



RFID ADOPTION FOR AGILITY IN THE FASHION BUSINESS

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ABSTRACT

Purpose- The main aim of this paper is to argue the determined benefits of RFID technology by focusing on fashion industry.

Methodology- In order to create an agile supply chain proposal, a new model has been designed on the basis of the models developed by Martin Christopher, Robert Lowson & Helen Peck (2004) and Claudia Loebbecke & Jonathan Palmer (2006).

Findings- By this integrated applicable structure of this proposal, it is aimed to support the efforts focused on product and process improvement. In this way, it is intended to contribute to the sustainability of the fashion industry.

Conclusion- An agile supply chain model including the benefits of RFID in the fashion industry has been designed. RFID is a promising technology that helps organizations and minimizes problems in supply chain management, and also plays an important role in order to propose new solutions for a greener sustainable industrial world.

Keywords: Agility, fashion business, innovative supply chain technology, integrated model proposal, RFID technology.

JEL Codes: L67, L10, M10

1. INTRODUCTION

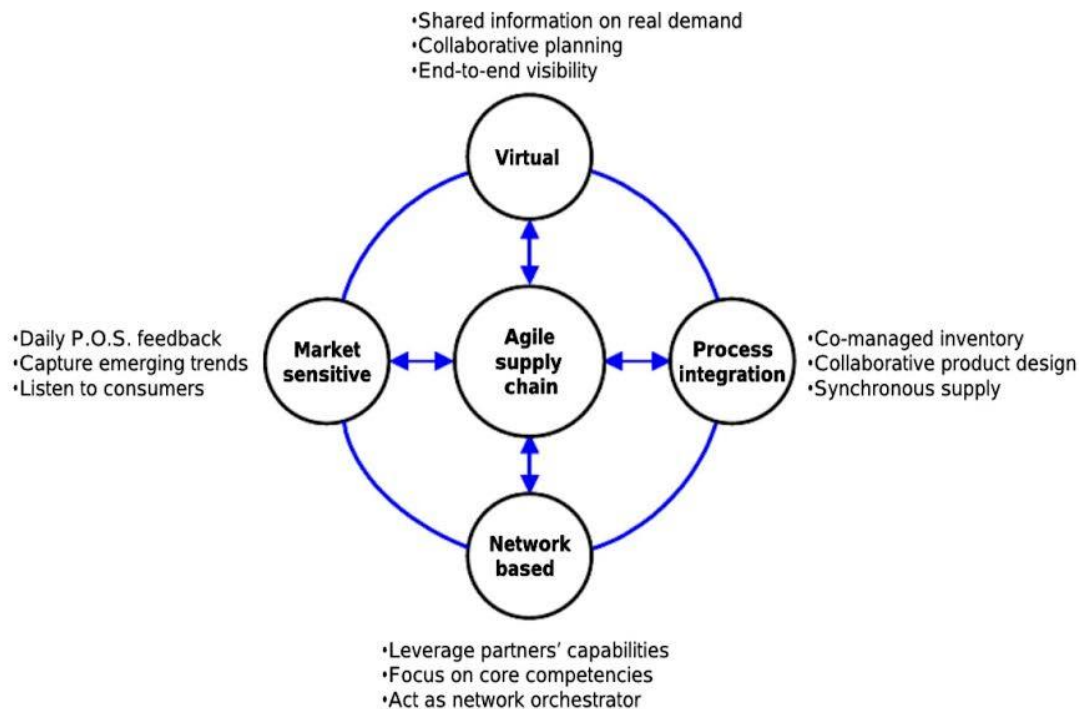
Fashion markets have long attracted the interest of researchers. Fashion is a broad term which comprises any product or market where there is a matter of style which is likely to be short-lived. Fashion markets can be defined as typically exhibiting characteristics like short life-cycles, high volatility, low predictability and high impulse purchasing. The focus of the most of the researches was the psychology and sociology of fashion product and process. Much of this earlier work was intended to create insights and produce tools to improve the demand forecasting of fashion products and to identify cycles in fashion. However, in reality it is now gradually accepted by those who work in this dynamic and uncertain industry and academicians that the demand for fashion products can not be forecasted. For this reason, fashion markets are needed to be recognized as complex open systems that frequently demonstrate high levels of 'chaos' during 'turbulent times'. In such conditions, managerial efforts may be expended on devising strategies to ensure company's success in turbulent times via creating innovative fashionable product designs, manufacturing and delivering on the basis of 'real-time' demand to spawn 'agile supply chain' and the 'philosophy' of quick response (QR).

