Information technologies in retail supply chains: a comparison of Tesco and Asda

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Abstract: This paper synthesises knowledge about information technologies (ITs) by outlining their functionalities and features, and reflecting on the strategic and operational opportunities and challenges they present to a retail supply chain (SC). The research is developed from empirical case studies, and literature on IT development and applications. It is acknowledged that, while implementation and integration of the ITs across the SC will enhance the overall SC performance in terms of cost, response efficiency and customer satisfaction levels, challenges still have to be addressed, including high setup costs, implementation complexity, and privacy and security issues. Better understanding of these opportunities and challenges will enable participants in the retail SC to transform challenges into opportunities. Drawn from primary and secondary resources, a comparison is conducted to compare the deployment of ITs for the two UK retailers (Tesco and Asda).

Keywords: information technology; retail supply chain.


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Colin Allen received his first degree in Engineering (MoD sponsored) from the University of Cambridge, and MSc in Rotating Machinery Engineering and Management and MBA from University of Cranfield. He is also a Chartered Engineer. Before joining the university, he served as an Engineering Officer in the Royal Navy, and became involved in major ship repair and improvement projects. After leaving the Navy, he joined P&O Containers Ltd. as an Engineering Officer and was seconded to the Technical Department, responsible for the major dry-docking projects. He became an academician in 1994, and teaches project management, total quality management and service excellence.
1 Introduction

Information technologies (ITs) play a vital role in improving information sharing and collaboration in a supply chain (SC) (Simchi-Levi et al., 2003). The rapid development of ITs enables the participants in a SC to receive and disseminate electronic information instantly, helps to improve information accuracy and reliability, and in turn provides competitive positioning of the SC participants through shorter lead times, reduced stockouts, quicker response and lower costs. ITs have increasingly been implemented in supply chain management (SCM) for strategic planning, virtual enterprises, e-commerce and knowledge management (Gunasekaran and Ngai, 2004).

In a retail SC, a retailer’s performance is affected by all the participants in the retail SC (Ellram et al., 1999). All of these, the participants are required to work collaboratively in order to compete in the global market through multiple competitive objectives such as price, quality, responsiveness, flexibility and dependability.

One of the most commonly implemented ITs in the retail SC is e-commerce, which takes a variety of forms such as electronic data interchange (EDI), internet, intranet, extranet and web-based point of sales (POS). Lancioni et al. (2000) discussed how the internet helps retailers and other suppliers to manage SC activities. Weber and Kantamneni (2002) examined the underlying factors influencing why retailers adopt POS and EDI. Retailers have enjoyed the benefits of these ITs in terms of improved SC efficiency and customer relationship as a result of a refined operations system. However, it is clear that the path to adoption has its challenges; for example, high setup cost, complexity of implementation, and privacy and security issues.

The aforementioned research only deals with one aspect or one particular technology, and there is very little research on how to implement the ITs collaboratively in a retail SC to achieve the target of the SCM, i.e., integrating all the activities that add value to customers, ranging from product design to delivery, while minimising the total cost (Simchi-Levi et al., 2003). The aim of this research is to synthesise knowledge about the ITs by reviewing a wide range of articles on the implementation of the ITs, and to suggest key considerations relating to their adoption in the retail SC. Compared with other reviews, this work is unique in that it explores IT application from the downstream to the upstream of the retail SC. The research explores how the IT approaches work together to enhance information sharing in the SC. The comparison between Tesco and Asda illustrates the considerations and preferences taken into account when retailers choose to adopt the ITs in practice.

In Section 3, a synthesis of literature on IT uses in SCM is reviewed to ground the empirical work done in the past, and demonstrate the contributions of this paper. The functionalities and features of ITs are summarised in Section 4, while a framework of the opportunities and challenges of adopting ITs is provided in Section 5. The practical applications of ITs are compared for Tesco and Asda in Section 6 and, finally, the conclusions are presented in Section 7.

