STRATEGIC SUPPLY CHAIN MANAGEMENT IN A LARGE BAKERY

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ABSTRACT

Electronic Commerce has ignited a range of risks and opportunities in the field of Supply Chain Management (SCM). To minimise these risks and maximise potential payoff, carefully thought out research into the area is needed.

This paper investigates the use of electronic commerce in SCM, using a case study of a large Australian bakery. This study examined how the firm uses E-Commerce to enhance SCM, looking at their past, present and future implementations of E-Commerce in the Supply Chain. Amid increasing importance of electronic commerce to the bakery, preliminary analysis indicates five key areas where electronic commerce has positively affected the supply chain. In addition, a number of costs were observed, some previously unforeseen. Areas for future research are also discussed.

Keywords: strategy, internet, commerce, adoption, supply chain management

Introduction

Information and communication technologies have been undergoing "substantial evolution and development" (Sarkis and Talluri 2004). E-commerce, "the marketing or exchange of products, services or information through the use of information and communication technologies" (Chaffey 2002, Awad 2003), comprises computers, the World Wide Web and the Internet, wireless communications, mobile computing and others. Shaw et al. (1997) postulate that the rate of technology change is so rapid that is affecting every aspect of how business is conducted. One of the major areas where the Internet has had a substantive influence is SCM (Lancioni et al. 2003a).

The Internet has unveiled new opportunities in SCM (Lancioni et al. 2000, Lee and Whang 2001, Swaminathan and Tayur 2003) in terms of both research and practice (Nagurney et al. 2002). As well as being important to research, e-commerce and SCM have received considerable attention from businesses (Au and Ho, 2002). For example, the Internet has created opportunities to integrate information and decision making across different functional units (Swaminathan and Tayur 2003). Accordingly, many companies continue to deploy e-commerce extensively throughout their organisation and their supply chains (Johnson and Whang 2002, Zhu and Kraemer 2002). Sarkis and Talluri (2004) posit that the advent of e-commerce has made SCM even more critical.

Numerous authors have recognised the importance of e-commerce in the supply chain. For example, Gunasekaran and Ngai (2004) argued, "It would be difficult to survive in today's competitive environment without an e-commerce enabled supply chain, the risk of not having an ICT enabled supply chain is enormous both in terms of survival and productivity of an organisation". Extant literature also describes e-commerce in the supply chain as a paradigm for gaining competitive advantage. Gunasekaran and Ngai (2004) claim that e-commerce in the supply chain has gained significance as a paradigm for gaining competitive

advantage. Motwani et al. (2000) agree, arguing that SCM infused by e-commerce is a paradigm to achieve dramatic supply chain improvements.

Other researchers have also noted the importance of e-commerce in achieving a commercially sustainable supply chain. For instance, Graham and Hardaker (2000) highlight the role of the Internet in building commercially viable supply chains. Motwani et al. (2000) concur, when they state that success of companies is partially dependant on their ability to apply e-commerce and information technologies in the supply chain. Gunasekaran and Nagai (2004) postulate that information and communication technologies have had a tremendous influence on achieving effective SCM.

Other researchers have noted the ability of e-commerce to optimise the supply chain. Boubekri (2001) posits that the Internet and related technologies are opening doors for manufacturers to optimise the supply chain and claim that the Internet is becoming more and more important in optimising the flow of materials throughout the supply chain. Au and Ho (2002) postulated that information and communication technologies are essential enablers of the SCM initiative. Gunasekaran and Ngai (2004) support this and say that e-commerce is a key enabling technology for effective SCM. Moreover, e-commerce is taking on a critical role in SCM (Roberts and Mackay 1998). Williams et al. (2002) call this concept the "electronic supply chain" which they say has been described by various authors as "boundary-less, spherical, circular, reconfigurable and even chameleon." It is recognised that e-commerce can add value to the supply chain (Sohal et al. 2002). Straub and Watson (2001) theorise three main issues emerge from using e-commerce in SCM, being the order of magnitude changes in the efficiencies of B2B systems over traditional physical systems, innovative B2B technologies that break the mould with new electronic alliances; and information visibility effects.

The baking industry in Australian is lucrative, with turnover valued at $5.1 billion (Bri Ltd. 2003). The bread market accounts for 23 percent of this, making it the most significant section of the baking industry. The total annual bread turnover is estimated at $1.6 million. The bread market is extremely competitive and fractious (Bri Ltd. 2003). The two major manufacturing players and their two respective subsidiaries in the bread market compete head to head. Together they account for over ninety percent of the total bread production in Australia. The industry is also influenced by two dominant end retailers. The current industry dynamics are centred on transforming market share while reducing SCM costs, including manufacturing, distribution and marketing costs. A crucial issue facing players in the bread market are the drastically high distribution costs (Bri Ltd. 2003). In some circumstances, product is distributed at a loss to the manufacturer.

