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Chapter V

Information Sharing in Supply Chain Systems

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Abstract

This chapter considers the importance of information-sharing techniques and strategies employed by industry sectors. Well-developed supply chain management often brings with it improved buyer-supplier communication processes, and we consider the impact of these not only from an intersector point of view, but also from a cross-sector viewpoint. The particular perspectives of the small business within a supply chain structure and of the supply chain customer are examined in detail. We conclude that information sharing is a critical component of business success both inside and outside the supply chain structure. However, while globally and at the large business level, both development and implementation of such technologies have mushroomed, smaller enterprises have tended to be left behind to cope as best they can with multiple pressures to conform.
Introduction

In Kannan and Tan (2002), the authors consider relationships between supplier management and improvements in business performance within several large US firms. In their study, they examine "relationships between the perceived importance of supplier selection and assessment criteria for items being used in production and business performance" (Kannan & Tan, 2002). Included in the study are several hard criteria such as price and quality, as well as a number of soft criteria such as management compatibility, integrity and buyer-supplier fit.

The authors conclude that "no evidence exists on the impact of supplier management on a buying firm's business performance" (Kannan & Tan, 2002). However, they identify one supplier assessment factor that correlates positively with all performance measures—a factor that also was considered to be least important by the group of respondents to the survey. This factor was information sharing. The authors conclude that "the results suggest the need for further study of buyer-supplier communication processes" (Kannan & Tan, 2002).

In this chapter, we discuss information-sharing mechanisms employed by industries in a number of sectors. In general, we restrict the discussion to those industry sectors in which supply chain management has been undertaken in an attempt to involve the entire sector. However, we also look at some of the sectors where it is evident that a lack of sector organization is causing major problems. Well-developed supply chain management often brings with it improved buyer-supplier communication processes, and we consider the impact of these not only from an intersector point of view, but also from a cross-sector viewpoint; not only within Australia, but also beyond national borders.

In a 2002 survey by the Center for Automotive Research (Frontline Solutions, 2002), it is reported that 47% of respondents expect adoption of e-business procedures as a supply chain tool to be a requirement for doing business with the automotive industry within two to three years. Additionally, the survey showed that a majority (81%) of suppliers anticipate a consolidation of the automotive supply chain in the near future and that, in consequence, customers will reduce their supply chain base all the way along the chain. A major result of these changes is likely to be a greatly increased information-sharing capability between the members of the supply chain.

An additional factor promoting information sharing is an industry sector's self-review process, which can reveal major inadequacies in operating methods. For instance, a report of the Australian Construction Industry Forum (PricewaterhouseCoopers, 2002) indicated that 30% of a construction project's total cost is the result of poor information management. The cost savings anticipated from rectifying such problems are a powerful motive for the adoption of new operating methods.
Information-Sharing Mechanisms

Bar coding is a major means of information sharing both within and between sectors and countries. The most prevalent bar coding system now used in Australia is the international EAN system. EAN recently has joined forces with the Uniform Code Council (UCC), which has taken a global leadership role in establishing and promoting multi-industry standards for product identification and related electronic communication with the goal of enhancing supply chain management. For instance, the meat and wool industries, which form significant components of the wholesale trade industry, have been persuaded to implement EAN bar code technology and have developed guidelines for the use of bar codes. Despite the huge and disparate nature of the wholesale and retail trade industries, much standardization has been achieved by adoption of the EAN-UCC numbering and bar coding system.

In his study of business-to-business e-commerce in Australia, Malone (1999) states, "the transport industry provides the logistical operations for Australian business through the movement of goods in the supply chain and to market. ... [I]ts adoption of eCommerce is likely to drive eCommerce uptake in the many sectors it services...with consequent benefits for those sectors". The implication is that the technology actually adopted will be shared by many components of the transport industry, which will promote interoperability and, hence, information sharing among several industry sectors, including those overseas.

