

## Chapter 2

# Assessing the Impact of RFID Technology Solutions in Supply Chain Management

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### **ABSTRACT**

*The use of Radio Frequency Identification (RFID) in Supply Chain Management (SCM) is one of the promising innovations in recent decades. This chapter first presents an introduction to the concepts and principles of RFID. It then discusses advantages and disadvantages of this technology in a supply chain setting. Application areas of RFID in the context of supply chains are reviewed to demonstrate best practices and related important implementation issues. Different industries (e.g. automotive, transport, retail) are used to emphasizing the benefits of RFID technology. The chapter also highlights operational and strategic implications of adopting RFID-based technological solutions and summarizes available evidence. Finally, a theoretical framework that links RFID key benefits and information attributes used in decision making is proposed. This chapter also provides comprehensive guidance for those considering the implementation of RFID in their supply chains.*

### **INTRODUCTION**

All businesses today understand the value and importance of building effective supply chains, as part of sustainable growth and profitability (Pal, 2019). A supply chain consists of a network of business organizations, facilities, people and activities for delivering products or services to a final customer. The key to make a successful supply chain relies on an extended collaboration and integration of business partners involved in the supply chain network. Such collaboration relies in supply chain business processes effective automation. The first significant attempt to automate supply chain was in manufacturing, with the automation of the car assembly-line in the early 1900s. Since then, automation extended to many industries and business processes that includes procurement, manufacturing, customer and supplier relationship management.

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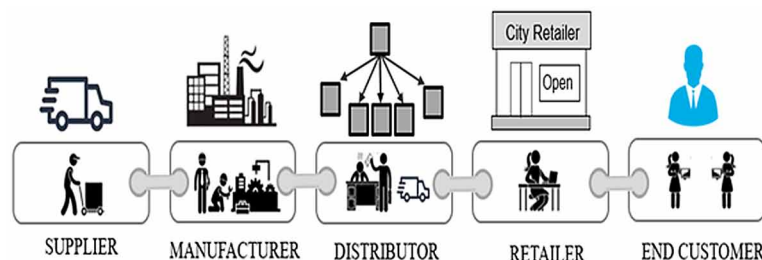
Due to globalization, retail supply chain business activities are carried out in different locations around the world. Goods manufactured at a factory are transported to intermediate storage facilities (warehouses, distribution centers) for packing and shipping to retailers or customers. Activities therefore are performed in specific sequences, with the completion of each activity, usually determining the start of another. The signaling of different activities is termed business events. An activity will generate an event upon start, completion, but also at intermediate points with milestones of the activity are reached. Such events and milestones include the completion of product manufacturing, the loading of products on transportation units, the unloading and storage of products in the warehouse / distribution center, the subsequent reloading onto different transport units for shipment to the customer. Figure 1 shows a simple diagrammatic representation of a supply chain, which highlights some of the primary business activities.

Despite several socioeconomic and technological advances, the main goal of supply chain networks has remained the same, i.e., the efficient delivery of products and / or services from the producer to the ultimate customer. Efficiency can be achieved through elimination of unnecessary activities, the simplification of activities, and more importantly through automation of activities. Significant efforts have therefore been invested for the automation of activities on the factory and warehouse day-to-day business practice. Recent emphasis has also been placed on transportation activities that move the goods across the different supply chain locations.

Many researchers have proposed the existence of a positive correlation between supply chain business performances and corporate information systems integration and coordination of business partners activities (Pal & Karakostas, 2014) (Pal, 2018a) (Pal, 2018b). This is the reason why supply chain businesses are more and more attentive to the opportunity offered by both internal activity coordination and intra-company activity coordination through information sharing. Hence, information has been seen increasingly as a strategic asset for supply chain management. As a result, many supply chain businesses are investing in new technology in order to boost the information exchange and are mandating the adoption of interoperable supply chain solutions (Smith, 2005) (Karkkainen, 2003).

RFID is a recent information technology that promises to enable supply process integration through information sharing. It is an identification technology, that utilizes radio communication and consists of two main components: (1) transponders (commonly known as tags) carrying data and attached on the physical objects to be identified; (2) interrogators (also known as readers) able to receive the transmitted data. The benefits of RFID technology compared to older product identification technologies such as barcodes include: (i) no line of sight path between reader and tag is required; (ii) longer distances between transmitter and reader (up to several meters) are feasible; (iii) nearly simultaneous detection of multiple RFID tags is possible; and (iv) ability to store more data in the tag (up to several kilobytes) compared to barcodes.

Figure 1. Diagrammatic representation of a generic supply chain



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