

REPORT

**B2B eCommerce Trading Processes And The Enabling
Technologies Used In The Retail Industry - The Risks, Benefits
And Future Developments.**

By

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Abstract

This report undertakes an analysis of the business processes and eCommerce enabling technologies used within the Retail Industry. This industry is characterised by both fragmentation and concentration. The activities of the larger corporations such as Coles Myer and Wal-Mart are the focus of this analysis as they demonstrate the extent to which the technologies such as EDI, EFT, Bar code applications and Exchanges can be used to achieve benefits from fast flow replenishment systems associated with Quick Response and Efficient Consumer Response. Problems and risks associated with the uptake of these technologies are discussed, as are the potential future developments for new industry applications and standards.

Outline the nature of the Retail Industry and why this industry was chosen

The Retail Industry

The Retail Industry has been chosen for analysis in this Report because it is a trading format that most people in developed countries throughout the world deal with everyday. Its analysis is interesting because retail has been one of the strongest and most effective exponents of Electronic Data Interchange (EDI), Bar Codes and Quick Response (Hadjiconstantinou 1999: v) which are technologies and processes that facilitate Business-to-Business eCommerce.

Retail Industry Size

To indicate the size of the industry, the Australian Bureau of Statistics (ABS) figures show the Australian Retail Industry's turnover, in the last financial year alone, was in excess of \$150 Billion AUD (ABS 2003: 8). In addition the Retail industry is "Australia's largest employing industry" (Australian Retailers Association 2001: 1). The retail industry is characterised by concentration and fragmentation. The technologies and business processes discussed in this report will concentrate on the activities of the large retail conglomerates such as Coles Myer and America's Wal-Mart. To give an indication of their significance it is worth considering that Coles Myer, Australia's leading retailer, has annual sales in excess of \$22.4 billion. The company operates more than 2,000 retail stores and more than 15 million customers shop at these stores each week. (GNX 2000: 2) From the perspective of eCommerce technologies this company is of particular interest because it has Australia's largest database and was a pioneer of Electronic Funds Transfer at Point of Sale (EFTPOS) in Australia and the use of EDI and the Internet to connect to suppliers. (GNX 2000: 2)

Retail Industry Scope

There are a great variety of types of stores and their different product ranges. These have been outlined by the Australian Retailers Association (2001: 3) and include the following categories:

- Grocery / Supermarket retailers
- Food retailers
- Department Store retailers
- Soft goods retailers
- Hard goods retailers
- Recreational goods retailers
- Other personal and household good stores

Description of the trading or business processes in the Retail industry.

Management through the supply chain

The retail industry provides outlets for the sale of consumer durables to the customer. This is the end point of a complex web of trading processes between manufacturers, suppliers, wholesalers and “the logistics infrastructure that links them together”. This network of trade relationships is referred to as the supply chain and is superimposed by further networks of relationships with financial institutions, advertising companies, accounting activities, legal and other service providers. (Whiteley 2000: 17) To place some practical boundaries on the discussion it is helpful to refer to Porter’s model of the value chain to conceptualise the retail supply chain as consisting of Procurement processes that involve inbound logistics, operations, outbound logistics, marketing and sales and after sales service (Turban 2002: 64).

These business processes are integrated from the original suppliers to the end customer in such a way as to provide products and information that adds value for the customer. Products flow through three independent information and product flows: from the supplier to the distributor warehouse; from the distributor warehouse to the store; from the store to the customer. (Ferne 1999: 176) Given that the large retailers have hundreds if not thousands of suppliers often spanning globally diverse processes these multiple channels are complex and the collaboration procedures with business partners that are required are highly sophisticated.

