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Understanding Information Management for Time Compression in Supply Chain Management: The Case of a Service Company in Barcelona, Spain in 2004.

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Abstract

This paper offers some insights to examine and further explore the importance of an Information Management (IM) approach in order to succeed with Time Compression (TM) Strategies in Supply Chain Management (SCM). Specifically, it focuses on the relevant elements that should be taken into account for an Information Management approach for getting the benefits of Time Compression in Supply Chain Management. The fundamental aspects of time compression are considered and a theoretical supply chain framework have been selected and applied in a real case study in the service sector to contrast the hypotheses established. The structural and infrastructural changes required for an IM approach are also analysed, and the need for a systemic view of the SCM is highlighted.

Keywords: Supply Chain Management, Time Compression, Information Management, Information Technology, Change Management, Trust.

1. Introduction

In an increasingly global marketplace most companies are competing with relatively similar machines, technology, and expertise. Consequently business strategy is becoming the cornerstone to establishing the world class enterprise (Mason, Jones and Towill, 1998). Major changes have occurred since the mid 1990s and two topics stood out as showing fastest ascendancy to prominence in the arena of Operations Management research: Operations strategy and Supply Chain Management (Choi et al.).

SCM is a novel management philosophy that recognizes that individual business no longer competes as solely autonomous units, but rather as supply chains (Chen, I. J. et al.). Executives are becoming aware of the emerging paradigm of inter-network competition, and that the successful integration and management of key business processes across members of the supply chain will determine the ultimate success of the single enterprise. Managing the supply chain cannot be left to chance. For this reason, executives are striving to interpret and determine how to manage company's supply chain network and achieve the potential of SCM.

In that sense and taking into account that time is increasingly being perceived as a crucial variable within competition one of the challenges for managers is the implementation of a Time Compression Strategy in their Supply Chains. The nature of time compression in relation to the fundamental principles of the supply chain could be addressed as a powerful source of...
competitive advantage that remains relatively under-utilized in most businesses. The emphasis of time compression is on reducing the amount of time consumed by business processes and to get that a Total Time Compression Strategy needs to be developed. Time Compression has two major components that are essential to meeting customer demand: information flow and material flow. Both are necessities and together make up the total supply chain lead-time; the information activates the material pipeline. The practice of material flow cycle time reduction is well established. We can not say the same with the practice related to the optimisation of the order information pipeline.

An Information Management approach should be worked in order to succeed with time compression strategies in SCM. Information Management has been mentioned as the vital ingredient for time compression in the supply chain (Towill et al.). However, the real power of Information Management for the information pipeline only becomes evident when it is utilised throughout the supply chain. It takes a visionary world-class supply chain to implement a total time compression strategy, especially from the point of view of market information sharing and information management approach for the holistic good.

2. Literature review

A relative large review of the literature was used to adopt a SCM framework and to highlight the main aspects of a TC Strategy. In the same trend, what is called in this paper an Information Management approach was developed and treated in its main aspects providing six associated hypothesis to work in the real case selected. The following section presents the SCM framework adopted, the basics of TC concept and TC Strategy and the main aspects of an Information Management approach.

2.1. Supply Chain Management

As mentioned by different authors one of the most significant changes in the paradigm of modern business management practice is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains. Business management has entered the era of inter-network competition and the ultimate success of a single business will depend on management's ability to integrate the company's intricate network of business relationships (Drucker, 1998; Castells, 1999)

Increasingly the management of multiple relationships across the supply chain is being referred to as supply chain management (SCM). Strictly speaking however, the supply chain is not just a chain of businesses with one-to-one, business-to-business relationships, but a network of multiple businesses and relationships. SCM offers the opportunity to capture the synergy of intra- and inter-company integration and management. In that sense, SCM deals with total business process excellence and represents a new way of managing the business and relationships with other members of the supply chain (Christopher, 1998 and Bowersox, 1997).

While top management recognizes that managing the supply chain cannot be left to chance, these executives are searching for ways to successfully deal with the complexity of the task (Hewit, 1994). Thus far, there has been relatively little guidance from academia, which has in general been following rather than leading business practice (Cooper, Lambert and Pagh, 1997). There is
a need for building theory and developing normative tools and methods for successful SCM practice.

2.1.1. A Supply Chain Management Theoretical Framework

In 1997, Cooper, Lambert, and Pagh offered a framework, illustrated in Figure 1 for understanding SCM and raised a number of research questions.

