



5G and Public Management: Opportunities and Challenges

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Abstract

The emerging information and communication technology represented by 5G technology will have a profound and extensive impact on the social economy and public management. Based on the characteristics of 5G technology and a large number of concrete cases in real life, this paper holds that the application of 5G technology provides new means for the supply of public management, promotes the transformation of the comprehensive social governance model, builds an online power operation mechanism and thus provides strong support for improving the transparency of supervision and regulating the operation of power. At the same time, the application of 5G technology also presents certain challenges to public management, especially the lack of normative constraints in the process of public management, risks of an “information-isolated island” effect, information security problems in the process of communication and sharing, and lack of operative technology and understanding of 5G technology application. In the conclusion, this paper argues that the public management body should fully recognise and evaluate the opportunities and challenges brought by 5G technology, make full use of its advantages, and make full preparations for its potential risks and challenges.

Keywords

5G; Opportunities; Challenges

Introduction

In terms of the development of human history, we have experienced six information revolutions, namely language, text, paper, radio, television, and network. At present, we are ushering in the seventh information revolution of all things connected. As the first year of 5G, 2020 has officially entered the 5G era. As the basic technology of the seventh information revolution, 5G technology is also known as the fifth generation mobile communication technology. It has the outstanding characteristics of fast transmission speed, low delay, high security, and all-things interconnection. After all kinds of equipment are connected to a 5G network; they can be connected with each other at high speed to realise information interaction. Furthermore, 5G technology is the basis for realising large-scale commercial use of artificial intelligence, Internet of things, virtual reality, machine learning, and other technologies. It can accelerate the generation and integration of new information technology and create great advantages in building the digital, intelligent, and modern economic and social life. Countries all over the world attach great importance to 5G technology. As of February 2021, 122 operators in 61 countries and regions have launched 5G network services, 413 operators in 131 countries and regions are investing in 5G network infrastructure, and 144 5G commercial networks have been developed in the world. Many countries around the world have formulated and announced a big 5G network investment plan in the next few years to boost the economy. At present, China's 5G deployment is at the forefront of the world. In 2020, China built 580,000 new 5G base stations, and by the end of 2020, it had built completely 718,000 5G base stations. In the next two or three years, 5G mobile communication infrastructure construction will be further accelerated.

5G technology has the advantages that meet the needs of modern people for the development of communication. Its purpose is to keep the end users in the state of networking all the time, with the advantages of fast transmission, low delay, and large capacity. The emerging information communication technology represented by 5G technology will have a profound and extensive impact on the social economy and promote the development of public management. For example, 5G technology has played an important role in the prevention and control of the epidemic, by supporting resource allocation, and resumption of work and production since the outbreak, which ensures the orderly implementation of people's medical, work, life, education, and public management. For example, in medical treatment, it is helpful to telemedicine, unmanned medical treatment, and health monitoring. In life, it is helpful to realise high-definition monitoring, remote office, and distance education. At present, COVID-19 is still a threat. 5G's contributions to the fight against the epidemic need further discovery,

creation, and realisation. It can be predicted that in the post epidemic era, and for a long period after the end of the epidemic, the application of artificial intelligence in public management scenarios will be more extensive, which will bring new opportunities and challenges to the traditional public management, which is also the focus of this paper.

Literature Review

At present, there is little research on 5G technology and public management at home and abroad; what there mainly focuses on the application of electronic information technology in public management, and the impact of the big data era on public management, especially government management.