2 Research methodologies

In order to investigate the use of ITs in SCs, and taking into account the nature of the subject, two main approaches were taken. Firstly, a comprehensive literature review was
undertaken, examining both the available technologies and their application to the retail SC, the latter including the associated benefits and challenges and the processes involved.

The core of the research was undertaken through comparative case studies of two leading supermarket chains, Tesco and Asda. The information for these case studies was drawn partly from existing papers and texts, these being assessed for their relevance and their contribution to the topic under consideration, and partly from structured telephone interviews with key staff responsible for IT projects, procurement, inventory management, logistics and marketing, these latter being designed to explore how ITs facilitate and improve performance of the entire SC, encompassing supplier relationship management, internal logistics and operations management, and customer relationship management (CRM).

The structured interviews were tested, modified and used to capture relevant data in cross-sectional surveys of the two organisations. The results of the interviews were then cross-referenced against the secondary information in order to provide a coherent narrative and analysis of the use of ITs in their SCs. Comparisons between their usages were then drawn up, with particular reference to the three main technologies, these being EDI, RFID and DM.

3 Literature synthesis and research justification

Nowadays, ITs serve as a nerve system for SCM, sharing information on various value-adding activities along the SC and enhancing SC performance by reducing cost, enhancing collaboration and facilitating organisational transformation (Nath and Standing, 2010). The literature on IT and its implementations in the SC context can be classified according to different research aims:

1 the roles of ITs in SCM
2 enhancing SC performance using ITs
3 the development of quantitative models assessing the impacts of information sharing on SC performance, such as mitigating the bullwhip effect, reducing costs, and facilitating decision-making with regard to order quantities
4 the implementation of specific ITs in SCs.

The details of the classifications and the representative literature relevant to each classification are presented in Table 1.

In an effort to add to the literature on the ITs in the SC, this paper reviews how ITs are implemented to facilitate key activities in the retail SC (as shown in Figure 1), encompassing partnership with suppliers, logistics and operations management, and CRM (Gunasekaran and Ngai, 2004). This paper will further educate practitioners on the challenges and opportunities of the ITs, as well as providing guidance on implementing the ITs interactively to maximise benefits brought by them. Academically, it provides both a comprehensive review through synthesis of knowledge of the ITs, and a direction to academics for further research on the adoption the ITs in the retail SC.
Table 1  The synthesis of literature on IT in SCM

<table>
<thead>
<tr>
<th>Classification</th>
<th>References</th>
</tr>
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<tbody>
<tr>
<td>The roles of ITs in SCM</td>
<td>Lancioni et al. (2000), Gunasekaran and Ngai (2004), Prasad et al. (2010)</td>
</tr>
<tr>
<td>The quantitative models assessing the impacts of information sharing on SC performance</td>
<td>Lee et al. (1997, 2000), Gavirneni et al. (1999)</td>
</tr>
</tbody>
</table>

4  Functionalities and features of ITs

ITs such as EDI, RFID and DM have been widely adopted by the retail SC partners in order to facilitate key activities, i.e., partnership with suppliers, logistics and operations management, and CRM; it is important to have a complete understanding of the functionalities and features of these ITs before adopting them.
4.1 Partnership with suppliers: EDI

EDI is defined as computer-to-computer transmission of standardised business transactions (Walton and Marucheck, 1997); it has rapidly developed as a technology for information transfer from retailer’s computers to suppliers’ computer throughout the retail SC, and is used by retailers and other parties to form partnerships with their suppliers. EDI has been widely adopted by many other business sectors beyond retail (Pawar and Driva, 2000), for example, in order to provide real-time sharing of actual demand and supply information across departments within a business.

EDI is highly accurate and very efficient at collecting information over the internet and facilitates a company in speeding up their transactions and order processes. By sharing customer sales figures and demand forecasts, EDI can enhance planning and control in order to reduce inventories through the use of timely information (Bamfield, 1994). EDI is mainly used to place electronic purchase orders, generate bills of lading/freight bills and invoices, transmit sales/inventory data, and give advanced shipping notice.

