

INTEGRATING SUPPLY CHAIN MANAGEMENT IN VIRTUAL ENTERPRISES

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Abstract: Supply Chain Management (SCM) methodology often encourages modelling real-world processes for analysis and optimization. A supply chain essentially has three main parts: the supply, manufacturing and distribution. The supply side concentrates on how, where from and when raw materials are procured and supplied to manufacturing. Manufacturing converts these raw materials to finished products and Distribution ensures that these finished products reach the final customers through a network of distributors, warehouses and retailers. The components of SCM are: Demand planning; Demand collaboration; Order promising; Strategic network optimization; Production and distribution plan; Production scheduling; Plan of reduction of costs and management of the performance. SCM is especially crucial whenever there is an elaborate distribution network, complex manufacturing base or numerous overlapping divisions.

Key words: supply chain management, concurrent engineering, collaborative work, virtual enterprise.

1. INTRODUCTION

Supply chain management is much more than a materials movement or transportation initiative. It is also a new way of thinking about business relationships. Some organizations, however, are trying to adopt supply chain management practices (such as just-in-time replenishment or strategic sourcing) without also implementing an organization-wide supply chain philosophy and culture. To really embrace supply chain management, companies must implement both supply chain methodologies and a supply chain philosophy.

Supply chain management (SCM) is more than a simple tool to evaluate and optimize a supply chain; it is a complex, structured business relationship model. It takes into consideration all aspects of the events required to produce company's product or service in the most efficient and cost-effective manner possible. SCM actually has two distinct and equally important parts: the SCM philosophy and the SCM methodology. It is possible to have limited success by embracing only one of the parts, but one can not achieve complete supply chain optimization, the return on investment of SCM, without embracing both.

2. SUPPLY CHAIN MANAGEMENT INTEGRATION

The first part of the SCM business relationship model, and the most critical to the overall success of the initiative, is the SCM philosophy. SCM philosophy is anchored in the realization that everyone involved in the supply chain (Fig. 1) [1], both internal and external to the organization, is both a supplier and a customer. Likewise, every event or task that takes place in the supply chain has a source and a delivery point. The interlinking of these dependent elements is the basis of the SCM philosophy. The philosophy forces companies to move

away from an organizational structure designed around functional silos and towards one designed around the end-to-end flow of business processes. To accomplish this transformation, one needs to create “An organization that, in all its thinking, emphasizes process as opposed to hierarchies with special emphasis on outcomes and customer satisfaction.” (Kevin P. McCormack). According to McCormack [1], all organizations moving from a functional style of organization to one that operates in the supply chain philosophy of end-to-end management must adopt the business process orientation (BPO) concept for doing business.

To fully understand this philosophy, it is critical to expand the traditional definition of a supply chain to include not just the flow of materials but also the flow of information (for example, purchase orders, forecasts, and plans). In most organizations these flows are combined into a “work flow”. One flow feeds the other as they are interlocked in a dependent relationship that directly influences the final product. This flow of information and material is critical to all operations and must be managed

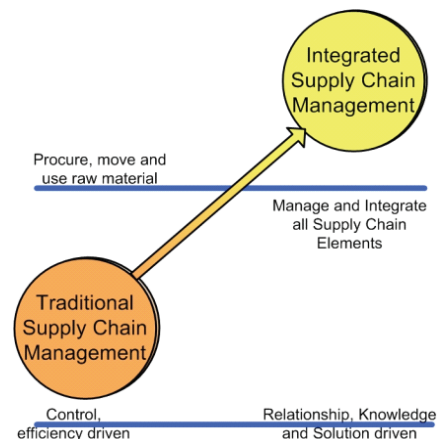


Fig. 1. Traditional vs. integrated supply chain management.

and monitored to truly embrace the SCM philosophy. Other traditional business definitions also must be expanded in order for supply chain management to be successfully implemented.

The second part of the supply chain management process is the SCM methodology. SCM methodology is the “how to” of SCM. In other words, it implements the philosophy. Selecting the correct methodology for implementation is as important as the philosophical decision to implement SCM.

