

Regulation of the development of smart cities in China

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Abstract. *The formation of a smart economy involves the use of new technologies and mechanisms for their introduction into economic activity. The change in the modern paradigm of the development of the global economic complex is characterized by the strengthening of the processes of intellectualization, digitalization, socialization and environmentalization, which involves the formation of a new regulatory system to ensure the functioning of smart cities. It was determined that the key determinants of the formation of a smart economy are the legal basis, the level of financing of smart cities, the formation of an institutional structure, the development of technologies and public participation. Asian countries are becoming active participants in the processes of smartization, among the leading countries is China, with its own strategies of intellectual development and technologization, innovation and stimulation of the economy.*

Keywords: *smart economy, innovation clusters, technology development, development and research*

Smart cities, most of which are equipped with the latest technologies and infrastructure, are defined as the most advanced centers of innovative development in urban environments. The development of smart cities in China not only reflects modern technological achievements, but is also a strategic direction for achieving global sustainable development goals. In the context of regulating the development of smart cities in China, it is necessary to consider the definition of the concept of "smart city" and its key characteristics, an overview of the history of its development in China, as well as the role of government initiatives in stimulating this process. The key determinants of the formation of a smart economy are the legal basis, the level of financing of smart cities, the formation of an institutional structure, the development of technologies and public participation.

Regulation of the development of smart cities in China is currently one of the key strategies of the government to stimulate innovative progress and sustainable development. One of the most important aspects of regulation is the legislative framework, which defines the legal framework for the development of smart cities and ensures their coordination with other spheres of activity. An analysis of key laws and regulations, as well as an overview of the "Internet +" policy, which actively affects the development of smart cities, allows us to understand the main principles on which the regulation of this process is based [1].

Additionally, financing is a key factor in ensuring the success of smart city projects. The study of funding sources, such as public investment and the role of the private sector, as well as the study of public-private partnership models aimed at the development of smart cities, allows us to understand effective mechanisms for attracting resources for the implementation of these projects. Such an approach contributes to ensuring not only the sustainability, but also the efficiency of the development of smart cities, which is an important aspect of China's strategy in the modern world.

Financing plays a key role in the development of smart cities in China. One of the main sources of financing is state investment, which reflects the government's strategic interest in the development of these cities. The Chinese government is actively promoting the creation of smart

city infrastructure by allocating significant financial resources to various projects aimed at introducing the latest technologies and improving the quality of life of residents.

In parallel with state investments, the private sector plays a major role in financing smart cities. Multinational corporations, investment funds and private enterprises are actively investing in the development of smart technologies, promoting innovation and economic growth. The role of the private sector is not only in financing, but also in the implementation of technological solutions and the creation of new business models, which contributes to the faster and more efficient implementation of smart technologies in cities [2].

In addition to public and private investments, public-private partnership (PPP) models are proving to be an effective tool in the implementation of smart city projects. These models allow combining the efforts of the state and the private sector for joint financing and project management, which helps reduce risks and ensure more effective implementation of innovative solutions in cities. PPPs become a platform for sharing knowledge and experience between public and private actors, which contributes to the creation of a favorable environment for the development of smart cities in China.

The institutional framework responsible for regulating and coordinating the development of smart cities in China includes national government bodies such as the Ministry of Housing and Urban Development and the National Development and Reform Commission of China, which develop strategies, legislation and standards for this direction. Local governments play an important role in the implementation of smart city projects, providing monitoring, interaction with local stakeholders and the development of local innovation ecosystems [3].

To ensure effective coordination in this area, special agencies and platforms are being created in China to bring together various stakeholders to jointly solve problems and develop development strategies. These organizations create conditions for the exchange of experience and better coordination of projects, contributing to the successful implementation of smart technologies in Chinese cities.

Technological innovation plays a key role in the development of smart cities in China, contributing to improving the quality of life of residents and optimizing the management of urban resources. The main technologies used in China's smart cities are the Internet of Things (IoT), which allows connecting various devices to the network and collecting data for analysis and optimization of processes. Artificial intelligence (AI) is used to analyze large volumes of data and make automated decisions to optimize the urban environment. Cloud computing provides access to computing resources and data at any time and from any device, which makes it possible to increase the efficiency of the use of resources in the city. In addition, much attention is paid to the use of Big Data technology to analyze and forecast urban trends and needs [4].

