

Seizing New Opportunities in Digital Technology and Digital Economy Development to Continuously Enhance Urban Science Research: Post-print

Authors: WANG Guangtao

Date: 2023-05-08T00:00:00+00:00

Abstract

Urban science is the study of urban issues from the perspective and with the methods of systems science. Currently, China's urbanization rate has reached 65.22%, and urban development has entered a new period of quality improvement and structural adjustment. The advancement of information technology and the development of the information industry have also brought new opportunities. Digital China is a new strategy for national informatization development in the new era, and urban modernization issues require the application of complex systems thinking. The article concludes by proposing the contemporary requirements for advancing urban science research.

Full Text

Preamble

ChinaXiv Cooperative Journal Scientific Focus Citation Format: Wang Guangtao. Seizing New Opportunities in Digital Technology and Digital Economy Development to Continuously Improve Urban Science Research. *Bulletin of Chinese Academy of Sciences*, 2023, 38(4): 533-535.

Urban science examines urban issues through the lens of systems science theories and methodologies. At present, China's urbanization rate has reached 65.22%, ushering urban development into a new era focused on quality improvement and structural adjustment, while advances in information technology and the growth of the information industry present fresh opportunities. Digital China represents a new strategic direction for national informatization development

in the new era, and urban modernization requires the application of complex systems thinking.

China's research on urban science can be traced back to the 1980s, when scientist Qian Xuesen proposed that "urban science research should take urbanology as its leading theoretical discipline." Qian emphasized that "research on cities must employ the perspectives and methods of systems science," and that "to solve open complex giant system problems, we must establish a comprehensive integration methodology from qualitative to quantitative analysis."

In 2021, China's digital economy reached a scale of 45.5 trillion RMB, ranking second globally in total volume, yet still significantly behind the United States—its total scale being only 46.4% of America's. In 2021, China's digital economy accounted for 39.8% of its gross domestic product (GDP). According to the China Academy of Information and Communications Technology's *Global Digital Economy White Paper (2022)*, which calculated that among 47 countries in 2021, the digital economy represented 45.0% of GDP on average, with Germany, the United Kingdom, and the United States exceeding 65% .

By 2022, China's urbanization rate had reached 65.22%, marking a new period of quality enhancement and structural adjustment in urban development, while progress in information technology and the information industry continues to create novel opportunities. Analysis of urban science research both domestically and internationally reveals a consensus that urban modernization requires complex systems thinking. However, existing urban science research has primarily focused on establishing mathematical and technical models, lacking integration with urban social practice. Urban science research must align with national conditions, be grounded in urban development stages, respect urban development laws, consider the overall urban context, and connect with the goal of building new-type smart cities. In the information age, new-type smart cities characterized by thorough perception, interconnectivity, and intelligent applications represent an advanced form of urban informatization, promising new important tools for urban science construction. The development of digital technology and the digital economy will bring new opportunities to urban science research. While proposing the utilization of advanced technologies, greater emphasis should be placed on addressing urban problems from a human-centered social perspective to properly harness the application value of data analysis in urban science. The City Information Modeling (CIM) foundational platform serves as a basic platform for advancing urban science research—"improving the city information modeling platform" has been included in the *14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and Long-Range Objectives Through 2035* and related plans. City information modeling, together with digital twin technology, will be applied in urban operation management services, helping to address current pain points and challenges in smart city construction such as missing basic data and information, poor information sharing, redundant platform construction, and disconnected data services across various links.

Requirements for Improving Urban Science Research

(1) Enhance urban science research levels by extending its depth and breadth. We should uphold the people-centered city concept to guide urban science research, advancing urban development from “smart” to “intelligent” to achieve people’s well-being and sustainable urban development. We must confront the foundations and difficulties of conducting urban science research: data standardization governance, independent and controllable information security, sustainable research and development, and government-enterprise partnerships. We need to promote the integration of urban planning, construction, and management, overcome traditional development limitations, expand the depth and breadth of urban science development research, and achieve sustainable research and development.

(2) Fully unleash the value of data elements and promote data sharing. We must break down data interoperability barriers, enhance digital technologies for data collection, processing, analysis, and model establishment, and promote public data sharing. We should converge and integrate information to achieve data standardization governance, with software development leading hardware manufacturing.

(3) Combine theory and practice in building modern cities according to local conditions. We need to support local innovative development based on current new-type smart city indicator systems while researching and establishing an indicator system for Chinese urban modernization. The “metropolitan area scope” definition method based on China’s actual commuting and transportation circles represents an active practical exploration. Furthermore, urban transportation science provides support for improving urban science development. Given that urban transportation networks exhibit characteristics of open complex giant systems, studying the construction and operation of urban transportation composite networks can help understand urban development and operation patterns from a dynamic perspective. The vast amount of urban-related data and modeling methods accumulated in urban transportation provide rich resources and deepening pathways for theoretical and empirical research in urban science, offering important reference value for multidisciplinary development in urban science.

China has entered a new development stage. We must adhere to the principle that “people build cities for the people,” creating livable, resilient, and smart cities. Urban science must persist in applying open complex giant systems thinking, seizing new opportunities in digital technology and digital economy development to continuously improve urban science research levels.

**Former Minister of Construction of the People’s Republic of China,
Director of the Environmental and Resource Protection Committee
of the 11th National People’s Congress. Long engaged in specialized**

research and administrative management of urban planning, urban transportation, and urban environment. E-mail: wgt789@126.com

Responsible Editor: Yue Lingsheng

According to the China Academy of Information and Communications Technology's *Global Digital Economy White Paper (2022)*, the digital economy of 47 countries reached a value-added scale of 38.1 trillion US dollars in 2021, representing nominal growth of 15.6% and accounting for 45.0% of GDP. The 47 countries include the United States, China, Germany, Japan, the United Kingdom, France, South Korea, India, Canada, Italy, Mexico, Brazil, Australia, Russia, etc.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.