Logistics

Operational measures for logistics are the key to the overall strategy. Delivery schedules are planned to either maximise internal or external back loading. “All the major grocery retailers have over 90% of their products centralised through a network of Regional Distribution Centres (RDCs)” where products are cross docked. (Ferne 1999: 179) Cross docking involves “merge in transit” solutions for delivery and despatch.(Coates 2003: 38). This is where supplier prepared pallets/containers of homogeneous or mixed products are transferred to facilitate streamline deliveries. Each pallet is assigned a unique identification code label before delivery and is exchanged for transit to an outlet - this process involves “some level of conveyer and automation technologies.” (Coles Myer 2003: 3)

Quick Response and Efficient Consumer Response

This aspect of logistics management is intrinsic to the business process for the Grocery sector is known as Efficient Consumer Response (ECR), and its variant in for the general Retail Industry which is known as Quick Response (QR). These processes involve a series of enabling technologies that will be discussed in further detail in the next section. Suffice to say that the ultimate goal of QR and ECR is a consumer driven responsive system in which distributors and suppliers work together to maximise consumer satisfaction and minimise costs via increasing the velocity of inventory and replenishment. “Accurate information and high-quality products flow through a paperless

system between manufacturing line and checkout counter with minimum degradation or interruption both within and between trading partners.” (Svensson 2002: 509) Quick Response is often referred to as the Retail Industry’s version of Just-In-Time (JIT) because it is a strategy for moving inventory through the supply chain faster and more efficiently (McMichael, McKay & Altman 2000: 612). Unnecessary costs and bottlenecks are eliminated, as are areas of duplication and inefficient processes, which are re-engineered through the implementation of “best practice” techniques and automation creating “value links” so that the whole chain can be managed with a “win/win” approach. (Zairi 1998: 62) Stock is replenished by being “pulled” through the supply chain, reducing response time and facilitating door-to door pipeline management. (Ferne 1999: 176; Coates 2003: 39).

How the Retail Industry uses eCommerce technologies to trade with business partners.

Overview of data capture technologies

The processes known as Quick Response (QR) and Efficient Consumer Response (ECR) used in the Retail industry, entail a series of enabling technologies that facilitate logistics, replenishment, ordering, inventory management and payment. These technologies “ensure the ability of a supplier to deliver both the product and the information about a product to a desired location within a timeframe designated by the buyer.” (Coles Myer 2003: 8) The technologies include bar code applications, Electronic Data Interchange (EDI), Value Added Networks (VANs) and Exchanges.

In application these technologies link “systems for purchasing, production and inventory control, distribution, customer order entry and service” (Hadjiconstantinou 1999: vii) through the sharing of information between retailers and their trading partners throughout the supply chain. Point of sale data, encoded in bar codes are scanned at the checkout “to yield meaningful data on customer choice” by an EDI-based Electronic Point-of-Sale (EPOS) terminal and the aggregated information is sent to suppliers for fast flow replenishment of the depleted stocks. (Ferne 1999: 173)

Essentially the technologies process and manage data capture and flow across the supply chain in near real time and without distortion. (Hadjiconstantinou 1999: vii) Systems between business partners are thereby integrated to minimise lead times and reduce inventory, speeding up the response time between customer purchases and replenishment of items on retailer’s shelves. (Ferne 1999: 173). How these technologies precisely function to transmit of information and create the linkages between business partners (suppliers, distributors and manufacturers) will now be discussed in greater detail.

Electronic Data Interchange (EDI)

EDI is the electronic exchange of business information (documents) in a computer readable, structured format within and between companies to facilitate order capture and processing. (Coles Myer 2003: 4) EDI interconnects systems using “document-based coupling, which interchanges messages (files) that can be read by the retailers and suppliers legacy systems” (Vargas 2000: 1) Data pertaining to stock availability and product prices as well as a purchase orders, invoices, advance shipping notices, and forecasts are communicated between one company’s computer application and another in an agreed format (Walker 1999: 4, Blamfield 1994) Through EDI business partners are linked “in the transmission, receipt and payment of orders [EDI/EFT]¹ and the scanning of products at warehouses through the supply chain to track goods from factory to final customer” (Ferne 1999: 174).

