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Abstract

As we enter the 21st century, a new round of information technology revolution has brought forward a wave of big data movement. It has become a global trend to use big data in such areas as promoting economic growth, social governance, public services and even the regulatory functions of governments. Following that irreversible trend, the Communist Party of China (CPC) has proposed in its Fifth Plenary Session of the 18th Central Committee its National Big Data Strategy, whose objectives and tasks have been further clarified in its13th Five Year Plan. Leveraging big data for innovative governance is not only vital for implementing the strategy, but also for further modernizing the State governance in China.

Keywords: *IT, data management, technologies, governance, regulation, decentralization, individual privacy, national security, socioeconomic development.*

Big Data Ushers in a Revolution of Governance

Since the 1950s, the integration of information technology (IT) into the economy and society has contributed to the rapid accumulation of data. Defined as a collection of data featuring a large capacity, diverse types, fast access speed and high applicable value, big data technologies have been increasingly used in the collection, storage and correlation analysis of data. Such a large volume of data has been obtained from different sources and shown in diverse formats. Afterwards, these new formats have been used by IT services in drawing insights, creating values and enhancing capacities. With the improvement of big data management technologies and the evolution of related industries, big data has evolved into a new production factor and a fundamental strategic asset. Such a change will completely alter the way of organizing and managing socioeconomic resources. It will also facilitate the innovation of organization and management methodologies, leading to a global revolution of governance.

The authors of "*Big Data: A Revolution Will Transform How We Live, Work, and Think*" [2] point out that big data is the source of new insights and values. Meanwhile, it changes the relations between markets, organizations, government and citizens. In global governance, it has become a powerful weapon in tackling the pressing global challenges, which include but are not limited to terrorism and cybercrime, global warming, poverty and epidemics. Specifically, such a new idea may help enhance governance in the following aspects.

First, big data can provide abundant and accurate information. Big data affords the government a window to the world. Due to its inclusiveness, big data helps eliminate the boundaries across government departments and between governments and people, gradually reducing the number of isolated information islands through data sharing. By effectively collecting and consolidating data from various government sources and society, the government can tap into the full potential of big data in improving the accuracy and effectiveness of social governance and provide insights into its work.

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[2] Viktor Mayer-Schönberger, Kenneth Cukier (2013). Big Data: A Revolution that Will Transform how We Live, Work, and Think. Houghton Mifflin Harcourt.

Second, big data is a powerful vehicle for processing information. Related technologies such as data fusion, mathematical models and simulation technologies strengthen the government's capacity in collecting, mining, and cleaning and analysing data. Thus, the government is equipped with a powerful tool for better administration, more efficient delivery of public services and effective policy making. It can even enhance the effectiveness of its decision-making by drawing deeper insights into the facts from big data.

Third, big data can help the government reengineer its working procedures. Traditionally, government data has to go through the process of designing, investigating, summarizing, analysing and publishing. Now with big data, statistical work is streamlined into three links, namely, obtaining, analysing and releasing data. This will not only lead to much lower labour intensity and administrative costs, but also higher coverage and accuracy of the data collected.

Fourth, big data can significantly increase the efficiency of government work. By leveraging big data technologies, the government can access data related to its governance in a timelier way, in a broader information base and faster channelling of public opinions. As a result, it will be able to improve the efficiency and effectiveness of its administration and policy making as well as the delivery of public services.

Using Big Data for Innovative Governance

In recent years, many developed countries have released strategic documents on promoting the research and application of big data, hoping to enhance the government's capacity to reshape their national competitive advantages. In the effort to create new public management modes, some developed countries have taken unprecedented steps to make government information more transparent through passing legislation on data fusion and utilization. They sped up the flow of data worldwide through the "*light-touch regulation*". They have also established a partnership, in which, information is shared between the government and the enterprises. It has become the mainstream governance model for managing public safety risks. These countries are also successful in developing and applying big data technologies into improving the response mechanisms in public services. The big data governance revolution offers China a strategic opportunity for leveraging its huge database to create and modernize its governance.

First, we should develop a data-centred conceptual thinking. Big data, first and foremost, is a way of thinking that focuses on acquiring knowledge and values through massive data rather than samples. Therefore, to spur the innovation of governance with this new tool, we must replace our traditional mind-set with a data-centred thinking and corresponding methodologies. A new concept and mechanism is necessary, namely "speaking with data, making decisions based on data, managing by using data and innovating through data". Our governance behaviour should be anchored on the outcomes of processing and analysing information to ensure that we consider everything necessary before making rational decisions. By transforming the unilateral decision-making process into a multi-centred one, we can increase the effectiveness of decision-making.