![Figure 1: Supply Chain Management: Integrating and Managing Business Processes Across the Supply Chain](image)

In 1998 the same authors began to address some of these questions by adding substance and making more operative the framework as we will see in the next two sessions (Lambert, Cooper and Pagh, 1998). The definition of SCM used was developed in 1994 and modified in 1998 by members of The Global Supply Chain Forum (Lambert et al., 1998):

"Supply chain management is the integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders"

Thus, business processes become supply chain business processes linked across intra- and inter company boundaries.

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2.1.2. Supply Chain Management: Main Elements

The SCM framework above mentioned encompasses the combination of three closely interrelated elements: the structure of the supply chain, the supply chain business processes, and the supply chain management components (see Figure 2). The authors believed that the combination of these three elements captures the essence of SCM. The supply chain structure is the network of members and the links between members of the supply chain. Business processes are the activities that produce a specific output of value to the customer. The management components are the managerial variables by which the business processes are integrated and managed across supply chain. The implementation of SCM involves identifying the supply chain members with whom it is critical to link, what processes need to be linked with each of these key members, and what type/level of integration of management components applies to each process link.

Figure 2
Supply Chain Management Work Framework: Elements and Key Decisions


2.1.3. The Supply Chain Management Components

The SCM management components are the third element of the SCM framework. The level of integration and management of a business process link is a function of the number and level, ranging from low to high, of components added to the link (Lambert, Emmelhainz and Gardner, 1996; Cooper et al., 1997). Based on their research the authors have identified nine management components for successful SCM. Figure 3 illustrates how the management components can be

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divided in two groups. The first group is the physical and technical group, which includes the most visible, tangible, measurable, and easy to change components. Their research and much literature on change management (Jaffe and Scott, 1998; Andrews and Stalick, 1994; Hammer, 1990; Hammer and Champy, 1993; Towers, 1994) shows that if this group of management component is the only focus of managerial attention, managing the supply chain will most likely be doomed to fail. The second group is comprised of the managerial and behavioural components. These components are less tangible and visible and are, therefore, often difficult to assess and alter.

**Figure 3**
Supply Chain Management: Fundamental Management Components

<table>
<thead>
<tr>
<th>Physical &amp; Technical Management Components</th>
<th>Managerial &amp; Behavioral Management Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and Control Methods</td>
<td>Management Methods</td>
</tr>
<tr>
<td>Work Flow/Activity Structure</td>
<td>Power and Leadership Structure</td>
</tr>
<tr>
<td>Organization Structure</td>
<td>Risk and Reward Structure</td>
</tr>
<tr>
<td>Communication and Information Flow Facility Structure</td>
<td>Culture and Attitude</td>
</tr>
<tr>
<td>Product Flow Facility Structure</td>
<td></td>
</tr>
</tbody>
</table>


If the managerial and behavioural components are not aligned to drive and reinforce an organizational behaviour supportive to the supply chain objectives and operations, the supply chain will likely be less competitive and profitable. In one or more components in the physical and technical group are changed, management components in the managerial and behavioural group likewise may have to be readjusted. Consequently, the groundwork for successful SCM is established by understanding each of these SCM components and their interdependence.

The objective of SCM is to maximize competitiveness and profitability for the company as well as the whole supply chain network including the end-customer. Consequently, supply chain process integration and redesign initiatives should be aimed at boosting total process efficiency and effectiveness across all members of the supply chain.

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2.2. Time Compression

Modern supply chains are expected to respond rapidly, effectively and efficiently to changes in the marketplace. Simultaneously there is the drive to achieve world-class customer service levels coupled with minimum reasonable inventory (MRI). We thus have the classic conflict of interests between marketing, production and materials management. Marketing wants the complete product range available off-the-shelf; production is still, all too often, looking to manufacture in economic batch quantities so as to achieve economies of scale; and materials management is trying to minimize storage and distribution costs which, in turn, require that a total system MRI policy be adopted. Time compression at all stages in the supply chain is seen as the way to respond to these challenges.

Unfortunately many companies take a restrictive view of time compression which they link purely with production cycle time reduction. However, Thomas (1990) utilises the phrase total cycle time (TCT) stating that “… the first word of Total Cycle Time was intended to express how short cycle times can be applied productively to all segments of a business, not just manufacturing efforts.” This distinction is important, hence TCT compression programmes should be directed at all the work processes linking customer need to that demand being satisfied (Towill, 1996). The consequential effect of reducing TCT is direct leverage on the bottom line and the development of a Time Compression Strategy is a must to get it. Different techniques have been used for TC and Mason-Jones and Towill (1990) developed one called Information Enrichment Model that we will describe in the next four sections.

