Supply chain knowledge management adoption increases overall efficiency and competitiveness

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1 Introduction

Companies have long shared data and information, jointly developed products, negotiated prices and terms, queried potential partners on product specifications, discussed demand expectations and shared promotional plans. These cooperative activities are essential elements of any successful business and are also information and knowledge intensive (Derome 2001).

Nowadays, businesses are operating within a new competitive landscape. Collaboration and the utilization of knowledge and intellectual assets have come to be the key ingredients for survival and success within this new landscape. The implementation of knowledge management practices enables a collaborative environment that enables the supply chain to be more adaptive and responsive and ultimately achieve an improved strategic competitive position in the market place.

It is demonstrated how the automation of the supply chain allows for optimal and efficient knowledge flow between supply chain partners, as well as the integration of the physical and financial supply chain. Finally, guidelines for effective and efficient knowledge

management implementation throughout the supply chain are examined.

2 Problem statements

How can the adoption of knowledge management practices and principles enable improved supply chain collaboration and, in so doing, increase supply chain efficiency, effectiveness and competitiveness?

- How does knowledge management (KM) interface with supply chain management and what value does KM contribute to the supply chain as a whole, particularly in terms of e-learning and business (supply chain) intelligence?
- How do traditional Web portals interface with KM to form knowledge portals that facilitate superior supply chain collaboration and knowledge capture, access and sharing?
- What is electronic document management and how does it enable and enhance the supply chain KM initiative?
- How does overall supply chain automation optimize knowledge flow and the KM initiative, as well as allow for the integration of the physical and financial supply chain to enable superior knowledge flow and transparency?
- What guidelines must be considered by all supply chain members in order to ensure optimal and successful KM implementation throughout the supply chain?

Various electronic sources were consulted in order to shed some light on the above-mentioned issues.

3 KM in the supply chain – a value-adding business discipline

Prior to an exploration of the need for and the benefits of KM adoption throughout the supply chain, the concept of supply chain management must first be defined. According to Krishnamurthy (2002), supply chain management (SCM) involves a network of facilities that integrates activities from procurement of materials from suppliers through manufacturing and distribution to the customer, which is normally accomplished through the integration of business processes across organizational walls.

SCM is therefore the process of ensuring that goods get to the right place at the right time. According to Eisenhart (2001), companies are discovering that while they can make incremental improvements by using SCM to streamline operations within their own walls, they will derive even more benefits from external collaboration. Consequently, they are searching for ways to cut costs and improve efficiency by working closely with their suppliers throughout the product life cycle. In the process, manufacturing operations workers are discovering tools and practices already familiar to KM professionals. They have begun collaborating on projects, achieving best practices, sharing knowledge across organizational lines and, most importantly, supplying information to decision makers when they need it.

In today's information age, only three things give a company a sustainable competitive advantage, namely:

- What they know
- How well they communicate what they know

- How quickly they learn new things

Organizations have their information assets in the form of databases, drawing files, existing applications, such as enterprise resource planning (ERP), and rows of filing cabinets. What is needed is a system to transform these sets of data into usable information and to allow everyone in the supply chain access to this information. The adoption and integration of the KM tools and practices mentioned above can provide individual organizations and the entire supply chain with such a system.

KM involves the transformation of raw data from many sources into coherent information delivered to people who need it. Skills, expertise and experiences of employees must also be captured and made readily available through portals that feed into an organization-wide knowledge repository. Employees and supply chain partners can thus gain access to these experiences and best practices to support and improve their decision-making processes, and thus ensure the making of decisions that will reduce costs and add value to the supply chain and subsequent international trade process as a whole. For example, a procurement professional can consult the knowledge repository to discover whether a supplier is legitimate, how good its past delivery performances were, as well as the best proposed methods of negotiating with the supplier to ensure the best price, lowest cost, and the timely, reliable delivery of quality goods in a damage-free condition. Drawing from such experiences reduces time and assists in the avoidance of the repetition of costly past mistakes.

KM has become a critical link in the supply chain infrastructure where the ability to manage events and decision points is of key importance. Information must flow freely. Suppliers and retailers, for instance, must share information about sales and forecasts. The emphasis on collaboration involves all partners, from the supplier of raw goods to the retailer (Zimmerman 2002b).