The finance and insurance sector is worthy of special mention in that it already operates what is effectively a single mechanism for information sharing, managed by the SWIFT consortium, which has been in existence since 1977. SWIFT (http://www.swift.com) is an industry-owned, international cooperative (under Belgian law) supplying secure messaging services and interface software to 7,000 financial institutions in 200 countries. Such a broad grouping of parties shows just what is possible when information sharing is seen as a goal in its own right.

Despite the pressures for improved information-sharing mechanisms, information-based transaction methods have diverged along two paths. One of these is based on XML and the other on EDI. Significant incompatibilities between these two systems have forced people to choose one over the other, but more recent drivers for a single technology underlying business processes are resulting in a movement to one new system that combines the best of both.

Until the underlying technical issues are resolved, we will continue to see the problem of disparate or competing technologies as they exist worldwide in the health industry. In Australia, EDI was successfully implemented for orders and confirmations for manufacturers and distributors with supply chain reform pilots in some hospitals as a result of a nationwide government-sponsored special project that ran from 1996 to 2001 (The PECC Story, 2001). On the other hand, Global Health Exchange (http://www.ghx.com), based in Europe and North America, was founded in 2000 by five leading healthcare suppliers: J&J, GE Medical, Baxter, Abbot Labs, and Medtronic. It provides supply chain solutions based on customized code to bring together hospitals, manufacturers, and wholesalers. Yet a third consortium is HL7, which is based on a set of American National Standards Institute-approved standards, covering clinical documents and the sharing...
of medical knowledge, as well as administrative documents covering such items as intellectual property and ethics.

An industry that lags behind most others on the information-sharing front is construction. A report of the Australian Construction Industry Forum indicated that 30% of a construction project's total cost is the result of poor information management. Much of the problem is blamed on the failure of hardware and software solutions to meet operational requirements that include mobility of the workforce, diverse working conditions, and lack of a fixed infrastructure.

In January 2000, the Construction Industry Advisory Group BSITE (http://www.bsite.com.au) was formed. This was an amalgamation of 20 industry leaders from throughout the industry supply chain in Australia and New Zealand. BSITE uses technology already prevalent on construction sites, such as mobile phones and fax machines, to perform core functions, including job scheduling, time sheeting, activity logging and reporting, contract management, project workflow, and document revision. Thus, rather than being specifically a supply chain management consortium, BSITE focuses on workforce management and project collaboration. They have adopted various global standards for communication between the user and BSITE's software and simultaneously have used this arrangement to shield the customer completely from the implementation of that software (Batten & Savage, 2003).

Common standards adopted by a group of businesses can be seen to be of great convenience to those in the group. However, the standards themselves often are not a solution to the problem of sharing data at a more global level. This leads us to consider several questions in this chapter:

1. What is the effect on a single supply chain of forcing its companies to adopt a single system to guarantee interoperability?
2. In particular, what would be the impact of such a move on the small and medium suppliers within the supply chain?
3. What impact would it have on customers beyond the supply chain?
4. What are the global implications of single supply chains committing to a specific technology for information sharing?

These points are expanded one by one in the sections that follow.

Supply Chain Induced Systems

Suppliers often are not given a choice when it comes to the decision to join a supply chain or a similar consortium. Wal-Mart, for example, has demanded of its suppliers that they implement CRP (Continuous Replenishment Process) (Green & Shaw, 2003).

In discussing the impact on a single supply chain of forcing its companies to adopt a single system to guarantee interoperability, we note that this single new system already
may be in use by some businesses in the supply chain, so adopting it actually may not incur a cost for them. On the other hand, those businesses who decide to move from an existing system to the proposed one will need to factor in the costs of discarding current physical resources and replacing them with new equipment, as well as the costs of retraining staff to use this new equipment.

We now consider the advantages and disadvantages to businesses.

Advantages

- **A1. A feeling of security in joining a group of similar organizations.**
  Joining such a group in effect is joining a community of like-minded entities, which can help suppliers reassure themselves that they have taken the correct decision. Such communities have become the norm, and, hence, suppliers now can concentrate on availing themselves of the advantages that result. In Shaw (2003), the author points out, “In running an e-business the Web-based supply chain model provides opportunities for several companies to work together and form a virtual enterprise” (p. 8). Such interactions then can be described as a supply web rather than just a supply chain.