This environment is a fertile ground for a case study. This paper documents initial findings in a case study of a major Australian bakery's adoption of e-commerce in its supply chain. Specifically, this paper reports preliminary analysis of the costs and benefits arising from the adoption process.

Supply Chain Management

Supply chain management (SCM) is receiving increasing attention from practitioners and businessmen alike. Increasingly sophisticated customer and technological demands have exacerbated the importance of SCM (Lee and Whang 2001). Across the SCM literature, some dominant themes emerged that were relevant to this study, such as the significance of the Management of information flows and current influences.

Strategic Supply Chain Management in a Large Bakery

Gunasekaran and Ngai (2004) proposed that SCM is an increasingly important paradigm; this idea is supported by Kehoe and Boughton (2001). Furthermore, Al-Mashari and Zairai (2000) claimed that SCM has gained increasing interest as a business improvement field. Similarly Lau and Lee (2000) claim that the interest in SCM is increasingly growing. Chiu (1995) says that the heightened intensity of retail competition has drastically altered the way companies distribute their products to customers. This idea is again presented by Motwani et al. (2000) who proposed that organisations are striving to become more competitive in a challenging business environment.

The emphasis throughout the supply chain literature is on the management of information flows and not just tangible product (Gunasekaran and Ngai 2004). Auramo et al. (2002) argue that managing information flow has become as vital as managing the flow of material. This is supported by Francessco and Renato (1997) make similar arguments. Two major influences on SCM are evident throughout the literature: customer's expectations and the pervasiveness of the Internet.

It is no longer sufficient just to deliver a tangible product, customers mandate cost effective delivery of the products to, when, where, how and in the quantity desired (Handfield and Nichols 1998). Swaminathan and Tayur (2003) agree, stating that in the electronic environment, customer expectations in terms of quick and timely delivery have also increased. This point is reaffirmed by Auramo et al. (2002) who propose that more sophisticated customer demands have added complexity to SCM. The point is again highlighted by Johnson and Whang (2002) who say that "modern manufacturing requires flexibility due to stiff competition, fast changing customer preferences, shortening product lifecycle and product variety proliferation".

Throughout the supply chain literature, the Internet emerged as a major influence. Johnson and Whang (2002) propose that nothing has had a more significant impact on supply chains than the introduction of the Internet. Kehoe and Boughton (2001) state that the role of the Internet in the supply chain is considered to be crucial and a main driver of change. Cotrill (1997) goes as far as to claim that "the Internet will be the enabler that ultimately revolutionises management of the supply chain".

The Impact of E-Commerce in the Supply Chain

The impact of e-commerce on supply chains has been significant (Simchi-Levi et al. 2003). In order to examine the impact on an organisation using e-commerce in the supply chain, the costs and benefits were considered. Researchers have identified a myriad of benefits that have been gained from using e-commerce to enhance SCM. For example Handfield and Nichols (1998) note that the principal effect of e-commerce is the creation of new and more profitable supply chains.

Accordingly, the dominant benefit documented in the literature from using e-commerce in SCM is the substantial cost savings that firms have realised. For example Wood (1997) states: "The supply chain of a company represents 60 to 80 percent of a typical company's cost structure therefore just a 10 percent reduction can yield a 40 to 50 percent increase in pre-tax profits" (Wood 1997). This is supported by Soloner and Spence (2002) who spoke of e-commerce in the supply chain as resulting in "startling cost reductions" and "remarkable increases in profit".

Nevertheless, the benefits of e-commerce in managing the supply chain extend far beyond simple cost reduction and increases in profit (Deeter-Schmelz et al. 2001). Other benefits

identified range from increased competitiveness to improved supplier relations. Yet, there has been no systematic assessment of the benefits of e-commerce in the supply chain (Mukhopadhyay and Kekre 2002). Straub and Watson (2001) suggested that studies need to be undertaken to identify what benefits are created for the firm.

In light of this, a review of the literature was conducted to determine common themes and benefits. The documented benefits of using e-commerce in the supply chain and their sources are listed in Table 1.