Technological innovations play an important role in the formation of a smart economy, including the Internet of Things (IoT), artificial intelligence (AI), cloud computing and Big Data analysis. The implementation of such technologies in China leads to the improvement of the quality of life of residents and the optimization of urban resource management. Global trends indicate the active development of artificial intelligence in China since 2016 (Fig. 1).

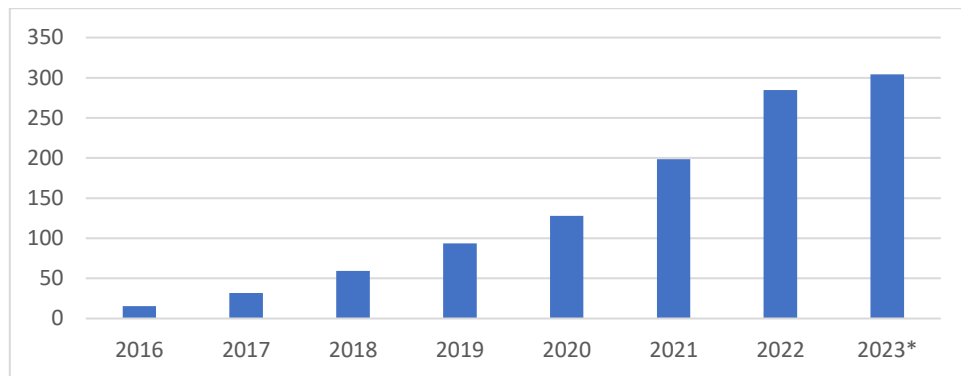


Fig. 1. The volume of the artificial intelligence (AI) market in China from 2016 to 2022 with a forecast for 2023, billion yuan [5]

During this period, the market has increased more than 20 times, from 15.4 billion yuan in 2016 to an estimated volume of 304.3 billion yuan in 2023. Artificial intelligence is actively used in various fields of activity, from technology companies to Chinese government initiatives.

Another technology that has become the basis for the development of the smart economy is the technology of the fifth generation of mobile communications, known as 5G, which has become one of the most discussed and rapidly growing technological trends in the world. Between 2021 and 2025, 5G adoption is expected to increase significantly in various regions of the world, including North America, China, Western Europe, and other regions. It is these regions that will lead the impressive growth in the use and deployment of 5G networks, with China at the forefront, playing a key role in this process (Figure 2).

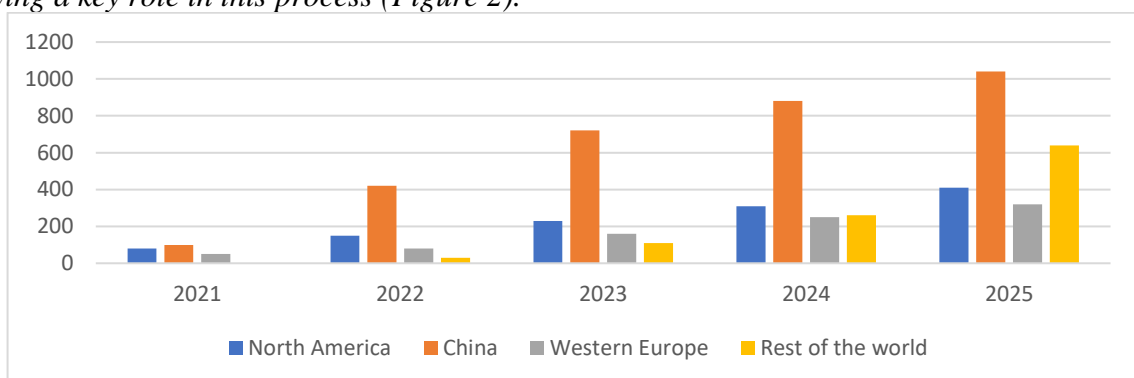


Fig. 2. Forecast number of 5G connections worldwide by region from 2021 to 2025, millions [6]

The expansion of 5G in these regions will have a significant impact on the economy, technological progress, innovation and social interactions, opening up vast opportunities for new applications and services, as well as providing the basis for future development and solving big global challenges.

