https://doi.org/10.37420/j.mlr.2024.017

Research on data security governance of smart city construction

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Abstract

In the post-epidemic era, the construction of smart cities has become an important link in the economic development of various countries. To improve the degree of urban smart, accelerate the construction of urban digital information infrastructure, and promote the safe sharing of network data is the meaning of smart city construction. At present, China's smart city construction has made breakthrough progress, but the data flow still faces problems such as leakage, abuse and sharing obstruction. Therefore, we can learn from the mature experience adopted by Europe and the United States in the construction of smart cities, set up third-party institutions to actively promote data sharing, build high-value data sets open to the public, and adhere to the first trial reform. The introduction of regulatory sandbox and common data space mechanism to improve the level of smart city construction and export China's template for smart city construction.

Keywords

smart city, data flow, data security, data sharing

1 Introduction

With the rapid development of digital technology, China's digital economy has grown from 27.2 trillion yuan to 45.5 trillion yuan with the advantages of large data volume and large market, ranking second in the world in total volume and becoming one of the main engines to promote China's economic growth. However, while the development of China's digital economy has made great progress, it should also be recognized that, according to statistics, the digital economy in the United States accounted for more than 60% of GDP, China's data ratio is only about 38%, so there is still some room for progress in the development of China's digital economy. In 2008, IBM of the United States proposed the concept of "smart Earth", and this concept is considered to be the future development goal of cities in the information age, and the construction of global smart cities is thus generated. Since the introduction of the concept of "smart city", China's smart city construction has gone through three stages of development, namely, the exploration period of the introduction of conceptual theory (2008-2012), the trial period of the first trial (2012-2015), and the construction period of overall security and development (2016 to date). China has made breakthroughs in the construction of smart cities. Beijing, as one of the first leaders in the construction of smart cities in the country, has basically completed the construction of smart city 1.0, relying on relatively complete and mature digital infrastructure and network data security governance system, and is steadily taking solid steps toward the construction of smart cities after urban digitalization and intelligence.

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2 Smart city construction data security risks

At present, in the practice of smart city construction in China, the rapid development of information technology leads to frequent conflicts between protection and sharing in data circulation, and data flow faces certain risks. The main manifestations are:

2.1 The risk of personal data leakage increases

The rapid development of information technology leads to an explosion in the amount and variety of data, which may be misused, leaked or attacked in the flow, sharing and storage, thus amplifying the risk of privacy protection. One is the illegal trading of personal data. In December 2022, NIO received a blackmail email, claiming that it had internal data of NIO and asked for $2.25 million equivalent bitcoin with the leaked data, including 22,800 pieces of internal employee data of NIO, from the president to the frontline employees, at a price of 0.15 bitcoin; Owner user ID card data 39,900, user address data 650,000 and other information, extortion asking price from 0.1-0.25 bitcoin. The same information was leaked and sold to other car companies such as Volkswagen and Toyota. The second is the leak of specific personnel. In terms of criminal subjects, telecom operators, SMS channels, third-party platforms, etc., have also become the leak channels that cannot be ignored in recent years. In addition, since 2018, the courts at all levels in Beijing have concluded 219 criminal cases of infringing citizens' personal information and sentenced 294 criminals. From the situation of the case, the leak of information by insiders is the main source of the crime of infringing citizens' personal information.

In addition, technological innovation brings efficiency and convenience to smart city data security governance, but also create data security risks, traditional network data security governance means can not maintain a balance with the speed of change of scientific and technological means, there is no way to track and trace the source in a timely manner, resulting in data in the flow process by hackers stolen and tampered with the risk of increasing. First, there are various forms of hacking attacks. Hackers can use online system vulnerabilities to drag databases, use social worker databases or weak passwords to crash databases, etc. In 2022, China's API risk intelligence platform monitored malicious attacks on government affairs systems, involving Guangdong, Hunan, Sichuan, Heilongjiang and other places, and attackers took advantage of API logic defects in business scenarios such as government affairs system registration and inquiry to attack. To obtain the user ID card mobile phone number or name, address and other personal privacy information. Second, the purpose of hackers has changed. Hackers shift from simply obtaining data to extortion, demanding that companies pay a high ransom (virtual currency), or else disclose sensitive corporate data, so as to obtain huge profits without revealing their identities.