- **A2. A reduction in the uncertainty surrounding the adoption of e-business in general and in the question of which system to adopt in particular.**
  The decision ends the uncertainty over what course of action to adopt and, hence, frees the supplier to focus on other matters. By choosing a specific system, the supplier’s uncertainty is replaced by an expectation that concrete benefits will flow from the interoperability of the system.

- **A3. Saving (part of) the cost involved in committing some of the supplier’s resources to investigating which system to choose.**
  Choosing a system being operated by other members of a supply chain means the supplier can stop expending resources on the decision process and, instead, concentrate on the implementation process. Choosing a system that is working for others means the supplier is utilizing the effort expended by those others in their investigation of which system to adopt. This saving can be achieved by a process that is quite informal. As explained in Tatnell & Burgess (2004), “In many instances a small business proprietor will adopt e-commerce because a friend is using it, or because they know a competitor is using it, or because a son or daughter learned about it at school” (p. 156).

- **A4. A greater likelihood of ongoing business with customers with whom the supplier is compatible.**
  Once an interoperable system is chosen, the supplier reasonably can expect that this will encourage others using the same system to want to do business with them, since the very interoperability means they can assume the effort involved will be less than it would have been otherwise. Of course, it is not normally the suppliers who are developing these systems, but other agencies. As with any software
purchaser, the supplier must assume the agency developing the system they have chosen is aiming at goals that are shared by the supplier. For instance, "RosettaNet seeks to enable interoperability in a supply chain by developing modularized technical standards surrounding shared business processes between supply chain partners" (Nelson et al., 2003, p. 426). This explicitly stated goal is, of course, in accord with suppliers’ expectations of what such systems ought to offer.

**A5. A greater likelihood of ongoing business with other suppliers for whom the current supplier is a customer.**

This is part of what is called the *virtual organization*, or the *extended enterprise*. Interoperability is a two-way street. With appropriate systems in place, a supplier more easily can become a supplier to new customers, where those customers are using compatible systems. In addition, the supplier more easily can become a customer to other suppliers, where those suppliers are also using compatible systems. "[Buyer organizations should not only look to add more of their suppliers to the system, they should also motivate the suppliers’ suppliers to join]" (Subramaniam & Shaw, 2003, p. 458).

**A6. The reduced likelihood of similar changes again in the future now that the members of the supply chain have committed to a standard system.**

Adopting a standard of any sort is a good excuse for conservatism. A supplier, having expended the resources to adopt such a system, is motivated to continue utilizing it, and all such suppliers and customers automatically become a block of like-minded entities with an investment in minimizing repeated expenditures of the same type. This, then, becomes a form of pressure helping to minimize changes in the standard and further helping to minimize the likelihood of changing to a new standard.

### Disadvantages

**D1. Loss, or perceived loss, of independence in the supplier’s decision-making processes.**

Choosing a computer system is not an exact science. Hence, deciding what choice to make is going to be difficult for many suppliers. Most likely, the larger the organization, the more resources it can afford to dedicate to the selection process. But since, in Australia as elsewhere, the majority of organizations are small, many will be dependent on external parties to assess the alternatives.

Joining a group and adopting the system(s) used by the group is saying, in effect, that the supplier adopts the decision-making process which led to the group’s choice of system(s). Whether or not the supplier was involved in the decision-making process, it is obliged at the end of the day to accept the final outcome. Thus, the supplier may not actually have much influence either on the process or on the outcome, which could, in fact, leave its people feeling frustrated.
• **D2. The all-your-eggs-in-the-one-basket effect.**

Having committed to this new system, the supplier may well find itself more dependent than before on one or very few customers, which means that if it loses those customers' business, it has fewer alternatives than before to turn to.

Interoperability restricts a supplier to doing business with only those organizations using a compatible system. So, if one of its customers withdraws, the supplier is limited to its remaining customers or must try to convince other potential customers to convert to a new system.