SCM methodology includes the transactional and mental processes needed for identifying, evaluating, optimizing, managing, and monitoring the critical events in the entire supply chain. The transactional processes are the physical, mechanical events or “hands-on” actions that are required to complete a process, such as the delivery of material, the issuing of a purchase order, and the paperwork needed to expedite the order. The mental processes are the thinking, planning, and decision making that supply chain management requires. SCM methodology encompasses everything from setting your strategic plan to fulfilling your operating and financial plans. It involves identifying the existing supply chain, evaluating it against best practices, creating the “desired state” through process reengineering to remove all non-value-added elements, and monitoring and managing the links of the supply chain through critical metrics. The exact methodology may vary in structure and content from one organization to another.

To implement SCM, an organization needs to start by developing a supply chain philosophy. The supply chain methodology then will arise out of this philosophy. Many supply chain management initiatives have failed because companies have tried to implement a supply chain methodology, or pieces of a supply chain methodology, without embracing the supply chain philosophy first. In these cases, companies often mistakenly think of supply chain management only as materials movement and transportation and not as a complete business relationship model.

3. SUPPLY CHAIN MANAGEMENT FRAMEWORK

Successful SCM requires organizations to balance people, process, and technology. We consider these the three most important components of SCM and the direct determinants of an individual organization’s success. They form the “iron triangle” (Fig. 2), symbolizing mutual support, stability, and productive internal communications. Although various authors and companies may use alternative names and slogans to describe their individual approach to supply chain management, we found various forms of this simple triad throughout our reviews of current literature, discussions with business process consultants, and visits to firms in the U.S. and Australia.

People. Supply chain management involves more than getting to know employees in your organization or in your supplier’s organization – it requires committed *leadership*, an inspiring and clear *vision*, strong supporting *culture*, sound *organizational structure* and dedicated *change agents* to build and sustain a successful

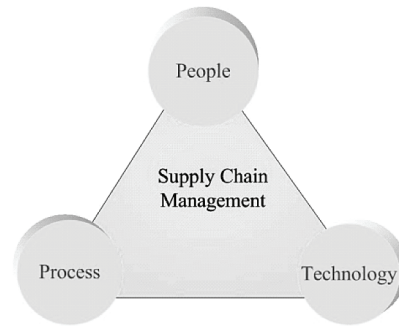


Fig. 2. Supply chain management iron triangle.

enterprise. It is also one of the more difficult areas to address when implementing SCM. When asked, “which one of the following has been the greatest challenge your company has faced managing its SCM project,” 54 supply chain executives at \$500 million-plus companies cited culture clashes and business process changes as the two biggest problems[3].

Process. Successful management of the entire supply chain requires a process perspective that fosters the streamlined movement, analysis, and continuous improvement of product flow between the various links in the supply chain. PRTM, in working with hundreds of firms, found those who succeeded in improving their supply chains were those that focused first on process and then on selecting the right technology to leverage those processes. In other words, process pulls versus technology push. What key processes are involved in SCM? The Global Supply Chain Forum identified eight key processes that drive supply chain efficiencies [4]:

- customer relationship management;
- customer service management;
- demand management;
- order fulfilment;
- manufacturing flow management;
- supplier relationship management;
- product development and commercialization;
- returns management.

The following section addresses key considerations in each of these processes and illustrates how industries are applying these principles.

Customer relationship management (CRM) is a company-wide business strategy designed to reduce costs and increase profitability by solidifying customer loyalty. Firms identify key customer segments and build tailored support and service agreements that specify performance expectations and ways to measure and reward that performance. The objective is to streamline processes in supporting customer desires and reduce variability in customer demand signals.

Customer service management (CSM) requires firms to manage “moments of truth” with customers before, during, and after the sale. Sound customer service management provides a single source of customer information and allows the firm to effectively manage partnerships with critical customers.

Successful *demand management* seeks to balance variability in customer requirements with inventory management, supplier capacity, production planning, and

marketing. Reducing inventory costs and increasing inventory turns are two key inventory management issues facing firms today. Collaboration with suppliers allows firms not only to shift the burden of owning and managing inventory but also to move from a “push” to “pull” orientation in managing customer demand.