¹ EDI and Electronic Funds Transfer (EFT) have been extensively used in the Retail Industry and the business world since the 1970s (Wang, Head & Archer 2000: 374)

Traditionally this communication has been conducted via a third party ie a Value Added Network (VAN) such as Edi*Express - the General Electric Information Service (GEIS) proprietary EDI network for the retail sector. (Coles Myer 2003: 4) However, these private network providers require dedicated lines and require relatively high start up and operational costs such that Web-based EDI technologies, that offer direct connectivity, are becoming increasingly attractive. Web-based EDI uses the AS2 standard which is a web-based transport standard which facilitates EDI messaging between business over the Internet that has recently begun to receive widespread use and interoperability. "Wal-Mart has completed the first trials of a web-based EDI system that it will roll out to suppliers later this year" (Ashead 2003: 8).

Bar Code Technologies

Bar Codes are used most commonly in the retail industry² to identify products and manufacturers. Bar Codes consist of a series of horizontal lines and spaces and characters underneath which represent numbers and or letters in a form suitable for reading by machines. (Coles Myer 2003: 11) The bar code number "is a unique identifier for an item (single unit or pack or pallet or global 'address') which ensures that any coded item can be tracked, traced and identified from its source point to its final destination – be it a supermarket shelf or in a factory" (EAN Australia 2003a: 1).

Each type of bar code is an international standard for item identification, data capture, data synchronisation as well as electronic messaging (EAN Australia 2003a: 1). Bar codes are used all through the retail supply chain to track inventories via computer and facilitate keyless data entry in an automation system that ensures information management between business partners. Data regarding sales and purchase orders are aggregated and transmitted for the purpose higher-frequency delivery schedules. (Holmes 2001: 708; Sohal, Power & Terziovski 2002: 96).

Bar code labels are placed on all retail merchandise, purchase requisitions, shipping containers, storage boxes as well as file folder and mail envelopes such that they "identify records that will be more completely indexed in a database management system" (Phillips 1997: 48). Data, that previous to this technology was keyed in, is now scanned by a bar code reader using a handheld scanner or one that is mounted below glass plates in checkout counters, or located along assembly lines. From the scanner data is automatically read and entered into the fields of the retailers database. Purchase orders can then be transmitted with the information encoded in EDI format (Phillips 1997: 49–51). When scanned at the Electronic Point of Sale (EPOS) terminal, information is shared down the supply chain "to jointly forecast future demand for replenishable items and to continually monitor trends to detect new opportunities for new items". (Adshead 2003: 8)

² "A retail item must be bar coded with either an EAN-13, EAN-8, UPC-A, or UPC-E bar code." (Coles Myer 2003: 11)

Exchanges

Consortia exchanges such as World Wide Retail Exchange (WWRE) and Global Net eXchange (GNX) offer many-to-many, B2B online marketplaces for the retail industry. They are open to all retailers and suppliers and create value for partners by streamlining and removing costs from the supply chain. GNX equity partners include many of the world's largest retailers, and together GNX retailers "account for more than \$185 billion in purchases from more than 70,000 suppliers, partners and distributors around the world" (GNX 2000: 1).

Leveraging the power of the Internet, their goals are based around the reduction of purchasing costs and the standardisation of the purchasing process to increase efficiencies in the supply chain. This is achieved through reverse³ and standard⁴ online auctions which eliminate the middle man to reduce procurement costs. (Cuthbertson 2000: 57, Lebharr-Friedman 2001: 16) "Since its inception, members of GNX have conducted nearly 15,000 auctions valued at more than \$10.5 billion"(GNX 2003b: 1). Central to the solutions they provide is Collaborative planning forecasting and replenishment (CPFR) offering real-time collaboration and information exchange and end-to-end visibility across the supply chain as well as brand and channel integrity (Lebharr-Friedman 2001: 16-18; GNX 2003a).

Wal-Mart one of the world largest retailing conglomerates is not a member of these public retail exchanges. Rather it has chosen to establish its own private supplier exchange (Retail Link) in order to establish closer relationships with its business partners and achieve the same supply chain efficiencies as GNX and WWRE. (Kashmeri 2000: 1) "Through its private exchange, Wal-Mart allows its suppliers access to the history of customer transaction data, the suppliers use this data to analyse the sales trends, plan their production, and manage their inventories accordingly" (Ranganathan 2003: 25). The attraction of private exchanges is that it allows a company to keep its proprietary supply chain practices secret and thereby seek additional competitive advantage. (Ranganathan 2003: 26).

