

The Shift in Thinking in Evidence-based Government Policymaking Incorporates Massive Data Analysis in the Public Sector

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Abstract: With the rapid development of Information and Communication Technologies (ICTs), democratic countries are more optimistic about the impact of ICTs on democratic governance. However, even the atmosphere of Technological optimism is filled, it does not necessarily respond to the major problems that the real government faces. Many studies have shown that the changes and effects brought about by an electronic government reform in the past decade or more may be smaller than we eagerly expected. The key lies in the changes in electronic governance. The problem of the corresponding combination of technology and the public domain is often overlooked, and the current most ardent trend of influential data is no exception; therefore, this article believes that the reform of big data analysis is not promising if it wants to be technological innovation. Deceived by the theory, you need to interact with the evidence-based government. Evidence-based government combined with three in-depth dialogues on management approach, governance structure, and policy framework, to achieve the purpose of public sector reform in concept, planning, and implementation, this article finally originates from New York City's Performance Statistics System as an example, discusses the prerequisites for a successful big data application plan, including a clear range of management options, governance structure changes that are both the internal and external, and specific and complete application of policy areas waiting for 3 items, let the technology of big data analysis not only be fully integrated with the domain knowledge of democratic governance but also truly meet the expectations of those who are optimistic about technological change and make a positive contribution to government reform.

Keywords: big data analysis, democratic governance, electronic governance, Evidence-based policymaking, Technological optimism.

Introduction

As "Information and Communication Technologies" (ICTs) entered various aspects of human life, American scholars HJ Leavitt and TL Whisler published the paper "Management in the 1980s" in Harvard Business Review as early as 1958 predicted that ICTs will bring revolutionary changes to social organizations. Traditional pyramidal organizations will be replaced by hourglass-shaped organizations. Organizational productivity will be enhanced. There will be an impact on the work; however, due to the reduction in the cost of central control, the organization will develop towards centralization. Therefore, the

ideal state of automatic control of the scientific management school will be further realized, which is for the contemporary optimism of technological change (Barber 1998) one of the beginnings. This is also a psychological phenomenon in the field of high-tech investment decision-making. It proves that when people make decisions if they have a higher level of awareness of technology, they will be more inclined to make overly optimistic decisions, which are called technology effects in decision-making.

In the 50 years from the 20th century to the 21st century, the process of political democratization in Taiwan is still relatively shallow. ICTs have impacted the government's bureaucracy one after

another, from the Internet, portal pages, to Web 2.0 community sites. From office automation, cloud computing, and smart cities, all the way to the prominent data that has become popular in recent years. Whether it is popular or the maturity of tools, huge data analysis has become one of the tools for innovation and reform in the public and private sectors. China After the government announced the Internet Wisdom New Taiwan Policy White Paper after the Internet Public Consultation in 2015, it focused on the electronic government's policies on how to effectively use Volume, Velocity, Variety, and Veracity. The 4V characteristics of huge data analysis capabilities (Desouza, 2014; Dumbill's 2012; Zikopoulos et al. 2013). Actively promote big data analysis including e-policy participation, online public opinion analysis, internal administrative data, and public service "Internet of Things", etc., to improve the government's response efficiency and democratic legitimacy.

At present, regardless of public policies such as disaster prevention and rescue, education administration, public health, traffic diversion information, water resource utilization and long-term care combined with local information system (GIS) and massive data analysis, it is used to improve the public service process (Lin, 2013; Wu, 2014; Lu, 2013; Chen, 2011). Besides, Zhan Daqian and Jin Chuanchun (2013) also discussed the application of GIS systems in the field of epidemiology, thinking the popularity and development of social media, for the prevention and monitoring of epidemics can use the application of GIS and huge amounts of data to obtain better prevention and treatment results than the authoritative public health governance in the past and the research team of the Taiwan Electronic Governance Research Center. In recent years, efforts have also been made to introduce tremendous amounts of data analysis into the government's first-line service value enhancement, government webpage operation data analysis and Internet public opinion analysis (Zhou, 2010, 2011; Liao, 2013; Xiao, 2014).