2.2.1. Time Compression Strategy: Information Flow and Material Flow

Our total cycle time (TCT) compression strategy encompasses the whole system in the supply chain from consumer demand to customer satisfaction. TCT has two major components that are essential to meeting customer demand: information flow and material flow. Both are necessities and together make up the total supply chain lead-time; the information activates the material pipeline. Therefore to optimise a time compression strategy TCT must include both the information and material flows. In other words lead-time consists of two consecutive components through a supply chain, the order information pipeline and the material flow pipeline. We confirm that material flow cycle time compression coupled with open information channels will potentially have a much greater effect on supply chain competitiveness.

Figure 4 illustrates the characteristic U shape of the total lead-time pipeline, from end consumer demand to goods delivery into the market place with orders flowing upstream and products flowing downstream. Material flow is activated by order information, therefore speed and fidelity of information transference is crucial to an effective time compression strategy.
In his paper Towill (1996) showed via the simulation of a real world supply chain that implementing a holistic time compression strategy must include both production and order information lead time reduction to maximise competitive advantage.

The Ford mass production paradigm for the exploitation of time led to “economies of scale”. The present exploitation of time is fundamentally different: TCT compression generates “economies of scope” (Towill, 1997a). With consumer choice being one of the major drivers of the competitive marketplace even the most loyal customer may turn to a competitor if the preferred company cannot supply on demand. This facet of consumer behaviour is summed up by Tunc and Gupta (1993), “… customers’ demand for quality and uniqueness is increasing. In addition, customers want their demands satisfied almost instantaneously, making time an important competitive strategy for the 1990’s”. It was shown by Stalk and Hout (1990) that under specific circumstances customers are even prepared to pay a price premium for fast response and ready availability of the right product. It is clearly shown that the consumer responds favourably to the company which supplies what he/she wants when he/she wants it, leading to an improvement in market share and increased profit margin.

2.2.2. Time Compression Strategy: Techniques for cycle time reduction

Companies have appreciated the benefits of minimising their cycle times for many years. The example of Henry Ford, presented earlier, shows that the automobile industry saw the light as far back as the 1920s. There are four basic tactical approaches to cycle time compression available, as listed in Table I (Towill, 1996). The continuous flow line implemented by Ford was a combination of compression and integration. However, as we have argued previously, the new output of TCT is fundamentally different. Now the effect is “economies of scope” and enables customer choice to be met at reasonable cost.
The practice of material flow cycle time reduction is well established. The same principles have been extended into areas that could not have been readily foreseen, such as commerce and insurance (Stalk and Hout, 1990). Companies have found that reducing and continually improving cycle times positively impacts on many other areas within the organisation such as inventory policies and workforce attitudes (Womack et al., 1990). For example it is of little benefit speeding up the shop floor if the internal warehouse is slow and cumbersome at despatching orders. This in turn leads to greater work-in-process (WIP), a ballooning warehouse, loss of response flexibility, but still dissatisfied customers.

Frequently, we find the warehouse is full, but with the wrong items. We then risk losing money from obsolescence as well as stock-out. As is evident from Towill (1996), cycle time reduction has positively affected many operational facets within individual company structures. The challenge is now to take the lessons outside and apply them to the whole supply chain. Applying TCT compression right across supply chain is obviously more complex but the basic issues remain the same and the four strategic approaches of Table I still hold strong.

Practical TCT compression can be achieved through a variety of techniques which following Scott and Westbrook (1991) are conveniently grouped as shown in Table II. The first three categories listed in Table II are associated with material flow time compression activities, whereas information technology improvements additionally tackle the order pipeline. The importance of the availability of undistorted marketplace information is further emphasised with the addition of electronic point of sales (EPoSs) to the original table in Towill (1996).
<table>
<thead>
<tr>
<th>Strategy</th>
<th>Technique</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial engineering</td>
<td>Set up reduction</td>
<td>Single minute exchange of dies</td>
</tr>
<tr>
<td>improvements</td>
<td>Handling methods</td>
<td>Container design and conveyor use</td>
</tr>
<tr>
<td></td>
<td>Product design</td>
<td>Design for manufacture</td>
</tr>
<tr>
<td>Production engineering</td>
<td>Integrate processes</td>
<td>Combine two into one</td>
</tr>
<tr>
<td>improvements</td>
<td>Sequence processes</td>
<td>Re-sequence to postpone variety</td>
</tr>
<tr>
<td>Operations engineering</td>
<td>Kanban</td>
<td>Production control via actual orders</td>
</tr>
<tr>
<td>improvements</td>
<td>JIT supplies</td>
<td>Greater frequency and smaller quantities</td>
</tr>
<tr>
<td></td>
<td>Shared call off data</td>
<td>Improved service levels via lower forecast errors</td>
</tr>
<tr>
<td>Information technology</td>
<td>Quicker and more accurate data capture</td>
<td>Barcoding on order paper work, materials packaging</td>
</tr>
<tr>
<td></td>
<td>EDI</td>
<td>Orders, funds, transferred instantly</td>
</tr>
<tr>
<td></td>
<td>EPoS</td>
<td>Marketplace demand data transferred instantly through the supply chain</td>
</tr>
</tbody>
</table>

