



Integrating business processes for global alignment and supply chain management

Integrating
business
processes

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Abstract *This paper presents a qualitative study of the integration of supply chain management and business process management activities. It reviews published literature in both fields and a number of supporting areas, revealing a minimal overlap in the research. A number of case studies of progressive organisations are examined, including an in-depth study of Nortel Networks Corporation's recent market repositioning and current supply chain integration activities. The study concludes that, while there is little evidence of research exploring the integration of processes extending throughout supply chains, some businesses are gaining competitive advantage by maximising the efficiency of their "global" supply chains or "virtual" organisations. A conceptual model of an integrated business process, derived from the case study, is presented, which highlights the importance of communication between processes and between partners in the supply chain.*

Introduction

In today's highly competitive world successful businesses need to "reinvent" themselves almost continuously. Global deregulation in many industries is opening markets to the entry of new competitors. Corporate expansion and a developing global culture are driving standardisation of business practices and a reliance on co-operation between customers, suppliers and other partners. How do organisations become more responsive, more efficient, and achieve co-ordination of the supply chain? How can the benefits of quality process based management be extended to embrace all members of the supply chain?

During the 1990s researchers and practitioners began to view the supply chain as a whole, and promoted customer focus, supplier partnerships, co-operation and information sharing and business process management (Hamel and Prahalad, 1989; Christopher, 1992, 1999; Lee and Dale, 1998). However, the integration of research and practice in customer supply chain and business process management has not been evident. Process management has been about improving the linkages between internal processes and supply chain management has been about improving the linkages between firms. As "virtual" organisations develop, business leaders need to take a holistic approach and consider the whole supply chain as one business.

This study suggests an approach for managers involved in global business. Can effective management of business processes deliver greater benefits by integrating processes that extend throughout the supply chain? Can lessons be learned from the experience of organisations that operate in successful global supply chains? To address this question, this study sets out to understand the

underlying relationship between managing business processes and managing supply chains.

Process based management approaches

Business process management (BPM) is considered to be a more general approach to organisational improvement. Zairi (1997) defines BPM as:

... a structured approach to analyse and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company's operation.

This seems to be an internalised view, and stresses the continuous improvement aspect of BPM. Elzinga *et al.* (1995) suggest a procedural approach to BPM and define it as:

A systematic, structured approach to analyse, improve, control, and manage processes with the aim of improving the quality of products and services.

De Toro and McCabe (1997) stress the cross-functional nature of process management and highlight the need for empowered employees to have "the authority to examine, challenge and change work methods". Empowerment has long been one of the stumbling blocks of process-focused management. Many employees are uncomfortable with "empowerment", and many managers are reluctant to relinquish their traditional control.

Following an analysis of the BPM literature, Lee and Dale (1998) conclude that most definitions of BPM agree that it is:

Structured, analytical, cross-functional and a continuous improvement of processes.

They go on to state that BPM integrates "the use of improvement tools such as re-engineering, continuous improvement and benchmarking". McKay and Radnor (1998) point out that many organisations develop their own approach to managing business processes:

The common theme to the methodologies is that processes are chosen, process maps created, problem or non-value-added areas identified, solutions created, process redesigned and, then, implemented.

However, business management and process improvement is not a "one-off" activity, but should be treated as a "plan, do, check, act" cycle. The path to business improvement must be an ongoing series of radical adjustments; each followed by an assessment and a refinement to supporting processes. Business process management cannot be about a short-term improvement, and should not be about a gradual improvement. To maintain leadership in a fast changing world, a world class organisation must continually reinvent itself (Sethi and King, 1998).

The success of BPM depends on the strength of the key organisational drivers which create the impetus for change (Peppard and Rowland, 1995). Armistead *et al.* (1997) identify five factors as the main drivers of process change:

- (1) globalisation;
- (2) changing technology;
- (3) regulation;
- (4) the action of stakeholders; and
- (5) the eroding of business boundaries.

A recent survey of Northern Ireland's "Top 100" companies (Hill and Collins, 1998) offered three states of competitiveness which drive managers towards considering process improvement methods:

- (1) a company in crisis;
- (2) a company in a strong competitive position, but envisaging greater competition in the future; and
- (3) a company in a strong position, and wanting to capitalise on that position.

This survey indicated that the threat of future competition was stated by nearly half of the respondents as the main reason for redesigning business processes, while less than 10 percent claimed that "crisis" was a driver. These findings support the view of Ryan (1994):

Few companies are so well run that they cannot enjoy the benefits of reinvention.