2. AGILITY: QUICK RESPONSE IN FASHION BUSINESS

In recent years, there has been a growing interest in the design and implementation of agile supply chain strategies (Christopher,2000). The idea of agility in the context of supply chain management focuses on 'responsiveness'. Conventional supply chains have been lengthy with long lead-times and hence, of necessity, have been forecast-driven. By

contrast, agile supply chains are shorter and seek to be demand-driven. A further distinction is that because conventional supply chains are forecast-driven that implies that they are inventory-based. Agile supply chains are more likely to be information-based. There are four key dimensions to create an agile supply chain for organisations competing in fashion industries as seen below,

Figure1: The Foundations for Agility in a Fashion Business



Based on the model originally developed by Harrison, Christopher & van Hoek (1999)

Source:Christopher, Lowson and Peck 2004

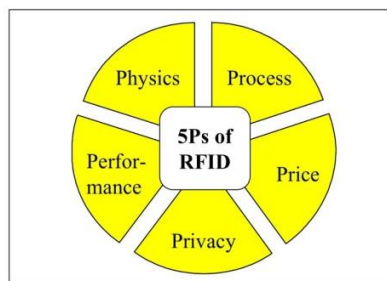
A state of responsiveness and flexibility in which an organisation seeks to provide a highly diverse range of products and services to a customer/consumer in the exact quantity, variety and quality, and at the right time, place and price as dictated by real-time customer/consumer demand. QR provides the ability to make demand-information driven decisions at the last possible moment time ensuring that diversity of offering is maximised and lead-times, expenditure, cost and inventory minimised. QR places an emphasis upon flexibility and product velocity in order to meet te changing requirements of a highly competitive, volatile and dynamic marketplace. QR encompasses an operations strategy, structure, culture and set of operational procedures aimed at integrating enterprises in a mutual network through rapid information transfer and profitable exchange of activity (Lowson, King and Hunter 1999).

For the retail industry, bar codes have long been an important technology for QR by helping the industry save production costs, hold inventories low, and prevent overstocking (Fiorito et.al.,1998; Hill, 2004; Ko and Kincade, 1997; Sweeney,1995). Increasing competition in the fashion industry put pressure on wholesale, retail prices and finally on margins. The number of fashion cycles grew from 4 to 16 per year. Fashion manufacturers and retailers reacted to the challenges by increasingly considering innovative supply chain technologies such as RFID “which is a wireless technology that uses radio signals to tag, recognize, track and trace the movement of an item automatically” (Loebbbecke, Palmer and Huyskens 2006; Moon and Ngai 2008; Ngai et al., 2009). The origins of RFID technology lie in the 19th century when luminaries of that era made great scientific advances in electromagnetism. Of particular relevance to RFID are Michael Faraday’s discovery of electronic inductance, James Clerk Maxwell’s formulation of equations describing electromagnetism, and Heinrich Rudolf Hertz’s experiments validating Faraday and Maxwell’s predictions. Their discoveries laid the foundation for modern radio communications (Weis, 2007).

According to Ngai et al. (2008), the application of RFID technology is diverse and has been applied in at least 14 industries, such as retailing, library services and logistics and supply chain management (Ngai et al., 2009). As a hot topic, “technology

vendors have praised RFID (radio frequency identification technology) to improve tracking and replenishment in supply chain management (Vervest et al., 2004; Huyskens and Loebbecke 2007). On the other hand, "RFID might not only the ability to revolutionize the supply chain" (Kuzeljevich 2005; Loebbecke 2005; Ulrich et al. 2008) with a focus on logistics, operations and supply chain management (Strüker and Sackman 2004; Ulrich et al. 2008). First trials with RFID as a marketing technology enabled more customized services and shopping convenience and lead to higher customer satisfaction and loyalty (Berthiaume, 2004; Loebbecke, 2005). The RFID technology is being touted as a tool to revolutionize the way business gets done because of its broad impact on manufacturing, logistics, material handling, inventory tracking and management (Chen, 2004; TIBCO, 2005; Koh, Kim and Kim, 2006). RFID is a technology, whose impact on supply chain management has been rising steadily. Apparel companies have shown a particular high interest in the RFID- based tracking of their products to improve logistical operations (Loebbecke and Huyskens, 2007). Many companies have announced plans for quick RFID adoption. "Rogers and Shoemaker (1971) define adoption of innovations in general as the relative speed with which an innovation is adopted by members of a social system" (Huyskens and Loebbecke 2007). As garment manufacturing is a labor intensive industry, output quality and under/over production problems happen frequently. Manufacturers require real time information of the production line to have a better management of the operation and solve operational problems occurred before it is too late. Garment manufacturing industry needs to enhance the efficiency and effectiveness of the production system so as to remain competitive in the market. RFID technology is a possible solution for it (Ngai et al., 2009).