Two features set EDI apart from other means of exchanging information:

1. EDI only works for business-to-business transactions, and not for individual consumers.
2. EDI involves transactions between computers or databases, not between individuals.

4.2 Logistics and operations management: RFID

RFID identifies items using a tag, which consists of a microchip with a coiled transmitter, the data being read by an antenna. A wide range of product information is transmitted when the tag is read by the reader, including the identification of the product, location details, price, and date of manufacturing/transportation/purchase. According to Singh (2003), RFID technology has the capacity to capture approximately 40 times more information than barcode technology.

The main differences between RFID and barcode technology are the data exchange and scanning processes. RFID can track the quantities of items without on-site scanning and send the information to a receiver located in the retailer’s warehouse, which makes the system more versatile and productive. Key features of RFID technology are real-time data capture and automated data capture, these enhancing information quality, and supporting business transactions. These features facilitate information collection and allow more informed and accurate decisions to be made throughout a company. The use of RFID technology in logistics and operations management is important for these reasons.

4.3 CRM: DM

Data mining (DM) is the process of extracting or mining knowledge from large amounts of data in such a way as to build predictive models for management decision-making (Han and Kamber, 2006). In general, companies use computers to capture details of business transactions and send all relevant information to a data warehouse where it is examined and analysed to reveal the total business situation (Lee and Siau, 2001).
Mined knowledge from large databases provides information for executives involved in strategic and tactical decision-making, as well as operational managers responsible for cost reduction.

In retail stores, loyalty cards provide a deep and broad pool of information which can be mined effectively. Therefore, DM plays an important role for retailers, especially in CRM, allowing retailers to gain knowledge and understanding of consumer behaviour (Byrom, 2001), and to segment their customer base while tailoring products and services to the needs and purchasing power of individual groups of customers.

Applications of the ITs in retail SCs are increasing, but the adoption of ITs is not only a matter of fit into the organisational context, but also the fit between characteristics of the SC and the type of IT. Figure 1 illustrates adoptions of the ITs in the retail SC. POS is widely adopted by retail stores to sell products to customers, EDI is used between retailers and their suppliers for data exchange, RFID can be implemented by both retailers and suppliers for data capture on products, and DM is adopted in the back office for extracting useful knowledge from large pools of data.

5 The opportunities and challenges of adopting IT technologies

The beneficial functionalities and features resulting from successful implementation of these ITs can bring companies opportunities to improve performance; however, adoption of them is still complicated and costly. Based on the literature survey, this section identifies the opportunities and challenges faced by the retail SC when adopting ITs, as shown in Table 2.

5.1 The opportunities and challenges of EDI

EDI provides an opportunity for an organisation to replace traditional modes of exchanging documents so that business transactions occur more quickly and with fewer errors (Ferguson et al., 1990; Murphy and Daley, 1999). The adoption of EDI shortens lead times, reduces stock outs, and accelerates response times, as well as improving demand forecasting.

In addition, EDI is important in the retail SC because it facilitates more frequent automatic transfer of information required for integration and coordination (Hill and Scudder, 2002), and improves information accuracy by eliminating data re-entry, which results in improved communication between suppliers and buyers (Murphy and Daley, 1999). Improved communication and better stock control reduce order lead times and provide customers with timely information about transaction status, thus improving customer service (Angeles and Nath, 2000). With EDI, funds can be paid or received more quickly, improving cash flow and allowing companies to make investments more efficiently (Murphy and Daley, 1999), while a win-win partnership can be fostered between suppliers and retailers to increase competitiveness (Iacovou et al., 1995). In the SCM context, EDI improves interorganisational cooperation and coordination (Sanchez and Pérez, 2003) by automating purchase order generation and transmission systems, reducing inventory, improving supplier processes and leveraging suppliers in new product design (Walton and Gupta, 1999).
Table 2  The opportunities and challenges of ITs applied in retail SC