Projected data indicate significant potential and rapid development of 5G technology worldwide. North America is expected to see impressive growth in connections from 150 million in 2022 to 410 million in 2025. The biggest acceleration in the deployment of 5G networks is seen in China, which is expected to grow from 420 million connections in 2022 to 1,040 million in 2025. Western Europe is also forecast to see significant growth, with the number of connections increasing from 80 million in 2022 to 320 million in 2025. The rest of the world is also expecting significant growth, with a projected increase from 30 million in 2022 to 640 million in 2025. Such a dynamic development of 5G technology shows the general interest in it and its importance for telecommunication development all over the world.

Due to the use of advanced technologies in China's smart cities, a number of important issues regarding cyber security and data protection arise. On the one hand, the increase in the number of devices connected to the network creates new vulnerabilities and risks for cyber attacks.

Therefore, it is important to develop and implement effective cyber security measures, including data encryption, network filters and intrusion detection systems. On the other hand, the collection and analysis of large amounts of data can raise privacy and confidentiality issues. Therefore, it is necessary to develop ethical standards for the collection, storage and use of urban data, as well as to provide control mechanisms and user consent for their processing.



Public participation in the development of smart cities in China is a key element, contributing to the involvement of citizens in decision-making processes and planning the future of the city. Through the implementation of feedback mechanisms and public control, residents have the opportunity to express their views, make suggestions and monitor the progress of projects. In addition, educational initiatives and measures to raise awareness among the population about smart cities help create conditions for active participation of citizens in shaping the urban environment and provide broad support and involvement in innovative ideas and projects [7].

Conclusion:

In conclusion, it can be emphasized that public participation in the development of smart cities in China is an important element, contributing to the creation of an open and transparent environment for decision-making and planning the future of the city. Mechanisms of feedback and public control provide citizens with the opportunity to actively participate in the formation of urban space and express their views and suggestions. At the same time, educational initiatives and activities to increase awareness of smart cities contribute to the formation and maintenance of broad public support for innovative ideas and projects in the city. This approach contributes not only to the effective implementation of technological solutions, but also creates conditions for sustainable and balanced development of the city, taking into account the needs and opinions of citizens.

Sources:

1. Hong, Y. (2017). Pivot to Internet Plus: Molding China's Digital Economy for Economic Restructuring?. *International Journal of Communication*, 11, 21. URL: <https://ijoc.org/index.php/ijoc/article/view/6105/1990>
2. Wang, D., Zhang, L., Zhang, Z., & Zhao, S. (2011). Urban Infrastructure Financing in Reform-era China. *Urban Studies*, 48, 2975 - 2998. <https://doi.org/10.1177/0042098010392079>.
3. Yan, J., Liu, J., & Tseng, F. (2020). An evaluation system based on the self-organizing system framework of smart cities: A case study of smart transportation systems in China. *Technological Forecasting and Social Change*, 153, 119371. <https://doi.org/10.1016/J.TECHFORE.2018.07.009>.
4. Jin, J., Gubbi, J., Marusic, S., & Palaniswami, M. (2014). An Information Framework for Creating a Smart City Through Internet of Things. *IEEE Internet of Things Journal*, 1, 112-121. <https://doi.org/10.1109/JIOT.2013.2296516>.
5. China: AI market size 2023 | Statista. Statista. URL: <https://www.statista.com/statistics/1262377/china-ai-market-size/> (date of access: 25.03.2024).
6. Smart cities in China: growth driver in the post pandemic world | SHS Web of Conferences. SHS Web of Conferences. URL: https://www.shs-conferences.org/articles/shsconf/abs/2021/40/shsconf_glob2021_04004/shsconf_glob2021_04004.html (date of access: 25.03.2024).
7. Bastos, D., Fernández-Caballero, A., Pereira, A., & Rocha, N. (2022). Smart City Applications to Promote Citizen Participation in City Management and Governance: A Systematic Review. *Informatics*, 9, 89. <https://doi.org/10.3390/informatics9040089>.

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