Order Fulfilment activities ensure firms are able to meet or exceed customer need dates. Warehousing and distribution activities, once viewed as a cost centre and drag on the firm’s profitability, can actually become value-added activities key to competitive advantage when managed using SCM principles. Firms must decide whether to manage and maintain these activities in-house or outsource them to third party logistics (3PL) providers. There is no single right answer – each firm must decide whether keeping these activities in-house supports its value proposition and enhances its ability to reduce costs and satisfy customers.

Manufacturing flow management seeks to match demand with production capacity. These processes, like order fulfilment, can either energize a firm or inhibit its ability to fully implement SCM principles and philosophies. Manufacturing and assembly facilities are significant capital investments and as such, firms may find it difficult or cost prohibitive to expand or modify these facilities to support leaner manufacturing processes. New facilities constructed with SCM principles in mind allow firms to integrate, on site, all key components in a manufacturing process and thus eliminate costs associated with component transport and storage.

Supplier Relationship Management (SRM) provides a structured way for organizations and suppliers to enhance their relationships, increase profitability, and ultimately provide improved products and services to the end users (customers). SRM is a dramatic change in perspective for many firms, as it requires a “new way of thinking about collaboration with suppliers, demanding greater transparency and trust than many companies have so far been comfortable with.” Two notable SCM leaders and authors, Stock and Lambert, identified four types of supplier relationships, ranging from arms length through partnerships, joint ventures and vertical integration. While most relationships are arms length, with suppliers offering standard products or services to a wide range of customers, there are times when it is appropriate for firms to pursue partnerships with suppliers. The depth of the partnership must consider the drivers (reasons to partner), facilitators (supportiveness of the environment), and components (methods to manage partnership) that lead to successful partnership outcomes. Mould and Starr examined partnership relationships from the perspective of operational complexity and market sophistication. Operational complexity addresses the intricacy of components in the supply chain while market sophistication addresses factors that influence how components are bought and sold [5].

Product development and commercialization requires firms to integrate suppliers and customers in product development efforts to reduce costs and shorten the time to bring new products to market. Many firms encourage personnel from their key suppliers to participate in design and development activities before manufacturing

new products. They also use customer focus groups to learn how to enhance existing products or develop a new product to satisfy an unmet consumer need.

The growth of direct-to-consumer channels such as catalogues and the Internet have led to returns to U.S. retailers that are worth over \$100 billion per year [6]. With this much at stake, there is growing recognition that *Returns Management* or “reverse logistics” is an area that demands attention separate and distinct from forward logistics processes. Indeed, while forward logistics is about efficiency and cost reduction, reverse logistics differs in that it focuses on prevention of monetary loss. Both disciplines, however, share the need to focus on customer service and are a tool to enhance a company’s comparative advantage. “Reverse logistics includes product returns, source reduction, recycling, materials substitution, reuse of materials, waste disposal, and refurbishing, repair and remanufacturing.” At every link in the supply chain, companies must answer the basic questions of reverse logistics – whether to repair, remanufacture, recycle, resell, or dispose of an item.

Successfully managing these eight SCM processes is difficult and time consuming; but it is absolutely vital to SCM excellence. This difficulty can drive supply chain managers and senior leaders to look for a quick fix – a piece of software or new technology that eliminates the need to spend time improving the underlying business processes. Unfortunately, “software on its own can’t fix basic shortcomings in supply chain management; in fact, it can make things worse. The real benefit comes from repairing broken business processes, and companies that tackle them before turning to technology can reduce inventory levels and predict demand more accurately. This effort alone can increase revenues. Add the software, and the improvements are accelerated and sustained”.

Technology. Technology considerations such as information exchange, in-transit visibility, automation, and security are key to implementing and sustaining SCM. In the information age, most companies rely on information technology to share information internally and with their key suppliers and customers.

The main objective of technology in SCM is to create supply chain networks that will improve enterprise integration initiatives. Chandra and his SCM research team argued creating SCNs requires an introduction of IT tools such as Enterprise Resource Planning, Distribution Requirements Planning, E-Commerce, Virtual Enterprises Management, Product Data and Knowledge Management, Collaborative Engineering, and Multi-Agent Technology. Effective SCNs provide increased connectivity between units in the network, alignment of inter-organization support systems, and sharing of information resources among units in the network [7]. Developing and implementing an effective SCN requires e-management technology that facilitates problem solving and information support across the network.