• **D3. Redundancy of existing software and hardware and new hardware costs, if the new system does not run on the existing hardware.**

A supplier, when considering a new system, has to take into account the depreciated value of its existing system. The less the value of the existing system, the more likely the supplier is to accept expenditure on a new system, and the more likely it will be to accept discarding the old system. Conversely, the more value remaining in the old system, the more incentive the supplier has to reject or delay the new system, and to continue utilizing the old one.

Singh (2004) puts it, rather blandly, thus: “The costs of any modifications required to existing technology before e-business is adopted should also be assessed” (p. 8).

• **D4. Loss (or reduction) of business with customers who choose not to adopt the single system or who choose to delay implementation of it.**

Another question faced by suppliers is this: Will they lose business by adopting a new system? This could happen when existing suppliers and/or customers are not in a position to interoperate with the supplier’s new system. Clearly, this question must form part of the supplier’s cost-benefit analysis undertaken before the decision is made to adopt a new system.

The supplier may be faced with stark alternatives: choose a new system and lose old business, or maintain the old system in order to maintain old business but risk losing new business. It is plausible that this could lead to ambivalence on the part of the supplier, which may explain partially the observation in Coulthard, Castleman, & Batten (2004) that small businesses have not met expectations of B2B adoption.

• **D5. Increased costs if the supplier chooses to maintain old systems in parallel with the new system.**

If the old system is to be maintained in parallel with the new one, it will be the supplier who bears the ongoing costs of such a choice. This also forms part of the cost-benefit analysis. Here is how Archer and Gebauer (2002) put it: “While sell-side systems allow selling organizations to interface with a multitude of customers, buying organizations may have to integrate their systems with multiple different solutions, depending on the number of suppliers. ... Still, suppliers wanting to participate in multiple buy-side solutions may have to deliver their data in multiple different formats, and adhere to multiple underlying business processes” (pp. 27, 29).
This can be construed as another aspect of Disadvantage 4 and serves to illustrate the fact that the adoption of new technology can be influenced by the very nature of the old technology.

- **D6. Transfer of the supplier’s computer business away from its software and hardware supplier(s) to a new supplier (or set of suppliers) with consequent disruption in the (current) supplier’s business processes.**

Under this point, we are talking about the supplier’s supplier of computer systems and, hence, a different supply chain, not the one (presumably) dealing with the goods and services normally transacted by the original supplier.

Switching computer systems in order to gain or to enhance interoperability may involve switching computer suppliers, which can involve various types of additional expenditure over and above obtaining such a system from a computer supplier with whom the supplier already has a relationship. Beginning a new relationship with a supplier brings with it the usual teething problems of such a transition. So, in choosing a new system, the supplier is also accepting that it will have to undergo whatever difficulties arise during the transitional period. This can be yet another factor reinforcing the ambivalence and conservatism mentioned previously.

- **D7. Incompatibility with customers and suppliers who adopt apparently compatible systems from different vendors.**

Although systems may be classified as meeting certain national or international standards, it is not uncommon for them to fail to interoperate.

When suppliers are aware of such a possibility, it is understandable that they will be motivated to proceed with caution and, thus, will be unlikely to commit themselves when they are only partially convinced of the safe outcome of the changeover.

- **D8. Adopting the new system does not guarantee that the supplier will avoid losing business.**

Business relationships change all the time. Existing customers and suppliers are not obligated to continue working with any particular supplier indefinitely.

Gebauer et al. (2003) observe, “For example, in the area of office suppliers, Motorola used as many as 300 different suppliers for the same items (the number has since been cut down to one).”

This implies that 299 suppliers lost some business with Motorola. We do not know how many of those also adopted systems compatible with Motorola’s, but we can say that such adoption did not lead to a continuing relationship with Motorola.

