

ASSESSING SUPPLY CHAIN COLLABORATION SCENARIOS ENABLED BY RFID TECHNOLOGY

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Extended Abstract

Since its origins, supply chain management has changed its focus from purchasing and logistics between the mid-1960s and 1990s to an updated focus on value creation since the mid-1990s and the new millennium (Kampsta et al., 2006). At about that time, an ongoing discussion emerged that supply chain management should be built around the integration of trading partners (Barratt and Oliveira, 2001), the sharing of information and benefits (McLaren, 2004) and the collaboration of organizations (Patrakosol and Olson, 2006). Supply chain collaboration as understood today has begun to take form since the mid-1990s, when the forms of collaboration multiplied (Pramadari, 2006) and new forms of information sharing extended their focus to include not only a passive exchange of information between partners, but also a more proactive approach through common planning and synchronisation of activities and business processes (Skjoett-Larsen et al., 2003), taking advantage of innovative technologies. Anthony (2000) suggests that supply chain collaboration occurs when two or more companies share the responsibility of exchanging common planning, management, execution, and performance measurement information. The volume of information exchanged and the intensity of interaction are expected to further increase dramatically when the advanced data capture capabilities of RFID (Radio Frequency Identification) technology coupled with unique product identification and real-time information gathering are employed. The emergence of RFID is expected to revolutionize many of the supply chain processes, especially those involving collaborating partners (Prater et al. 2005). A recent industry report (GCI, 2005) refers to new supply chain collaboration services that will be empowered through the use of RFID and information sharing between trading partners (RFID-enabled supply chain collaboration services), such as anti-counterfeiting, product recall and reverse logistics, collaborative in-store promotion management and total inventory management.

Looking specifically at the grocery retail sector, we came to define the following supply-chain collaboration scenarios enabled by the use of RFID technology:

1. *Back-room and shelf visibility*: The store personnel receive real time, information about the backroom inventory level of each product. If a product is not on the shelf (Out-Of-Shelf-OOS), but there is available stock in the backroom, the store personnel is informed to refill the shelf; otherwise, if there is no stock in the store at all (Out-Of-Stock), a new replenishment order is placed. The salesman of direct-store-delivery suppliers has also direct access to this information through a PDA.
2. *Out-of-shelf response*: Retailer and supplier get statistical information about shelf availability, i.e. the level of stock on the store shelves, in order monitor the level of out-

of-shelf, which is considered one of the major problems the retail sector faces today (Roland-Berger 2003). While the previous scenario requires real-time information flows to support daily operations, this scenario is more about business intelligence and decision support.

3. *Remote shelf management*: Retailer and supplier get real-time information for the actual shelf layout. RFID readers “scan” and “read” the shelf and provide its “digital image”, including information about the size, specific products’ position and layout, as well as information about the shelf’s performance.
4. *Smart pricing*: Retailer and supplier have the possibility to identify products that are close to their expiration date or are standing still on the shelf for a long time and dynamically reduce their price, in order to boost consumer demand and reduce waste.
5. *Smart recall*: Retailer and supplier have the possibility to identify the location of products with specific characteristics and recall them from the market e.g. in case there is a risk with consumer safety, fast and at the minimum cost.
6. *In-store promotion management and promotion evaluation*: Customers get direct information about special offers and promotions relevant to the product they just got off the shelf. Retailer and supplier can manage better their promotion plans and evaluate in real-time the efficiency of their in-store promotion activities.
7. *Demand management*: Retailer and supplier have the possibility to monitor the inventory and the sales of products and relocate them if needed (e.g. in case of a special promotion event) in order to eliminate lost-sales opportunities.
8. *Traceability information*: The consumer at the end-point-of-sales has a clear view of the product’s history and origin as provided by the product supplier. At special information desks, the consumer can get details about production date and origin, expiration dates and other unique product’s information that can ensure product authenticity and safety.

These scenarios capitalize on RFID capabilities for automatic data capture and identification of unique product instances, in combination with other information that can be derived in association with RFID, such as the shelf location, the context of an in-store promotion event, etc. Furthermore, collaboration between retailer and supplier takes place either through joint involvement in a collaborative process (e.g. promotion management), through information sharing for decision-support purposes (e.g. out-of-shelf, promotion evaluation) or through information sharing in order to support the delivery of a service to the end customer (e.g. traceability information).

Each of these RFID-enabled collaboration scenarios can be categorized according to the following two dimensions:

- a) the extent of collaboration required between retailers and suppliers; and
- b) the RFID technology requirements.

The extent of collaboration between trading partners is analyzed based on the collaboration index of Simatupang and Sridharan (2005), which defines three interrelated dimensions: information sharing, decision synchronization, and incentive alignment. Information sharing

refers to the act of capturing and disseminating timely and relevant information for decision makers to plan and control supply chain operations; decision synchronisation refers to joint decision-making in planning and operational contexts; and incentive alignment refers to the degree to which chain members share costs, risks, and benefits.

The RFID technology requirements refer to the level of tagging and the location of the tag readers. Tag costs constitute the bigger part of RFID deployment costs and, thus, the tagging level is the dominant variable when deciding on the adoption of alternative RFID-enabled processes (Alexander et al., 2002). On the other hand, the benefits of RFID are expected to increase significantly as adopters migrate from pallet, to case, to item-level tagging and tag readers are located in more areas.

Using these two dimensions we perform a high-level assessment for each of the supply chain collaboration scenarios, in order to understand the anticipated costs and benefits as well as predict the expected barriers of implementation and adoption, including process changes and collaboration incentives. This assessment follows both an operational and strategic perspective, as some of the scenarios focus on the management of specific operations and processes (e.g. backroom visibility, dynamic pricing, smart recall), other focus more on supporting decision-making and building domain-knowledge (e.g. out-of-shelf response, promotion evaluation), and others combine both aspects (e.g. promotion management, traceability information).

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