Table 1. Benefits of Using Electronic Commerce in the Supply Chain

Benefits Derived	Source
Increased Profit	Lancioni et al. 2000, Soloner and Spence 2002, Power and Sohal 2002, Lancioni et al. 2003a, Presutti 2003
Cost Reduction	Roberts 1998, Christiaanese and Kumar 2000, Cross 2000, Lin and Hsieh 2000, McIvor and Huang 2000, Attaran 2001, Lee and Whang 2001 Garicino and Kaplan 2001, Boyer and Olsen 2002, Chaffey 2002, Soloner and Spence 2002, Power and Sohal 2002, Williams et al. 2002, Garcia-Dastuque and Lambert 2003, Lancioni et al. 2003a, Lancioni et al. 2003b, Subramani 2004
Cycle Time Improvement or "Faster" Supply Chain	Segev et al. 1997, Roberts 1998, Jayayram et al. 2000, Walker et al. 2000, Loebbecke and Powell 1998, Attaran 2001, Au and Ho 2002, Power and Sohal 2002, Williams et al. 2002. Awad 2003
Improved Inventory Management	Mukhopadhyay et al. 1995, Roberts 1998, Lee et al. 1999, Lancioni et al. 2000, Walker et al. 2000, McIvor and Huang 2000, Attaran 2001, Power and Sohal 2002, Awad 2003, Lancioni et al. 2003a; Presutti 2003, Simchi-Levi et al. 2003, Subramani 2004
Increased Sales	Mukhopadhyay and Kekre 2002, Power and Sohal 2002, Subramani 2004
Improved Cash Flow	Power and Sohal 2002, Attaran 2001
Increased Efficiency	Lin and Hsieh 2000, McIvor and Huang 2000, Lancioni et al. 2003b, Soloner and Spence 2002, Chaffey 2002, Attaran 2001 Zank and Vokurka 2003
Increased Productivity	Lancioni et al. 2003a, Power and Sohal 2002
Increased Flexibility	Power and Sohal 2002, Lancioni et al. 2003a
Improved Service Quality	Power and Sohal 2002, Lancioni et al. 2003a, Attaran 2001, Lancioni et al. 2000, Lin and Hsieh 2000, Awad 2003, Simchi-Levi et al. 2003
Improved Purchasing and Procurement	Chaffey 2000, Chaffey 2000, Lancioni et al. 2000, Attaran 2001 Lancioni et al. 2003a
Improved Order Processing	Chaffey 2000, Lin and Hsieh, 2000; Lancioni et al. 2000; Walker et al. 2000, Williams et al. 2002, Lancioni et al. 2003a
Improved Supplier Relations	Chaffey 2000, Lin and Hsieh 2000, Lancioni et al. 2000, Attaran 2001, Lancioni et al 2003a, Zank and Vokura 2003, Subramani 2004
Improved Transportation and Delivery	Mukhopadhyay et al. 1995, Roberts 1998, Lin and Hsieh 2000, Attaran 2001, Boyer and Olsen 2002, Lancioni et al. 2003a
Improved Customer Satisfaction	Loebbecke and Powell 1998, Boyle and Alwitt 1999, Walker et al. 2000, Power and Sohal 2002, Lancioni et al. 2003a
Reduced Errors	Attaran 2001, Warschum and Schneidewind 2002
Increased Competitiveness	Walker and Martha 2000, Attaran 2001, Simchi-Levi et al. 2003, Gunasekaran and Ngai 2004
Improved Information Management	Mukhopadhyay et al. 1995 Boyle and Alwitt 1999, Lancioni et al. 2000, Lin and Hsieh 2000, Attaran 2001, Lee and Whang 2001, Chaffey 2002, Garcia-

Dastugue and Lambert 2003, Lancioni et al. 2003a, Gunasekaran and Ngai 2004

Despite the reported benefits of e-commerce implementation, the literature does not suggest that e-commerce implementations are a panacea for SCM (Simchi-Levi et al. 2003, Themistocleous et al. 2004). In order to increase the understanding of these opportunities, more research is required (Gattiker et al. 2000) in the role and impact of e-commerce in SCM.

Research Method

In order to obtain meaningful and useful information, research must be undertaken using an appropriate method. Common research methods include surveys, focus groups, experiments, data mining, events study, historical research, grounded theory, action research, literature reviews, ethnographies and case studies (Miles and Huberman 1994, Cooper and Schindler 2003, Salkind 2003).

The choice of research method depends on the nature of the phenomenon being studied (Morgan and Smirchich 1980, Benbasat and Zmud 1999), the feasibility of the research (Cooper and Schindler 2003) and the relevant discipline areas (Benbasat et al. 1987)**. Singleton et al. (1993) recommend case studies when the item under study is a single social phenomenon or a single unit of analysis, such as an organisation. The dynamism of the subject matter (Benbasat and Zmud 1999) also warrants a case study being conducted.** Given these constraints and the issues identified in the literature, a case study approach was chosen as a suitable method to achieve the goals of the research.

