

Chapter 3.24

Emerging Mobile Technology and Supply Chain Integration: Using RFID to Streamline the Integrated Supply Chain

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ABSTRACT

This chapter explores how a mobile tracking technology is able to further streamline the integrated supply chain. Previous technologies which have attempted to integrate suppliers, manufacturers, distributors and retailers have lacked the flexibility and efficiency necessary to justify the prohibiting costs. Radio frequency identification (RFID) technology however enables various organizations along the supply chain to share information regarding specific products and easily remotely manage internal inventory levels. These applications are only a sample of what RFID is able to accomplish for the integrated supply chain, and this chapter seeks to explore those applications.

INTRODUCTION

This chapter sets forth to provide a holistic view of how a recently adopted wireless identification technology, specifically radio frequency identification (RFID) tags, could potentially revolutionize the integrated supply chain. Companies are able to become more flexible and efficient by using a combination of mobile technologies and RFID to provide for remote inventory control and real-time, information-rich tracking of shipments in the distribution channel (Lapide, 2004). Although this technology has several hindrances currently blocking it from mass usage (Thompson, 2003), recent advancements in the technology have increased the viability of RFID for widespread organizational use, increasing the capacity and

strength while decreasing the size and cost. RFID now rests in a unique position wherein large organizations are strongly considering its viability in a variety of applications to streamline the supply chain.

Organizations have already begun considering its application in the realm of supply chain management, attempting to further streamline the process. However, while many authors have discussed the benefits of RFID tags for parts of the supply chain, this insight has only focused on a localized level, such as inventory management in retail outlets (Atkinson, 2004; Lapide, 2004; Kinsella, 2003; Schindler, 2003). Much of this discussion is centered on reducing costs for those isolated parts of the supply chain. For example, several large manufacturers are pushing the technology by actively conducting trials in manufacturing, distribution, and even retail. These companies include Proctor and Gamble, Gillette, Unilever, and retail giant, Wal-Mart (Kinsella, 2003). These RFID trials have been limited to single stages of the supply chain, focusing on the reduction of costs as the ultimate goal. Although cost reduction is commendable, true improvements in value for industry and consumers come through a unified effort to improve the entire supply chain network, reducing costs and improving accuracy and efficiency for all companies integrated into the network.

This chapter will first provide an overview of the technical aspects of RFID. Following this, an analysis of two perspectives of the integrated supply chain will be framed in light of the current and possible future applications of RFID in each area and the relationships between those areas. Finally, RFID will be framed in a holistic view of both the integrated supply chain as well as the demand chain, addressing some inter-organizational issues.

BACKGROUND

The RFID Tag and Reader

The core of RFID technology consists of two components, the identification tag and the tag reader. The identification tag itself is composed of a small antenna and a microchip, which stores a small amount of information pertinent to the object tagged (Rappold, 2003). Although the information stored may take a wide variety of forms, for many objects a simple code would be sufficient to identify the item. Asif and Mandviwalla (2005) identified five types of RFID tags in their RFID Applications Framework, including active, semi-passive, passive, chipless, and sensor. Tag readers may also be stationary or mobile, depending on the application. Of those tags which contain chips, RFID tags may either be active, passive, or a combination of the two. Active tags are powered by some external power source, such as a small battery. Passive tags, on the other hand, have no individual power source and receive power from the electromagnetic waves the tag reader uses to access the information from the tag. Some tags may use a combination of the two strategies, where an active tag containing a battery is recharged by the transmission used to read it. Chipless tags have the lowest power consumption, range, as well as cost of all the types of RFID tags since they do not contain either a battery or a silicon chip. Information storage is also significantly less, often only enough to store a simple product code.

The tag reader uses electromagnetic waves in the radio frequency band to transmit the data stored on the identification tags to the reader and, in some cases, power the identification tags. The reader may be a mobile or stationary unit depending on the application, and an organization could easily employ both. Mobile readers naturally benefit from being able to change location; however, power limitations have a severe impact on the range and may even become an issue if passive

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