³ Reverse auctions are buyer led

⁴ Standard auctions are supplier led

Benefits gained from using the eCommerce technologies in the Retail industry.

Overview of general benefits

The benefits gained from using the eCommerce technologies in the Retail Industry are both strategic and operational and create new opportunities. (Fynes & Ennis 1993: 16) The overall benefit gained from using eCommerce technologies in the Retail Industry is improved profitability which is achieved through “better inter-firm relationships, supply chain planning and collaboration, product pricing, logistics and distribution management and procurement efficiencies” (Ranganathan 2003: 26). These benefits transpire from the strategies of Quick Response and Efficient Consumer Response and their enabling technologies. Reduced lead times, smaller inventories and fast flow replenishment are achieved while the costs of transmitting data are dramatically reduced. (Ferne 1999: 174, 179). Through the resulting faster ordering and delivery, more accurate stock control and forecasting, retailers enjoy a greater market share and customer loyalty as the technologies of eCommerce enable quick and reliable response to customers’ changing needs. (Walker 1999: 6, Hadjiconstantinou 1999: v).

Integrated Information

The integration of information from the customer and between the retailer and its suppliers and distributors ensures “clearer ordering and stock control and speeds and smooths logistics flows” (Hadjiconstantinou 1999: viii) essentially providing integration of the information chain from ‘till’ to ‘mill’ (Walker 1999: 5). Through the integration of data and information through the supply chain the eCommerce enabling technologies link manufacturing and procurement lead times to the needs of the marketplace and “provide enhanced operational efficiency, more effective market positioning and greater opportunities for business partnerships” (Jenkins 1999: 37)

Improved Trading Partner Relationships – Collaborative Advantage

Benefits from technologies such as exchanges and EDI have resulted in a transformation of the once adversarial relationship between buyer and supplier. New collaborative partnerships are being formed between manufacturers, distributors, suppliers and retailers. These trading partners now work closer together to optimise stock levels, jointly forecast future demand and continually monitor trends to detect new opportunities. (Hadjiconstantinou 1999: v). This shift to a more open partnership arrangements has been formed by the bond created by the linking of information through enabling technologies such as bar code scanning and the transmission of EPOS data. (Walker 1996: 6) This shift in the nature of partnership can be referred to as “collaborative advantage” where redundant or overlapping processes between trading partners are eliminated (Jenkins 1999: 38).

Benefits of Bar code technologies and EDI

Bar codes and EDI and their associated technologies deliver benefits at every level of the supply chain that have direct consequence for the retailers themselves. “It is possible for today’s orders to be based on today’s inventory – reducing stock outs as well as excessive inventory” improving response times and facilitating fast flow replenishment through greater frequency in deliveries (Holmes 2001: 709). EDI, GPS⁵ and Bar codes make it easier for retailers and their suppliers to monitor product movements – “progress information” – on goods in transit (McKinnon 1992: 24).

In addition the automation of systems that has resulted from using bar code as “miniature data storage media” have expanded both the quantity and quality of the data input and the information processed. (Phillips 1997: 48) This provides a virtually error free set of procedures for conducting stock take, inventory management, ordering and checkout while saving labour time and associated costs that were once consumed with highly repetitive manual data entry.