Enablers of and barriers to business process initiatives

Information technology was originally put forward as the key enabler in process re-engineering projects. Davenport and Short (1990) advocated "using the power of modern information technology to radically redesign business processes in order to achieve dramatic improvement in performance". A more intrinsic enabler for operating a successful process based organisation is communication. During the last decade communication technology has grown alongside computer technology, and enables the necessary flow of information between functions, and between supply chain partners. Corrigan (1996) noted that many companies studied "highlighted the protectionism that existed at all levels, and how the positiveness of the political climate was very important in introducing change". Human resources management is crucial to the success of radical process change initiatives. As traditional power structures are eroded and roles change, employees need support and help to understand their positions in the new structure.

The enablers of process improvements across supply chains can be expected to be largely the same as those within companies. The goals of the process are not necessarily the goals of individual companies, but in each case the value expected by the customer must be communicated to all people involved in the process. Establishing a culture of TQM and flexibility in each member of a supply chain is essential to enable seamless integration of the overall business

process. An example of this is Motorola who expect all their US suppliers to apply for the Baldrige National Quality Award.

Supply chain integration

Since the mid 1980's it has been observed that many successful organisations are co-operating with partners in their supply chains (Porter, 1987). This co-operation and the related "outsourcing" of non-core competencies (Hamel and Prahalad, 1989) have created inter-organisational networks. Benetton, for example, are able to respond to rapidly changing customer demands, particularly seasonal changes in fashion colours, by co-ordinating their own activities and their suppliers' activities (Christopher, 1992). Toyota pioneered "lean production" and "just in time" principles by encouraging suppliers to operate near by, and monitor stock levels directly (direct line replacement). This innovation allows rapid response to changing customer demands, and eliminated the cost of holding "just-in-case" stock. Christopher (1992) defines supply-chain management as "the requirement to extend the logic of (logistics) integration outside the boundaries of the firm to include suppliers and customers".

Cooper *et al.* (1997) go further and define supply-chain management as a philosophy for integrating all the activities in the life of a product or a service from the earliest source of raw materials to the ultimate customer, and beyond to disposal. They suggest that this value system is best represented by a "value tree" where the "firm" is represented by the trunk, the branches represent multiple suppliers and the roots multiple customers. Any given path through the tree defines a particular "supply chain". Customer focus is an integral part of the supply chain philosophy. Every part of the supply chain must have the same mission: to satisfy the final customer and to maximise the value added by the overall chain. This implies a change in the traditional power structure seen in organisations. The most powerful employees are those in direct contact with the final customer. This inverts the traditional organisational structure (Doyle, 1994).

Integrating the supply chain

The concept of integration within the functions of a firm can be represented by Porter's "value chain" (Porter, 1987) (Figure 1). Porter looked at the firm as a collection of key functional activities that could be separated and identified as primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) or support activities (infrastructure, human resource management, technology development, and procurement). He arranged these activities in the "value chain". Maximising the linkages between the activities maximises the efficiency of the firm and so the margin available for increasing competitive advantage or for adding shareholder value.

According to Doyle (1998):

A well-organized supply chain leads to increased efficiencies, faster response to market changes, better design and manufacturing processes, and increased productivity.

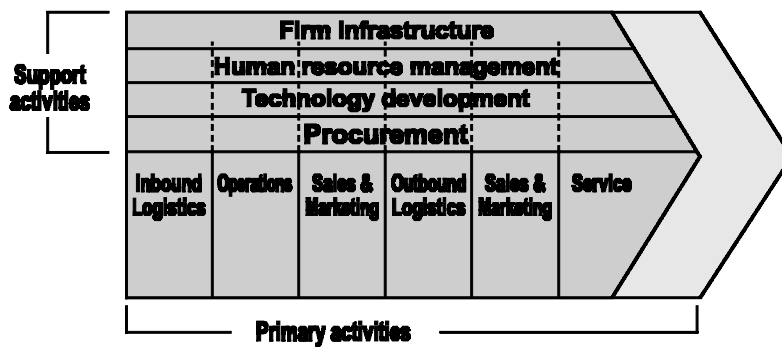


Figure 1.
Porter's value chain

These approaches are similar to those of BPM as suggested by Lee and Dale (1998) and Peppard and Rowland (1995) where “supply chain” can be used inter-changeably with business processes. Furthermore, Figure 1 conveys the idea of processes spanning functions, as is the case for BPM (Sethi and King, 1998). Integration occurs between the primary activities in each value chain, and is enabled by the support activities. It also takes place between activities in different companies. In some cases, the support activities also share resources.