<table>
<thead>
<tr>
<th>ITs</th>
<th>Opportunities</th>
<th>Challenges</th>
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<tbody>
<tr>
<td>EDI</td>
<td>Quick access to information (Ferguson et al., 1990); decreased administrative and transaction cost (Murphy and Daley, 1999); improved communications and information accuracy (Ferguson et al., 1990; Murphy and Daley, 1999); improved cash flows (Murphy and Daley, 1999); increased productivity (Ferguson et al., 1990); improved tracing and expediting (Ferguson et al., 1990); better customer service (Angeles and Nath, 2000); enhanced competitiveness (Jacovou et al., 1995); improved interorganisational cooperation (Sanchez and Perez, 2003) and SC integration (Walton and Gupta, 1999)</td>
<td>Cooperation between partners (Ellram et al., 1999; Jun and Cai, 2003); managerial leadership issue: limited awareness of EDI from top managers (Tuuinainen, 1998); technical issue: incompatibility of hardware/software (Murphy and Daley, 1999); human resource issue: insufficient education and training for users (Banerjee and Golhar, 1993); security issue: disclosure of information (Banerjee and Golhar, 1993); legal issue: agreement on terms and conditions of EDI use (Aggarwal et al., 1998) initial setup cost</td>
</tr>
<tr>
<td>RFDI</td>
<td>Improve information quality, accuracy, relevancy, completeness (Jones et al., 2005a); synchronise information flow and improve integration of SC members (Wamba and Boeck, 2008); reduce operation cost (Jones et al., 2005b); reduce shrinkage (Gogoi, 2005); boost store productivity (Gogoi, 2005); enhance warehouse space use (Jones et al., 2004); increase traceability, inventory control (Jones et al., 2005a); improve forecasting (Lapide, 2004); improve customer supplier relationship (Boeck and Wamba, 2008)</td>
<td>Lack of standards maturity (Attaran, 2007); high capital cost (Attaran, 2007); customer privacy; managing data generated by RFID (Jones et al., 2004); training on users (Jones et al., 2004); integration of RFID with information system (Attaran, 2007);</td>
</tr>
<tr>
<td>DM</td>
<td>Develop intelligent marketing strategies (Focht and Cochran, 1999); SCM (Focht and Cochran, 1999); end-to-end optimisation or redesign of business processes (Folorunso and Ogunde, 2005); justify resource allocations by segregating customers (Aeron et al., 2010)</td>
<td>Scalability: very high data volumes and data flow rates; efficient algorithms to handle multiple complex data types (Kohavi et al., 2004); data extraction, cleaning, and consolidation from many sources (Chen et al., 1996); mining at different abstraction levels (Lee and Siau, 2001); interactive, web mining (Shaw et al., 2001); privacy and data security (Lee and Siau, 2001)</td>
</tr>
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</table>

One of the key challenges in implementing EDI is the high initial setup cost, while another is to get all participants in the retail SC to use EDI and to reach an agreement on terms associated with EDI use (Jun and Cai, 2003); support from senior management plays a vital role in successful EDI implementation (Tuuinainen, 1998). In order to successfully introduce EDI, it is necessary that, prior to the implementation phase, the existing business processes are altered in order to accommodate the features of the EDI system. In the implementation process, it is a difficult task to fully integrate EDI into a company’s existing computer system (Murphy and Daley, 1999), while challenge is the lack of sufficient education and training for managers and users of the EDI (Banerjee and Golhar, 1993). Implementing EDI may also lead to security and legal issues. Disclosure of information, modification of messages and repudiation of message origin or receipt
can severely damage communication and collaboration between trading participants in retail SCs (Banerjee and Golhar, 1993). Therefore, it is suggested that EDI users reach agreement on the terms and conditions related to EDI use to avoid legal problems, such as liability for paying network charges, duration of contract, obligations of users, etc. (Aggarwal et al., 1998).