On the one hand, Chun et al. (2010) concluded that E-government 2.0 helped to strengthen the collaborative decision-making between the public and the government. Lips (2012) proposed that the realisation of E-government needs two conditions: one is that the leadership puts information technology in the central position of national governance, while the other is that it promises to provide the necessary support mechanism. Gajendra (2012) believes that the functions of E-government and its extension to the areas of service provision, citizen power, transparency, and efficiency of accountability, promoted the reform of government management. Haque and Patrannarakul (2013) consider that the application of information technology was the driving force behind the process of good governance from the government, which could increase the participation of the government and citizens. In addition, Bertot et al. (2010) also believe that E-government and other information technology tools play an important role in providing information to citizens and citizens' ability to supervise government activities. Khan et al. (2014) also believe that the government could improve the efficiency of public management through the good use of social media. Dion (2014) found that after the financial crisis in 2008, E-government and E-governance, network governance, and stakeholder engagement were seen as increasingly important in shifting governance in Europe, yet these have opened up new questions of accountability, transparency, and trust.

On the other hand, Schonberger et al. (2013) conclude that "big data" has a high potential to influence society and science, including the way we approach and conduct empirical research. Improving the emergency response capability of public security will also bring challenges such as the lack of big data awareness, the major challenges of information security issues, and imperfect data. Wang Jia (2019) considers that the trend of public management decision-making mode under the background of big data was diversified development of decision-makers, flat development of decision-making organisation structures, and sensitive development of decision-making schemes. Xu Zhengyao (2019) believes that in the era of big data, the changes in public management mainly included a comprehensive way of thinking, diversified governance, scientific policy, and efficient management. Mi Jianing et al. (2020) believes that since 2012, local governments in China have made a lot of attempts at reform and innovation in the supply of public services, especially in the use of big data and artificial intelligence technology to change the mode of government services, thereby breaking through the traditional "physical space" mode of government supply and causing strong social repercussions in government innovation.

In addition, only a small number of scholars have studied the possible impact of 5G technology on public management. For example, Du Xianning (2020) introduced 5G technology into the current urban public management system, which could comprehensively optimise the existing operation concept and operation mode and promote the intelligent and intensive development of urban systems.

Based on the summary of the existing research results, it can be found that there is little research on the opportunities and challenges of 5G technology to public management. Therefore, this paper will analyse the opportunities and challenges brought by 5G technology to public management by using a qualitative analysis method and case analysis method based on the characteristics of 5G technology and a large number of concrete cases in real life. On this basis, the corresponding policy recommendations are put forward.

Important features of 5G

5G technology is the important basis of large-scale commercial application of artificial intelligence, Internet of things, virtual reality, machine learning, and other technologies. Specifically, 5G technology has the following four significant characteristics.

First, fast transmission speed of 5G. Compared with 4G technology, 5G will provide more than 10Gbps bandwidth with a new network architecture. The user experience rate can be stabilised at 1gbps-2gbps, and the transmission rate is tens to hundreds of times that of 4G technology.

Second, low delay of 5G. The network delay of 4G is 20-30ms, while in the 5G environment, the network delay can be reduced to 1ms, greatly reducing the waiting time for users to receive information. After the wide spread of 5G technology, the problem of network delay will be solved, and the channels and ways of interaction between government and people will also be changed.

Third, high security of 5G. In the 5G era, network security has become a very important field. Traditional internet technology mainly solves the problem of high speed, low delay, and barrier-free information transmission, but the problem of information security is increasingly exposed. In 5G technology, security will be placed in the more important position. Various protocols and frameworks based on 5G communication technology will fully guarantee the information security of users and comprehensively improve network security.

Fourth, all things are interconnected. 5G will help to realise the communication from people to people, and people to things, things to things. In the future, any product may be connected to the 5G network and become an intelligent product. The growth of intelligent terminal equipment will expand information dissemination channels and increase the number of dissemination tools.