Changing company structures

Perhaps the most common organisation structure today is the matrix formation, which is a compromise between functional focus and product (or customer) focus. Members communicate through peers in the same function or peers in the same product line. As organisations continue to build global supply chains this trend towards informal communication structures will inevitably increase. This approach is an integral part of supply chain integration. To enable effective integration of the primary activities in the value chain, employees must be able to talk directly to their peers in other activities. To integrate various companies in the supply chain an equivalent communication must be created between activities in different organisations. Communication is between members of the same business process, not the same function or location (Armistead, 1996).

Small companies are inherently flat in their structures. Each employee is multi-skilled and may carry a project from inception to completion. This enables fast reaction to market changes and flexibility. Large organisations are generally slow to change, and often slow to even see the need for change. Integrating the activities of key parts of the value system will allow large virtual organisations to be more agile and gain competitive advantage in a fast moving market place. By empowering all employees in the supply chain, utilising world-class electronic communication systems and operating common simplified processes, even the largest organisations can compete in this environment (Hamel and Prahalad, 1989; Lee and Dale, 1998).

Difficulties in extending the supply chain

As supply chains develop, they increase in complexity. The number of linkages to be managed increases and communication of a common goal becomes more difficult. Supply chain members become more dependent on each other. This dependency can cause feelings of insecurity in managers who feel that they are no longer in control of their firm's destiny. Also, the unique differentiating culture of particular organisations may be lost in the "oneness" of the supply chain. "Lean" management of inventory is critical, as buffers between activities, while individually small, add up to a significant inventory in the whole network. Another observed phenomenon of large supply networks is the "Forrester effect" or the "Bull Whip effect" (Lee, 1999). The communication of customer demand through the supply chain can be exaggerated at each linkage and distorted until supply is greater than the actual demand. This happened in the semiconductor industry in 1995. There was a perception that demand for semiconductors would be high, and distributors ordered up to three times what they actually needed. Suppliers scrambled to meet perceived demand only to find that poor information had left them with high stock levels.

Global business

The effects of a company seeking globalisation are far reaching. Managing the "supply chain" becomes a key focus as international operations must be able to source equivalent supplies anywhere in the world. Motwani *et al.* (1998) believe that global supply chain management "allows corporations to take advantage of diversity in the international environment by recognising and exploiting regional differences". Business information, including order details, inventory levels, directives and product changes, must be communicated to the people who need it, when they need it, wherever they are. Similar arguments are advanced in applying systematic measurement to BPM (Armistead, 1996). Moss Kanter and Dretler (1998) present a different view, suggesting that global strategy is synonymous with holistic approaches. They believe that "global" is an attitude rather than a geographic statement:

Global strategy involves thinking in an integrated way about all aspects of a business – its suppliers, production sites, markets and competition.

This approach considers all activity centres in the supply chain as one entity, not just looking at bits of it. It involves understanding and accommodating local variations and cultures, striving for open "world" standards and understanding international issues. All this needs to be part of the process and product design of the organisation (Lee and Dale, 1999), not added as an afterthought when seeking entry into a new market. A good example of a global attitude is at Ford Motor Company. Their "global car" concept consists of a basic engineering design, accompanied by regional variations to suit local tastes. Final assembly of models is postponed where possible to react effectively to local demands.

Literature consensus

From the brief summarised review of the literature, several key criteria are identified for a comparative analysis of business case data. These are total quality culture, process focus, supply chain focus, management commitment and performance outcomes. These criteria are not exhaustive; they are the more prominent themes in the literature. Total quality culture includes training, teamwork and collaborative people management. It implies some form of control measurement and an awareness of the wider business environment. Furthermore, the term implies an integration of TQ principles into normal operations (Dale, 1999). Process focus describes an organisation's flexibility, agility and openness of communication. Peppard and Rowland (1995) see this criterion as a key test of an organisation's resolve for implementing BPM. Supply chain focus describes the involvement in a wider community of partners, customers, service providers and suppliers. Motwani *et al.* (1998) argue that organisations can only adopt a supply chain focus when other internal processes have been identified and improved. In the literature the two topics, process and supply chain focus, are normally treated separately although there is a degree of overlap in process and supply chain discussions. This suggests that integration of the two topics is inevitable, but as yet, researchers have only briefly mentioned that processes may extend outside the organisation (Tinnilä, 1995; Van Hoek, 1998)

A number of writers (Armistead *et al.*, 1997; Hamel and Prahalad, 1989; Dale, 1999) have noted management commitment, or leadership, as the most important driver for successful change. In BPM and supply chain it is therefore important to consider performance and measurable success which are very important in practice. Therefore, there must be a mechanism to differentiate "successful" and "unsuccessful" strategic decisions. Both Peppard and Rowland (1995) and Cooper *et al.* (1997) stress the importance of measuring performance outcomes.

