Chapter 8
Mastering Big Data in the Digital Age

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ABSTRACT

This chapter explains the overview of big data; the volume, velocity, variety, veracity, and variability of big data; the privacy and security of big data applications; big data and multimedia utilization; the concept of MapReduce; the concept of Hadoop; big data and data mining; big data and cloud computing; the applications of big data in health care industry; the applications of big data analytics in tourism and hospitality industry; and the challenges and implications of big data in the digital age. Big data is the large volumes of data of high velocity and their variety requiring information processing to add value to the information in the future. The chapter argues that applying big data has the potential to increase organizational performance and gain sustainable competitive advantage in the digital age.

INTRODUCTION

Technology industry is experiencing its dramatic changes in the amount of data that requires the effective management and the sufficient place that data can be stored (Park, Kim, Jeong, Hong, & Kang, 2016). The pervasiveness of computers and the Internet can increase the availability of digital data in terms of volume and variety (Bantouna, Poulios, Tsagkaris, & Demestichas, 2014). The variety and veracity that are related to big data introduce a degree of uncertainty that has to be handled in addition to the volume and velocity requirements (López, del Río, Benítez, & Herrera, 2015). Big data can be utilized in science, technology, economics, and social studies (Guo, Wang, Chen, & Liang, 2014). The emergence of big data offers unprecedented opportunities for not only accelerating scientific advances, but also enabling the new modes of discovery (Honavar, 2014).

The advancements in telecommunications and computer technologies and the associated reductions in costs have led to an exponential growth and availability of data, both in structured and unstructured patterns (Kshetri, 2014). Due to the increase in the volume and types of data processed in the cloud

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computing environments, methods that allow easy access to big data stored in the heterogeneous devices in the different network environments are in demand (Jeong & Shin, 2015). Processing big data presents an important approach to the existing computation platforms and hardware (Yang & Fong, 2015). Contemporary discussions concerning big data have been technologically biased and industry-oriented, toward the technical aspects of its design (Boyd & Crawford, 2012).

In recent years, big data has been an important item on the national agenda and is considered as a crucial element of technological infrastructure (Esposti, 2014). The design and analysis of big data-related technologies should be based on contextual understanding, that is, a context-based evaluation that determines the usefulness of a technology within a specific context (Shin, 2014). Big data becomes more popular because it widely exists in many applications, such as social network and astronomy (Li, Chen, Jin, Zhang, & Zhou, 2014). Big data goes beyond the critical data that companies traditionally used to make business decisions (Fanning & Grant, 2013). Big data is generated from recent social network services, and distributed processing techniques have been studied to analyze it (Park, Kim, Jeong, & Lee, 2014).

This chapter aims to bridge the gap in the literature on the thorough literature consolidation of big data. The extensive literature of big data provides a contribution to practitioners and researchers by describing the theory and applications of big data in order to maximize the business impact of big data in the digital age.

BACKGROUND

The quantity of data is exploding worldwide, and the ability to analyze large data sets, also known as big data, is a significant factor for competitiveness that is underpinning the new waves of productivity, growth, and innovation (Kitchin, 2014). The advancements in big data analysis offer the cost-effective opportunities for the improvements in the critical decision-making development areas, such as health care, employment, economic productivity, crime, security, natural disasters, and resource management (Tinati, Halford, Carr, & Pope, 2014). Big data technology revolutionizes commerce and society. The unlimited potential of a data-driven economy is widely recognized, and there is an increasing enthusiasm for the notion of big data (Shin & Choi, 2015).

Big data is an emerging paradigm applied to the large data sets whose size is beyond the ability of commonly used software tools to capture, manage, and process the data within a tolerable elapsed time (Wigan & Clarke, 2013). The collection and aggregation of large data sets and the development of analytical tools by which to study these data is part of cutting-edge efforts across scientific disciplines, with social, behavioral, and economic sciences (White & Breckenridge, 2014). With the rapid development of group-oriented services over big data, it needs the technological solutions to ensure the security of big data (Hsu, Zeng, & Zhang, 2014).

The data generated through mobile applications on smartphones represents one of the most interesting and valuable shares of big data (Buck, Horbel, Kesseler, & Christian, 2014). Business knowledge is as important as technical skills for working on big data initiatives (Debortoli, Müller, & vom Brocke, 2014). The characteristics of big data are tightly linked to data privacy, security, and effects on consumer welfare, thus attracting the attentions of practitioners, policymakers, and researchers (Kshetri, 2014). Big data requires a shift in traditional computing architecture (Chen, Lu, Xiao, & Liu, 2014).