2.2 Data sharing mechanism is blocked

How to use data while protecting personal privacy and corporate secrets becomes a challenge. Data sharing is an indispensable step in the construction of smart cities. In practice, there are problems such as "unknowable", that is, users do not know whether the data exists and where they can obtain the data, "unavailable", that is, users cannot obtain the required data in a timely or real-time manner, and "inaccessible", that is, the low connectivity of data sharing between governments, enterprises and individuals. At the same time, there will be insufficient cross-departmental and cross-level collaborative governance in the

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supervision process. Different departments provide different data technical standards, and different systems can not realize effective data sharing and exchange, resulting in insufficient exchange of data. As a result, various systems, departments, and levels are unable to form a joint effort to conduct whole-process linkage supervision, and a long-term and effective development mechanism cannot be built in response to major data security events in the construction of smart cities. Taking open sharing of public data as an example, in the process of public data authorization operation, first, due to the lack of mature experience for reference across the country, different development conditions across the country, the digital divide still exists, resulting in inconsistent open sharing standards across the country. Second, in the process of authorized operation, some local governments still worry about data leakage damaging national and public interests, and believe that data sharing will affect power operation under the influence of the inherent right concentration thinking. Third, data sharing involves the interests of data providers, data collectors, data processors and other parties. In the case of disputes over data confirmation, data rights and obligations, and the distribution of data benefits, there is a natural resistance to open sharing of public data.

3 Coordinate the countermeasures and suggestions of data security governance in the construction of smart cities

In October 2023, the OECD released "Data Governance for Smart Cities: Challenges and the Way Forward", which pointed out that in the construction of smart cities, reasonable and effective data security governance systems, frameworks and strategies should be built. In this regard, the EU, the United States and the United Kingdom have accumulated relatively effective data security governance experience in practice. Compared with foreign countries, China has basically built a network data security legislation system with "Network Security Law", "Data Security Law" and "Personal Information Protection Law" as the fundamental law. However, because the provisions of these basic laws are too principled, it is necessary to further introduce and implement detailed implementation, which can learn from the mature experience of foreign smart city construction and overall data security governance in China.

3.1 Improve data sharing mechanism

At present, on the basis of the data classification protection system in China, the protection mode of personal data, enterprise data and government data is classified first and then ranked, so as to create a reliable, safe and compliant data basic environment for data sharing.

First of all, in view of the problems of incomplete, unpatency and distrust in data sharing in practice, the EU establishes a registered third-party professional body as the intermediary between enterprises and government data sharing based on the Data Governance Act and the EU Data Act approved by the European Parliament in 2022 and 2023 respectively. Promote public sector data sharing. For example, third parties can provide enterprises with a secure data sharing environment in the form of digital platforms, and encourage the spontaneous sharing of data between enterprises on the basis of compliance with relevant European and Member State legislation. Third parties can also create new personal information management mechanisms such as personal data Spaces and data money packages, allowing individuals to decide whether to share data with trusted companies.

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In order to eliminate data access barriers, optimize data sharing rules between enterprises and governments, and create sharing paths between data holders and potential users, China can learn from the EU's form of collecting and sharing government, enterprise and personal data by qualified third-party intermediaries on the basis of new data element service providers. The function of Chinese "quasi-data intermediary" such as data exchange, data broker, data provider and so on is reformed or expanded. Let registered data intermediaries with professional knowledge and technical equipment as neutral third parties collect and sort data through the signing of service, confidentiality, authorization agreements and other forms, provide data sharing platforms for governments and enterprises, create personal data space and other information management mechanisms for individuals, and provide professional services such as data trust, data analysis, and security. It does not establish a commercial relationship between data holders and data users, and realizes data sharing between government, enterprises, individuals and other subjects in a neutral and trusted way, so as to enhance the sharing power of data holders.

Secondly, in order to promote the sharing and utilization of data, EU countries such as Germany, Denmark and France have collected and constructed "high-value data sets" for free and open sharing, and adopted relatively strict regulations on them. [8]For example, with the exception of some data sets of special value involving public institutions, the sharing of most data sets should be open to EU members on a free basis; Another example is that the scope of data covered by the high-value data set should be evaluated by economy, environmental protection, corporate income, etc. Finally, the construction and maintenance of the data set should be based on the dynamic update, and the value of the data set should be evaluated on a regular basis to reflect the national economic and social development situation in a timely manner.