Research methodology

Most of the research in the field of business process focused management and supply chain management has been by empirical observation and case study. A number of surveys of businesses in local regions have also been undertaken, notably Hill and Collins (1998) in Northern Ireland and Tikkanen and Pölönen (1996) in Finland. Much of the development of methods, guidelines and "best-practice" in this rapidly changing field is originating from inspirational "gurus" and management consultants, working with pioneering organisations like Nortel Networks Corporation, Ford Motor Company, Hewlett-Packard, and Rank Xerox.

This study uses a grounded theory case study approach (Glaser and Strauss, 1967) to discover relevant criteria that describe the behaviour of supply chain management in a process-focused business. Three case studies were analysed to determine the key criteria (Eisenhardt, 1989), in addition to those supported by the literature, for the main case study analysis. Eisenhart (1989) describes

how the process of “grounded theory” starts with no overriding theoretical framework, but rather key criteria are developed as a study of an organisation grows. The study methods used in this study, as recommended by Eisenhardt, included the literature, ethnography, semi-structured interviews and archive material. The three companies involved were:

- Boeing A&T – Malcolm Baldrige National Quality Award Winner, 1998.
- Design to Distribution (D2D) Ltd – Towards Contract Manufacturing.
- Ford Motor Co. – Ford 2000 (The global car).

The grounded theory derived criteria were then used to analyse the main case study – Nortel – and inductively generate a conceptual model for an integrated business process.

Thus, complex case study data was analysed (Easterby-Smith *et al.*, 1993) using semi-structured interview data (management and employees), transcripts, ethnographic observations, current and archived company information. The purpose of this research study is to look for the application of process management techniques between members of supply chains, and to understand ways to integrate core business processes. The in-depth case is of the new business model being created at Nortel Networks Corporation, a global communications technology provider. It highlights what is believed to be “best practice” in the areas of supply chain integration, business process focused management, and a holistic approach to business operation.

Case studies

The organisations selected for analysis in these case studies are from a range of business sectors, and vary in size. The common factor is that they have all implemented some degree of process-focused change initiative and quality management system in the effort to become “best-in-class”. Each case was analysed from the same viewpoint and summarised in the same format. This allows comparative case analysis of their structures, activities, and experiences. The three companies in these case studies are all striving to maximise their competitive position, and their internal efficiency. All three companies have embraced some formalised model of total quality management for day-to-day operations. Achieving accreditation from a recognised quality association is clearly a factor in improving competitive positioning, but the discipline of following a defined model is also integral to managing the organisation towards a common goal.

Each company determined a set of “core” processes and corresponding sub-processes, and mapped these to show how they affect the business. Integration of core processes was clearly mentioned in the Boeing and A&T cases, but integration and extension of these processes outside the organisation is not specified. Senior management is very clearly attributed with directing the change processes, and has demonstrated considerable commitment to the work. In the Boeing, D2D and A&T cases, senior executives managed much of the

ongoing detailed supply chain relationships. Ford Motor Company clearly stresses the involvement of many supply chain partners to the operation. This is a tendency observed in the automotive industry as a whole. The other case companies have embraced customer focus and immediate supplier management approaches.

Overall a set of key criteria were identified (in addition to, and in support of, the literature):

- market changes;
- network strategy;
- total quality culture;
- process focus and supply chain integration;
- management commitment; and
- performance outcomes.

In-depth case study organisation – Nortel

Introduction and sources of information

This case study looks at the strategic positioning of Nortel Networks Corporation as the global telecommunications business undergoes dramatic change. The corporation has responded to the new environment with several major strategic innovations, including:

- to create and dominate a new industrial sector;
- to operate a large organisation as if it were a small business;
- to control the complete global supply chain;
- to align the global operations of the company.

The research for this case study has come from interviews with members of the global supply chain team, other Nortel Networks employees, current and archive company data and information.