Site Selection

Site selection is a critical part of case study design (Stake 1995, Patton and Applebaum 2003, Yin 2003). Patton and Applebaum (2003) argued that "the researcher must strategically select a case that is pertinent to the object of study and that will allow the subject to be investigated fully". A single case study was further justified as the organisation is unique (Ellram 1996, Dube and Pare 2003, Salkind 2003, Yin 2003). Furthermore, a single case study was appropriate given the study's time constraints (Dube and Pare 2003). Moreover, gaining access to the site is paramount (Yin 2003). Without access, the study cannot proceed. Special access, like in this study is important to research, as it allows the researcher to access an interesting site that would otherwise be unavailable for research. This was a contributing factor to the selection of the case site (Perry 2001, Yin 2003).

The site was intentionally selected based on the uniqueness and complexity of its supply chain, and its accessibility (consistent with Eisenhardt 1989). The case firm has a complex supply chain system that has been described as a "logistical nightmare" (Human Resources Manager). Consequently, the resulting unit of analysis was a large bakery in Australia. As prescribed by Yin (2003), the researchers developed case study and interview protocols.

Evidence Collection

Evidence was gathered using a variety of methods, including observation, interviews and documentation (Eisenhardt 1989, Yin 2003). The primary tool used to collect the data was

interviews, based on Miles and Huberman's (1994) advice of "watching, asking and examining". Interviewing is an effective way to inquire about subjects that are exclusively internal to participants, such as opinions, expectations and intentions (Yin 2003, Cooper and Schindler 2003). The interview is also a principal tool for obtaining descriptions and interpretations from others (Stake 1995). Seidman (1991) also states that the primary way for a researcher to investigate an organisation is by interviewing the individuals who comprise the organisation or carry out its processes. Ten interviewees were selected from various levels of the organisational hierarchy. The interviewees included General Managers, Regional Managers, National supply chain Managers, Regional supply chain Managers, IT Managers, IT Personnel, Vendors and Delivery Drivers. The aim was to seek a wide range of opinions and experiences from various levels of the organisation in order to obtain an accurate picture of the circumstances at the bakery.

The questions were designed to be short and open ended, and as unbiased as possible. In addition to this the questions were aimed at exploring, the past, the present and their future intention. This was incorporated into the interview framework, which was developed to ensure that the questions posed during the interviews adequately addressed the central research question and the three purposes of the research.

An interview protocol was developed. This protocol was designed to ensure orderly collection of the data, to help guarantee that the questions asked met the objectives and purposes of the case study and to provide a reliable framework for analysis of the data (Yin 2003). The major sources of documentation were eight interview transcriptions and five websites. A limited number of documentation from other sources was also used. Table 2 lists the sources of this documentation.

Table 2. Sources of Documentation

Internal	External
Emails	Annual Reports
Memos	ASX Announcements
Reports	Newspaper Articles
Faxes	Websites
Presentations	Press Releases
Mission Statements	ACCC Reports
Procedure Statements	
Job Descriptions	
Training Manuals	
System Documentation	

Data were analysed using methods presented by Miles and Huberman (1994) and Yin (2003). The tools and techniques used to analyse the data are listed in Table 3.

Table 3. Methods for Data Analysis

Method	Source
Convergence of Data	(Yin 2003)
Creating Data Displays	(Miles and Huberman 1994)
Putting information in chronological order	(Miles and Huberman 1994)
Calculating the frequency of certain events	(Miles and Huberman 1994)

Open Coding	**(Miles and Huberman 1994)**
Developing a case description	**(Yin 2003)**
Pattern Matching	**(Yin 2003)**

As specified in the interview protocol and recommended by Miles and Huberman (1994), the information obtained during the case study was organised, analysed and presented in chronological order. As recommended by Miles and Huberman (1994), interviews were transcribed and coded. The data were then converged (Yin 2003) from the various documentation and interview sources in order to derive facts for the case.

Analysis

The case firm is a dominant player in the Australian baking industry. It is a leading manufacturer of bread, biscuits, cakes and smallgoods, with an annual turnover in excess of $1.3 billion and currently employing approximately 7000 people. It is majority owned by a large foreign multinational, one of the world's most prominent food companies. It is a vertically integrated business; the company owns everything from research and development to flour milling to the bakeries that manufacture their products.

The case firm began as an amalgamation of several small bakeries shortly after World War II. Since then it has grown to become Australia's leading bread manufacturer, producing white wholemeal and grain bread, muffins, crumpets, rolls, and Lebanese, Turkish and pita breads. The firm's range comprises nine principal nine brands, also manufacturing named products for Australia's largest supermarket retailers. They have rigorously promoted their brand and products over the years to develop strong recognition. The firm's performance and market leadership status make it an ideal candidate for case study research.