5.2 The opportunities and challenges of RFID

Retail organisations want to take control over their inventory by maintaining volume in low-margin items as this is an important factor in maintaining or improving profitability. According to Attaran (2007), “Organisations should consider RFID if they want to increase their revenue growth, lower cost, reduce inventory, better utilise fixed assets and gain favour over competitors”. It is estimated that Wal-Mart can save up $8.4 billion in total cost from RFID implementation (Rockwell Automation, 2004).

RFID enables retailers to get more accurate, relevant and complete information about products and customers (Jones et al., 2005a). This in turn synchronises the information flow with product flow in a retail SC, and provides a better level of information integration between SC members (Wamba and Boeck, 2008). RFID can improve forecasting accuracy (Lapide, 2004), warehouse management and also reduce operational cost (Jones et al., 2005b). It can reduce shrinkage due to stolen or missing goods and respond quickly to product request, and boost store productivity (Gogoi, 2005). In addition, RFID improves the use of warehouse space (Jones et al., 2004).

With the wide range of benefits that RFID brings to the retail SC, it can be argued that RFID revolutionises the retail SC and longer term strategic decision-making, which appears to be a beneficial element of RFID adoption.

From a manufacturing or warehouse standpoint, RFID technology is not mature enough to be adopted, as there is a lack of agreement concerning standards for the technologies and an uncertain return on investment (Attaran, 2007). In terms of personal privacy and security, RFID has some limitations; customers’ personal transaction data held in the RFID tag after the POS may be misused, accessed or disclosed without authorisation, which is a potential challenge for retail organisations interested in adopting RFID.

In addition, the cost of RFID readers, associated infrastructure, and software that needs to be installed is high and requires a considerable investment. As an RFID system will collect massive amounts of data, storage and transmission issues will place severe strains on the users’ computer networks (Jones et al., 2004), which may also need to be upgraded, again at considerable cost.

From an organisational point of view, an RFID system can revolutionise the whole SC system if it is properly integrated with the existing SCM, CRM, and enterprise resource planning (ERP) applications. However, this is a challenge for the IT specialists who must determine how to make the integration (Attaran, 2007). Proper implementation of RFID will also result in improved supplier and customer relationship (Boeck and Wamba, 2008).

5.3 The opportunities and challenges of DM

DM is a powerful tool for retail SCM, and can be used in five areas:
1 reducing the level of risk to business by checking the customer’s credit history (Kusiak, 2006)
2 reducing stockout or overstock by analysing the movement of warehouse stock in relation to product type, product location and shelf space (Lee and Siau, 2001)
3 forecasting customer demand and behaviour by analysing customers’ previous performance (Kusiak, 2006; Katsaras et al., 2001), and justifying resource allocation by segregating customers on the basis of their contribution to the company (Aeron et al., 2010)
4 improving CRM by providing a deep understanding of customer behaviour and needs (Kusiak, 2006)
5 optimising strategies relating to market segmentation, market targeting, market differentiation and positioning (Forcht and Cochran, 1999; Katsaras et al., 2001).

More strategically, DM tools allow the retail SC participants to collect massive quantities of data from multiple resources, and extract useful and relevant knowledge from databases in order to redesign and optimise business processes (Folorunso and Ogunde, 2005). DM techniques predict futures and trends, allowing companies to make proactive and knowledge-driven decisions.

DM has many challenges to overcome. Scalability is one of the key constraints on DM adoption, as there are usually very high data volumes and data flow rates to be analysed. Business transactions are completed online, and the data collected through web is usually complex, so efficient algorithms need to be designed to handle the multiple data types and generate output that is comprehensible in order to provide insight into the business (Shaw et al., 2001; Kohavi et al., 2004). As users of DM may require different types of information to be extracted from the database for different purposes, the system should allow the data to be mined at different levels (Chen et al., 1996).

Finally, privacy and data security is argued to be a challenge of DM. Different levels of data can be viewed at different perspectives from DM, and it is relatively easy to construct a personal profile using these data (Lee and Siau, 2001).

