress in global, regional and country aspects. The world economy allocates an average of 4% to the development of industrial projects. However, this figure is differentiated by country and region of the world. Thus, China spends about 8.6% of GDP on the development of industrial projects, India — 4.9%, Africa — 3.1%, the United States and Canada — 2.5%, as well as Eastern Europe and Latin America — 2.4%. Only 0.5% of projects are equipped with some kind of smart solution [1]. In most cases, they are elements of the intellectual sector.

Cities are becoming one of the directions of high-tech development in the XXI century. Cities have long played an important role in the global and national economy. First, they are home to most of the Earth's inhabitants. The UN predicts that by 2050 the world's population will increase by more than 2 billion people, and the share of the world 's population living in cities will grow from 55.73% in 2019 to 68.36% (table 1).

Table 1

The number of urban populations in the world in 2010-2019 and forecast to 2050

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2050**
The total number of population, in million	6 145	6 223	6 302	6 381	6 461	6 542	7 467	7 550	7 633	7 715	9 772
Number of urban population , % of the total population	51,66	52,13	52,58	53,03	53,47	53,93	54,38	54,84	55,29	55,73	68,36
China											
The total number of population, in million	1 360	1 367	1 375	1 383	1 390	1 397	1 403	1 409	1 415	1 420	1 360
Number of urban population , % of the total population	49,23	50,51	51,77	53,01	54,26	55,50	56,74	57,96	59,15	60,31	80,03
India											
The total number of population, in million	1230	1247	1263	1279	1294	1309	1324	1339	1354	1369	1659

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2050
Number of urban population , % of the total population	30,9	31,3	31,6	32,0	32,4	32,8	33,2	33,6	34,0	34,5	52,8
Russia											
The total number of population, in million	143,1	143,3	143,4	143,6	143,8	143,9	144,0	144,0	144,0	143,9	143,2
Number of urban population , % of the total population	73,69	73,73	73,79	73,86	73,95	74,05	74,16	74,29	74,43	73,69	83,33

Source: compiled from UNCTAD data.

But in some countries, such as China, which occupies the 1st place in the world for number of cities (in the 2nd place on this indicator is traditionally India), in the middle of the XXI century will live more than 80% of the population, and in Russia — more than 83%.

Millions of people moving to urban areas will put pressure on municipalities, as a result of overcrowding, heavy traffic congestion and extreme air pollution, which is already faced by Asian megacities.

At the same time, the world's cities are growing mainly due to an increase in residents in large cities. Thus, the growth of urbanization in India is mainly driven by the growth of cities with a population of 100,000 or more (class I cities). As a result, the number of megacities (class IA and IB with a population of more than 1 million) increased from 35 in 2001 to 53 in 2011, and they were home to about 43% of India's urban population (compared to 38% in 2001) and are expected to be home to about 87% of the country's urban population by 2031. In turn, population growth in small cities tends to stagnate or slow down, with the proportion of population in class II–IV+ cities falling from 31% in 2001 to 28% in 2015 [2].

Most of the world's economic growth is in cities: the world's 600 largest cities will generate about 65% of global GDP in 2010-2025 [3].

As urban areas become exponentially more populated over the next decade, cities will increasingly use IT technology to reduce infrastructure costs, interact more effectively with residents, and improve urban services such as parking, housing and public Wi-Fi.

Consequently, there is a need to step up the implementation of concepts and projects of the "smart" city and its intellectual sector, which is being implemented by many countries in the 21st century.

Smart city: the nature and perspectives

Smart cities are all urban settlements that make a conscious effort to strategically use the new landscape of information and communication technologies to ensure environmental sustainability, functionality of urban systems, quality of life for all, knowledge-

based development and community development. Their main components are the urban environment, information and communication [4].

In fact, the idea of a "smart city" arises from the prospects for the development of innovative systems and digital cities. More specifically, this is the result of two main driving forces: the growth of the knowledge economy and innovation, on the one hand, and the spread of the Internet as one of the main technological innovations of our era, on the other [5].

Cities and countries are now looking to take advantage of the new ICT landscape to offer innovative services for business and capital that provide attractiveness and sustainable growth. In this regard, traditional competition among cities is becoming more intense, as they compete to attract investment, developing businesses and qualified personnel on a global scale [6].

The prospects for the development of "smart" cities are very promising, and various strategies are being developed for their development.

Smart city development strategies

An important feature of smart city strategies is their basic approach. According to this principle, the following types are distinguished: strategies based on economic sectors or geographically oriented strategies, and strategies aimed at achieving certain goals or infrastructure-oriented strategies.