Source: Evans (1993)

The tremendous benefits exhibited by TCT compression within the supply chain can be described as “squaring the dynamic response circle”. Not only are the stock dynamic responses improved via time compression, but the capacity dynamics are also radically improved. Therefore TCT compression avoids the dilemma frequently faced by companies when implementing change of having to trade off customer service level against capacity utilisation.

2.2.3. The Information Enrichment Model

The concept of a world-class company has changed immeasurably over the last century. The attributes for attaining and maintaining such a position are no longer static, but are dynamic in many dimensions. The marketplace is no longer an arena of a few players with loyal customers and well-established trademarks. Customers are now far more demanding, requiring greater choice, quality, value for money and timely delivery. The consumers now have a world marketplace to choose from and are notorious for voting with their feet. Each player in the supply chain is dependent on the patronage of the end consumer, so no matter how far upstream a player resides, satisfying the customer at the marketplace should be key to their strategy. Therefore the performance of the whole supply chain is crucial; a bad link can critically affect all members of the chain.

Hence companies need to work together and optimise the complete pipeline by establishing a seamless supply chain (“think and act as one”) to maximise their market share. Only with this support of the holistic chain concept can further significant and radical improvements in individual business performance be realised. The greatest opportunities for time compression are therefore at the holistic level. This includes lead-time compression via information sharing. A time-based company is only as good as their fellow players in the supply chain.

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Market sales data are the catalyst information for the whole supply chain, holding undistorted data describing the consumer demand pattern. The order information pipeline offers ample opportunity for time compression and invariably has an unnecessarily long lead-time due to the way in which orders cascade along the chain (Mason-Jones and Towill, 1997). Therefore the best way to compress the information pipeline is to directly feed each player in the supply chain with the market sales data thereby eliminating the traditional long pipeline. So rather than each player making his/her order decision based purely on the internal chain order data he/she can now make an informed judgement based on what the end consumer is actually buying at the point in time of sale. Not only is the speed of the order information pipeline vastly improved, but also supply chain benefits such as stock reduction and greater flexibility are possible due to the virtual elimination of the Burbidge Law of Industrial Dynamics, which states:

“If demand for products is transmitted along a series of inventories using stock control ordering, then the demand variation will increase with each transfer” (Towill, 1997b).

Figure 5 shows a rich picture representation of the optimised order information pipeline, in which each echelon receives the data directly. This technique we call the information enrichment model is achieved via an EPOS (electronic point of sales). Hence utilising the market sales information throughout the supply chain allows all “players” to have an undistorted view of the consumer thereby enabling the supply chain to operate effectively without the added burden of the magnification effect described by the “Law of Industrial Dynamics”.

Analysing the response to a step demand is an essential starting point when simulating a supply chain because of the relative ease of analysis and background of previous research. As expected reducing lead-times in the material flow path improves the supply chain’s response to the step up in demand although this inherently causes the system to be more oscillatory. This is scarcely unanticipated because although all players have improved their material flow lead-times they are still receiving stale, distorted data. Conversely improving the information pipeline offers greater ordering control thereby reducing the “shock” to the system induced by the demand. This is hardly surprising because an EPoS link to the factory order decision point will ensure visibility of changing consumer habits as and when they occur. The “information enriched” factories are therefore able to make an informed decision at a much earlier point in time than the manufacturer at the end of the traditional supply chain. The supply chain simulation results offer conclusive evidence that to maximise time compression benefits a TCT approach should be used.

2.2.4. Time Compression Strategy: Benefits

The combined effect of TCT showed in the simulation (mentioned in section 2.2.1) the dramatic benefits available. Not only have the response times been greatly improved but the overshoot of the supply chain has reduced for both the ordering function and the stock levels. The effect the production and information pipelines have on supply chain behaviour is seen as significantly different. Information is crucial to the control of the supply chain whereas material flow directly affects the speed of response. A TCT strategy combines the best features of compressing each pipeline to offer a far healthier and competitive advantage. So the “product champion” (Towill, 1992) has substantial evidence to support his/her drive for enabling supply chain time compression via information sharing.