- **D9. Staff, Training, Privacy, and Job Structure.**

It may seem unusual at first to put these topics under disadvantages. Our intention here is merely to emphasize that handling such issues properly involves planning and ongoing effort. It is the expenditure of this effort that suppliers need to account for when considering (new) e-business systems.
Since interoperability will lead to more information flowing, not just more goods flowing, the staff may effectively be doing the same type of work after the adoption of e-business, but it will probably have to be trained to think differently about the process. Also, it is likely that the staff will have to be trained to use any new software that is introduced. Good methods of staff management suggest that staff be encouraged to do such training. Miller et al. (2003) state, “On this view, the new supply-chain management will shift its focus from old material flow to a combined flow of material, information and financials” (p. 80). But, despite the presence of computers, it will be the people who manage this flow, and it is the people who need to be trained.

For an extended discussion of this topic, see the section titled Sociotechnical Issues in Singh (2004).

Another aspect of staff training concerns privacy. Since interoperability implies closer ties with other organizations and, hence, may shift the boundary of what is seen to be private (data); it is the people in each of the cooperating enterprises who have to become familiar with the legal requirements stemming from the relevant legislation. In Australia, this legislation is called the Privacy Amendment (Private Sector) Act 2000, which came into effect on December 21, 2001.

**D10. Risk management.**

Adopting a new computer system can be a risky undertaking for businesses large and small. However, large organizations often develop policies around the use of technology, which includes a risk assessment. Smaller businesses tend neither to have a policy nor to assess risk on a systematic basis. In fact, in Coulthard, Castleman, & Batten (2004), small and medium enterprises listed technical support problems and the lack of in-house skills as two areas of concern when asked about barriers to electronic trading; both of these impact the ability of an organization to manage trust.

In summary, although our list of advantages is shorter than the list of disadvantages, we do not want this to be taken to mean that we regard the advantages as a whole as being outweighed by the disadvantages.

Rather, the supplier is encouraged to assess the sum total of the advantages in terms of feeling more secure (A1), reducing uncertainty (A2), reducing some costs (A3), and the long-term consequences of interoperability (A4 to A6) (since standardization is hardly going to go away), to compare this with the effects of the diverse factors given here as disadvantages, and then to act on the result of that comparison.

Indeed, it may be better to describe these disadvantages as being more like complexities or complications that must be recognized and planned for rather than regarding them as disincentives. In this way, what appear to be negatives can be used to help formulate the plan of action that the supplier uses to handle the transition to a new system.
Impact on Small and Medium Suppliers

Small and medium suppliers (SMEs) are of particular interest to the supply chain issue, because, although as individual companies, they do not have the power of their large counterparts, as a group they constitute over 90% of all private business in most countries (Yellow Pages eBusiness Survey, 2003). However, because it relies extensively on its large customers, an SME tends not to think of itself as part of a large sector but in terms of its relationships with its customers. Indeed, this is generally how it is viewed from all sides (Batten et al., 2004). Survey results of Coulthard et al. (2004) determine that, for SMEs, e-business is not seen as a major strategy with which to meet business goals. They also point out that SMEs trading in multiple sectors rely on multiple transaction methods in order to maintain their business relationships.

The adoption of common information-sharing mechanisms in a supply chain within which an SME works would leave the SME with a major decision—move to the new system or leave the supply chain. Most SMEs faced with this decision likely would prefer to maintain the relationship with established supply chain customers. In fact, most SMEs would not have developed the expertise required to investigate such systems or make decisions on what to implement, so it is to their advantage to have the decision made on their behalf by better informed parties. Of course, these parties will be operating for their own commercial advantage, so any advice they offer to the suppliers often will take a specific viewpoint and may not be in the best interests of the smaller organizations within the supply chain. In addition, in order to work successfully, the supply chain must support all the components necessary to its operation and so must agree to maintain the less capable parts of the chain in the introduction of any new system.

Adopting a new system enhances the integration of an SME into one (or perhaps in some cases, more than one) supply chain but, at the same time, may well increase its processing costs. This can happen if the enterprise needs to upgrade an existing system, introduce a new one, or take on additional expertise to maintain its business systems. Hence, this adoption can be a factor in influencing them to put pressure on the members of other supply chains to adopt the same system and also to put pressure on themselves to cut ties with customers and suppliers who decline to adopt the new system.