Figure 2: Five Ps of RFID



Source: Loebbecke and Palmer, 2006

The fashion industry has also been an early RFID-adopter. Several fashion makers like Swatch watch, Ecco shoes, Prada, and Benetton have all tagged clothing with RFID labels. These tags are typically for retail inventory control, since retail clothing stores often face a high level of 'shrinkage', as well as a lot of legitimate movement of inventory by customers trying on clothing. RFID tags have also been used as a pedigree for high-fashion items or to enhance the consumer shopping experience. For example, Prada's retail store in New York City offers an RFID-enhanced dressing room that displays product information and suggests matching apparel. Clothing is particularly suited for RFID, since it does not contain metals or liquids that interfere with some types of RFID systems. Retail stores also typically do not have sensitive electronics, like medical equipment, that some RFID operating frequencies may interfere with. Clothing's relatively high per-unit value also justifies the use of RFID tags, which could be removed and recycled at purchase-time. The clothing industry was an early-adopter of simple EAS systems in the 1960s for these very reasons (Weis, 2007).

In order to realize the potential of RFID, companies must take into account several crucial aspects of RFID. There are *five key categories, the five Ps*, that need to be evaluated in a firm's consideration of RFID: the *Physics* of transponder, the reader, and the data transfer; the *Processes* being changed and enhanced, the *Prices* for technical components and their installation, *Privacy* aspects of capturing and retaining customer data, and the *Performance* impacts, the business case contribution, of RFID implementations (Loebbecke and Palmer, 2006)

The fashion industry includes various prices, styles, packaging and shelf lifes that rely on multi-tier supply chain, which involves manufacturers, distributors, and retailers. "The initial euphoria about RFID's potential has recently made way a more down-to-earth view of its benefits in the supply chain. Companies who consider using RFID usually conduct a conservative preliminary analysis of the financial impact of such an investment. These analyses typically focus on three types of benefit expected from RFID: The reduction of labour, capital and non-conformity costs such as costs caused by wrong deliveries. Labour and capital costs can be decreased by RFID- enabled process speedups, while non-conformity costs can be reduced by detecting mistakes made during the distribution process and taking appropriate action to prevent them" (Goebel, Tribowski and Günther 2009).

3. BENEFITS OF RFID TECHNOLOGY

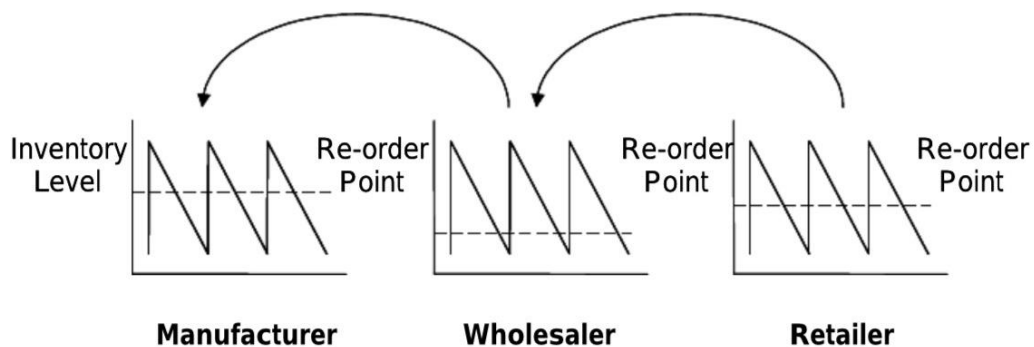
Radio frequency identification (RFID) is a rapidly growing technology that has the potential to make great economic impacts on many industries. While RFID is a relatively old technology, more recent advancements in chip manufacturing technology are making RFID practical for new applications and settings, particularly consumer item level tagging. These advancements have the potential to revolutionize supply-chain management, inventory control, and logistics (Weis,2007). Management needs to evaluate the cost and benefits of the adoption of RFID technology and how the change can align with the strategic direction. The cost/benefit evaluation is not only associated with financially. It also brings intangible benefits, which can enhance the business value by integration and efficiency .

RFID adoption yields many efficiency benefits. In this paper, by focusing on fashion industry, determined benefits of RFID technology has been argued. Four benefits of RFID in the fashion industry, are categorized as: (1) improved inventory management, (2) velocity of fashion cycle, (3) integrated fashion business model, and (4) efficiency of operations.