This section first examines the benefits the bakery derived from using e-commerce in the supply chain, with respect to the existing literature, followed by the costs incurred. Next the management issues arising from the case will be discussed.

Realised Benefits

Commensurate with the literature, discussed earlier, The bakery discovered several benefits from implementing e-commerce in the supply chain, as discussed below.

Increased Efficiency
The bakery discovered that employees saved hours of time and money with the new handheld computer system. They also found that they could achieve the same task with fewer employees. For example, interviewers made remarks such as "The supply chain is now more streamlined" (Sales Manager), "The supply chain is a lot faster" (General Manager) and "I can't believe how much time it saved me" (Distributor). The contributing factors to increased efficiency are captured in the diagram below.

Reduced Data Entry
"The driver would have their copy, the customer would have copy, and we would have a few copies floating around and consolidate them all at the end of the day it was very inefficient" (General Manager). The bakery discovered that the amount of data entry required was reduced significantly and virtually eradicated with the introduction of e-commerce into the supply chain. "The system eliminated the transcription of data" (Vendor). At different nodes of the supply chain, data entry was reduced. For example, the bakery was able to reduce up to seven or eight entries of the same data down to one.

Improved Order Processing
The bakery found that the speed and accuracy of order processing thoroughly improved upon the implementation of e-commerce. "Improved order processing definitely has to be one of the major benefits" (Supply Chain Manager). The bakery were able to process orders much quicker, and through a variety of methods via telephone, fax, EDI, E-Mail. This was revealed in an interview with a Sales Manager, who discussed the various mediums for accepting orders. "We accept orders though phone, fax, E-mail and the Internet". As a consequence of implementing e-commerce in their supply chain, The bakery achieved improved order processing. For example with EDI, The bakery were able to import the orders into their system automatically, this substantially reduced the number of errors and time take to process orders.

Reduced Errors
With e-commerce there is "less opportunity for human error" (Sales Manager). The bakery saw that the number of errors reduced substantially with the introduction of e-commerce. In fact, every single participant interviewed mentioned increased accuracy as a benefit of using e-commerce in the supply chain. In particular a vendor at the bakery spoke of the reduced error rate and increased accuracy resulting from the use of e-commerce in the supply chain. "You can imagine that I have a two percent to four percent error rate every day, and so does every other vendor, and this gets multiplied every time the figures were read, it costs [the firm] a lot of money...the system eliminated the day to day errors…accuracy was the main thing, you could tell at the end of the day…" (Vendor). The reduced error level was an obvious benefit of using e-commerce in the supply chain at the bakery, resulting from the reduced data entry.

Increased Customer Service
With the introduction of new information and communication technologies, The bakery were able to service their customers through a medium which suited them. This was revealed in an interview with a sales manager who stated: "We can serve the customers though a variety of means, and they are happier". The bakery found that this increased the level of customer's service. For example, the sales manager stated: "We found that we can serve the customers much better… sales staff can talk to supply chain managers or go down to stores with their laptops and show customers a visual representation of what we are doing for their business". The bakery was able to find new and innovative ways to keeps their customers happy through the implementation of e-commerce.

Improved Inventory Management
The combinations of enterprise resource planning systems (ERPS) and e-commerce communications have improved Inventory Management at the bakery. This was exposed in an interview with a supply chain manager who claimed "When you rely on manual requisitions, manual counts and gut feel, you get shrinkage. Basically we were getting it wrong" (Supply Chain Manager). A distribution manager further went on to say that after the implementation of e-commerce, "we now know where the inventory is at any given time, where it is going, and approximately when it will get there" (Distribution Manager).

Improved Purchasing
The bakery realised that using e-commerce in the supply chain was able to improve their purchasing process. This was made apparent in an interview with a supply chain manager, who stated: "We now know what to order, it's a case of what you should be holding versus what you think you should be holding". With the improved Inventory Management, The bakery were able to more accurately track their inventory. As a result purchasing became less of a guessing game and more a planned, forecasted endeavour.

Reduced Costs
The bakery attained reduced costs from implementing e-commerce in the supply chain. These reduced costs came in a variety of forms, including remuneration, data entry, and process shrinkage to name a few. Reduced costs were attributed to many of the other benefits associated with using e-commerce in the supply chain.

Novel Benefits

The bakery also found some interesting benefits that the literature had paid little attention to including reduced labour costs, increased visibility, improved job satisfaction, improved returns management process and improved fraud management.

Reduced Labour Management Costs
The bakery discovered that adopting of e-commerce in their supply chain resulted massive reduction in the amount of administrative staff required. Moreover, employees throughout the supply chain were able to save time throughout their day resulting in further cost savings for the firm. In sum, reduced labour costs realised substantial savings.