KM, through the use of Web portals, also allows for a full understanding of the inter-relationships among enterprise functions (e.g. product design, marketing and procurement) as well as collaboration and sharing of skills and expertise across geographical borders. For example, members of a design team in Germany, the sales and marketing team in New York and the manufacturing operation in the Far East can understand each others' business issues and each other's expertise. This increases efficiency and ensures that the best and most informed supply chain decisions are made and implemented.

According to Schrader, in Zimmerman (2001a), managing supply chain knowledge across organizational boundaries is of key importance. A new product introduction process can serve as an example: everyone from engineering to manufacturing is involved, and the key to making that process smoother is determining how to provide collaboration. Once the engineers have designed the product, manufacturing people discussed and send it back; then supply chain partners provide feedback. To enable this, cross enterprise workflow capabilities are needed.

Many companies seeking to increase supply chain efficiencies are using the Internet to communicate. This enables sharing of knowledge about product availability and shipping status, as well as collaboration and product design and the planning of the most cost-effective delivery routes. Greater supply chain visibility is enabled as more information is available to all partners, and this differentiating advantage is enabled through KM capabilities. According to Katz, in Zimmerman (2001a), one of the drivers of SCM is real-time access to knowledge.

The amount of collaboration described above requires access to large quantities of

information. Staff members must be able to analyse, access and respond to the data they receive. Technology is a major facilitator of KM in the supply chain, especially the use of the Web and other access portals serving as gateways to collaboration, needed knowledge and best practices, as well as electronic document management systems to facilitate the automation of knowledge throughout the supply chain.

KM with its collaborative technologies, also allows a holistic view of the entire supply chain, provided the partners implement compatible systems. For example, different partners must be capable of using the same portals to communicate and must employ the same document management systems to feed information and knowledge into, and extract needed knowledge and best practices from a central shared knowledge repository. In the past, different segments of the supply chain have tended to be highly compartmentalized, resulting in myopic departmental perspectives as well as functional orientations. KM provides a universal platform for an integrated supply chain programme and SCM.

According to Hanson, in Roberts-Witt (1999), people understand that they are in the business of maintaining a physical supply chain but they do not always understand that the basis is knowledge. What companies do not realize is that what they are really trying to make work efficiently is the knowledge flow – the critical issue here is capturing the knowledge that allowed the supply chain to work in the first place.

The integrative knowledge flow must therefore be captured, stored in central repositories powered by intuitive search engines for easy knowledge categorization and retrieval, in order for all departments within all organizations in the supply chain to have access to a full holistic view of all needed and relevant supply chain knowledge. For example, the manufacturer's marketing department can easily access the supplier's demand forecasts without having to go through its own purchasing department, which delays decision-making and reaction times. It is evident that there is a need to develop an integrated KM system that encompasses a global vision of the supply chain in order to realize these efficiencies.

According to Scaff, in Roberts-Witt (1999), managing the supply chain also means managing the knowledge that, on a daily basis, builds and optimizes supply chain systems. This usually involves many dispersed but overlapping systems with flawless operational and tactical execution on a local level. Enabling companies to become aware of this knowledge is the first significant challenge

There are three supply chain flows that need to be managed: the product, information and financial flow. KM can support and enhance all three flows by providing all partners, employees and managers with the most up-to-date knowledge that supports accurate report generation and decision making. For example, one supplier may possess the knowledge through past experience that a particular customer has a history of bad credit. This knowledge must 'flow' well in time behind the scenes through the system to the manufacturer so that it knows not to grant credit to the customer and insist upon payment on delivery. This reduces the costs of bad accounts and reduced efficiency in the supply chain.

While getting products from one place to another is the nitty-gritty job of SCM systems, a whole lot of KM goes on behind the scenes to make things happen. To furnish all partners in the supply chain with the most accurate information and cohesive reports, KM systems are being used to define workflow and gather data from a number of different sources (Zimmerman 2001a).

The flow of knowledge in real-time also facilitates the achievement of dynamic supply chains that are responsive to changing customer needs and demands. According to Fancher, in Zimmerman (2001a), without applied KM organizations are stuck with static supply

chains. The SCM system captures knowledge about what is happening. KM analyses those results, compares them to the intent of the supply chain partners and infers better ways of doing things. The partners can then enact those improvements to perform better in the next cycle.

