Chapter 15
Toward a Conceptualization of Big Data Value Chain:
From Business Problems to Value Creation

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ABSTRACT

The generation of digital devices such as web 2.0, smartphones, social media and sensors has led to a growing rate of data creation. The volume of data available today for organizations is big. Data are produced extensively every day in many forms and from many different sources. Accordingly, firms in several industries are increasingly interested in how to leverage on these "big data" to draw valuable insights from the various kinds of data and to create business value. The aim of this chapter is to provide an integrated view of big data management. A conceptualization of big data value chain is proposed as a research model to help firms understand how to cope with challenges, risks and benefits of big data. The suggested big data value chain recognizes the interdependence between processes, from business problem identification and data capture to generation of valuable insights and decision making. This framework could provide some guidance to business executives and IT practitioners who are going to conduct big data projects in the near future.

INTRODUCTION

The increasing digitalization of organizations, coupled with the advances in the capabilities of technology, has led to the explosion of data in different formats from various digital sources. The volumes of data amassed by organizations are "big" (McDonald and Lévéillé, 2014). According to estimates, the volume of business data, across almost all companies worldwide, doubles every 1.2 years (McKinsey

DOI: 10.4018/978-1-6684-3662-2.ch015

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Global Institute, 2012; Chen and Zang, 2014). The volume of data available today is measured in zettabytes (ZB) – a measure equal to one trillion gigabytes (GB) and equivalent to the data storage capacity of about 250 billion DVDs (Alharthi *et al.*, 2017). As a consequence, companies in many industries are increasingly interested in how to leverage on these "big data" to draw insights from the various kinds of data available to them and gain an in-depth understanding of the hidden values in order to exploit new opportunities (Tan et al., 2015; Raguseo, 2018). The International Data Corporation (IDC, 2017) forecasted that "Big data and business analytics worldwide revenues, which reached $49.1 billion worldwide in 2016, are expected to maintain a compound annual growth rate (CAGR) of 11.9% through 2020 when revenues will be more than $210 billion".

Big data is a nascent concept introduced to describe the tremendous quantity of data that requires to be managed in organizations. The proliferation of digital devices such as web 2.0, smartphones, social media and sensors has led to a growing rate of data creation and is driving an increasing need for real-time analytics and evidence-based decisions. Notwithstanding the emerging nature of big Data, the origin of the concept is not new. It was introduced by the Gartner analyst Doug Laney in a research note from 2001 in which he noted: "*While enterprises struggle to consolidate systems and collapse redundant databases to enable greater operational, analytical, and collaborative consistencies, changing economic conditions have made this job more difficult. E-commerce, in particular, has exploded data management challenges along three dimensions: volume, velocity and variety*" (p. 1).

Big data is a new concern for organizations. The objectives of big data initiatives are generally focused on data value (McDonald and Lévéillé, 2014). With big data, firms can extract new insights about their markets, customers and products which are important to innovation. However, as noted by McAfee et al. (2012), businesses are collecting more data than they know what to do with. In this way, managers should define a clear strategy for how to use big data to respond to business problems and support firms' innovation capabilities. The main challenges for ensuring this strategy are both related to the development of skills and a new decision-making culture to turn all this data into a competitive advantage (Raguseo, 2018), and to the establishment of a robust IT architecture that enables acquisition, storage and analysis of very huge data sets (Barton and Court, 2012; Kumar et al., 2013; Wamba et al., 2015).

The purpose of this chapter is to provide an integrated view of big data management. A conceptualization of big data value chain is proposed as a research model to help firms understand how to cope with challenges, risks and benefits of big data. Value chain, a concept introduced by Porter (1985), sees an organization as a series of processes and each process adds value to the product or service for their customers (Chou, 2014). Value delivered by actions is therefore a foundation of decision-making. Value chain architecture helps to analyze the sources of value creation by identifying the main activities and processes a firm should perform and how they interact. Miller and Mork (2013) applied Porter's value chain theory into a reference model for big data value creation. However, the model is limited to the big data management process and neglected other processes like big data architecture and business process reengineering.

The purpose of defining an integrated big data value chain is to provide a holistic approach to big data management that begins with the identification of business problems explaining the need to carry out big data projects, and ends with the value creation by generating and leveraging deep customer insights. From the beginning to the end of the value chain, three interrelated processes are positioned which are related to big data management process, big data architecture and business process reengineering. The suggested value chain focuses on the interrelations between strategic, organizational and technological elements in order to extract value from big data. Such a definition is needed for strategic planning and

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