Chapter 72
Big Data for Digital Government:
Opportunities, Challenges, and Strategies

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ABSTRACT

"Big data" is one of the emerging and critical issues facing government in the digital age. This study first delineates the defining features of big data (volume, velocity, and variety) and proposes a big data typology that is suitable for the public sector. This study then examines the opportunities of big data in generating business analytics to promote better utilization of information and communication technology (ICT) resources and improved personalization of e-government services. Moreover, it discusses the big data management challenges in building appropriate governance structure, integrating diverse data sources, managing digital privacy and security risks, and acquiring big data talent and tools. An effective big data management strategy to address these challenges should develop a stakeholder-focused and performance-oriented governance structure and build capacity for data management and business analytics as well as leverage and prioritize big data assets for performance. In addition, this study illustrates the opportunities, challenges, and strategy for big service data in government with the E-housekeeper program in Taiwan. This brief case study offers insight into the implementation of big data for improving government information and services. This article concludes with the main findings and topics of future research in big data for public administration.

INTRODUCTION

"Big data" is one of the emerging and critical issues facing government in the digital age. Global information has grown at a compound rate of 60% and is forecasted to reach approximately 1,700 exabytes (exabyte is one billion gigabytes) by the end of 2011, based on a study by the International Data Corp (The Economist, 2010, p.5). For the U.S. federal government alone, a recent estimate

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put the amount of data it generated for the next two years at 2 petabytes (a petabyte is one million gigabytes) (Business Wire, 2012).

In addition to volume, big data are also different from traditional data in terms of velocity, variety, and nature. The increased velocity of data coming into government is evident. For instance, government websites can gather real-time transaction information from citizens. We can also see an increase in variety, such as video data from security cameras, image data from deep space exploration, telecommunication log data, web transactions data, and data on the interactions in social media. Additionally, big data are more about behavior (transaction logs) than about opinions (survey responses). The nature of data has also become more social such as "Likes" in Facebook and cellular phone records that link individuals together.

The U.S. government has recognized the importance of big data by promoting research on core techniques and technologies for advancing big data science and engineering. For instance, the 2012 NSF BIGDATA program aims to fund big data research. Moreover, the move to open data will facilitate the dissemination of data from government to the general public. This is intended to fuel innovation via a mesh-up of data sets, development of applications, and generation of solutions to complex public problems.

The rise of big data provides both opportunities and challenges for government. Opportunities include generating business analytics for significant improvement in online information and service delivery by government, utilizing real-time information for adaptive and personalized e-government experiences, tracking and visualizing government performance for dynamic and participatory public policy decision making, and producing insight for business process reengineering and transformation of government.

Big data challenges for government are both institutional and technical. Institutional challenges are designing a governance structure for addressing some core issues effectively, including common data standards for information interoperability, privacy safeguards for earning the trust of citizens who share information, data sharing, and linkage agreements between organizations for personalization. A related challenge is to secure institutional support in the form of leadership commitment. Technical challenges are a shortage of relevant talent, underdevelopment of relevant software tools, integration of multiple data sources and formats, and data storage and access.

There is a gap in big data research as pertinent to public administration. The existing research on big data focuses on businesses. For instance, several works are on the demonstration of the business values of big data and the appropriate strategy to maximize return on investments in big data in the private sector (McAfee & Brynjolfsson, 2012, p.63). Another set of scholarly works is on the techniques and technologies to harness the power of big data such as business analytics (i.e. H. Chen, Chiang, & Storey, 2012). However, for public administration, a search of selected public administration journals and specialized e-government journals has yielded no research article focusing on big data.[1] This gap is probably the function of the novelty of the concept and the presumed technical orientation of the topic.

To fill the gap in our knowledge about big data in public administration, the main research question is: what are the opportunities, challenges, and strategies of big data for public administration? This study aims to answer this question by adapting the lessons learned from the private sector for the public sector and by grounding the answers in the research of information technology and public administration. The next section will explain the general concepts of big data and develop a typology of big data for public administrators. The following section explores the opportunities and challenges for big data in government along with recommendations for strategies in realizing the potential of big data. Finally, the big data pilot project on Taiwan's e-housekeeper service serves