6 A comparison of the IT applications in Tesco and Asda

Two British supermarkets, Tesco and Asda, are selected to compare the use of the ITs in their SCs. Tesco is the largest retail chain in UK, with a market share of 30.4% in 2009, while Asda is the second largest (with a market share of 17.5% in 2009). Both retail food, clothing and general merchandise and are prime candidates for IT implementation in the retail industries. Over the last decade, both Tesco and Asda claim that ITs have played a key role in their success, by enabling fast response, increasing stock availability, improving collaborative planning, forecasting and replenishment, and finally reducing cost. However, the two supermarkets adopted different ITs at vastly different rates dependent to their business strategies; this is partly influenced by the fact that Asda is a subsidiary of the US retail giant Wal-Mart, which has a different culture from UK retail sector. A comparison is done for their implementations of ITs, as shown in Table 3, and the opportunities and challenges of these ITs are summarised.
6.1 The applications of EDI in Tesco and Asda

Tesco has developed and implemented a Web EDI, TescoLink, which involves its small suppliers for the first time. TescoLink removes a lot of manual efforts, reduces delays on orders, and gives suppliers instant and direct access to Tesco’s ordering system and store level sales data on their products, as well as information on wastage, margins and stock availability (Tesco, 2010).

One key challenge that Tesco faces in implementing TescoLink is the capability of small suppliers in using PC and internet-based systems. Some of the small suppliers have never used a computer before, and need training and help them to fit into the system.

Asda (2010) started using AS2 standardised Web EDI technology with its suppliers, in order to have faster and more secure data transactions and reduced transmission costs and, therefore, improved efficiency and speed of EDI communications. AS2 enables suppliers to establish a secure point-to-point link with Asda via internet connections for exchange of EDI documents. With AS2, the traffic costs for Asda and its suppliers are eliminated and delivery and confirmation on receipt of transmission are made instant (Watson, 2005). Implementation of EDI speeds up the stock replenishment cycle, provides flexibility to increase data volumes at no extra cost, improves tracking of inbound and outbound data, and is believed to have a profound impact on all retail and manufacturing sectors.

One challenge with the AS2 standardised EDI is that many of Asda’s suppliers have to upgrade their existing EDI systems and make them compatible with AS2. Some EDI systems cannot upgrade to web EDI, so Asda negotiated the option of a free single license of AS2 software for its suppliers to facilitate the changeover and have been running the traditional EDI in parallel until the upgrade is completed (Tomas, 2004).

Both of the companies face high initial setup costs associated with buying the technology and installation of the software, plus training staff in using the new system.

6.2 The applications of RFID in Tesco and Asda

RFID provides a tool to integrate retail SCs, reduce inventory levels and increase response speed (Rizzotto and Wolfram, 2002). However, the investment in RFID tagging for each item on the shelf is huge and non-profitable; therefore, the tagging is applied at the transport-unit or case level by most of the retail SC (Karkkainen, 2003).

Instead of tagging cartons and containers, Tesco puts a passive RFID tag on roll cages. The containers are loaded onto the cages that are then rolled through the stores, and the systems know which cage is destined for which store. If there is an error in loading the cage, the system will send an alert to the operator who can take action to correct it. By implementing the RFID solutions in the roll cages, Tesco is able to balance inventory stock among different stores, i.e., avoid having too much inventory in some stores and lost sales in others (Trebilcock, 2007).

Asda’s first RFID trial started in 2003 as a test case, in which the sales of RFID-tagged CDs were tracked and monitored in the stores (Jones et al., 2004). Although problems and limitations were highlighted (most notably the locations and the cost of the RFID tags) RFID was shown to improve SC efficiency. Asda also confirmed that it would begin trials of RFID tags in 2006 when Wal-Mart extended its worldwide trials (Hadfield, 2006), while also recognising that the technology is still not mature enough for universal use. Until now, Asda still has not implemented RFID in any of its operational
sectors, and it is late into the game in comparison with Tesco, but it has the advantage that its parent Wal-Mart has already had successful trials and experiences. Wal-Mart requested its top suppliers to provide RFID tagged cases and pallets to its distribution centres (Lee and Ozer, 2007), and benefited through reducing product stockout by 16% (Hardgrave et al., 2008) and cutting 67% off the replenishment time (Knights, 2006). Currently Wal-Mart is helping Asda progress towards implementing RFID, enabling the UK retailer to learn from the experience of Wal-Mart in relation to supplier interaction and managing stock inventory.