Increased Visibility
Straub and Watson (2001) and Swaminathan and Tayur (2003) postulated that increased visibility would be an important issue in using e-commerce in the supply chain. Accordingly the case firm discovered that increased visibility was an important consequence of implementing e-commerce in the supply chain. "We found there was more visibility" (Distribution Manager). They discovered that they were now able to know where products were in their supply chain. This was a vast improvement as, previously, product process identification had been difficult.

Improved Job Satisfaction
Improved job satisfaction was evident from the vendors to the sales people. "It was good, really good, there's no question about that. It made my job much, much easier" (Vendor). From participant comments, it was evident that improved job satisfaction was a consequence of implementing e-commerce in the supply chain. For example a Sales Manager stated, "It allowed us to give our sales people freedom; they are much happier". The researchers saw that some participants personally felt their job satisfaction had increased as a result of implementing e-commerce in the supply chain.

Improved Fraud Management
One of the major benefits discovered from implementing e-commerce in the supply chain was a major reduction in fraud. The old systems did not allow for proper inventory management, making fraud detection difficult and costly. But with e-commerce, things have changed. A Sales Manager said, "Something that might normally slip through the cracks will now be highlighted". A Distribution Manager noted, "e-commerce will help to stop corruption…we are now more aware, and people are more accountable". Similarly, a Supply Chain Manager argued that "Before, at no point did the financial people know what money was where". Upon analysis of that data it was clear that other benefits combined led to the reduction of fraud.

Unrealised Benefits

Contrary to literature theory, the case firm did not realise any of the following benefits by implementing e-commerce in the supply chain.

Improved profit
Although it is natural to assume that the culmination of other benefits such as reduced costs would result in increased profit, no participants made any mention of an increase in company profits. This may be due to the fact that in increase in profit is difficult to measure, as profit is affected by many other variables. It may also be because of the large costs incurred to implement the e-commerce in the supply chain. All other things being held constant, it could be presumed that implementing e-commerce in the supply chain results in an increase in profit. However, this was not a finding of this case study.

Increased Flexibility
The bakery actually felt that IT had stifled their flexibility. This was discovered in an interview with a supply chain manager, who stated that: "I think these systems are great in some respects… but they are just not suitable for our business, not appropriate... and inflexible" In our business things change every five minutes… there is a hive of activity… we need unique systems that make quick decisions". This case study did not find that increased flexibility from implementing e-commerce in the supply chain.

Improved Transportation
The implementation of e-commerce in the supply chain did not result in improved transportation. In terms of the all important "last mile" (Supply Chain Manager) problem of actually getting the product to the customers, e-commerce has not affected the way this is done at [here]. I think in terms of the base supply chain operations, in terms of how we get the product to the customer, e-commerce has not impacted it all" (Supply Chain Manager). This is perhaps due to the nature of their product, bread and consumables, which cannot be delivered online. Similarly, there was little evidence of any improvement in the time taken to deliver product from conception to consumption.

Improved Supplier Relations
One Supply Chain Manager noted, "We do not conduct any type of electronic procurement with our suppliers, and I think there is a big scope for improvement there". The case study did not observe improved supplier relations with e-commerce, as they have yet to implement e-commerce into the supply side of their supply chain.

Improved Cash Flow
No participants mentioned an improvement in cash flow. There was mention that e-commerce provided the firm with different means of making and accepting payment with suppliers band customers. However it is not reasonable to assert that implementing e-commerce in the supply chain resulted in an improved cash flow.

Increased Competitive Advantage
Contrary to much literature theory, managers did not perceive that they gained competitive advantage from their use e-commerce in the supply chain. This was revealed in an interview with a Sales Manager who stated that: "We are basically playing catch up on this one rather than gaining a competitive advantage. Our competitors are more innovative and leading edge, we like to research and think things through before we implement". Respondents felt that the implementation of handheld computers was just keeping up with their major competitor, Buttercup, as opposed to actually giving them a competitive edge. Further, respondents sometimes felt that they had to implement the solutions in order to survive, consistent with Talluri (2000). This was uncovered during an interview with a supply chain manager, who claimed: "We just had to do it to stay in the market, we had no choice".

In addition, the use of e-commerce in a supply chain is often instituted by the leader in the supply chain and consequently can be an unfortunate strategic necessity for suppliers

(Subramani 2004). Accordingly respondents signalled that the firm felt compelled to adopt e-commerce in their supply chain. The reasons behind the adoption of e-commerce was an interesting find from the case. At no point during the study did the researcher observe that the firm had implemented e-commerce into their supply chain of their own accord. Implementation had generally been imposed on the bakery from other sources. Instead, the bakery had actually been forced into e-commerce adoption by their major customers. This was revealed in an interview with a supply chain manager, who stated: "It depends on the customer really. Our major customer will draw out terms rather than mutually agree. They don't negotiate, We'll they do, but there is only a 20 percent chance of us getting what we want, and that's if we're lucky" (Supply Chain Manager) The participant further went on to say, "They almost use technology as a weapon".