However, the implementation of the effectiveness of big data analysis requires the creation of a two-way feedback mechanism with

cross-disciplinary fields in various organizations. Therefore, both academics and practitioners want to know whether the government's bureaucracy has changed due to the introduction of big data analysis. According to the accumulated experience and research of the e-government in the past years, even if people are optimistic about technology's vision, the operation of government organizations, whether it is internal processes or external interaction with cross-sector organizations and stakeholder groups, the change is still limited. Therefore, at this juncture for all levels of government to be busy with big data analysis, it is necessary to review from theory and practice. The reasons why big data analysis has brought changes to government organizations still cannot meet the expectations of those who are optimistic about technological change. In other words, what is the key factor in the gap between ideal and reality? The following article will explain them one by one.

Materials and Methods

Massive data analysis under Technological optimism: Three Vision Gaps.

Although information and communication technology has become one of the important forces to promote government reform in the past quarter of a century, scholar Chen Yuzhe and senior analyst XieCuijuan of the National Development and Development Commission believe in a huge amount of paperwork (Chen, 2014), under the challenge of the huge amount of data application, the contemporary government simply cannot focus on the technological level to truly fulfill the expectations of those who are optimistic about technological change. Reformers must introduce new technology while facing the construction of interest. The human-centered governance structure, the adjustment of government organizations to the environment that facilitates data analysis technology and talent retention, and finally the framework that combines the analysis of huge amounts of data with policy performance. The fundamental change in decision-making, regardless of the changes in the governance structure, management approach, and policy

framework, has not yet responded to the pressure of reform brought about by the online society (Liu, 2015). From these perspectives, this paper believes that in the era of huge amounts of data, government reform must have an exclusive direction of administrative reform, and the Certificate government (David's, 2004). This is a proper subject of reform. However, before discussing the essence of evidence-based government, we must first talk about the vision gap in the three aspects:

1. Governance structure
2. Management approach
3. Policy framework.

First of all, from the perspective of governance structure, the transformation of democratic government organizations is usually a political issue, and political issues aren't simply changed by making technological changes. That is to say, massive data analysis is only a kind of governance. The catalyst for structural change is just that the real change of the government still requires the conscious transformation of its system from the governance structure. The analysis of large quantities of data itself must be consistent with the quality of democratic system governance.

Only by echoing each other can we maintain the expectations of the optimistic theory of technological change. Benjamin Barber (2000/2001: 8), a well-known democratic theorist in contemporary America, believes that the good operation of a democratic system is not mainly affected by the quality and connotation of technological development, but by the political society itself, he said, "The democracies we have in small nations are not working very well yet we hope to have a global democracy because of the new technology? No what, I want to suggest then is whether democracy survives and flourishes is not going to depend on the quality and character of our technology, but on the quality of our political institutions and the character of our citizens. That means that our first questions remaining today, as they always have been, are not technological but political. I think whether democratic politics will survive or spread in the future is not mainly based on the quality and connotation of technological

development but the quality of our democratic system and the connotation of citizens. This represents the (democratic development) problem we are facing today, from in the past, it has been a matter of politics rather than technology."

Furthermore, from the perspective of the management approach, bureaucratic organizations introduce huge amounts of data analysis, and the transformation of public organizations' functions is no longer simply a question of whether individuals within the organization accept technology or not. Existing public management applications within the bureaucracy this approach will generate different thrusts and pulls to the formation of a virtual government under the guidance of huge amounts of data, which will affect the results of the entire reform; this part is often the most easily overlooked key point for technology change optimists. Jane E. Fountain (2001: 6), professor at the Kennedy School of Government at Harvard University, said in her famous book "Building a Virtual Country: Information Technology and Institutional Change". "The major challenge for government is not the development of web-based G2C transactions but reorganizing and restructuring the institutional arrangements in which those transactions are embedded. For the government, the challenge (caused by the pressure of virtualization) is not just to develop a G2C web page to interact with the public (transaction) but to reconstruct and build a new government system environment from scratch. We need to support this new interaction."