Cities that seek to become "smart" as part of a sector strategy focus on improving the intelligence of specific socio-economic aspects of everyday life, such as business, housing, commerce, management, health, education, community, etc. — without much emphasis on the geography of each sector, but mainly on its productivity.

For example, IBM's smart cities program offers solutions for governments and administrations, as well as government and administrative agencies, in the following areas: "smart buildings and urban planning", "environment", "energy and water", "transport", "education", "health", "social programs" and "public safety" [7].

Similarly, the Cisco "Smart + Connected Communities" platform offers relevant entities smart solutions in areas such as transportation, training, security, sports and entertainment, utilities, real estate, healthcare, and government [8].

A distinctive and well-defined sectoral approach is the Smart nation 2015 strategy (adopted in 2015), which is a 10-year plan for Singapore to gradually and consistently transform it into a smart island. The master plan for 2015 included the transformation of seven key sectors of the economy: digital media and entertainment, education and training, financial services, e-government, healthcare and biomedical Sciences, manufacturing and logistics, tourism, hospitality and retail [9].

The second type of smart city strategy focuses on geographically defined areas and clusters[10, 11] such as business districts, research and development clusters, university and educational districts, logistics clusters, tourism and entertainment clusters, etc., as well as smaller areas such as neighborhoods. It is a spatially determined perspective that recognizes the predominant nature and main functions of city districts, the location of its elements, and develops applications to organize and support their effectiveness.

The strategy is targeted at specific groups of users who should benefit from the area / cluster they live in, work in, or just visit. The strategy proposed for the city of Thessaloniki, Greece, is a good example of a geographically based smart city strategy.

Thus, the focus of the smart Thessaloniki offer is on the most important areas of innovation and entrepreneurship in Thessaloniki, namely: (1) the port of Thessaloniki, (2) the Central business district and commercial center of the

city, (3) the campus of the Aristotle University of Thessaloniki, (4) the technology district in Eastern Thessaloniki, and (5) the airport district.

The number and availability of Apps and e-services varies from one city to another. The port cluster offered "smart" platforms to expand and facilitate cargo operations and other port activities. In the Central commercial district, smart platforms were recommended to facilitate access and mobility, as well as to provide environmental monitoring. Smart platforms were offered on campus to promote research and knowledge dissemination, as well as to implement the triple helix model by encouraging collaboration with the private sector. Finally, smart platforms were offered in the Eastern technology district to help promote the district's commercial real estate and attract tenants, provide online technology services, and support new business incubations [12].

Another example of a geographically based smart city strategy is Amsterdam Smart City; the program includes 32 zonal projects in Amsterdam's neighborhoods, commercial and recreational areas, focusing on energy transition and open communication [13].

There are also goal-oriented smart city strategies, in the sense that they are focused on goals that are neither sectoral nor geographical. The Smart city Barcelona strategy is a typical example: the strategy is developed within three axes (a) international promotion, (b) international cooperation and (c) local projects. The strategy reveals each of these three axes individually [14].

However, in practice, many of the smart city strategies used do not have a clear structure — for example, the UAE [15]. It is not easy to say whether they follow a sectoral, geographical or other common goal approach, while in many cases they solve the problem of creating a "smart city" by combining them.

Consider the "infrastructure-oriented" strategy for the development of a "smart" city. In each case, as shown by world theory and practice, the question is whether the strategy for the development of a "smart city" will use technology to promote "hard" infrastructure systems of the city (for example, transport, water, waste, energy) or "soft" infrastructure for the city's population (i.e., the development of social and human capital; knowledge; creativity; social equality, etc.).

However, a significant part of the "smart city" supporters view infrastructure-oriented strategies as fragmented, which do not guarantee the real development of cities and the "mental" development of their citizens [16, 17, 18, 19, 20].

A typical example is the "infrastructure-oriented" strategy for the development of Rio de Janeiro as a "smart" city, which involves a generous investment in a citywide intelligent system that, based on the analysis of data generated by special sensors in real time, improves the security and transport functions of the city. The project was negatively criticized in popular media. A huge metropolis with a high crime rate and acute social and environmental problems can hardly be considered "smart" [21].

Thus, we come to the conclusion that the development of "smart" cities is both a necessity and an important task for many countries of the world (including the Russian Federation). This task is due to the growth of cities, the growth of their inhabitants and the importance of ensuring their effective economic activity and comfort of living, including environmental. And, as evidenced by modern theory and world practice, the solution of these problems is possible only on the basis of the implementation of the concept of a "smart" city, which will allow both individuals and legal entities to function effectively, as well as the city administration. At the same time, the world experience should be used more widely, but when choosing a strategy for the development of a "smart" city, the specifics of

a particular urban entity should be taken into account in each case.