6.3 The applications of DM in Tesco and Asda

Tesco introduced the Clubcard to reward customers for shopping at Tesco. With Clubcard, customers earn 1 point for every pound they spend in store, with the points being converted to vouchers which can be used to obtain money off the shopping bill. As well as a money-off voucher, coupons are mailed to customers for products that they buy regularly or on products that Tesco think customers would like to try. The introduction and use of Clubcard has earned Tesco global admiration as a pioneer and innovator in DM, and makes it the leader in the UK supermarket industry (MarketingWeek, 2008). Today, Tesco is exporting its approach, which is based on analysing data effectively using DM, across the world.

Tesco uses Dunnhumby (a British DM firm, now part of Tesco) to analyse the data obtained from Clubcard use, identify each customer’s buying pattern and send rewards to individual customer based on that buying pattern. Currently, Tesco embed the Clubcard information into their product ranges, prices, promotions, space allocations, store designs and locations, and marketing communications, which improves its operations and offers competitive advantages (MarketWeek, 2008).

One-third of UK households are now holders of Clubcards, so the data that Tesco holds on customers has become valuable information for marketing survey companies, for their suppliers and for other businesses.

As discussed in the previous section, privacy and data security are raised as key concerns on Tesco’s ‘exhaustive and secret’ database, although Tesco and Dunnhumby claim that they are very protective on their customers data and meet all the requirements of the Data Protection Act (Tomlinson and Evans, 2005). However, the fact that Tesco holds an impressive amount of information about their customers and sells sample data to their suppliers and other businesses put them at risk of being challenged over privacy and data protection.

Mailing voucher and coupons to all their customers (1/3 of households in the UK) four times a year uses up large amounts of paper, and may leave Tesco open to criticism from environmental campaigners.

Asda is not a DM company, so it does not run a loyalty card scheme, but instead invests the money in a scheme to drive down prices for its customers. As a subsidiary of Wal-Mart, Asda adopts the same business strategies as its parent company, focusing on information about stores rather than information about customers. Asda analyses the data obtained from the system retail link, to manage inventory more effectively, replenishing its stock quickly and with less waste (Taylor, 2009).

However, Asda’s lack of customer related data that allows them to analyse customer buying patterns, segment markets, and target customers individually can cause them difficulties (Taylor, 2009). Wal-Mart has been threatened by Tesco’s use of DM,
especially after Tesco entered the US market in 2006. Another challenge to Asda is the complexity of using and analysing RetailLink data. Navigating the system, finding the correct data, downloading the data, and then creating an actionable report involves a lot of work for the user, especially if the supplier has other retail customers who make the same data available. It is difficult to turn the data into actions for users without data manipulation and analysis skills (Using Retail Link Data, 2010).

### Table 3  A comparison of the ITs applied in Tesco and Asda

<table>
<thead>
<tr>
<th>IT</th>
<th>EDI</th>
<th>RFID</th>
<th>DM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tesco</strong></td>
<td></td>
<td>Tray and case level</td>
<td>Tesco club card</td>
</tr>
<tr>
<td><strong>Web EDI: Tesco link</strong></td>
<td></td>
<td>Opportunities: improved inventory control</td>
<td>Opportunities: segment market and target individual customer;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Opportunities: communicate with all suppliers large or small; better planning for new lines and promotions; improved in store availability</td>
<td>Challenges: insufficient education and training for users in small suppliers; accompanying business process change; initial setup cost in Tesco;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Challenges: cost of RFID implementation;</td>
<td>Challenges: large amount of data to be analysed; data protection of customer; waste paper and criticism from environment protector;</td>
</tr>
<tr>
<td><strong>Asda</strong></td>
<td></td>
<td>N/A</td>
<td>N/A, but analyse the data from Retail Link</td>
</tr>
<tr>
<td><strong>Web EDI: AS2</strong></td>
<td></td>
<td></td>
<td>Opportunities: quick stock replenishment and less waste;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Opportunities: faster and more secure transfer of data; reduced data transmission costs</td>
<td>Challenges: complexity of using RetailLink data; No information about customers.</td>
</tr>
</tbody>
</table>