Finally, from the perspective of the policy framework, a Turkish public administration scholar Mete Yildiz (2007), after reviewing the electronic government literature, pointed out that the impact of electronic government on the government policy framework has three major problems: First, The definition of e-government policy is too vague. Second, reformers oversimplify the government's path to e-government development, especially in the face of complex institutional and political environments. Third, the effectiveness of research methods to assess policy effectiveness problems, etc. Among them, the first and second issues are the most important policy framework issues for those who are optimistic

about technological change. The political essence of the government's public policy process is the focus. This political nature is to discuss the expectations brought about by the electronic government change, then we can find the path of institutional change within the existing institutional and organizational framework of the government. Therefore, systematically change the operation of the government.

In a nutshell, the vision gap that the technological change optimism should face is the need for a complete government change strategy goal as a guide, otherwise, it may fall into a swarm of fashion reforms, and the demand for this strategic goal. The main background is that in the face of the development of the Internet Society, government public management has entered an era in which information is the mainstay of human life. It can promptly correct the negative impact of information and communication technology on civil society and even human prosperity. On the other hand, how to lead the digital transformation of the government's own organizational and institutional environment and become a true public servant organization for the people. The positioning of an evidence-based government under the frenzy is one of the most indispensable connotations in the future digital life.

The core of the huge data application in the public sector: Evidence-based government.

For any new technological invention, there will always be optimistic and pessimistic imaginations in society (Barber's 1998), and the rise of huge amounts of data is no exception. The TV series "House of Cards" staged in the United States in 2013 caused a sensation. This TV series based on the remake of the British album in the 1990s was the result of the selection of online customer usage data analysis by the American online entertainment firm Netflix. Starting from the type of plot to the role of the actor is determined by the analysis of huge amounts of data. It is generally believed that this is a new business model of the film drama, which will bring revolutionary changes to the filming businessman's shooting decisions (2014). However, in June of the same year, Edward J. Snowden, a former National

Security Agency analyst, leaked the classified confidential documents (especially the so-called "Mirror Project" (PRISM)), to the British Guardian and the Washington Post. On one hand, the public can feel the huge scientific and technological potential of analyzing huge amounts of data, but on the other hand, with huge amounts of data analysis they become George, the big brother, who monitors the people at any time in George Orwell's novel's "1984". On one hand, the application of science and technology brings huge business opportunities and changes to human society, but on the other hand, the more radical the application of science and technology is the more it will arouse discussion and even debate on human-related issues such as ethics (Gallo's 2013; Zakaria's 2013). Of course, from the academic point of view, inheriting the cautiousness of the aforementioned Technology Change Optimism, researchers of electronic government faced with the huge amount of data, must look at an evidence-based public administration research from the perspective of institutional environment change to conduct in-depth, refined, and practical research that can have an impact. However, what should this strategic goal be?

In recent years, the concepts of evidence-based public policy, evidence-based management, or evidence-based public administration (Stewart 2002; Chen Dunyuan, Lu Jiaying, 2009), have developed in the field of public health policy. The growing prosperity is mainly based on the rational argument of public policy, emphasizing that government policy-driven decision-making should be based on evidence; of course, in the process of social discussion of public policy in the democratic era, the proponent must propose relevant. Evidence as the basis of the discussion is an important source of legitimacy for public policy. For example, before a policy is implemented on a large scale, it is possible to have a small-scale experiment, and then modify the policy plan according to the experimental results, which will improve its feasibility and public acceptability. From the perspective of pre-assessment. In recent years, why policy piloting has become the main reason for the evidence-based policy planning

model commonly used by public affairs managers (Sanderson's 2002).

For instance, before promoting long-term care, the Ministry of the Interior implemented a three-year pilot program in two communities in Yingge, Taiwan, and Chiayi City, which is an important example of such a small-scale experiment to obtain the first-line Execution of evidence. Of course, such a model is also challenged from the methodology and practicality, Learmonth & Harding's (2006) believes that because the evidence is always divergent (divergent is uncertain, long-term, evidence-based). It will make managers lose more authority over policy management. Of course, the two authors also admit that such an argument cannot overturn the political value of evidence in short-term policy planning and implementation, but the two authors still believe that when policy evidence is overly divergent and lacks consensus, completely ignoring the evidence should also become a legitimate basis for public management. Of course, the immense quantity of data analysis in Taiwan must be combined with democratic discussions with evidence-based pressure. Next, this article will discuss government reform based on the evidence-based government in the era of massive data from the perspective of the aforementioned three major perspectives.