Eikenbrook and Olsen (2002) agree with arguments in this direction and define e-business success as "the potential of value creation in e-business in four interrelated dimensions, which are efficiency, complementarities, lock-in, and novelty. ... The third dimension, lock-in, described the potential value in creating switching costs from arrangements that motivate customers and business partners to repeat and improve transactions and relationships" (p. 587).

Lock-in can have a domino effect and may well be a factor in the eventual widespread adoption of the new system. Each SME needs to decide for itself the cumulative effect of the four factors on its business and then whether to join in with a new system, to delay its adoption, or to reject it outright.
Impact on Customers
Beyond the Supply Chain

Simchi-Levi et al. (2004) cite a fascinating example of how the development of a supply chain by IBM in the early 1980s as a result of their decision to enter the PC market impacted the other customers of the supply chain members and, in the long run, adversely affected their own market share. "Rather than take the time to develop those capabilities, IBM outsourced almost all the major components. By 1985, IBM's market share was more than 40 percent....However, the downside to IBM's strategy soon became clear, as competitors such as Compaq were able to enter the market by using the same suppliers....By the end of 1995, IBM's market share had fallen to less than 8 percent" (Simchi-Levi et al., 2004).

It is unlikely in future that any large organization will make the same mistake as IBM. However, there are still opportunities for customers of supply chain organizations to benefit from the positive effects of supply chain involvement. Such benefits might include streamlining of the purchasing and delivery processes, improved product quality, as SMEs develop their expertise assisted by the larger community with which they work, shorter payment periods, and so improved cash flow.

Archer and Gebauer (2002) agree with this analysis. "The benefits include streamlined purchasing operations. ... This results in time and cost savings, and freeing purchasing and accounts payable personnel from clerical work for more strategic tasks. As information quality and market transparency is improved, maverick buying (end-user purchasing from non-standard suppliers) can be reduced, enabling more favourable contracts with fewer suppliers ... they [B2B electronic hubs] eliminate the need for market participants to link directly to their business partners. ... The savings from implementing only one interface to the intermediary instead of multiple interfaces to many suppliers or customers may in fact be quite substantial. Second, suppliers may deliver content in one standard format, while buyers access one integrated solution" (Archer & Gebauer, 2002, p. 31).

This leads to potential growth in the size of the supply chain, and it is interesting to note that if such growth occurred, it would be driven by the interoperability of the new system but would be independent of the precise nature (i.e., industry sector) of this new system.

Global Implications

There are interesting lessons to be learned from the history of the development of the personal computer. Initially, there were many manufacturers of the PC and its various components. PCs were based on different design configurations and were essentially incompatible, each having its own operating system. Each disk drive had to be configured for the specific PC into which the drive was installed (Allan, 2001).
Over time, with complaints that some major producers such as Xerox and Digital were not producing PCs that were compatible with IBM hardware, and with the realization that interoperability was both useful and cheaper for customers, components began to be standardized and often were interchangeable. The fact that IBM outsourced most of the PC component parts meant that there were supplier companies producing items that also could be bought by other PC manufacturers; thus, proprietary issues did not arise (Allan, 2001). This still left the market open for many manufacturers, but proprietary technology had given way to componentization. Hence, the hardware had to compete on capacity and price, because interoperability became a given.

With supply chains, something similar can be predicted. There are four major factors that influence the decision of supply chains to expand globally: the development of new markets; the minimization of costs; requirements to meet international standards, even in a national context; and the requirement for assessment and comparability.

In Handfield and Nichols (1999), the authors point out that “the trend toward global supply chains has been fuelled by needs for centralized research and development, the development of homogenous markets and global products and global market segments for many products.” Thus, those sectors with established supply chain alignments are confronted eventually with the need to go beyond this infrastructure in order to seek new markets.