In the "Overall Plan for the Comprehensive Reform of Market-oriented Allocation of Factors" issued by The State Council in 2022, it is proposed that "priority should be given to promoting the opening of high-value data sets such as enterprise registration and supervision, health, transportation, and meteorology to the society". However, due to the abstract design of the top layer of the opening of high-value data sets, the optimization and implementation of the system are not operable and other difficulties, so the opening work is slow. At present, Beijing shares public data in the form of a public data open platform, but there is still much room for progress in the scope, interoperability and effect of openness. Due to limited government resources, improving the efficiency of data sharing has become the focus of the current issue, so Beijing can promote the "high-value data set" built by the government opening, optimize the type of data opening, smooth open catalog, and expand the sharing subject. In the process of constructing high-value data sets, first, we should realize that the meaning of high value is the composite priority value of multiple fields. Second, for Beijing, the range of high-value data sets can be divided into education, health, geospatial, meteorological data and other data with high utilization value in the economy and society. Third, the construction of data sets should be based on linking existing data packets. First, the government departments should make a preliminary priority sharing list according to the value of the data, the attention of government functions, the frequency of data utilization and other standards, and then the technical experts in related fields should evaluate and modify it. Again, the government department evaluates, reviews and publishes the public website based on the reuse value of the data, and finally the data opening agency maintains the update and modification of the data set. In the construction process of high-value data sets, the consensus of

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stakeholders such as government departments, enterprises and users should be incorporated, and the data of government departments, enterprises and individuals should be connected in different fields and scenarios at the domestic level, and the data sharing warehouse should be dynamically updated on the principle of free sharing. However, the construction and application of high-value data sets still have some practical problems, such as different evaluation standards of government departments, the control of staff discretion, and the realization of stakeholders' right to speak, which need to be solved in the construction process.

3.2 Promote the application of innovative technologies in the field of data security

Adopt digital emerging technologies to deal with new risks, and promote the deep integration of innovative technologies and smart city construction. As early as 2019, blockchain has been considered an important breakthrough in independent innovation as a core technology. Blockchain technology is widely used in the construction process of smart cities in various countries around the world because of its immutable, secure, decentralized, efficient and other characteristics. Therefore, first, apply blockchain technology in the storage of core data and important data, build a two-dimensional data security governance system that combines chain-governed chain and law-entering chain, and realize mutual trust and mutual recognition in the construction of smart city and digital economy. Let the government first build a blockchain basic service platform based on the public chain and alliance chain, and various enterprises are responsible for the platform operation in different fields and industries, and implement blockchain technology in the construction of smart cities in the form of "government set up a platform and enterprises sing", and the blockchain supports the deep sharing and application of smart city information. For example, in the medical field, on the basis of the government's construction of the medical data blockchain service platform, medical enterprises use blockchain technology to encrypt the original data for storage, privacy protection, authorized access, information traceability, etc., so as to achieve smart medical care. Second, 5G, artificial intelligence, cloud computing, the Internet of Things and other technologies are supported to work together on data security governance. The different types of city data collected by the Internet of Things technology are transmitted to the cloud for processing, artificial intelligence technology is used to analyze the data, and VR technology is used to transform the city model into a real twin platform, so as to realize the prediction and real-time monitoring of the city operation, and promote the construction of "digital twin cities". At present, it is more used in traffic management, in addition, innovative technologies can be applied to medical and health, environmental protection, urban planning and other fields, such as promoting the intelligent transformation of residential water, electricity, heating and other appliances, building intelligent building management system, to achieve regulatory risk early warning, privacy data protection and other effects.

3.2 Continue to promote the pilot mechanism reformation

At present, China's capital Beijing, on the basis of implementing the "Plan for the Establishment of Beijing Data Infrastructure System Pilot Zone", "Guiding Opinions on Promoting the construction of Beijing Data Zone", "Work Plan for Deepening Reform and Innovation to create a Comprehensive Demonstration Zone for Business Environment", "Policy List of Beijing Data Infrastructure System Pilot Zone" and other systems, draws on the experience of global smart city construction. We will actively promote pilot reforms.

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First, actively explore and promote the regulatory sandbox mechanism. The UK's innovative "regulatory sandbox" mechanism, in conjunction with the "Regulatory Sandbox Report" issued by the FCA, has been applied to various fields such as green finance, blockchain technology application, healthcare, etc., to proactively balance the contradiction between technological innovation and privacy protection in the operation of enterprises, maintain data security, and improve the effectiveness of data governance. In the field of balancing technological innovation and data privacy, the regulatory sandbox system can create a flexible and controllable data space, meet the requirements of data availability and invisibility, and form a continuous and controllable regulatory model in the form of data supervision, sharing, and open license agreements. In Zhuhai, the regulatory sandbox mechanism is applied to the pilot work of building data brokers. With the innovative idea of "1+X", under the guidance of the provincial and municipal government service Data Administration Bureau, the regulatory system of data broker qualification recognition, classification and classification standards, risk prevention and control mechanism, data security and privacy protection and other aspects are gradually explored and improved. As well as data asset registration and evaluation, market pricing and other supporting measures. The three pilot enterprises of the first batch of data brokers contributed to the successful landing of the first batch of projects in a short period of time, involving key areas such as electricity, finance and e-commerce, marking the substantial progress of the first batch of data broker pilots in the country. Beijing can transfer the experience of this pilot reform to its own regulatory sandbox mechanism exploration process.