First of all, the governance structure of massive data analysis is a social-technical phenomenon: Two Microsoft researchers in the United States, for the era of massive data, put forward six arguments that can cause discussion, let everyone begin to think about this Society. The essence and future of a socio-technical phenomenon (Boyd and Crawford 2012) can be regarded as a sober head for a social or government decision-making official planted in a huge amount of data mania:

1. The huge amount of data has changed the definition of human knowledge and turned to the direction of computer computing and research.
2. Massive data technology claims that objective and accurate are misleading.
3. A larger amount of data does not mean better data.

4. When the massive data analysis leaves the social situation, it will suddenly lose its meaning.
5. The data collection that is available does not mean that it is ethical.
6. The monopoly of the huge amount of data technology and data will bring about a new digital pause.

These arguments have three common features: Firstly, huge amounts of data cannot only be considered from the perspective of the development of information and communication technology. It is also a social or even political phenomenon and must be considered together. Secondly, the optimism of technological development which is the pursuit of new ideas has the marketing intentions of technology companies, and on the other hand, the result of the long-term socialist social imagination, which must be based on "What kind of society do we want?"; (Lyon's 2014: 9) to balance the governance thinking. Thirdly, if the government must think about the new technological developments in society from a forward-looking perspective, it cannot do policy planning from an optimistic perspective. Usually, these arguments can allow the government from the perspective of public problems in advance to carry out forward-looking strategic policy planning to make huge amounts of data a new technology with more advantages than disadvantages. This attitude looks at the introduction of the method of analyzing large amounts of data by electronic governments. The most important thing is to hope to be evidence-based, that is, any government action to introduce new ICTs technology must be planted to see the evidence as a basis of practical research. Also, the construction of the responsibility ethics in the management approaches. The rise of huge aggregates of data technology in the Web 2.0 era has created ethical issues for public and private organizations to monitor the behavior of people or consumers, and because of the intense discussions caused by the Snowden incident. The discussion of immense amounts of data cannot stop at the technical level. It must enter an important ethical turn. Compared with the hotspots at the technological level, these

controversies are viewed from the perspective of electronic governance. Accountability is nothing more than the most important institutional concept. How can we take into account the various aspects of the era of social, political, and commercial decision-making analysis using online behavior and speech data? Information technology-related public policy challenges, including the right to collect and disseminate data, the property rights and management of digital assets, the protection of personal privacy, the guarantee of network security, and the storage and management of data (Bertot and others, 2014; McNeely and Hahm's, 2014; Washington, 2014) scholars put forward the concept of "procedural data due process" (Crawford and Schultz, 2013), which is to allow personal data to be organized by different organizations or individuals in the online world. When applied, you can get the right to inform early, especially the results of massive data analysis, which may affect your work, reputation and even political rights (Nikerson and Roger's, 2014).

Finally, the application of technology requires the expansion of the evidence-based concept. Although the application of tremendous masses of data has caused a surge in practice and academia, it is not a purely technological change, but also a conceptual change. This change will have a major impact on the future operation of the government or enterprise. For illustration, the issue of qualitative and quantitative data that has been debated in academia for an extended time will have an integrated voice due to the emergence of huge amounts of data. Scholars believed that data analysis of huge amounts of data will not be a success of quantification, but a better understanding of the inseparable importance of qualitative and quantifiable. The future development of the "hybrid; Lewis and others 2013" is the most important model. Innovative research methods that should be carried out, especially in the application of online public opinion analysis, the collection of government administrative data cannot only stay in the framework of improving administrative efficiency but must also be injected with "discovery informatics" (Honavar's, 2014). Of course, the

expanded application of traditional administrative data should also carry out more experimental applications (Daas and others, 2014), and pay attention to the errors in data collection, sensitivity to missing data and the representativeness and digitalism of public data. Issues such as sex and data background (data stovepipes; McNeely and Hahm's, 2014: 306) that is to say, the government has a large amount of administrative data in it and it requires a prior change in concepts to formally enter the era of tremendous amounts of data.

