Adoption of Big Data Analytics in Supply Chain Management: Combining Organizational Factors With Supply Chain Connectivity

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ABSTRACT

Supported by the literature on big data, supply chain management (SCM), and resource-based theory (RBT), this study aims to evaluate the organizational variables that influence the intention of Saudi SCM professionals to adopt big data analytics (BDA) in SCM. A survey of 220 supply chain respondents revealed that both top management support and data-driven culture have a high significant influence on their intention to adopt BDA. However, the firm entrepreneurial orientation showed no significant effect. Also, the findings revealed that supply chain connectivity positively moderates the link between top management support and intention. This study contributes to the practical field, offering valuable insights for decision makers considering BDA adoption in SCM. It also contributes to the literature by helping minimize the research gap in BDA adoption in the Saudi context.

KEYWORDS

Adoption Intention, Big Data Analytics, Partial Least Squares Structural Equation Modeling, Supply Chain Management, Survey

1. INTRODUCTION

The recent developments in information and communication technologies have transformed the ways to do business and changed the competition territory in many industries. These developments have also motivated logistics and supply chain management (SCM) practitioners and scholars to understand the role of these new technologies, and to determine how organizations can capture competitive advantage through the adoption of information and communication technologies (Lai et al., 2018; Queiroz &
Farias Pereira, 2019). With the widespread use of disruptive technologies, big transformations among supply chains have occurred toward a more digitalized business. Indeed, the integration of cloud-based solutions and the massive use of social networking services have favored more coordination between partners through digital platforms, leading to greater digitization of the related data. Thus, firms have been able to face challenges related to big data (BD) storage and analyses in link with SCM. According to Vassakis et al. (2018), the generation of data is expected to reach 180 zettabytes in 2025, giving data a leading role in a new “digital universe”.

According to Feki (2019), “Many companies can capitalize on big data analytics by managing risks, reducing costs and improving supply chain visibility and traceability” (p. 108). Queiroz and Farias Pereira (2019) added that “big data offers a powerful approach to helping organizations analyze (Croll, 2015) large amounts of data to provide insights into the decision making process (Abawajy, 2015)” (p. 390).

In this regard, big data analytics (BDA) appears as a helpful tool for managers to improve the decision-making process. Such tool can be useful in several areas including SCM. Indeed, since partners within a supply chain may be currently electronically linked, the amount of exchanged data is constantly increasing (Mezghani, 2019). Feki (2019) indicated that companies apply BDA “in their supply chain to reduce cycle time, react faster to changes, optimize performance, and gain insight into the future” (p. 107). Moreover, supply chain analytics capabilities are deemed to support operational supply chain transparency (Zhu et al., 2018).

Previous studies have largely demonstrated the benefits of using BDA in SCM (Queiroz & Farias Pereira, 2019). However, one can note a gap in academic research dealing with BDA adoption in Saudi context, especially in link with SCM. In fact, to the best of our knowledge, no previous study analyzed the intention of Saudi firms to adopt and use BDA in SCM. The Saudi efforts toward more digitalization and consideration of BD present an opportunity for scholars and practitioners to fill this gap. Thus, this study aims to improve our understanding of the organizational factors that could affect Saudi firms’ intention to adopt and use BDA in SCM.

To achieve these objectives, this study is organized as follow. First of all, we present a literature review aiming at analyzing the SCM reality in the era of digitalization in order to understand the need for BDA use in SCM with a focus on the RBT perspective. Second, we identify the main organizational factors that could influence the intention to adopt BDA by proposing a research model with the supply chain connectivity (SCC) integrated as a moderator factor. Then, data collection and analyses details are reported in the research methodology section. The subsequent sections discuss the empirical findings of the statistical analyses performed using the partial least square (PLS) technique and present the study conclusion and recommendations.

2. LITERATURE REVIEW

2.1 Supply Chain Management and Digital Transformations

Recent technological innovations have played an important role in the growing importance and attention to BD and its analytics to revolutionize SCM operations, with the aim of improving firms’ performance by enhancing their operational efficiencies and revenue opportunities. Some of the recent technological innovations include Web 2.0, Industry 4.0, the Internet of things, delivery drones, robotics, and 3D printing (Addo-Tenkorang & Helo, 2016; Govindan et al., 2018; Roy, 2018; Wiedenmann & Größler, 2019). However, organizations have already been accumulating big amounts of data related to supply chain operations, which were collected from different sources, such as Web clicks, RFID, tags, sensors, loyalty cards, and barcodes (Al-Qirim et al., 2017; Zhong et al., 2016).

Despite the high expectations of BDA in SCM, particularly with regard to reducing inventory and risk, and improving batch sizes and customer satisfaction (Nguyen et al., 2018; Queiroz & Farias Pereira, 2019), many firms are hesitant to invest in BDA technology (Arunachalam et al., 2018),