Nortel Networks background

Nortel Networks has been a multinational corporation for many years. It is one of the five main telecommunications equipment providers in the world, and was named as the “World’s Most Global Company” in its sector by the editors of Global Finance magazine in 1998. The corporation is North American based (US/Canada) with sales and manufacturing facilities scattered internationally. The traditional customers of telecommunications equipment were large national “postal, telephone and telegraph” monopolies (PTTs) like GPO/British Telecom. The equipment produced is very high quality and very expensive, but has traditionally had a long operating life. Research and development is expected to be slow and costly. The facility at Monkstown, Northern Ireland has developed into Nortel’s main producer of switching and signal transport equipment outside North America. European and world sales are conducted

from the European headquarters outside London. The case study is discussed under the criteria headings identified earlier.

Market changes

The global telecommunications market place is currently changing rapidly. Since the 1980s deregulation of the industry in most of the world has enabled a host of new companies to set up in competition to the traditional PTTs. These companies have new demands, new ideas and no legacy systems. They tend to be small, inexperienced in telecommunications and funded by investment capital. In the past few years the growth of the Internet and the blurring of the traditional line between data communications and voice communications has further accelerated this change and led to the creation of even more new customers. Computer networks use the telephone system for remote connections and computer users place telephone calls and video links across their computer networks.

The host of new customers has provided the opportunity for new entrants to the equipment manufacturing industry. Many of these new competitors are relatively small companies from the data networking business (e.g. 3COM and Cisco Systems) and are experienced in operating in a fast changing environment. The traditional legacy links between PTTs and national suppliers are disintegrating. New suppliers, and new customers create new technologies, shorter product life-cycles and the demand for quicker payback on investments. Developments are progressing in “web time”, where technologies are being outdated in months rather than years. Nortel Networks’ management terms this environment as the “short, short” business – short development times, and short operating lives. The existing PTTs are also reacting and are moving into international markets as secondary players. Telecommunications companies who operate in several countries want a supplier who can provide for their needs in each of these locations. This is the driving force for globalisation for any organisation which wants to operate in the world communications market.

Nortel Networks strategy

One approach is to accelerate the merging of data and voice communications networks and position Nortel Networks as the most responsive and most accessible supplier. In 1998, US\$9.6 billion were invested in buying Bay Networks, one of the largest mission critical data networking companies in the USA. This created considerable turbulence in the stock market, but positioned Nortel as the one company capable of bridging the gap between the two industries. A world-wide restructuring is currently under way to present the new product, the “Unified Network” and the new merged organisation, “Nortel Networks” as global brands. The company is continuing to acquire smaller businesses, with reputations in the data market, leading edge products, or highly skilled employees, and is merging them into one integrated customer-facing organisation. This means constantly changing the business model

rather than forcing new employees and business units into a rigid “one right way”.

The “Manufacturing 2000” initiative involves rationalising the company’s many manufacturing plants into a number of key supply chain centres and a set of globally interconnected supply and logistics operations. Each of these “systems houses” owns the supply chain for a given range of products, and has the responsibility to manage all activities from initial customer interest to customer satisfaction.

Nortel – Manufacturing 2000 – a regional experience

Strategic overview

As the corporate strategy began to emerge, a decision was made to rationalise manufacturing operations globally. There were 23 manufacturing sites around the world and, it was announced, John Roth expected that no more than seven should be needed. The main locations began to prepare themselves for whatever the new structure would be, and to position themselves as the preferred “systems house” in their market region. This created considerable unrest among employees, as it was expected that headcount would be reduced. In the first quarter of 1999, Nortel Networks’ operation in Monkstown, Northern Ireland was selected as the main “systems house” for Europe, responsible for all transmission and switching equipment.

Total quality culture

Nortel Networks’ operation in Monkstown, Northern Ireland has been using a process-focused, self-assessment quality system, based on the EFQM model, and before that had achieved ISO 9000 accreditation for manufacturing and information systems development. This created a regular performance measurement system, and helped to highlight and improve process performance issues. Nortel Networks have since won the Northern Ireland and the UK quality awards based on the EFQM principles, and a number of internal “best quality site” awards. Supply chain performance is being measured by a “scorecard” system. This encompasses measures of the financial organisation, end-to-end supply chain processes, customers and future growth. The key metrics and the aspects of the business measured are outlined in Figure 2.

The total quality culture approach involves team working and investing in people. Employees are encouraged to work in different roles and cross-functional improvement teams.