Secondly, in the field of data security governance, the EU has always advocated the concept of building a single data market in the European region, in which personal data and non-personal data are in a safe state. Therefore, the EU proposed to build a "common data space" with the Data Governance Act. The EU is building a common data space covering 11 fields such as green energy conservation, finance, health, energy and agriculture, so that trusted partners can comply with EU market norms in this space, such as the European Commission's draft Regulation on Medical Data Space published in 2022. The Healthcare Data Space will establish a data governance framework with common data rules, technical standards and infrastructure. Within this framework, patients, healthcare professionals, researchers, regulators and policy makers are guaranteed more direct access to healthcare data, improving the availability of healthcare data, and incentivizing horizontal data sharing across industries.

Under the guidance of the pilot mechanism, Beijing can learn from the mechanism of the European Union to build a "common data space" with the Data Governance Act, build a benchmark city for the global digital economy, and contribute to the construction of a global data governance system. The establishment of the common data space mechanism can connect the existing regional, national and supranational data ecosystem, emphasizing the participation of foreign participants in the European common data space on the basis of complying with EU legal norms and technical standards, so that both public and private data users can obtain relevant data, and contribute to the smooth realization of the global data sharing mechanism.At present, Beijing is committed to building a "global benchmark city for digital economy", proposing to build a pilot mechanism for data zones in major fields, key regions or specific scenarios to empower education, medical care, transportation and other industries. The construction of data zone is more inclined to the integration of government and social data flow in specific industries or fields, while the common data space is

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a data ecosystem composed of shared policies and rules based on specific application domains, and emphasizes the application of unified standards and rules across industries and fields while promoting connectivity. In this regard, under the overall planning of the National Bureau of Data, Beijing can build data zones in different fields as the basis, create government-led, leading enterprises, large digital platforms and other major data holders as spatial gatekeepers, connect data in transportation, medical care, energy, agriculture and other fields, establish cross-industry standard coordination mechanisms and promote technology standardization, improve data interoperability, and promote data interoperability. Support cross-industry data flow and aggregation, forming a fair data space for mutual trust, data sharing and exchange. At the same time, drawing on the form of cooperation between the EU and data space organizations around the world to publish initiatives, introduce common policies and rules, encourage local enterprises to participate in the construction process of a common European data space, gradually build an international data platform, and contribute to the construction of a global data governance system.

References

[1]Zhang Xinchang, Hua Shuzhen, Qi Ji, et al. New smart city construction and Prospect: Big Data, Big Model and big computing power based on AI [J]. Journal ofGeoinformation Science, 2018,26(04):779-789.
[2]Zhai Yun, Cheng Zhu, He Zhe, et al. Promoting the Construction of Digital China as a Whole and Leading the New Era of Digital Intelligence: A Written discussion on the Overall Layout Plan for the Construction ofDigital China [J]. Electronic Government,2023(06):2-22.
[3]Zhang Xinchang, Liao Xi, Ruan Yongjian. Discussion on digital twin and meta-universe in Smart city construction [J]. Bulletin of Surveying and Mapping,2023(01):1-7+13.
[4]Bao X L. Trusted data space: Dual governance of technology and system. Zhejiang Journal, 2024(01): 89-100+239-240.
[5]Wang Yi, Wang Hongwei. Learning from EU's experience in deploying common data space to enhance the competitiveness of digital economy [J]. China Industry and Information Technology,2023(07):52-55.
[6]Anthopoulos L G. Understanding the smart city domain: A literature review[J]. Transforming city governments for successful smart cities, 2015: 9-21.
[7]Cugurullo F, Caprotti F, Cook M, et al. The rise of AI urbanism in post-smart cities: A critical commentary on urban artificial intelligence[J]. Urban Studies, 2024, 61(6): 1168-1182.
[8]MONTERO-PASCUAL J J, Finger M, DE ABREU DUARTE F M. Creating a common European mobility data space[M]. European University Institute, 2023.
[9]Zhao F, Fashola O I, Olarewaju T I, et al. Smart city research: A holistic and state-of-the-art literature review[J]. Cities, 2021, 119: 103406.
[10]Lim Y, Edelenbos J, Gianoli A. What is the impact of smart city development? Empirical evidence from a Smart City Impact Index[J]. Urban Governance, 2024, 4(1): 47-55.

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