In other cases the firm had implemented their IT and e-commerce solutions as prescribed by one or more of their controlling entities. For instance, one multinational firm, which own 78 percent of the bakery's parent company, imposed a particular IT product on all its subsidiaries. One supply chain manager revealed, "Our parent company forced the [ERP] adoption upon us – we didn't really want it" (Supply Chain Manager).

Costs

The bakery faced typical costs such as "software, hardware and implementation costs" (General Manager). "Plus the costs of interfacing" (Supply Chain Manager and Vendor). These can involve "horrendous initial costs…with…large ongoing management costs" (Supply Chain Manager). As well as the expected costs, the bakery faced additional unanticipated costs from implementing e-commerce in the supply chain, as follows.

Anticipated costs included hardware, software, installation, consultancy fees. For example, a General Manager noted, "The hardware isn't cheap - the handheld terminals cost about five thousand dollars each". A vendor added, "and they get dropped, they fall off trucks, they break, accidents happen". The bakery had also anticipated disruption to the firm, with "the usual teething problems that come with any new system. It cost time, there's no question about it" (Supply Chain Manager).

However, most interestingly, the bakery also faced unanticipated challenges in the implementation process. The first unanticipated cost involved the threat of redundancies and associated backlash from unions. "The biggest cost is pulling people out, and the lengths you have to go to pull them out" (Supply Chain Manager) The increased efficiency resulting from the implementation of e-commerce resulted in staff becoming redundant. In some instances, the firm was able to retrain staff and move them to different parts of the organisation. The bakery also faced stiff opposition from employee unions, who lobbied on behalf of laid-off staff.

A second major obstacle in the implementation of e-commerce was the time that it took to retrain the staff. "A big cost was the time it took to train staff" (Supply Chain Manager). Several managerial respondents believed that they were obligated to longer-term staff: "We had no choice but to retrain" (Sales Manager).

The third unanticipated cost was the apparent backlash from dishonest people who were no longer able to cheat the system: "You get some backlash for people who may have been less than honest in the old system" (General Manager). The bakery discovered instances of employees and contractors showing fierce resistance to the system because it hindered their dishonest behaviour.

Management Issues

Adoption of e-commerce can involve deep level changes that affect the core levels of the organisation, such as business mission, vision, strategy, structure, size, goals, culture, technology, training and policies (Mukherji and Mukherji 1998). Furthermore, implementation issues have been significant in achieving the full potential of e-commerce in the supply chain (Gunasekaran and Ngai 2004). The firm also had to deal with crucial organisational issues surrounding their e-commerce implementations.

The bakery found that their organisational culture was an obstacle the seamless implementation of e-commerce. "In terms of a company that accepts and embraces technology, we are definitely not one of those" (Supply Chain Manager). Another Supply Chain Manager noted, "We are not considered to be the leading IT innovator; we are more of an old fashioned company". This problem could be attributed to the fact that the firm comprises a more mature workforce, who are relatively inexperienced users of IT and e-commerce: "We have a more mature work force. We have guys who have never even touched a keyboard, haven't seen computers before" (Sales Manager).

Similarly, at the extreme, the firm had observed many employees who absolutely refused to accept change. A Distribution Manager noted, "You'll always have the dinosaurs, who refuse to accept change". A Vendor noted, "The term 'dinosaur' comes to mind, people who are very reluctant to change". These dinosaurs can substantially impede if not prevent successful e-commerce implementations. For the successful implementation of e-commerce, a significant change in corporate culture was required: "We weren't quite ready for it, It took a long time to adjust" (Supply Chain Manager).

The increased efficiency derived from implementing e-commerce in the supply chain resulted in the firm undergoing significant corporate downsizing. Entire administrative sections were no longer required. However, at the same time, because the bakery progressively rolls out their systems, adopting a phased approach, in-house IT management teams had increased. These project teams consist of Information Systems personnel and external consultants. While the dedicated project team approach proved to be a successful method of managing e-commerce , there was a shift in corporate staffing.