Opportunities of 5G to public management

According to the characteristics of 5G technology and its application in China, this paper holds that 5G technology will provide three main opportunities for public management:

First, a 5G foundation can effectively enhance the supply of public goods such as medical, education, transportation, and social security, and meet the needs of the people during the epidemic period while improving the efficiency of epidemic prevention and control. 5G technology supports the public management department to provide 24-hour public services for the public and enterprises and provides strong support for the accurate prevention and control of the epidemic situation and the promotion of resumption of work and production. In the case of novel Coronavirus pneumonia, the State Council joint defence joint control mechanism, the State Council Information Office, and all media outlets delivered more than 170 press releases, about 7,000,000 government websites and nearly 130,000 government new media postings in about 7,000,000 outlets nationwide, which provided strong support for epidemic prevention and control. After the resumption of production and work, many new office modes have appeared, such as remote real-time video conferencing, remote collaborative offices, etc. 5G technology supported cloud conferencing to avoid cross infection. In addition, with the gradual stabilisation of the epidemic situation, the information and communication industry has launched a variety of innovative applications, such as remote signing, smart sites, intelligent logistics, remote monitoring, etc., which systematises the learning work that took place during the epidemic. During the epidemic, teachers and students throughout the country carried out an online education innovation practice of "stopping no teaching." Thirty two provinces have established public service platforms for educational resources, and the public service system of digital education resources in China has been basically completed. As well, 5G technology is widely used in medical processes. The development of high-speed data internet, data collection, remote consultation, remote monitoring, and other services increases the supply of medical power, effectively reducing the work pressure and infection risk of medical staff, and realises the large-scale real-time data transmission and sharing of epidemic prevention conditions, so as to develop treatment programs, cure patients, and provide a strong guarantee for the prevention and control of epidemic spread.

Second, 5G can promote the transformation of the comprehensive social governance model, and improve efficiency and the ability to discover, respond to, and handle events. It helps improve the supply capacity of public management services and the comprehensive efficiency of public management and promotes the quality equalisation of public service resources of urban and rural residents. 5G helps us improve the ability to obtain, analyse, and process information. Monitoring and processing all kinds of basic information related to social operations are possible more timely and accurately, and establishing a network of high-speed information circulation, as is organically linking and integrating each independent information module, so as to deeply integrate various elements of public management such as space, object, and resources. The corresponding management transaction flow is operated uniformly and synchronously, and efficient communication and mutual

sharing operation of information data can be realised. Furthermore, open and integrated information management can be promoted, and the operation of the public management mechanism in the whole city will be more effective. Therefore, 5G provides new means for the supply of public management, and creates more favorable conditions for the supply of public management services. It also creates a management mechanism with wide coverage, high interactivity and multi-channel capabilities, which can further optimise the existing urban public management system, and allow it to more timely and effectively supervise the environment, allocate resources, guide transportation, and plan space. At the same time, it can reduce resource consumption in the process of public management, reduce the various costs that would be invested in social public management, and effectively reduce energy consumption due to inconsistent goals, thus achieving double the effect with half the effort.

Third, 5G technology helps to build online power operation mechanisms, promotes the openness of government affairs, promotes public participation in the comprehensive social governance, further broadens the supervision channels of the people, strengthens the role of the public in the comprehensive governance, and provides strong support for improving the transparency of supervision and regulating the operation of power. Take China as an example. China is working on building a digital government for a new era. According to the data of China's digital government service capacity in 2020, by the end of November 2020, local governments in 23 provinces and 31 key cities in China had made clear the overall management organisation of government data and promoted the construction of local digital government. Sixteen provincial and ten key cities have issued and publicised the plans and proposals for digital government construction to promote actively the construction of data open platform. In terms of percentages, 56.3% of provincial governments, 73.3% of the deputy provincial governments and 32.1% of municipal governments have established a government data open platform relying on the government portal. All regions have made deep efforts to promote the cross platform and cross-level sharing and integration of government data, and strongly support the work of internet government services and internet government decision-making. The Jiangsu data sharing platform is interconnected with the national platform and 13 regional and municipal platforms. Thirty one national ministries and commissions have been applied for interfaces and 13 million calls have been made to improve the online processing efficiency of government service. Guizhou Province has a big data support platform for targeted poverty alleviation, which has made the data of more than ten departments available for public security, education, and human society, improved the accuracy of poverty alleviation, and actively used data to strengthen social governance and assist decision-making. These phenomena are enough to show that 5G technology greatly improves the openness and transparency of government affairs.