Dynamic supply chains also allow the achievement of efficient consumer response (ECR). By connecting with customer organizations through a collaborative intranet portal, the manufacturing organization can predict precisely when and in what quantity new inventory will be required and can communicate in terms of schedule knowledge to suppliers so that they can phase materials delivery and achieve lower inventory and greater efficiency.

SCM systems cannot only lower inventory costs, but can also deliver the product or service more rapidly to the customer. SCM can thus be used to create ECR systems. SCM and ECR systems both require network-based information technology (IT) infrastructures and software competence to make customer and supply chain data flow seamlessly among the different organizations of the supply chain (Laudon and Laudon 2002: 90–92).

KM thus enables superior collaboration, sharing and knowledge flow in the supply chain, ultimately resulting in improved financial success for the entire supply chain. According to McIntosh (2001), at the centre of SCM is the premise that collaboration between business partners and suppliers leads to financial success through inventory control, lasting customer relationships and increased competitive edge. The integration of KM technologies – such as collaboration – and SCM is a natural fit.

KM also enables superior business intelligence that allows for increased supply chain efficiency and profitability. This is explored in more detail below.

3.1. KM unleashes business intelligence for increased Supply Chain Intelligence

The tools of KM include many intended to help predict and respond. In addition to the tools of transaction analysis – data mining, business intelligence, online analytical processing – organizations are relying on the search, retrieval, forecasting and communication tools of KM (Bolita 2001).

The efficient application of these KM tools results in supply chain intelligence which can be used to make the supply chain more proactive with regards to changing customer needs and preferences. According to Krishnamurthy (2002), supply chain intelligence (SCI) involves the application of business intelligence to various SCM functions and product life cycles on a strategic scale to optimize the results of these functions by means of enhancing the ability to produce cost-effective products. SCI involves the ability to analyse products, processes, components and materials. This demands a data integration infrastructure, which provides the capability to extract, transform and load data extracted from multiple enterprise sources, such as ERP source data, quality assurance data and supplier and customer data.

Known data, such as factory shipments to a particular customer, for example can be compared with historical information. In turn, that data can be compared against variables such as marketing efforts and weighed against market research. SCI allows the understanding of the reasons behind changes in supply chain trends, operations and processes. Better demand forecasting and capacity planning for the future are also enabled, which is of key importance to controlling inventory – the major cost factor. SCI therefore provides insight into and knowledge concerning fluctuating customer demand. This knowledge can be used to proactively predict future inventory demands better so that all partners in the supply chain can be more responsive and carry less inventory and safety stock. Less capital is tied up in inventory which can be used elsewhere in the supply chain.

4 Knowledge portals facilitate and improve supply chain collaboration

A portal is an e-business framework that enables different levels of functionality and interactivity to members based on preferences and business rules. Portals provide better 'context' around work activities and add value through customized connections (Cox 2001).

According to Mauriello (2002), a Web portal can provide access to all types of documents. It can be configured to allow a user to only see the documents that have relevance to his/her job; placing all documents in a centralized place (i.e. the portal) eliminates the need to search for needed information.

Portals are Internet sites that make information available and provide access to goods and services. Portals provide user-friendly interfaces that are tailored according to an individual user's unique needs. For example, a shipping clerk's portal will provide easy access to all shipping-related information (e.g. letters of credit, bills of lading, export and import licenses and best shipping practices employed by the industry. The portal will provide intuitive icons to this information so that the information is literally a click away. An easy to use search engine incorporated into the portal will also facilitate quick and easy search and retrieval of the needed information. Valuable time is saved and costly errors are avoided by ensuring retrieval of the most accurate and updated information.

In today's fast-paced global marketplace, the ability to give workers ready access to the applications and information they need for sound decision making has become imperative for businesses striving to be productive, agile and profitable. It becomes even more important as mobile knowledge workers dominate key positions in organizations. These employees depend on immediate access to the shared knowledge of the organization from distributed and remote locations (Richtberg 2001).

Web portals are made even more effective when they are combined with KM practices and principles to become knowledge portals. These knowledge portals allow immediate access to shared knowledge regardless of an individual's location within the supply chain. For example, a freight-forwarder may need to access supply chain knowledge on how to best handle problems experienced with letter of credit transactions while overseas.