Process focus and supply chain integration

As a “systems house”, Monkstown is responsible for the entire supply chain. The corporation recognised that in the global business it was not a case of companies competing, but supply chains. Nortel needed to make the most efficient use of the supply chain, and ensure that all business processes were aligned. In the words of Christopher (1999):

KEY SUPPLY CHAIN MANAGEMENT METRICS	Customer Facing		Internal Facing	
	Quality	Time	Cost	Asset Management
Delivery to Original Promise Date	✓			
Faultless Installs	✓			
Bid Management Cycle Times		✓		
Order Fulfilment Lead Time		✓		
Delivery to Customer Requested Date		✓		
Cash to Cash Cycle Time		✓		✓
Upside Production Flexibility		✓		✓
Total Supply Chain Management Cost			✓	
Bid Management Costs			✓	
Inventory Days of Supply				✓

Figure 2.
Key supply chain management “scorecard” metrics

There will be advantage to be gained through the pro-active leadership of the supply chain network – in effect by the assumption of the role of supply chain “captain”.

There is a significant paradox in the various views of supply chain and process integration. The supply chain is seen as a value chain adding value to a product from the earliest suppliers to the final customers. The core processes of an integrated business are seen as a flow of information and activity from customer interest to customer fulfilment (Figure 3). Suppliers, manufacturing operations and support functions are often offset as non-core activities. Nortel Networks’ process management teams addressed this issue with an integrated business model allowing many alternate process paths through the “functions” of the supply chain to add value and satisfy a customer’s requirements (Figure 3).

Organisation structures change to suit their environment and to enable strategic decisions. The Manufacturing 2000 initiative involves forming strategic relationships with suppliers, divesting operations that are not on the critical path of the supply chain and extending the site’s influence along the supply chain from the supplier’s supplier to the customer’s customer. Each of the functional activities in the supply chain is modelled to represent major suppliers, customers, processes and information flows. The part of the model representing the core activities of the Monkstown systems house is outlined in Figure 4.

The number of suppliers that Nortel uses is being reduced, and global agreements are ensuring that the same supplier provides a service to all Nortel