In a word, the technology of huge amounts of data to assist the analysis of government administrative data and online public opinion is just the beginning. Under the pressure of the democratic society, they have to respond to all the problems needed by the democrats. Government agencies are bound to enter the application of huge amounts of data. The era of American scholar McNeely and Hahm (2014: 307) put it this way, "Big data must be engaged with an appreciation not just of its power but also its limitations. That is, analysts need to understand and account for the limit of big data and of the kinds of questions it can address and the kinds of interpretations that are meaningful in light of those limitations". The contact between human society and huge amounts of data must not only be joyful of its amazing capabilities but also have an understanding of its limitations. Analysts of huge amounts of data must understand the limitations of huge amounts of data and incorporate them into applications. Among the considerations, there are certain predicaments and dilemmas, as well as the limited interpretation of data collection and application at any time.

However, such entry also requires an equitable and evidence-based mentality. Understanding its limitations from a critical point of view of the essence of massive data technology will be a good start. Next, this article will start with a report called "Performance Statistics System" of the US local government big data application case, to discuss the possibilities and limitations of this evidence-based government, in the era of immense volumes of data.

Development and Challenges of the “Performance Statistics System” of State Governments in the United States.

In 2014, Martin O’Malley, then governor of Maryland, was invited to publish a special article in the *Public Administration Review*, the most important public administration journal in the United States. Big data changed the face of government governance, the gist of what he said, “Most important, we moved away from ideological, hierarchical, bureaucratic governing, and we moved toward information age governing—an administrative approach that is fundamentally entrepreneurial, collaborative, interactive, and performance-driven. We moved away from a spoils-based system of patronage politics to a results-based system of performance politics.” It is an administrative approach with entrepreneurship, collaborative cooperation, interactive decision-making, and performance-oriented. That is we left the stolen goods system under servant politics, and entering into the result-oriented system under performance politics. The core of this change is that local governments use the concept of massive data analysis and open data as a basis to help the mayor construct a leadership strategy (Behn’s, 2014).

The practical model allows a city to find specific problems in specific areas based on government data under the leadership of the mayor, assisted by a network interface that is open to the internal and external implementation of urban governance. Various reforms are open to the internet at a certain time according to the spirit of open data, so that the supervisory function of the municipal leadership can be shared with the public. Of course, this system can also connect all kinds of citizens' needs. Life information, even this platform can introduce "real-time steaming analysis" or "augmented reality". The emergence of the "timely stream analysis" network event processing engine has enabled big data analysis to deal with the time-pressured decision-making needs, saving enterprises costs or improving production processes, as well as government detection. Counter service, customs clearance inspection, and traffic flow control provide real-time big data decision support system. For example, a

subordinate UN called “Global Pulse Labs, UN” participated in the typhoid outbreak in Uganda in early 2015. The laboratory’s branch in Kampala, Uganda, uses various data connecting WHO and local health units to display real-time graphical information to provide government-related medical resources (drugs and personnel) and emergency medical centers. The configuration decision of the public education center has produced a priceless and timely decision effect. Among them augmented reality technology application, is defined as a technology that calculates the position and angle of camera images and adds corresponding images. The goal of this technology is to put the virtual world in the real world and interact. This technology is also gradually being used in e-government applications. For example, the border police decide which cars should be inspected. In the future, on the one hand, letting citizens use more real-time information to process personal life decisions, on the other hand, increase the government’s sensitivity to the environment and increase the effectiveness of regulation. This is a so-called "service-oriented decision support system" (SODSS, Demirkan and Delen, 2013). This system is more than a massive analysis computing framework.