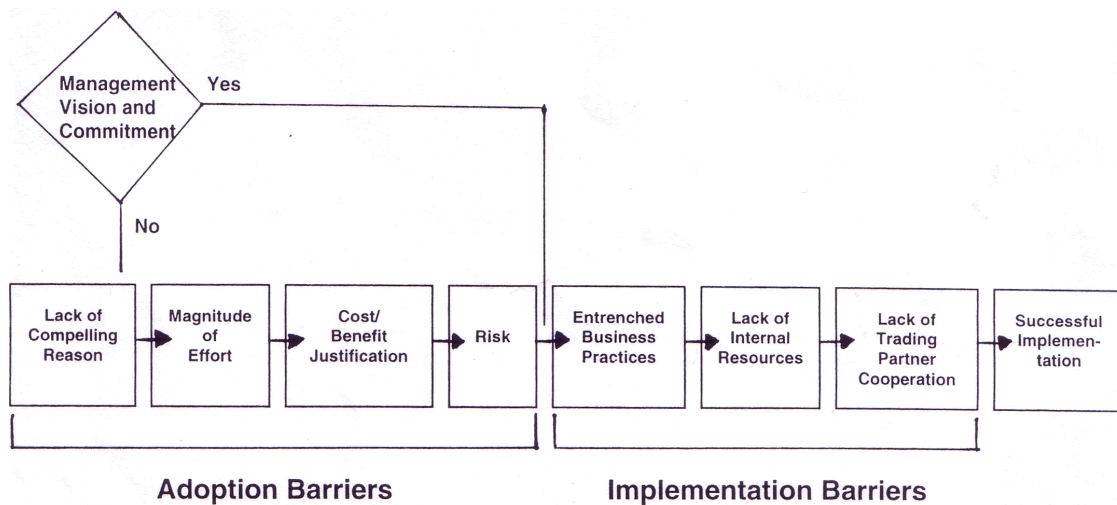
Many more records can be processed providing larger amounts of more accurate data. (Phillips 1997: 48) At the same time the speed and efficiency of data processing has lowered the transaction cost of placing an order. (Holmes 2001: 710). Through the automation of business processes, EDI and bar code technologies result in extensive savings in clerical and administrative costs while massively reducing the amount of documentation and paper used for orders, invoices and other communications. (McKinnon 1992: 24)

⁵ Logistics firms use Global Positioning Systems (GPS) to check on its fleets for real-time parcel tracking and as traffic congestion warning systems to ensure maximum efficiency in delivery systems. This information is able to be accessed by retailer’s and suppliers through integrated infrastructure. (Steward, Callaghan & Rea 1999: 125)

What are the problems experienced and possible risks in using eCommerce technologies in the Retail Industry? How can these problems and risks can be overcome or minimised.

Adoption and Implementation Barriers

There are several barriers businesses must overcome before they can use eCommerce technologies. The diagram below, created by the Uniform Code Council, illustrates the generic adoption and implementation barriers to the use of new technologies.



Source: Uniform Code Council, Horizon Scan Project

(Hadjiconstantinou 1999, p. 175)

Interoperability

Interoperability across participant internal systems and the applications used by other business partners is an important technical concern in B2B eCommerce. (Ranganathan 2003: 28) If B2B systems are not integrated with the current IT infrastructure of multiple partners there can be problems with document transfers from a sender on one network to a recipient on the other network. In this situation files are not readable by the recipients computer applications or are not in a format that can be directly entered into the recipients database. The result is the requirement for the manual re entering of data and that leads to all the inefficiencies that the technologies are designed to overcome. The solution to this problem involves “developing integrated solutions for proprietary mainframe based applications, multiple platforms, and databases across multiple companies.” (Ranganathan 2003: 28)

Real-Time Interactivity

EDI messages do not allow for interactive searches, in addition they are less immediate than connecting on-line and in real-time unlike Web-based EDI or XML(Vargas 2000: 1). It would appear that the solution is simple in that retailers should simply move to Web-based EDI which can bring cheaper and easier support to supply chain systems. However, many EDI systems can not be upgraded to web-based EDI basically because the messages must be encoded using a different standard i.e. into AS2. (Adshead 2003: 8-9). The solution is partial and temporary in that “many companies will need to run traditional and web EDI side by side, if mandated to use the new standard by a customer”(Adshead 2003: 9). For smaller companies (SMEs) however, the Web-based alternatives such as EDI I (EDI Internet) can offer a more affordable alternative with all the benefits of direct connectivity.