3.1. Improved Inventory Management

The challenge to any business in a fashion market is to be able to predict real demand. Real demand is what consumers are demanding day-by-day, and even hour-by-hour. But in reality, most supply chains are driven by orders that are determined by forecasts and inventory replenishment. In this way, real visibility of the market can't be provided to the supply chain partners. As Figure 3 “suggests inventory hides demand. In other words, the fact that there will usually be multiple, independent decisions on re-ordering policies and inventory levels from the retail shelf back through wholesalers, to suppliers means that up-stream parties in the chain are unable to anticipate the changing needs of the customers other than through a forecast- based as much upon judgment and guess-work as it is upon actual consumer demand” (Christopher, Lowson and Peck, 2004).

Figure 3: Inventory Hides Demand



Source: Christopher, Lowson and Peck 2004.

The primary problem that confronts fashion companies is the time to source materials, transform them into products and move them into the market place is continually longer than the time the consumer is prepared to wait. In general, this-lead time gap was filled with a forecast-based inventory.

3.2. Velocity of Fashion Cycle

Fashion markets are synonymous with rapid change and, as a result, commercial success or failure in those markets is largely determined by the organisation's flexibility and responsiveness. Responsiveness is characterised by short time-to-market, the ability to scale up (or down) quickly and the rapid incorporation of consumer preferences into the design process (Christopher, Lowson and Peck, 2004).

3.3. Integrated Fashion Business Model

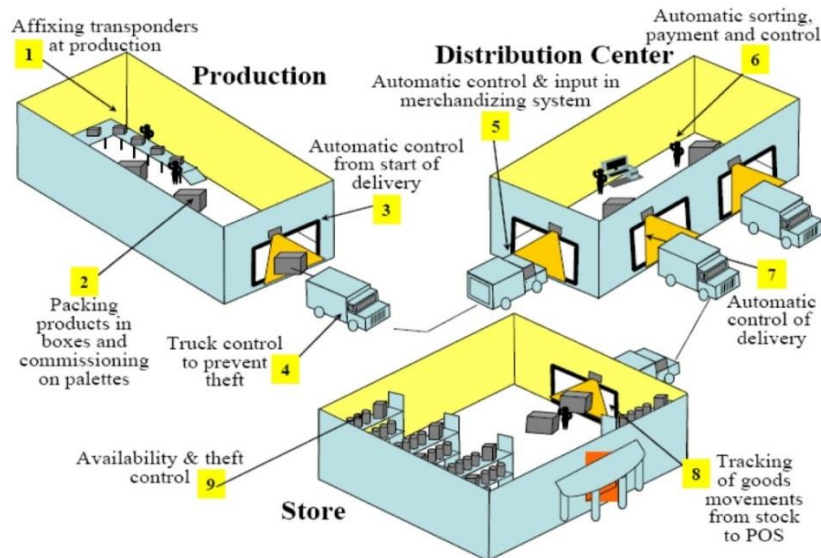
Fashion markets are volatile and difficult to predict. (Christopher, Lowson and Peck, 2004). Hence the need for agile information-based supply chain emerges. Harrison, Christopher and van Heck (1999) suggested that an agile supply chain has a number of characteristics:

- Market sensitive – it is closely connected to end-user trends.
- Virtual – it relies on shared information across all supply chain partners.

- Network-based – it gains flexibility by using the strengths of specialist players.
- Process aligned - it has a high degree of process interconnectivity between the network members.

One of the most substantial developments in recent business management is *extraversion*. The performance of the company depends on a series of alliances and relationships with other companies in the fashion environment as the most effective and efficient way to concern with constantly changing market conditions. Strategy in fashion business is at a network level comprehending numerous external connections throughout the supply chain. “Apart from the strategic implications, QR also requires a number of operational building blocks that have to be integrated and aligned for efficient and effective reaction to ‘real’-time demand“(Lowson, King, Hunter, 1999).

Figure 4: The RFID in the Supply Chain



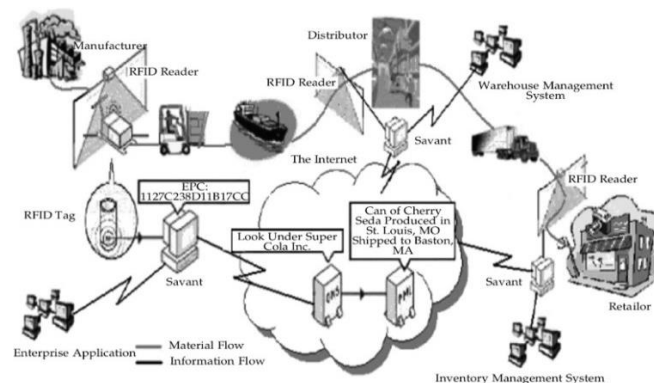
Source: Meyerson, 2007

3.4. Efficiency of Operations

QR is recognised as an operations strategy (Lowson,2002). The ability to cope with the complexity of fashion supply chain and to develop methods to combat the cruel rivalry in the fast fashion industry are the causes to make this strategy efficient. Like all fast moving industries, demand is now more fragmented in fashion industry and customers are more conscious about the products’ cost and quality because of the existence of numerous kinds of brands and products.