Challenges of 5G to public management

At the same time, the application of 5G technology also presents some challenges to public management, mainly in the following four aspects.

First, 5G technology aggravates the information security problems in the process of data acquisition, storage, and sharing. With the support of 5G technology, the rapid data collection and transmission produces rich real-time big data. High bandwidth carries a high-precision data stream, and the importance and potential value of data becomes increasingly apparent. The related technologies of data mining, analysis, processing, and visualisation have become the focus of capital, benefit, and profit pursuit in various industries. Due to the resulting data and personal privacy leakage and other data security issues, data security has become one of the most urgent core issues in the field of information security. All kinds of big data platforms carry huge amounts of data resources, sensitive resources, and important data, which increases the difficulty of data security and may cause a lot of data damage or loss. Once used by criminals and hostile forces, the data will become tools for planning, implementing, and promoting various illegal and criminal activities, which threatens data security and personal information security. It will also pose a serious threat to public governance and even national security, causing great damage to national security and social stability.

Second, the laws and regulations of 5G technology used in the field of public management are not perfect, which leads to a lack of normative constraints in the process of 5G technology use in public management. With the in-depth use of 5G technology, network security has far exceeded the scope of technical problems and put forward higher requirements for security supervision. It needs a new legal framework, supervision mode, and

evaluation and certification system. At the same time, it also challenges the existing network governance system, operation and maintenance system, and customer service system. In recent years, although laws and regulations related to big data, internet security, and public information security have been promulgated one after another, there are still some problems, such as the general expression of laws and regulations, weak pertinence and operability, low level of legislation, untimeliness of legislation, insufficient connection between laws and regulations, and weak systematicness and coordination. On the whole, there are no laws and regulations and regulatory measures for the application of 5G in the process of public management. There is a long way to go to establish and improve relevant laws and regulations.

Third, 5G technology may aggravate the information island risk of public management data, so that it is difficult to share the collected data and information. At present, in the process of public management, there are the following problems: the information sources of various government departments are independent, the information platforms are mutually exclusive, the information processing is difficult to be associated with each other, the use of information cannot be exchanged, and barriers and information jams affect the sharing of information. The reasons for these problems lie in the fact that the construction of public management information systems is independent and lacks unified management and arrangement, which leads to poor data availability, low data quality, and difficult data integration and sharing between business links. The lack of information sharing and business collaboration mechanisms between departments makes it difficult for the data of each department's information system to be compatible. The management and operation standards of information databases are not unified, which makes it difficult to mediate and use the data of various systems when they need to share. Information collection, release, disclosure, and sharing systems are not perfect, so that the departments can only selectively open and share information according to their own convenience and independent judgment. The problem of information islands has become a major bottleneck in the further development of public management. It's difficult for 5G technology to fulfil its true value. While restricting management efficiency and the decision-making level, it will also cause the waste of information and repeated construction and will also produce direct high costs and huge economic losses.

Fourth, the main body of public management lacks the application technology and understanding of 5G technology application. Unlike the traditional information technology, the extensive use of 5G technology requires people to change their way of thinking in time and form a dynamic management thinking method to meet the requirements of public management in the 5G era. However, at present, both the government departments and the public are relatively weak in this awareness, which has become an important problem faced by public management in the 5G era. Especially in the process of public management, due to the lack of understanding of the connotations, characteristics, and functions of 5G technology and the lack of enough understanding and attention to the great value of 5G technology in public management, the traditional public management mode and experience still continue, and the basic data related to public management cannot be actively mastered. The data and information that have been mastered cannot be analysed and processed in time, which leads to an inability to perceive the social needs and social dynamics timely and accurately, and an inability to obtain insight into deep-seated social problems, which affects the improvement of public management ability.