Second, we should use big data to streamline administration and transform governmental functions. In the big data age, information flow leads to the flow of technologies, materials, capital and talents. That process will exert a huge impact on the division of labour on the market and change the ways of collaboration. It will also fundamentally reshape the relations between the government, markets and society. Guided by the "data-driven" model, we must

continue to allow the market to play a decisive role in allocating resources and improving governmental functions. We build a harmonious relationship between the government and market and better coordinate their respective roles. We should deeply streamline our government and decentralize the power by applying advanced big data concepts, technologies and resources, thus effectively transforming governmental functions.

Third, we should facilitate access to data and streamline administration simultaneously. Access to data is the precondition of governance with big data. It is the key to push through the decentralization of power. In practice, the government holds the critical data resources on socioeconomic development. For China, 80% of the statistics are scattered at all levels of governments and public institutions. Better access to such massive amounts of information is the surest way to go. What we need to do is to remove barriers on the way in order to step up decentralization. Only by doing so, we can truly empower governments at lower levels by addressing the deficiencies of current reforms that emphasize too many obligations. We should continue the process of cancelling the obligatory approval by higher levels of the items that were subject to administrative approvals, or delegate the power for approving that items to lower levels of governments. In the meantime, we should establish a parallel approval platform with the Internet and big data technologies. An online data repository for reviewing and approving items across departments and different levels of government is needed. It is fundamental to unify the systems for reviewing, approving and filing projects; should also facilitate sharing of and access to information. Big data should be used to support the transition from an approval system to a concurrent and ex-post supervision system. We should compile and make available in a transparent manner the data on market supervision, statutory inspection, illegal and dishonest behaviour, public complaints and corporate data that should be released to the public in accordance with the law. The introduction of a big data monitoring model and the conduct of correlation analyses should be prioritized. Such analyses of the market entities' behaviours and features are necessary to ensure an effective decision-making and accurate prediction for risks, and optimisation of the mechanism of concurrent and ex-post supervision. We have to leverage big data to optimize service resources, make innovations in service model and improve the response mechanism. The public should enjoy more convenient and personalized services. In this way, public service requests are sped up while people do not need to shuttle among departments to offer the information the authorities need. With the help of this new technology, we could ensure the transparent management of the government's lists of negatives, powers and responsibilities. It is imperative to introduce a better system for monitoring big data flow and the technologies for combating corruption, by which we ensure that our government is responsible, honest and abides by the rule of law.

Fourth, we should use big data to improve the accuracy and effectiveness of macro-control, market regulation, social governance and public services. We should speed up the establishment of the national macro-control database and release relevant statistical indicators and data in a timely manner through the use of online data resources and information services as much as possible. We should enhance correlation analysis and integrated use of government data resources. We should provide necessary information for monitoring the dynamics of the economy, forecast the threats to industrial safety and transform growth models, ultimately ensuring the accuracy and effectiveness of our macro-control. Our efforts must be focused on building an all-round system for monitoring the market to ensure fair trade and a unified market. The best use of the borderless Internet, Internet of things and big data to establish a coordinated regulatory mechanism online is

something we cannot ignore. This modernized mechanism is necessary to address the chronic problems of nowadays, caused by centralization, segmentation, local protection and market monopoly, more efficiently and quickly. Moreover, we need to build a unified national market based on universal access rules and regulations in order to create a fair and orderly business environment. It is significant to put a system in place for applying big data on social governance; improve the collection, mining and correlation analysis of data in social governance; provide better statistical support for handling major public emergencies to improve our social governance. A mechanism and platform is needed for data to be shared among government departments, market entities and the general public. Non-governmental players should be encouraged to engage more in social governance based on a new model of social governance focusing on targeted services and multi-party cooperation. A new system of public services that is people-centred and beneficial to everyone should be developed. Insights should be drawn from the big data on people's needs; expand access to increase the coverage of services; improve quality of services, enhance the coverage of urban services and extend public services to the grassroots. We should ensure the equitable distribution of public services between urban and rural areas. It is a must to generate a system of public services oriented towards people's livelihood, social security and public safety and at the same time ensure that the system is fair, inclusive, convenient and efficient.

