Chapter 4
Small Manufacturers vs. Large Retailers on RFID Adoption in the Apparel Supply Chain

May Tajima
The University of Western Ontario, Canada

ABSTRACT

The apparel industry is one of the most rapidly growing sectors of the radio frequency identification (RFID) market, and within it, large retailers have been driving RFID adoption. However, the continuation of this industry's fast-paced growth is questionable due to the uncertainty associated with how manufacturers, especially small ones, would react to the retailer-led RFID initiative. The literature suggests that the relationship between small manufacturers and large retailers could promote or inhibit RFID adoption among the manufacturers. In order to study the impact of the relationship between small manufacturers and large retailers on the small manufacturers' RFID adoption decisions, this research develops a 2×2 (two-by-two) game model and conducts outcome stability analysis. The results show that, in the 2×2 game framework, (i) the retailer's opportunistic behavior is unlikely to occur due to the strong stability associated with the manufacturer's do-nothing option; (ii) the do-nothing option, however, may lead to missed opportunities for both parties; (iii) the retailer's pressure tactic is not effective in persuading the small manufacturer to adopt RFID; and (iv) the retailer's collaborative strategy also does not guarantee the manufacturer's RFID adoption. The discussion of these results concludes with specific suggestions for how to encourage RFID adoption among the small apparel manufacturers.

INTRODUCTION

Radio frequency identification (RFID) is a wireless technology that uses transmitted radio signals to tag an item and to track and trace its movement without human intervention (Moon & Ngai, 2008). Since the introduction of RFID supplier mandates in 2003 by some of the world's leading retailers, such as Wal-Mart and METRO, RFID has attracted significant interest from the retail community, representing an enhancement over the existing bar code technology for managing product flows within supply chains.

Within the apparel industry, RFID adoption has also been led by well-known large retailers: Marks & Spencer, Gap, and Benetton (Moon & Ngai, 2008). Apparel has been one of the most rapidly growing sectors of the RFID market (RFID Update, 2008c), as well as one of the leading sectors of RFID's item-level application — as opposed to pallet- or case-level — along with pharmaceuticals, books, and DVDs (RFID Update, 2006; 2007c; 2008a). Apparel retailers are especially interested in RFID's ability to automatically track individual products inside the stores because it can, for example, reduce inventory count and product search times, increase staff availability for customer assistance, and collect data on customer shopping behaviors to improve customer retention and sales promotion (Moon & Ngai, 2008). In addition, the collection of real-time sales and inventory data enabled by RFID can facilitate automatic replenishment. This aspect of RFID is particularly appealing for apparel retailers because timely replenishment can increase their profits substantially by reducing the risk of stockouts for popular items and by lowering on-hand inventory to avoid taking losses on markdowns of unpopular items (Forza & Vinelli, 1997).

In fact, the concept of automatic replenishment has been known as one of the Quick Response (QR) practices by the United States (U.S.) apparel industry since the mid-1980s (Şen, 2008). In order to better compete with inexpensive foreign imports, the QR practices focused on improving the apparel supply chain's responsiveness by sharing key data, using bar code and electronic data interchange (EDI) technologies, and practicing vendor-managed inventory (VMI) and automatic replenishment (CPA Journal, 1992). The progress of QR, however, turned out to be slow and limited. A review of the literature reveals that many apparel manufacturers adopted QR partially or did not adopt it at all (CPA Journal, 1992).

In the U.S., the majority of apparel manufacturers are small. In 2007, approximately 80% of establishments in apparel manufacturing were self-employed businesses, and for the remaining 20%, the average number of employees per establishment was 25 (U.S. Census Bureau, 2007). Small businesses typically have limited financial, technical, and management resources, and it is this scarcity of resources that has made it difficult for small apparel manufacturers to adopt new technologies in general (Hunter & Valentino, 1995). One QR study found that the firms with higher sales volumes, more employees, more stock-keeping units (SKUs), and more plants were more likely to adopt QR than smaller firms (Sullivan & Kang, 1999).

For small firms, there is one well-known factor that influences their adoption of new technologies: pressure from large trading partners (Morrell & Ezingeard, 2002). In the apparel supply chain, large retailers hold significant bargaining power over small manufacturers due to retail consolidation, and may demand favorable terms in price, service, delivery, and product diversification and differentiation (Şen, 2008). Historically, however, the relationship between the apparel manufacturers and retailers has not been collaborative, and in regard to the QR adoption, many small manufacturers were more concerned about being disadvantaged by the retailers' opportunistic behavior than they were about the consequences of non-compliance (Hunter & Valentino, 1995). Their skepticism led to a reluctance to exchange sensitive information

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