A portal provides an entry point for individuals and organizations when they wish to access something. For example, many enterprises provide an intranet portal that allows users access to all its internal resources. Organizations must combine KM with the idea of a portal. The knowledge portal allows end-users and communities to discover information and applications on a particular subject, and it also facilitates the sharing of information and applications in organizations, both small and large. This makes it beneficial to both the enterprise as a whole and the individual departments (Patton 2001).

A knowledge portal is based on a document management server which enables organizations to manage all of the workflow processes associated with the publication of documents and to share them in dedicated spaces. The knowledge base manages the publication and the classification of documents and provides users with a single knowledge portal. Users can add their own advice and experiences via their browsers and the portal allows access to immediate and accurate information to allow employees to make a real contribution to the bottom line (Meingan and Peltier 2002).

The knowledge portal provides the additional functionality of allowing employees access to files and recommendations made by their colleagues in similar supply chain situations (e.g.

how do deal with customers who have a history of bad credit or who are making unique demands on the supply chain such as requesting overnight delivery on a consignment that is usually delivered within one week of order placement). If a file is not 100% relevant, exployees can improve it and make their expertise available to others. The portal-enabled access to the knowledge base ensures that employees have all the information and knowledge that they need to make better decisions more rapidly than they could before. Prior to the existence of knowledge portals, employees spent too much time searching for the right person with the right information, resulting in wasted time and inefficiency.

According to Melbourne (2002), implementing an elaborate enterprise knowledge portal that only provides access to disparate pieces of information does little to build a corporate knowledge store, increase learning, enhance cross-departmental communication, decrease decision-making time, or increase overall data integrity. Many enterprise portal implementations overlook the human element. The human brain transforms information into knowledge. People, not database records, are the crucial components of successful enterprise portal implementations.

Knowledge processing is enhanced by the interaction of unique minds involved in collaboration. With economic limitations forcing every organization to do more with existing resources, it is crucial for organizations in the supply chain to tap into their corporate team's store of knowledge. An easily navigable map of knowledge equity (pointers to experts and creators of knowledge) must be integrated into the knowledge portal to allow the accurate identification of employees who possess knowledge on specific topics as well as those who are involved in particular supply chain initiatives at any one given time. This results in improved and increased supply chain knowledge generation as well as an increase in the skills of the organization's human capital, which allows all workers in the supply chain to achieve greater job effectiveness and efficiency. This ultimately results in a more skilled, profitable and competitive supply chain.

5 Electronic document management enables and supports the supply chain knowledge management initiative

With information sharing across supply chains comes a need for strong KM practices. Documents need to be retrieved by a variety of people and document management features and functions must be adopted to ease the burden of managing the flow of paperwork. According to Zimmerman (2002b), if documents do not make their way smoothly across the process in the appropriate time frame, there can be delays in manufacturing, shipping and clearing customs.

Before the above-mentioned seamless flow of documentation through the supply chain can be achieved, organizations within the supply chain first need to understand the concept of document management, as well as how traditional paper-based document management can now be achieved electronically and can subsequently support the flow of knowledge. According to Cox (2001), document management is a set of solutions that enables the creation, maintenance, archiving and use of information contained in images and electronic documents.

Document management traditionally focused on the data that were contained in paper documents stored in filing cabinets. Today, however, these documents consist of electronic files that contain embedded information. The best way to implement document management is to have all of the supply chain's information and knowledge assets accessible via a single logical electronic vault. This vault can form part of the central supply chain knowledge

repository or can be accessed via that repository. Through the electronic vault and the knowledge portal system, all users will have a single place where they can get information and knowledge.

Document management implementations include workflow processes to automate specific departmental processes. Business processes are then modelled, using workflow technology that is a mechanism for automating both the standard and ad hoc business processes, resulting in cycle time reduction. An audit trail of actions is maintained and metrics of performance can be presented to enable continuous quality improvement. Workflow technology allows knowledge in the vault to be automatically delivered to the people who need it, when they need it. This technology must be presented to users in a training programme aimed at ensuring user acceptance. The benefits of document management include improved cycle times, reduced costs and the agility to respond to market changes.