REFERENCES

1. Smart City Enterprise. Smart Technology Industrial Sales Network & Blockchain Tendering Platform — URL: https://neironix.io/documents/whitepaper/4955/SmartCityEnterpriseWhitePaper.pdf.

2. Planning Commission. (2011). Report of the Working Group on Urban Strategic Planning (Final Report). India: Ministry of Housing and Urban Poverty Alleviation. Retrieved from URL: http://www.planningcommission.nic.in/aboutus/committee/wrkgrp12/hud/wg_rep_Urban_WG.pdf.

3. "Urban World: Cities and the Rise of the Consuming Class," McKinsey Global Institute, June 2012, URL: www.mckinsey.com/insights/mgi/research/ urbanization/urban_world_cities_and_the_rise_of_the_consuming_c lass.

4. Wolfram M. Deconstructing Smart Cities: An Intertextual Reading of Concepts and Practices for Integrated Urban and ICT Development. Paper presented at the REAL CORP 2012, 14-16 May 2012. Schwechat.

5. Komninos N. Intelligent cities: Variable geometries of spatial intelligence. // Intelligent Buildings International. 2011. №3 (3). P.172-188.

6. Rodionova I. A., Gordeeva A. S., Kokujceva T. V. The new technologies: a growing role in the competitiveness of the countries of the world // proceedings of the Ural state University of Economics. 2010. No. 5 (31). Pp. 119-126.

7. IBM. Overview: What is a smarter city? Retrieved 30 May 2013, from URL: http://www.ibm.com/smarterplanet/us/en/smarter_cities/overview/.

8. CISCO. Smart+Connected Communities Retrieved 1 February 2013, from URL: http://www.cisco.com/web/strategy/smart_connected_communities.html.

9. Official website of the InfoCom development Authority of Singapore, 2014.

10. Komninos N. Intelligent cities: towards interactive and global innovation environments // International Journal of Innovation and Regional Development, Special Issue: Intelligent Clusters, Communities and Cities: Enhancing Innovation with Virtual Environments and Embedded Systems. 2009. №1 (4). Pp. 337-355.

11. Komninos N. Intelligent cities: Variable geometries of spatial intelligence // Intelligent Buildings International. 2011. №3 (3). Pp. 172-188.

12. Komninos N., Tsarchopoulos P. Towards Intelligent Thessaloniki: from an agglomeration of apps to smart districts // Journal of Knowledge Economy. 2012. №4(2). Pp. 149-168.

13. Official website of Amsterdam Smart City, 2014.

14. Official website of Smart city Barcelona, 2014.

15. Шкваря Л.В., Айдрус И.А.З. ОАЭ: на повестке дня «Умные» города // Сегодня и завтра Российской экономики. 2018. № 89-90. С. 5-12. [Shkvarya L. V., Aidrous I. A. Z. UAE: on the agenda "Smart" cities // Today and tomorrow of the Russian economy. 2018. No 89-90. Pp. 5-12. (In Russian)].

16. Anthopoulos L., Tougountzoglou T. A Viability Model for Digital Cities: Economic and Acceptability Factors. In R. Ch. & S. Aikins (Eds.), Web 2.0 Technologies and Democratic Governance: Political, Policy and Management Implications: Springer, 2012.

17. Aurigi A. New Technologies, Same Dilemmas: Policy and Design Issues for the Augmented City // Journal of Urban Technology. 2006. №13 (3). Pp. 5-28.

18. Hollands R.G. Will the real smart city please stand up? // City. 2008. №12 (3). Pp. 303-320.

19. Komninos N. Intelligent cities: towards interactive and global innovation environments // International Journal of Innovation and Regional Development, Special Issue: Intelligent Clusters, Communities and Cities: Enhancing Innovation with Virtual Environments and Embedded Systems. 2009. №1 (4). Pp.337-355.

20. Neves B.B. Are digital cities intelligent? The Portuguese case // International Journal of Innovation and Regional Development. 2009. № 11(4). Pp. 443-463.

21. Heaton B. Will New York City Embrace Open Source Code? Retrieved 20 June 2014, from URL: http://www.govtech.com/computing/Will-New-York-City-Embrace-Open-SourceCode.html; Honan D. The Automation of Rio: Smart City or Digital Tyranny? Big Think Retrieved 2 May 2012, from URL: http://www.bigthink.com/humanizing-technology/future-cities.

22. UNCTAD URL: https://unctad.org/en/Pages/Home.aspx.

■