People, process and technology – they are the dancers, choreography and music that make up the supply chain management ballet. In our domestic and international travels, we saw firms that were ready for Broadway – they performed beautiful ballets, executing every aspect of their SCM operation in perfect harmony with suppliers

and customers. We also saw firms better suited for off-Broadway venues – they may have a great musical score but lack the dancers and choreography to compete with the best-in-class companies. Success in SCM requires excellence in all three areas – people, process, and technology. It also requires senior leaders who are able to create, ignite, and sustain a burning platform – a compelling reason to change – in order to drive transformation throughout the organization.

4. CASE STUDY

In the project to which we will refer in this study are involved three partners S.C. OPTOTECHNOLOGIES S.A., University POLITEHNICA of Bucharest (UPB) and S.C. ROMDUR GRAVURA S.R.L. each one of them having their employees. We present here below how the three partners will collaborate during the project. We have to mention that the alliance between those companies is made only with the purpose of one product execution (the laser manufacturing device with two wavelengths).

S.C. OPTOTECHNOLOGIES S.A. is the coordinator of the entire project and they will elaborate the research, design, manufacturing and homologation strategy for a laser manufacturing device with two wavelengths and they will also be a part in this project with specific activities during each phase of the project.

UPB will cooperate with the project coordinator during the phases of execution technical documentation elaboration for the prototype, for the accomplishment, experimenting and homologating the prototype. Cooperation will be concretized by studies, analysis, prognoses etc. which will be elaborated for each phases of the project.

S.C. ROMDUR GRAVURA S.R.L. will also cooperate with the project coordinator during the phases of execution technical documentation elaboration for the prototype, for the accomplishment, experimenting and homologating the prototype. Cooperation will be concretized by execution technical documentation elaboration, the execution of subassemblies, testing and homologating programs elaboration as well as the participation to the device testing and homologation trials.

5. CONCLUSION

While we tried the implementation of SCM on the project “Laser manufacturing device with two wavelengths”, some conclusions have been revealed. Distribution can be a complex and costly process. One might receive supplies from vendors, store them as part of your inventory, and/or ship goods in response to customer orders. To be profitable, one need to maintain optimal staffing levels, avoid tying up funds in inventory, and operate with a high degree of precision and economy. Microsoft solutions can help one run more cost-effective and efficient distribution operations, so one can consistently honour your customer commitments.

Vendors, suppliers, business partners, and other parties in your supply chain (Fig. 3) can affect your degree of success. While you want to make it easy for them to do business with you, you also want to be firmly in control and make sure our suppliers live up to their agreements

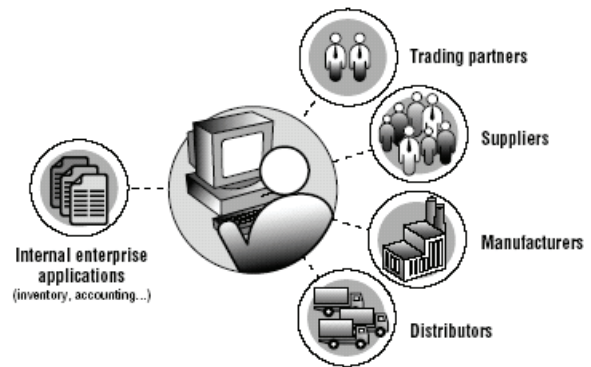


Fig. 3. IBM workplace for retail SCM.

and deliver the best quality of goods and services. Software, tools, and industry insight from Microsoft can help one generate the full value of business relationships, and use them to advance their objectives.

SCM Advantages are:

- Streamline everything from the earliest sales forecasts to customers' acknowledgements of orders received.
- Model complex supply chain scenarios, factoring in all relevant costs and all potential supply and demand constraints.
- Extend supply chain business processes to customers, suppliers, and partners, making it possible to adjust to unforeseen events in real time.

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