One such process that must be automated for increased efficiency is enterprise resource planning (ERP). By automatically delivering relevant knowledge to key decision-makers when they need it (i.e. in time to make critical supply chain resource allocation decisions), resources can be better allocated and managed, based on real-time knowledge and on the collective supply chain expertise for increased overall efficiency and profitability.

According to *KMWorld Magazine* (2002), ERP integration requires orchestration of a variety of internal and external resources. Knowledge transfer between employees, vendors, sub-contractors and consultants is a critical factor in ERP deployment and maintenance. With simple, well understood KM practices, ERP integration and upgrading can be a rewarding experience.

Knowledge transfer is the deliberate process of converting conceptual knowledge into broadly applied procedural knowledge. It is achieved through well designed collaboration and interaction between the knowledge source and the target. Document management systems and leading collaborative technologies are therefore central in a knowledge transfer platform. Full, seamless access must be made available to all ERP stakeholders, particularly external resources and consultants. Users must be allowed to administer content for maximum knowledge transfer. According to *KMWorld Magazine* (2002), robust knowledge transfer processes deliver rapid assimilation, improved competitiveness and higher performance of all ERP stakeholders and the entire enterprise systems portfolio.

In addition, document management systems can accelerate the pace at which goods cross borders in international trade and lower logistics costs by providing the right documents with accurate content. An electronic document management system can access and index the supply chain's knowledge database and repository, and can thus provide multi-jurisdictional, multi-currency documentation to continuously reduce external costs in the global supply chain. It can also provide access to numerous documents of many countries that enable the company to meet import, export, hazardous materials and financial reporting requirements.

According to Sangree, in Zimmerman (2002b), efficient document management practices can shave days off the process of clearing customs. It is all about making sure that the documents are accessible when the shipment makes it through various checkpoints. For example, a truck may pick up a shipment to take it to the pier or terminal where it may be delayed while waiting for some paperwork, resulting in customers waiting for their consignments and overall inefficiency. The idea is for the paperwork to arrive ahead of the consignment and this is where automated workflow is becoming increasingly important. If an organization creates a request electronically, the carrier can send an electronic confirmation. If the shipment is delayed, the carrier can send an automated message. This

kind of knowledge sharing is highly automated and solves some of the problems associated with bill of lading.

Document management therefore streamlines the complicated process of managing international trade documentation while reducing costly errors and time delays. Correct documents with accurate content are provided, which lowers logistics costs, improves regulatory compliance, reduces errors and shortens the order to fulfilment cycle.

According to Treadwell, in Zimmerman (2002b), incomplete documentation is the top reason that goods do not move on time. The trend is toward developing a centralized repository of documents that are accessible to everyone. This can be achieved through a central knowledge repository accessible to all supply chain members.

Proper documentation can improve the flow of goods and help international importers avoid fines. Fast and easy access to shared documentation in a central supply chain repository also results in timely order fulfilment and delivery as well as lower safety inventory stocks for when things go wrong. According to Lamont (2002a), customs officials can approve shipments more readily when the entire shipment history can be seen. Delays are costly to both retailers and manufacturers and, if companies do not know when an imported shipment will arrive, they must maintain higher inventory to cover their needs, or risk not being able to fill orders.

Efficient document management within the overall supply chain KM architecture ultimately results in greater efficiency (greater percentage of on-time delivery); increased profitability (less capital tied up in safety inventory); and improved supply chain capability with regard to the management of exceptions. For example if a carrier experiences problems with customs in a foreign country, the supply chain documentation and experience can be easily accessed via remote Web portals in that country – translating into a faster solution and circumventing lengthy delays.

The supply chain is now a full-time operation, supplying visibility across time zones and cultures. This requires extremely tight document management and workflow processes and KM must be used to manage exceptions in the supply chain process. The ability to manage events and exceptions – which is really KM – is the key to supply chain success (Jones in Zimmerman 2002b).

6 Supply chain automation optimizes knowledge flow and integrates the financial and physical supply chain

Today's economic environment is driving business users to demand greater efficiency, more automation and higher levels of performance from their business processes and the IT systems that support them. However, exchanging data within a company and with business partners and customers is not easy and is often accomplished through costly customized programming by internal IT departments (Goyal 2002).

The implementation of a uniform KM architecture will enable organizations to seamlessly transfer and share information and knowledge both within the organization and with external supply chain partners.