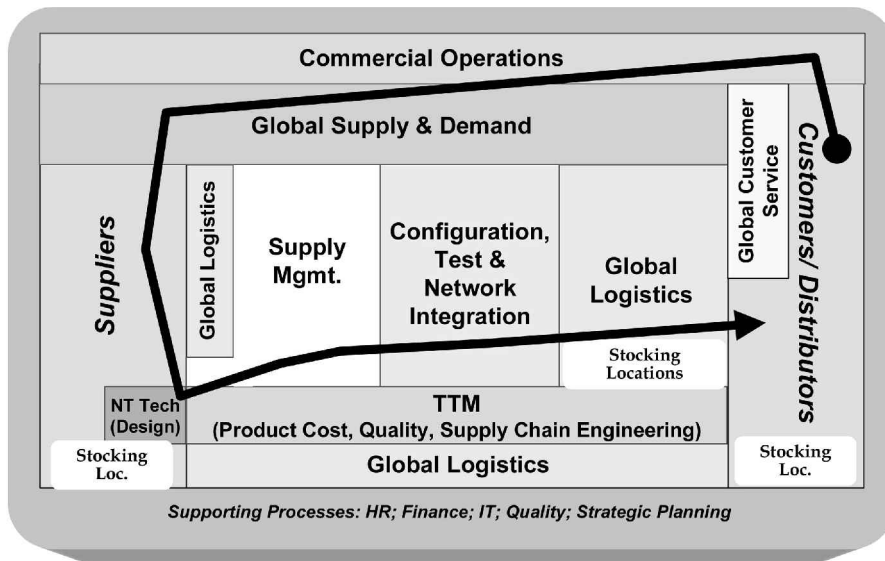


Figure 3.
Nortel Network's
integrated business
model

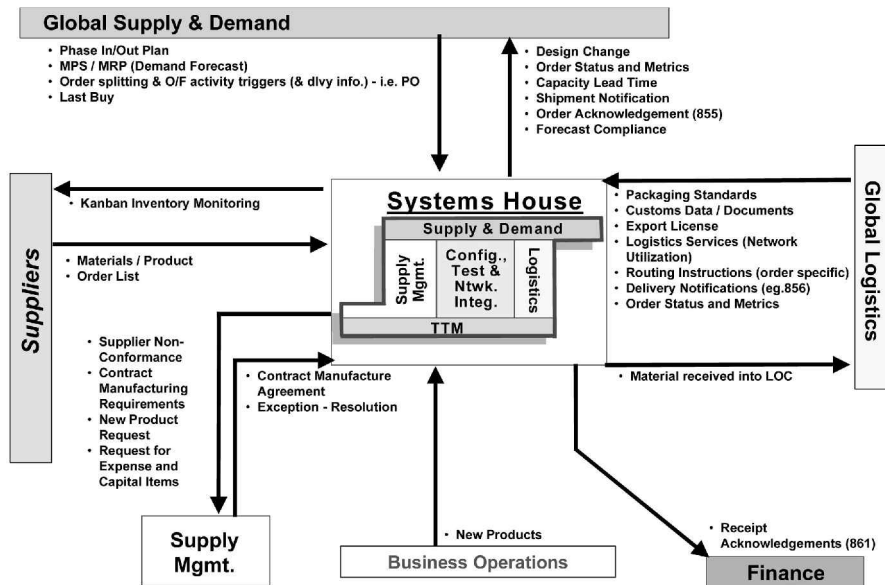


Figure 4.
Nortel Networks
systems house
supply chain position

sites. They are responsible for gathering material together as required from their suppliers and are being given a view of Nortel's future order load, as a preliminary forecast. It is also expected that some suppliers will accept design responsibility for sub-units of Nortel Networks' products and deliver a completed item. A supply chain "engineering" team was set up with a remit to identify opportunities for standardising processes across product lines and

lines of business and for reducing the cost of the supply chain. Another objective was to increase the awareness that processes permeate through the business, and are not limited within functions.

Customers are being offered standard models that reduce the lead-time on delivery. They are given delivery promises and visibility of internal schedules. A new integrated master-scheduling tool is being implemented to co-ordinate orders, and invoices around whatever “systems houses” are necessary to fulfil an order. Customer focus implies a change in the traditional power structure seen in organisations. The most powerful employees are those in direct contact with the final customer. This inverts the traditional organisational power structure (Doyle, 1994). At the Monkstown “systems house” customer focused teams have been set up to represent the customer throughout the life of an order. Each team looks after orders for a particular customer or small group of customers and is ultimately responsible for making the supply chain perform. These customer teams are the “captains” of the supply chain. The customer teams are responsible to the customer, not particular functions, or lines of business within Nortel, or the supply chain.

“Value managed relationships” are being built with key suppliers and key customers to ensure that the maximum value is added to the supply chain at the point where it is most appropriate. Key suppliers are entering stock holding arrangements, direct line replenishment agreements and fast response policies. They benefit by a commitment to long-term business, sole vendor arrangements and early visibility of “future load”. Employees from suppliers and customers are being placed in Nortel offices and factories full-time to co-ordinate activities. One major customer contract has been designed, managed, and implemented by an integrated team of about 40 employees dedicated full-time to that contract. They can use their respective contacts in the two companies to maximise the value added in the contract. The ongoing move to create the “systems house” as a supply chain owner involves removing what were originally core activities and procuring the services from external suppliers. This has necessitated outsourcing activities, notably materials storage, contract electronics manufacturing, field installation, and mechanical and electrical pre-assembly. Where possible this has been achieved by divesting existing operations as “going concerns”.

Management commitment

In the early 1990s, Nortel’s operations in Northern Ireland were considered to be a “fortress” of manufacturing. There were rigid boundaries, and limits on the flexibility of the business. Since then the research and development facility has grown, and operations have become highly flexible and customer oriented. The local management team in Monkstown has promoted the principles of regional systems houses from before it was selected as a corporate strategy. The assumption of “systems house” status brings responsibility for a large section of Nortel Network’s revenue. As the new business environment takes shape, functions are being relocated, replaced by process based teams, or removed.

Management has had to make some difficult decisions concerning employment and restructuring but has maintained their commitment to the local community in Northern Ireland.

Due to the company's commitment to empowerment, people with operational responsibility for products and processes make many of the "strategic" decisions. Employees are trained and encouraged to move into a variety of job roles in their careers. Senior managers are champions of core processes and coordinate activities to ensure that overlaps in effort are minimised.