### 7 Managerial relevance

ITs and their applications in SCs are generally regarded as the highest impact management issues by managers in large retail organisations, and have been well aligned with research trends. Managers have expressed the need for accurate and timely data to facilitate informed decision-making; accurate and timely information increases visibility throughout SCs and improves communication between SC members.

The research reviewed the functionalities and features of EDI, RFID and DM, and explored their applications from the downstream to the upstream of the retail SC, which provides a rich picture for managers as to what the ITs can contribute to building an integrated and transparent SC system. Empirical case studies with Tesco and Asda further validate the findings, and can be used as guidance and information for implementing these ITs.
Through exploring the opportunities and challenges associated with the ITs, this research highlights the potential competitive advantages that retail SCs can gain in adopting and implementing the ITs, and the challenges in the path of adoption. The comparison between Tesco and Asda reveals the practical considerations and preferences these retailers have taken into account, and is highly relevant to practitioners who are at the stage of adopting ITs.

Given the nature of the operations of large and medium sized supermarket-style chains, which could also include such retail outlets as DIY centres and large domestic electrical/computer goods retailers, it is apparent that two key areas where advantage can be gained are through more sophisticated control of stock, including stock held in the pipeline from suppliers and distributors, and knowledge of customers and their buying patterns. The ITs analysed in the research provide both of these to retailers; therefore, the authors would argue that the research presented would, in itself, be of great benefit to those retailers when deciding which ITs to implement.

8 Conclusions and scope of future work

The advent of ITs offers many opportunities to the retail SC, and is acknowledged as being useful in improving business performance and optimising business processes. However, the extent and speed of adoptions of these ITs are impacted by many challenges. Among them, EDI is more widely implemented in the retail SC compared with RFID and DM, and this is attributed to the high setup cost of RFID and complexity of DM. Public perceptions and acceptance of ITs also impact on the decisions of companies; concerns about privacy and security issues associated with ITs need to be addressed to avoid legislation being imposed on them. The next step is to explore how to exploit RFID and DM in more creative ways in order to maximise the benefits and minimise the challenges.

The comparison between Tesco and Asda illustrates the considerations and preferences when retailers choose to adopt ITs in practice. EDI is implemented in Tesco and Asda to record sales and communicate with suppliers. However, the implementation rates on RFID and DM vary with the two supermarkets due to their different business strategies. Tesco is a company which focuses heavily on customer information and endeavours to tailor products to individual customer needs, so RFID is heavily adopted to improve stock availabilities, while DM is implemented to target the correct market segments. Asda is not a DM company, but focuses more on investment to optimise inventory management and bring down prices. However, it has not adopted RFID yet due to the technology’s immaturity and is being helped to progress by its parent company Wal-Mart.

The discussions presented in this paper provide useful insights into the nature of the ITs and their uses in the retail SCs of Tesco and Asda. There is scope for further empirical studies to be conducted with Tesco and Asda, to identify cross boundary implementation of the ITs between different SC entities. This empirical work will highlight the necessity of integrating ITs across a retail SC, emphasise the importance of collaboration and trust between SC entities, and thus facilitate the development of knowledge in a manner by which Tesco and Asda, along with other retailers, can be better advised how to implement them in their SCs. The ITs reviewed in this research will also be investigated in retail SCs other than grocery chains, and a comparison will be...
made of opportunities and challenges encountered in different industry sectors, along with factors influencing adoption and strategies of implementation.

References


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