The search for enterprise knowledge can be both daunting and exhausting. As organizations grow, so do their internal knowledge bases. To maximize the return on investment in collective employee business knowledge, management of this knowledge should be

automated. (The Haley Enterprise 2000).

There are two criteria for knowledge automation. Firstly, the knowledge must be active instead of passive. Knowledge is active if the systems that contain it use it automatically to make decisions or support business processes. Secondly, to manage and automate knowledge, the system that houses the knowledge must be capable of automatically capturing, implementing and maintaining knowledge. New technologies, such as natural language parsing, inference engines and automated generation of case-and-rules-based programming code are now enabling business people to manage knowledge and automate it themselves.

Passive document management systems still rely on people to interpret and understand the knowledge contained in the systems. However, using the latest automation technologies will allow business people in the supply chain to take direct ownership and control over implementing and managing supply chain knowledge, which will in turn increase the supply chain's reaction speed to business dynamics. According to The Haley Enterprise (2000), by combining technologies such as automated case-and-rules based code generation, inference engines and natural language processing, the true power of KM can be realized.

Knowledge must not only be automated, it must be relevant to those who use it and to whom it is delivered. Users must understand the context surrounding the knowledge creation and application in order for that knowledge to be efficiently used to assist them in achieving their goals. According to Angus (1999), knowledge stored in systems can be useful, but the 'truth' comes from understanding the patterns that connect points of knowledge. While most knowledge systems are trying to derive their deliverables from stored data, few give equal time to deliverables from the metadata. Using metadata gives one a chance to reveal the patterns that connect data.

Metadata enables organizations in the supply chain to determine which employees originally launched the ideas that eventually became profitable and which teams of people participated in key supply chain developments, improvements and processes. These data reveal which people were the creators of the most-used documents of specific subjects and which were the most frequent editors. According to Angus (1999), the metadata about the documents – from who contributed and used what, to how often it is used and by whom – clarify the fuzzy picture most organizations have of their own processes. Analysis is the precursor to understanding processes, and understanding is the precursor to improving them.

A knowledge-enabled, automated workflow system is also what enables organizations within the supply chain to share knowledge freely with suppliers, customers and business-to-business partners. According to Lamont (2002b), part of the value of the system is that it can move readily from the project management level to the strategic planning level, providing senior management with information and knowledge that enables logical decisions to be made.

Automated knowledge and workflow is required for both the physical and the financial supply chain. The financial supply chain is actually much broader than most realize due to the fact that it includes not only the flow of financial information, but also financial products such as credit assessment, risk management, financing payments, and servicing. The efficiency gained by streamlining and automating the knowledge flow of the financial supply chain results in greater supply chain and individual organizational ability to monitor and assess receivables, working capital needs and overall financial position.

According to Valente, in Zimmerman (2002b), managing the financial supply chain is also a key part of the supply chain process and is extremely document intensive. While many

supply chain systems are focused on the flow of goods, very few are focused on the financial supply chain. The flow of goods, the flow of information and the flow of money are all related.

Automating and integrating the physical and financial supply chain require the intelligent utilization of knowledge portals and document management systems as explored above. A good visible interface of the knowledge contained within and generated by both chains as well as an enabled functional collaboration will allow supply chain partners to gain insight into the transactional flow among buyers, suppliers, logistics providers, intermediaries and financial service providers, as well as the elimination of costly inefficiencies. It can also open the door to revenue generating opportunities. Collaboration between the physical and financial supply chains is of primary importance to fully realizing cost reduction and revenue enhancement advantages.

Automation and integration can also increase business intelligence, as the right financial or physical information or knowledge is made available to the right person at the right stage to enable superior decisionmaking. Today, trade terms are often set in a standard way (e.g. 2% discount in ten days or net 30) and do not usually discriminate on past performance. For example, an international buyer would typically pay 90 days after receipt, which means that the seller is basically funding the buyer 60 days of capital. Assuming a 10% annualized cost of capital, 1.67% of capital is lost for the 60 days of outstanding receivable. On a $100000 invoice, that would amount to $1667 for 60 days. Armed with this kind of information, a company can more intelligently price the product and the relationship.