Summary and Conclusions

This case study explored the role of e-commerce in a major Australian supply chain.The firm has realised a majority of the benefits identified in the literature. Overall, respondents believed that the benefits of implementing e-commerce in the supply chain outweigh the costs, but they felt that these benefits don't come easily. This is consistent with Motwani et al. (2000), Spekman et al. (2002) and Gunasekaran and Ngai (2004). A General Manager noted, "The benefits outweigh the costs, but there is a lot of heartache on the way". Respondents also spoke about costs being mostly short term and the benefits being long term. "The long run benefits outweigh the short term costs" (Distribution Manager). Importantly, however, short term cost-benefit analysis would find that e-commerce implementation was not worthwhile: "you can't afford not to think in a progressive manner, you just can't" (General Manager).

The firm did not realise all projected benefits from the implementation. In some instances, it can be attributed to firm culture. For example, in an interview with a supply chain manager, it was revealed, "In terms of a company that accepts and embraces technology, we are definitely not one of those…there's a lot of room for improvement". It is also important to note that as each organisation is unique, each organisation would attain different costs and

benefits from implementing e-commerce in the supply chain. "We are not considered to be the leading IT innovator; we're more of an old fashioned company" (Supply Chain Manager).

The case has rendered some new and interesting benefits not found in the general literature. Likewise, the bakery has incurred costs both consistent and inconsistent with the literature. The firm underwent changes to their culture, structure, technology and training before the successful implementation of e-commerce was possible. One lesson to be learned is that, as every organisation is unique, every organisation may receive different results from implementing e-commerce in the supply chain. An interesting finding from the case was how major retailers use their power to impose e-commerce solutions onto suppliers.

Overall the implementation of e-commerce resulted in improved SCM. In the manufacturing industry, aside from benefits to efficiency, cost reductions, improved inventory management and increased accuracy, there may be unanticipated consequences from e-commerce implementation. "There is a lot of heartache along the way" (General Manager). A supply chain is a complex system which crosses inter-organisational boundaries. When considering implementing e-commerce in a supply chain, businesses have to choose technologies appropriate for every single organisation in their supply chain, which is no easy task.

While the single case study approach proved useful for generating meaningful insights and gaining a deep level of understanding about the case site, consistent with Patton (1998), the study may be open to some limitations. The case was conducted in the manufacturing industry in the Australian context; the results may not be generalisable beyond these settings. This study was formed on the basis of opinions, reflections, and attitudes of the employees. While every effort was made to ensure accurate and reliable data, there can be no guarantee that the scenario presented accurately reflects the present situation at the bakery.

A single case study can be useful for gaining deep insights in theory building (Dyer and Wilkins 1991, Stake 1995, Yin 2003). However, Lee (1989) claimed that the fact that a case is marked by unique and non-replicable events makes it vulnerable to the charges that its findings cannot be easily generalised onto other settings. This in highlighted by Patton and Appelbaum (2003) who claimed that "what the case study gains in depth, it loses in breadth." Case studies are also commonly criticised on the basis that the results are not representative of the broader population (Lee and Baskerville 2003, Yin 2003).

As highlighted by Dube and Pare (2003), the researcher is confined by the boundaries of time. Similarly, the researcher's presence may affect the behaviour of the organisation and the individuals within it. This is evidence where participants may adjust their behaviour in an attempt to influence the researcher's perception of them or the organisation they work for. Foddy (1993) reinforces this and claims that the actual act of conducting a case study may influence participant behaviour.

This case study spawned several topics for future research: some of the notable issues include, first, the suitability of technology with a diverse customer base. One manager noted, "there is a dilemma that we have a diverse customer base, and it is hard to serve them all; with suitable technology…you have to be aware of the suitability of different types of technology for your customers". The bakery has a large and diverse customer base. Any business-to-business e-commerce must take this into consideration.

Similarly, an issue facing many businesses is whether it is better to "jump straight in" and embrace new technologies, or to "test the water before you dive". "Our competitors are

more innovative and leading edge, while we like to research and think things though before we go ahead with them" (Sales Manager). Nearly all interviews spoke of not knowing what the future holds. Minimising uncertainly would be of particular interest to practitioners in the field. Which is a more successful strategy? What part does corporate culture and risk adversity play in this?

Several studies make reference to the benefits of using e-commerce in the supply chain, however few studies explore the social costs incurred. The costs of using e-commerce in the supply chain extend far beyond the tangible costs such as software and hardware. There are more complex, unanticipated costs that receive little mention in the literature, such as the backlash from dishonest workers, the costs of redundancy court cases and union disagreements.

Internal and external power shifts would also make for interesting work. The firm found that it could significantly reduce the number of staff after implementing e-commerce into their supply chain. Research could be conducted to discover if this is common for all organisations. Research posited that e-commerce would bring about a power shift from manufacturers to customers. In this case, the power already rests at the hands of the major retailers, who are able to leverage their economies of scale and enforce technology upon their suppliers.

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