Network Security

Security of sensitive and financial data over the Internet is still a concern. The risk of unauthorized parties viewing confidential information (Hadjiconstantinou 1999, p. 48) is a fundamental issue and risk of using computer technologies to communicate with trading partners and customers. According to Threlkel and Kavan, to overcome the increased security risks when using internet-based EDI, companies should ensure that they use “firewalls, authentication and encryption” (Threlkel & Kavan 1999 p.354). These measures are basic to a strategy that guarantees network security.

Bar Code Printing

Some problems can be experienced in the accuracy of data entered from bar codes if the label resolution of the bar code is not of a certain standard or has been reduced or magnified to an incorrect size. The risk associated with this problem results in a slow or interrupted rate at which data can be transmitted to the database. (Phillips 1997: 3) The solution to this problem is simple but can involve additional expense, as dedicated bar code printers and software are usually required to ensure that the printed bar code is effective and can be correctly read without errors. Different printer technologies are required for various bar code requirements. (Phillips 1997: 3).

Identify the opportunities that exist in the Retail industry to use eCommerce technologies.

Although the retail industry has many eCommerce technologies in place, the industry is “bottom-line-orientated” (Hatka 2000: 33), which means caution is used before looking to adapt new technology. Stocktaking and inventory management as well as the error free identification of products has become so much easier by use of bar code technology (Babicz 2000: 40). Yet RFID (Radio Frequency Identification) tags look set to replace bar codes.

RFID Tags

RFID tags are tiny microchips, often referred to as transponders. The tags respond to a signal from a reader, by sending a radio frequency response that includes a unique code. Many new RFID tags use electromagnetic fields of the readers and do not require batteries. Some of these RFID tags are now smaller than a millimetre in size. (Pope 1997: 23)



Hitachi μ -chip RFID microchip
Source: RFID Journal, 2003

In the article ‘RFID Chips are here’, Granneman introduces RFID tags, as a very attractively small, reliable, accurate technology (2003). Unlike barcodes RFID tags would not require physical line of sight scanning. Inventory of RFID tagged products can be taken quickly and easily without opening boxes, or moving products (Pope 1997: 23).

Wal-mart (America) in a partnership with Gillette is attempting to create store storage space which can detect when RFID tagged razors need restocking. The added benefit of RFID tags is that they can help prevent theft. (Granneman 2003).

There are however concerns with this new technology. Granneman highlights the potential for consumers lose privacy and anonymity, “imagine everything you own is numbered, identified, catalogued and tracked” (Granneman 2003). One day you could walk into a shop, and instantly the store knows what you are wearing, what you are carrying in you pocket and possibly even who you are - good for retailers, bad for consumers (Granneman 2003).

eXtensible Markup Language (XML)

Extensible Markup Language is an alternative Internet based format that looks set to become the preferred alternative and future to EDI. XML offers a real-time interactive and direct messaging format that can be read on a Browser. One of XML's strengths over EDI is the ability to include any type of data in messages (including images, sound etc), which could change the way information is shared in the future. (Kammerer 2000) XML is increasingly being used for "implementing common architectures across the enterprise". XML will become the "glue ware" allowing different types of computers and devices to communicate with each other (Hatka 2000: 33).

Summary

The retail industry entails a complex web of trading processes throughout the supply chain. Procurement processes link manufactures, suppliers, wholesalers and retailers through highly organised logistics operations. Strategies such as Quick Response and Efficient Consumer response facilitate fast flow replenishment systems. These processes are enabled through the use and application of EDI, EFT and bar code technologies. The use of the technologies result in major benefits for retailers which include: reduced inventory holds; the shortening of order lead times, and; the elimination of out of stock situations via continuous and fast flow replenishment. These benefits are translated at the checkout into better customer service and greater profitability. Smaller retailers experience adoption and implementation barriers to these enabling technologies that can be overcome by adherence to issues of Interoperability and Network security amongst other risk minimisation strategies. Technologies are still advancing and the future may witness the introduction of RFID tags as well as the general replacement of EDI file formats with XML.

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