Knowledge automation (with associated online storage in a central repository) increases the availability of more comprehensive knowledge regarding specific transactions and their associated executors. For example, the buyer-seller negotiation process can be improved with actionable knowledge about the total cost of responding to a request for quotation. Such comprehensive knowledge allows companies to more accurately quantify the risk and cost implications of using certain financial products, such as insurance and trade financing, which in turn speeds up the international trade process. The negotiation process can also be improved by knowledge regarding a supplier's prior deviation-to-service level history in areas such as invoice accuracy.

Supply chain automation therefore enables the efficient practice and implementation of knowledge management and ultimately results in cost reductions, productivity gains and improved inventory. Improved data accuracy, simplified data entry and reduced-lead time can also be achieved. With the automation of inventory control, all employees across the supply chain are also freed to focus their attention on more important customer service issues.

7 Implementing KM in the supply chain

Supply chain partners must consider many issues when implementing supply chain-wide KM. According to Barth (1999), organizations must design KM systems that adapt to local conditions map the cultural roadblocks to KM anticipate miscommunication in multicultural teams optimize their corporate culture for knowledge sharing by understanding and leveraging inherent values and be insensitive to corporate culture and be sensitive to the different cultures of functional competencies within an organization.

- *Design KM systems that adapt to local conditions* – organizations in the supply chain must decide whether to expand a local KM system, integrate the systems of all their

supply chain partners or to create an entirely new and integrated KM system. The starting point is to examine why the supply chain needs an integrated KM system and what it intends to accomplish through it. Organizations must consider the different cultural norms throughout the supply chain, from the start, to ensure that all parties are willing to contribute and share valuable knowledge.

- *Map the cultural roadblocks* – supply chain members must establish how people in the supply chain work in groups, whether they share information and knowledge easily, what systems they use to share information and knowledge, how pervasive knowledge sharing is and at what level and frequency they use KM systems. The different cultural values and beliefs in the supply chain must also be investigated as different cultures' belief systems, community hierarchies, persistent taboos and gender relations are all critical to how they share information and knowledge among themselves and with those outside their circle (i.e. other supply chain members).
- *Anticipate communication in multicultural teams* – it must be acknowledged that cultural differences are most apparent in work teams that draw from the entire supply chain. People with different cultural backgrounds may have different approaches to the same problem and may even disagree about the existence of a problem. Problems may also be approached from different angles according to cultural orientation.
- *Optimize the corporate culture for knowledge sharing by understanding and leveraging inherent values* – if the supply chain wants a large multinational KM structure, the different partners have to analyse how culture affects their activities. Adding attributes to data and knowledge that give it a cultural flavour can allow an organization to establish what kinds of values are represented by given actions.
- *Be sensitive to corporate cultures* – this becomes more important as the nature of the supply chain moves away from manufacturing towards knowledge-based value creation. The way in which knowledge is managed on a global scale becomes the hallmark of the different organizations and the related supply chain's image and reputation. When a supply chain is spread geographically, it is very important to manage knowledge so that it is consistently received by clients. Knowledge is what actually constitutes a supply chain and the supply chain relies on people. Since it is impossible to instruct employees on every detail of what to do, their actions in the supply chain have to be driven by knowledge and values. Capturing of knowledge gained in each interaction in the supply chain must be a priority so that valuable knowledge is retained even if employees leave the company.
- *Be sensitive to the different cultures of functional competencies within the organizations of the supply chain* – whether crossing geographic or national borders, or crossing borders of certain competencies within the individual organization, problems start with a lack of a shared vocabulary, of a shared competitive landscape and of a shared view of how the supply chain actually works. The key purpose of KM is to help people create this shared context. KM creates an enormous transparency within the individual organization and within the entire supply chain. And, depending on culture, transparency is usually welcome.

If these issues are properly and duly addressed by all members of the supply chain, the probability of supply chain-wide adoption and optimal urilization of KM will be increased.

8 Conclusion

Based on the evidence presented in this article, it can be concluded that the adoption of KM practices and principles, and the subsequent automation of the supply chain through collaborative knowledge portals and electronic document management systems, enables organizations within the supply chain to develop a more cost-effective, efficient and

competitively responsive and adaptive supply chain. However, this can only be achieved if the guidelines for successful supply chain KM implementation, and subsequent use and adoption, are seriously addressed and followed.

More and more companies are starting to realize and subsequently reap the benefits of KM adoption and implementation within their supply chains.

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