Pressing ahead with the Sharing of Data Resources

To improve governance through the use of big data, we must step up our efforts to increase access to public data resources and ensure that they are transparent and shared among the government, market entities and the society. Specifically, we should focus our work on the following five aspects:

First, we need to develop unified statistical standards. Big data appears in massive amounts and is often unstructured. The statistical information acquired through big data can be divided into four categories: (1) data related to different entities, including natural persons, legal persons, buildings, etc.; (2) behavioural data, including digital, video and audio data; (3) data on massive transactions; (4) data on characterization. All these data originate from our production and daily life; therefore, they are the most basic information on human behaviour and are of rudimentary and primitive nature. All the four types can be useful, but have to be standardized first into a certain format. For that purpose, it is inevitable to develop unified standards on compiling data, including metadata and basic data. Progressively, at the statistical level, we might even need to develop rules on data classification.

Second, we need to make data accessible. A considerable amount of data is now held by different government departments, enterprises, institutions and other entities. To tap into the full potential of the value of big data, we need to make it accessible to the public. Laws have to be put in place to make data collection compulsory, except that on individual privacy, business secrets or national security and open to the public. Only if data is accessible can we form big databases. Only if we impose legal or administrative measures can we effectively make it transparent. Otherwise, it will be difficult to acquire data even for the companies specialized in data search. Currently in China, internet giants such as Baidu, Alibaba, Tencent are owners of massive data. Therefore, how to find a way for these companies to make their data open to the general public is a question we need to answer.

Third, we should link statistical platforms. Government departments are the owners of basic statistical information, in particular some structured data. However, one of the critical

deficiencies is that these pools are built by individual departments and are neither open to each other nor inter-linked. In this way, data cannot be shared. To open access to big data, we should start with the data held by various government departments. A feasible way to make these data accessible is to establish a unified third-party data platform that links government departments. This can be seen as an indirect way to link the information of aforementioned platforms.

Fourth, we should enhance legal protection. Data access and security are two sides of the same coin. We must adopt strong measures to ensure data protection. We need to establish laws to protect individual privacy, business secrets and data related to national security while we ensure access to the data. Legal protection is the key to the proper use of big data and it is a critical element for implementing statistical standards and regulating the behaviours of the government and market players.

Fifth, we should let the market take the lead. China's experience shows that the market should play a decisive role in putting big data to productive use. The main driver for the industry to develop big data management is the competition between market players. The market itself serves as the boost to its development. Therefore, we need to allow market players and enterprises to take the lead in such development. The government instead should be the creator for a favourable legal environment, ensuring its sound growth. A sound legal system is necessary for the competition order in the market, which in turn will support the continuous growth of this emerging industry.

Building a Talent Pool for the Big Data Industry

The key for big data governance lies in talents and a core driving force for reshaping the national competitive advantage is developing a talent pool of industry experts. To modernize our governance through the application of this idea, we need to make innovation in our system for grooming industry experts and build a sound multi-tiered talent pool where various specializations are available.

First, we need to improve the training of industrial professionals. Universities should set up related disciplines in data science and engineering. Particularly, training engineers, operators and analysts specialized in this industry is a priority. We should facilitate universities, research institutions, government statistical departments and related enterprises to train high-level data scientists together. Finally, we should include relevant occupation into the list of national professional technical titles.

Second, we need to step up the cultivation of inter-disciplinary talents. Encouragement should be given to universities for developing joint programmes for training interdisciplinary experts in statistical analysis, computer science and economic management.

Third, we need to improve the training on practical skills. Local governments should be given incentives to fund training programmes through purchasing services and leveraging private educational e-resources to be mobilized in an attempt to disseminate the related expertise. We need to popularise the big data knowledge and enhance the overall social awareness and the range of potential applications.

Fourth, we need to make full use of international expertise. It is important to promote international exchanges and cooperation in big data technologies'. Bringing in high-level leading experts that meet the needs of big data industry is necessary. For that purpose, we need to implement the supporting measures to attract more high-end talent from foreign

countries to set up their own businesses and work in China.

Fifth, we need to improve the training of government officials. Favourable policies should be made to encourage all levels of Party schools, administrative academies and cadre institutes to offer courses on big data governance. To do so, a mechanism should be put in place for coordinating teaching, scientific research and consultation to better boost our research and development. Moreover, training bases can be set up for higher institutes and enterprises to update the expertise of Party and government officials on public administration and policy-making so as to modernize our governance.