Main Conclusions and Policy Recommendations

According to the analysis of the important characteristics of 5G technology and the opportunities and challenges that 5G technology brings to public management, and the citation status of 5G technology in the actual economic and social development process, this paper holds that the public management body should fully recognise and evaluate the opportunities and challenges that 5G technology brings, and take full use of its advantages, and, at the same time, fully prepare for its potential risks and challenges.

First, we should continue to speed up the construction of 5G technology and supporting facilities, so as to lay the technical support and facility support to enable full play of its efficiency. We should give full play to the government's function of overall planning and guidance. While vigorously promoting the popularisation of 5G technology, we should also follow up the construction of a series of related supporting facilities such as base stations, information monitoring systems, and mobile management platforms, pay attention to the supply of various basic hardware resources, and build a large-scale, standardised, and efficient network coverage system, The advantages of 5G technology, such as fast information transmission, high connection efficiency, and

intelligent operation, are brought into full play, and gradually integrated into the various processes of the current public management system, so as to facilitate the smooth implementation of various management affairs for relevant managers.

Second, we should strengthen the construction of big data sharing platforms and security systems supported by 5G technology. In the aspect of data sharing, we should formulate and promulgate regulations on the collection, utilisation, and sharing of public information data as soon as possible, stipulate the contents, procedures, and standards of open sharing of public information data in the form of law, and on this basis, strengthen the construction of public information data sharing websites and form a sharing service system. In the aspect of data security, we should improve data security laws and regulations, strengthen the network security infrastructure construction, and establish and improve the data security emergency mechanism, so as to greatly reduce the data risk.

Third, we should promote the gradual transformation of the public management concept through 5G technology. With the help of 5G technology to improve effectively the operation process of information collection, analysis, and transmission, we can provide diversified and humanised personal services for the people, advocate the establishment of research and exploratory social situations, guide people to participate in public affairs, and make suggestions through various communication terminals relying on 5G technology platforms. Through the application of 5G technology, we should gradually adjust and change the existing public management concept, constantly explore more reasonable and efficient evaluation mechanisms and incentive systems, stimulate and release the innovation potential and vitality of public management, so as to promote the open and diversified development of public management mechanisms.

Fourth, we should accelerate the intelligent transformation of public management mechanisms through 5G technology. We should gradually promote the transformation from the traditional minority decision-making to "joint decision-making between the manager and the managed," speed up the democratisation and scientisation of decision-making, establish and improve the intelligent emergency response mechanism for public affairs, immediately capture all kinds of potential security risks in economic and social development, and draw up more reasonable solutions with reference to the information feedback of 5G technology platforms. The relatively decentralised transaction management modules should be aggregated to form a new management mode with accurate positioning, sensitive feedback, and collaborative interaction.

Fifth, we should strengthen the people's participation in public management through 5G technology. Highlighting the diversity, and sharing is an important goal of 5G technology socialisation promotion. The deep integration of 5G technology and public management mechanisms should also follow the development principles of transparency, visualization, and diversity to form a new regulatory style of openness and co-construction. Relying on 5G technology, we will carry out operation processes such as real-time monitoring, real-time analysis, and joint discussions, and focus on the display of an environmental index, traffic congestion index, and price index, so as to encourage ordinary people to fully participate in the process of public management by means of online communication and suggestions, and therefore continuously improve the efficiency of public management and improve the people's satisfaction with public management.

Sixth, we should strengthen the introduction and cultivation of 5G technology professionals and strengthen the intellectual support of public governance in the 5G era. In the 5G era, the most important resource is data, but an even more important resource than data is talent. The role of 5G technology in public management is not only to grasp the huge amount of data information, but also to realise the value of big data in public management through the professional processing of these items of data information. In the data professional processing, the core element is talent. Therefore, it is imperative to cultivate professionals with big data thinking and big data analysis technology and application ability as soon as possible and establish a talent training mechanism to meet the needs of big data development. In a word, public management in 5G era is more technical and professional. Only by cultivating and recruiting a large number of professional and compound talents, can we make better use of 5G technology in the process of public management and continuously improve the efficiency and ability of public management.

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