In recent years, a demand on all industries to cut costs is reflected in the decisions made by many organizations in developed countries to offshore components of their business to less developed countries with a major wage differential. For example, “between 1998 and 2000, out-sourcing in the electronics industry increased from 15 percent of all components to 40 percent” (Simchi-Levi et al., 2004, p. 139).

This has had many side effects, including a move into new markets and pressures on governments to maintain low tariff barriers. Cisco employs the following strategy:

First, we have established manufacturing plants all over the world. We have also developed close arrangements with major suppliers, and if we do our job right, the customer cannot tell the difference between my own plants and my suppliers in Taiwan and elsewhere. (Simchi-Levi et al., 2004, p. 140)

The global move to standardization, especially in technology areas, has had a major impact on supply chains. As in the example of the PC, customer demand for interoperability has resulted in standardization; on the other hand, the introduction of standards is reflected in decisions at the research and development end of production, and products from various companies now tend to have components and modules with interoperable functions that can be used in many environments.

With supply chain provisioning software, in particular, becoming a commodity, SCMIs should find it easier to pick and choose systems best suited to their business needs. For instance, those who do business by electronic mail have the option to choose an e-mail system that will safely export their data from the chosen system and import it into a client's different system. PocoMail is one such example, as it guarantees to import automatically all e-mail from Outlook Express and Eudora.
Radio Frequency Identification Technology (RFID), which uses smart tags to track products, is already heavily used in some supply chains and will enter many more industry sectors in the near future. According to Simchi-Levi et al. (2004):

"The impact of the RFID technology on supply chain performance cannot be overstated. It includes:

- Improved service level by reducing store/shelf stockout rate.
- Reduction of the stockout level.
- Better utilization of store and warehouse space.
- Significant improvement in the ability to locate items at the store and in the backroom. (p. 257)"

Communication over the Internet has expanded into electronic shopping, the tracking of shipments, and collaboration among organizations. The year 2000 fears resulted in a major move on the part of many companies to replace their legacy systems with client-server-based enterprise resource planning (ERP) systems (Simchi-Levi et al., 2004). It is expected that ERPs will be integrated into supply chain management in the coming years.

In a different context, standards are applied to reporting company mechanisms by government and industry bodies. There has been a recent move, for example, of companies reporting their annual profit-and-loss sheets in XML, which, therefore, leads to simplification in the ease with which companies can be analyzed and compared.

The eXtensible Business Reporting Language (XBRL) consortium has gained rapid momentum over the past year. Projects to introduce XBRL are underway in a number of countries, and some US and Australian companies already are reporting their financials in it. Since it also is expected that regulators eventually will require companies to use the XML filing format, XBRL currently is producing a prototype.

In summary, supply chains seeking new markets beyond the national context will be obliged to think in global terms. The advantages may be greater market share along with reduced costs. In addition, the pressure to comply with global standards both at the product processing level and at the financial reporting level will position supply chain organizations to make the jump to global both easily and effectively.

**Conclusion**

Information sharing is a critical component of success both inside and outside the supply chain structure. Major innovations affecting industries globally include bar coding and RFID tracking, while within individual industry sectors, industry-specific technologies...
(SWIFT, Global Health Exchange) often have been generated. Pressures to develop new markets have driven universal solutions such as XML and EDI.

For customers of supply chains, benefits have included improvements in market quality and transparency of transactions. For members of the supply chain, there are numerous advantages and disadvantages.

Small and medium enterprises are worthy of special note, as they form a significant part of the industry but do not act as a community in terms of implementing new business technologies. This makes them vulnerable to pressures from their clients to adopt certain technologies. As a result, many SMEs use several e-business methods of trading with their customers.

Information-sharing technologies and strategies are, thus, critical to the success of industry alliances, such as those in supply chains. While globally and at the large business level, development and implementation of such technologies have mushroomed, smaller enterprises have tended to be left behind to cope as best they can with multiple pressures to conform. It is this bottom end of the supply chain structure that will slow down rapid changes in information-sharing methods. Until the problems encountered by SMEs can be dealt with, it is difficult to see how growth can be optimized.

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