Chapter 32

Big Data and RFID in Supply Chain and Logistics Management:
A Review of the Literature and Applications for Data Driven Research

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ABSTRACT

Big Data refers to complex and unstructured data that is difficult to analyse and utilize with traditional applications and analyses. Big Data comes from a variety of sources, including tracking and sensor devices which are widely used in logistics and supply chain management, and relate to Radio Frequency Identification (RFID) technology. Thus, this chapter reviews the literature on RFID adoption in supply chain/logistics management from 1995-2015. We identify current trends in the literature, drawing on the three levels of decision making, that is, strategic, tactical, and operational. We suggest that more research needs to be conducted with regards to the intangible benefits of RFID, the use of RFID big data for achieving higher performance, and to shift the focus from the 'what' and the impacts on performance to the 'how' and the ways RFID is adopted and assimilated in organizations and supply chains. Finally, the managerial implications of our review as well as the limitations and future research directions are outlined.

INTRODUCTION

Over the last years, there has been an increased interest in big data (e.g. Riggins & Fosso-Wamba, 2015; Fosso-Wamba et al., 2015; Zhong et al., 2015; Wang et al. 2016). Companies have invested in creating and acquiring the necessary capabilities in order to obtain value from big data and attain competitive advantage (ibid). Big data may come from different sources, such as mobile devices, Internet of Things, and tracking and sensor devices which are widely used in logistics and supply chain management, including radio frequency identification (RFID), which is the focus of this chapter. In particular, this chapter reviews the literature on IT and in particular RFID in Supply Chains to identify current data-driven research and suggest future research avenues. In particular, the chapter presents a critical analysis of the articles published in the last 20 years (1995-2015) through a systematic literature review. The relationship between RFID and big data has been highlighted in the literature. RFID tagging is generating huge operational and strategic data across diverse industries' value chains in terms of volume, velocity, variety, value, and veracity (Wamba et al., 2015). DeRoos (2013) had predicted that the number of RFID tags will increase from 1.3 billion in 2005 to about 30 billion in 2013.

Ferrer et al. (2010) have argued for the further study of RFID for the following reasons:

1. Although the idea of RFID is not new, organizations have started to investigate the potential of RFID and the generation of Big Data that follows its use, and therefore managers are under pressure to grasp the application and benefits of RFID and related Big Data for organizational and supply chain performance,
2. Experts suggest that the RFID brings superior supply chain and logistics performance (Wyld, 2005; Ferrer et al., 2010),
3. The rapid evolution of RFID technology creates uncertainty and speculation with regards to the benefits that RFID may bring to organizations and supply chains,
4. Managers are still struggling with the investment justification of RFID as well as with selecting the appropriate configuration that will deal with operational needs and enhance operational performance.

The majority of current studies in RFID are quantitative in nature and may draw on particular frameworks including for instance, diffusion of innovations, technology acceptance model, the unified theory of acceptance and use of technology. Furthermore, there are studies that look into the behavioural aspect of technology for supply chain and logistics management (SCLM). There is a need, however, to systematically review this role of IT for SCLM. To address this gap, this chapter:

1. Provides a systematic review of the literature related to the role of IT through RFID in SCLM; and
2. To classify the literature, it uses the well-known framework by Gunasekaran et al. (2004) that is based on the role of IT in each of the decision making levels, that is, strategic, tactical, and operational.

Our results illustrate on one hand the growing importance of IT and RFID applications for, *inter alia*, supply chain integration and efficiency. On the other hand the majority of the papers are either outlining the benefits of RFID for supply chains, or they are conceptual. Our contribution lies in not only comprehensively reviewing the literature on Big Data through focusing on RFID in supply chains through a 20-year period, but also to provide endorsements for the future study of RFID big data and performance within organizations and supply chains.

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