This set of leadership strategies supported by big data analysis was first introduced in 1990 by the New York City government to create a Comp Stat network interface to promote a performance management system that reduces crime rates. The analysis and planning of various data used in it successfully reduced New York. After Martin O’Malley was elected Mayor of Baltimore in 1999, he founded City-State to extend the successful experience of New York City to various fields of municipal administration. This system was awarded the Municipal Innovation Award of the Ash Center for Democratic Governance and Innovation at Harvard University in 2004. Later O’Malley was elected as the governor of Maryland in 2007, he created State Stat (detail 2) continued his journey of governance innovation. After he stepped down in 2015, he announced in May that he participated in 2016, democratic election of the US presidential election. It is generally believed

that this democratic candidate is a new type of leader in the data era, whether or not he can be nominated by the president in the Democratic primary, he has set a new example for the political leadership in the huge data era.

The aforementioned application example of big data analysis combining government structure (introducing public participation with open data), management approach (government performance management on an evidence-based basis) and policy framework (divided to monitor different policy areas separately) in government reform, on the other hand, it does show that this article uses the evidence-based government conceptual framework to ensure that big data analysis technology can obtain good technological change performance. It's said that government resources are getting exhausted, but people's requirements are increasing. In recent years, the US central government and local governments have gradually added more decision-making foundations for government programs because of budgetary squeezes, more and more evidence-based research output, federal government funding requirements, and the attention of state government chiefs. In the introduction to the 2016 Budget by US President, Obama in 2015, the concept of evidence-based government was also extensively used. It is hoped that with the open government information plan, the US government's public policy decisions can be more based on Evidence-based reasons. Likewise, Professor Steve Kelman of the Department of Governmental Sciences at Harvard University believes (2015) that public policy decisions need a background of evidence. The basis of the consensus policy of the two parties is not necessarily the evidence-based knowledge of the policy. Therefore, although the construction of an evidence-based government is necessary, it needs to be more cautious politically.

Furthermore, the British think tank Policy Exchange stated in a research report titled "Big Data Opportunity" that although all policies have a large amount of data as support, contemporary social organizations can't enlarge the amount of data produced in the Internet age is indeed an important opportunity to implement evidence-based public decision-making. More importantly,

this is also the moment when the evidence-based and decision-making based on experience will be distinguished. The tools and scope of big data are constantly expanding, It will be conducive to the improvement and implementation of the concept of evidence decision-making (Yiu, 2014). However, other scholars (Ekbia, 2015) believe that the development of large amounts of data in brief periods and many disciplines and application fields, often resulting in many development dilemmas. Therefore, the essence of certain technology applications should include autonomy, anti-opacity, generativity, discontinuity and futurity, and other evidence-based government essential issues when applying big data technology.

Results and Discussion

This article clearly stated that the huge amount of data analysis technology in democratic countries frequently faced by the governance environment of "exhaustive government resources, but the people's requirements are increasing", and indeed set off another wave of "optimism on technological change". However, this wave of optimism had also brought about three changes in the "view gap", including the neglect of governance structure, the inadequacy of government management channels, the vagueness of the policy framework. To promote the concept of massive data analysis as a strategic goal, we can gradually implement the desire of extensive data technology to assist the government in reforming governance in the democratic era. Finally, the performance statistics system developed by the local government in the United States may be one of the three reform prototypes of the gap. This is just a big data platform for leadership strategy, on which more new technology can be integrated to make the government management and the people truly become a partnership, and together improve the governance of the government efficacy.

Conclusions

However, although evidence-based government is the strategic target of big data analysis and

application, the concept itself also needs the support of relevant systems and capabilities. The foundation is that the government can intelligently use enormous data to improve governance performance of course two online bloggers believe that, the statement of the management master. Deming at the beginning of this article, i.e, the spirit of evidence-based government pays attention to its essential connotation. In contrast to the consciousness of this article, the significance is that the lack of government assistance and the enthusiasm of data only is the most serious gap in the horizon of the evidence-based government. Therefore, the two bloggers (Graig, 2014), modified this sentence to the following quotation i.e; "We believe in God, but others have to come up with data, appropriate interactive analysis procedures and a data science team with appropriate functions". When promoting big data analysis one should remember "Perhaps it's time to amend this slogan: In God we trust, all others bring data, sound iterative analytical processes, and well-rounded data science teams."

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