All operations within a fashion company can be paced to accurate demand thanks to monitor customer behaviour. Products and services are designed, produced and delivered in the desired variety and amount that match the demand of the customer.

Figure 5: Nine Potential Uses of RFID to Improve Inter-Organizational Process



Source: Robeck, 2005; Loebbecke and Palmer, 2006

One of the most important QR principles is the capability to *press time in the supply system*. The pipeline can be condensed, so the design of the products can be improved in accordance with the expectations and demands of the customers; the demand for fashion products can be assessed faster and more accurate. Timely and accurate data-information flows activate fast and accurate responses without waste and unnecessary cost. Fast and accurate adaptation to volatile fashion market is the most significant element of the QR.

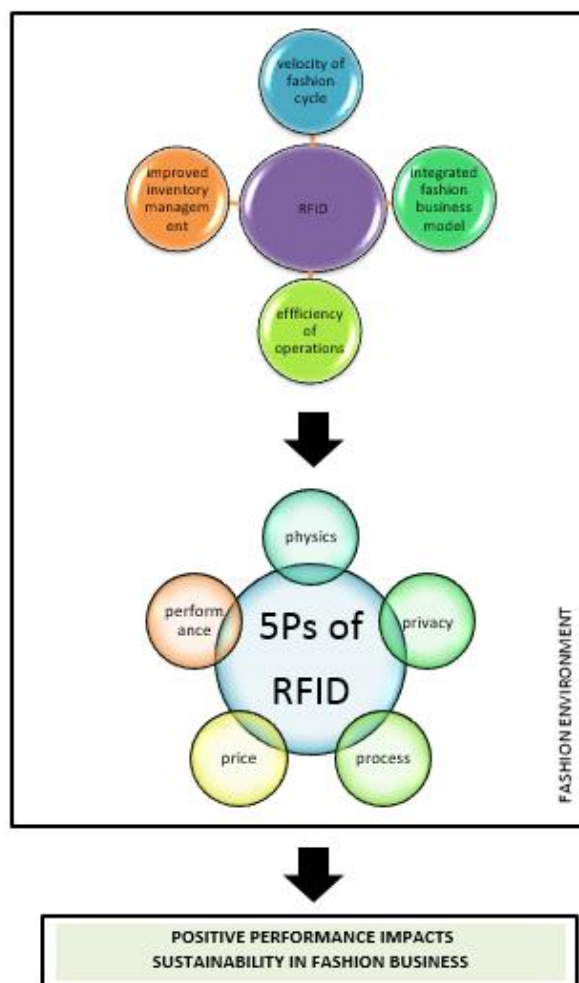
4. A NEW MODEL DESIGN FOR FASHION INDUSTRY

The fashion industry provides an appropriate environment for studying on RFID due to its wide product assortment and its integrated units. The industry handles a variety of products, prices, packaging, shelf life, and integrated supply chain required to configure which becomes necessary to establish (production, distribution and retail).

Particularly, fast fashion requires a quick response – not only in terms of fashion trends, but also in terms of producing and marketing purposes. RFID technology is significant in fashion industry due to the characteristics of the industry such as short-life cycles, high seasonality, wide variety of products, high volatility, impulsive purchasing, complicated production, distribution and logistics. RFID adoption also allows fashion companies to manage the stock levels more efficiently. In addition, thanks to adopting RFID, close monitoring of product circulation provides integrated production, marketing and logistics. For these reasons, there is high investment in the development and improvement of RFID systems because of the substantial advantages that the fashion companies can gain by utilising it.

In the scope of this work, a new model, focused on RFID technology and its benefits in the fashion industry, has been designed as it is shown below:

Figure 6: Agile and Sustainable Fashion Supply Chain with RFID Benefits



5. CONCLUSION

The dynamic environment of fashion generates many ambiguities. This volatile structure of fashion forces companies to adopt new technologies in order to create an agile supply chain. RFID technology generally improves tracking and replenishment in supply chain management. Within this study, an agile supply chain model including the benefits of RFID in the fashion industry has been designed. RFID is a promising technology that helps organizations and minimizes problems in supply chain management, and also plays an important role in order to propose new solutions for a greener sustainable industrial world.

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