Performance outcomes

The primary measurable performance factor in process-based supply chain activity should be customer satisfaction and loyalty, a core measure in the EFQM model. Customer satisfaction is monitored following regular customer surveys, and from a review of accolades and complaints. In practical day-to-day terms, it is reflected in delivery performance and commissioning failures. The systems house model is still in its infancy, and the effect of increased customer focus on satisfaction is not readily apparent. However, one unusual factor of success is the number of complaints, or suggestions for improvement. Because the customer is working as part of the supply chain, they are often initiating process change opportunities. The business is changing, and growing rapidly, and business performance metrics show that the integration of the supply chain is not yet complete. Based on the "success factors" of completion, acceptability and achievement (Miller, 1995) an estimation of the success of the Manufacturing 2000 initiative in Monkstown can be made. Completion is about 80 per cent, as most of the infrastructure is in place. Supplier relationships and increased utilisation of outsourcing for design and manufacturing is being negotiated for existing work and planned for future work. Acceptability is near 100 per cent.

Conclusions and recommendations

The purpose of this study has been to understand the nature of the relationship between managing business processes and managing supply chains. It has been found that there is little evidence of organisations actually exploiting the integration of business processes in their supply chains. In the research literature, the two fields are generally treated separately. Business process management techniques are applied to a single firm, although the concept is not bound by company limits, while supply chain research tends to focus on the relationships between organisations. Most studies focused on one member of a supply chain and their links with immediate suppliers and immediate customers.

One common factor of the organisations studied in this report is that they have a total quality management culture and undertake both self-assessment and external assessment procedures. Accreditation of a business with a recognised quality body not only provides market "stature" but also forces managers to look at their own business with fresh perspectives. Management

has an important role in the success of a major integration exercise. Senior managers are responsible for providing a vision and common goal. Empowered teams of process specialists need a clear direction to guide their decisions and strong support to promote the new ideas to the wider organisation.

All process-based management techniques advocate identifying and documenting core processes, and suggest a series of steps to facilitate the changes. The core processes rely on communication of information through them, but are also linked to each other in a variety of ways. Boeing Airlift and Tankers termed their inter-links as “mega-processes”. Nortel Networks integrate their core processes by defining sub-processes that are dependent on information from more than one core process. The important aspect of this is to have a communication between processes. This communication may be formalised as a linkage, or relaxed as “chatting” between employees working in open-plan office spaces.

To extend this process integration throughout the supply chain there cannot be a fixed boundary between partners. The supply chain must be managed as a single organisation. Value managed relationships between firms, and the placement of employees in customer and supplier companies enables the formal and informal communication between supply chain members. Processes must be defined as extending from the supplier’s supplier to the customer’s customer, and acknowledge the flow of information from customer interest to final delivery of a solution.

The model of a globally integrated business being developed at Nortel Networks Corporation is expected to make the organisation as agile as much smaller companies, and more capable of providing global telecommunications solutions than any competitor.

The conceptual model of an integrated business process, shown in Figure 5, has been developed from the practices and ideas discovered during this study. It considers all the core processes as intertwined strands. Communication paths

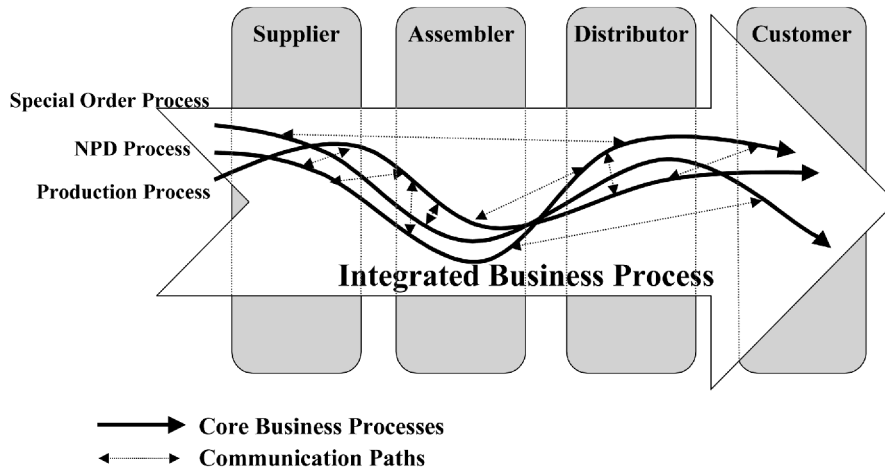


Figure 5.
Conceptual model of
integrated business
process

between core processes and between firms and functions join the strands in the supply chain. The model shows three core processes and some examples of points of contact. It provides a holistic perspective on a business that many managers may not readily consider.

Further research is needed to understand the extent of integration between supply chain management and business process management. In practice, they are often treated as two aspects of the same activity. A quantitative study to assess the opinions and understanding of strategic business leaders about process and supply chain integration would help to determine the extent of integration activities.

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