A truly effective information flow time compression strategy must address the order magnification problems experienced within supply chains if competitive advantage is to be optimised. This cannot be enabled without significant attitudinal change amongst the players. There is still much untapped mileage available to companies competing on time by using undistorted point of sales information provided they are willing to embrace a new strategy for the data pipeline. Successful time competitive supply chains must view their information as a strategic asset and ensure that it flows with minimum delay and minimum distortion. The payoff is better customer service, reduced stocks throughout the chain, and reduced risk of product obsolescence leading to enhanced business performance by all “players”.

2.3. Information Management

As we have already seen all supply chains have two distinct lead-time pipelines, first, the order information transfer pipeline, from point of sale to raw material supplier, and second, the product transfer from raw materials to end customer. Production is activated by demand information, therefore speed and fidelity of order data transference is crucial to an effective supply chain time compression strategy. The two pipelines together result in the total effective lead-time of the supply chain determining supply chain dynamics.

Unlike production delays, which are reliant on technological processes, the order information pipeline can in theory be instantaneous from the marketplace to the upstream players (Mason-Jones and Towill, 1997). The essential competitive benefit of marketplace data usage by each

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player in the supply chain is summarised by Sabath (1995) as “When everyone plays from the same sheet music, delays are minimised”. We show in the paper that a very effective way of achieving TCT is via access to EPoS data by all “players” in the supply chain.

Stalk and Hout (1990) specifically warn of the dangers of slow information lead-times, summing up the problems with information delays when they state “The underlying problem here is that once information ages, it loses value, and old data cause amplifications, delay and overhead. The only way out of this disjointed supply system between companies is to compress information time so that the information circulating through the system is fresh and meaningful.” However, sharing information is only simple in theory: in practice attitudes must also be changed. It does not help if the other players in “our” supply chain are frequently regarded as “the enemy” (Macbeth and Ferguson, 1994).

2.3.1. The Information Management Perspective

Information is the way people in business express, represent, communicate and share their knowledge with others to accomplish their activities and achieved shared business objectives. If knowledge –our experience, skills, expertise, judgment and emotions – resides primarily with people, then by using information, people can inform each other and be informed about the decisions, actions and results of their work in companies. It is through information about markets, customers, competitors, partners, internal operations and the mix of products and services offered by the company that managers and employees create business value and improve business performance (Marchand, 2000).

Drucker (1999) has called information “data endowed with relevance and purpose”. Data exists all around us in the form of signals, events and situation, which people can choose to interpret as potentially relevant or not relevant depending on their purposes. This over-abundance of data challenges people in business organizations to manage their time and attention carefully since both of these resources are in scarce supply. Business organizations must focus their managers and employees on the relevant information to execute appropriate activities and tasks to implement their strategies and achieve results.

Companies compete with information to the extent that managers and employees seek, collect, organize, process and use the relevant information in decision-making and actions that lead to superior business performance in markets. Effective use of information is critical to how executives manage their companies and how business creates value in their markets (Marchand et al., 2000).

A basic assumption is that managers and their people shape the use and deployment of information in companies. Information technology (IT) practices and investments, while important to managing information in business, do not lead directly to improved business results. Although we will address the role of IT in enabling companies to manage information effectively in their business, we share the view advance so eloquently by Tom Davenport (1997) that: Information and knowledge are quintessentially human creations, and we will never be good at managing them unless we give people a primary role…..The status quo approach to information management, invest in new technologies, period, just doesn’t work.
2.3.2. Information Management Responsibility

The perspective for Information Management emphasises the mindset and viewpoint of the general manager rather than the functional manager – the IT or information specialist -. Information Management is the responsibility of every manager in a business, for three main reasons:

1) It is the unique responsibility of general and senior managers to develop an integrative view of how to manage people information and IT in a business to implement strategies and achieve results.

2) General Managers are necessarily generalists rather than specialists who must approach information management with a holistic perspective and critical eye. General Managers must exercise their judgment in deciding when IT investments and applications are appropriate.

3) While General Managers may not be expected to be information specialists in their business, they are expected to create the conditions in a business for effective information use.

On the one hand, managers are expected to know and understand what information they need and use to make decisions and interact with people inside and outside the company. Drucker (1999) has called this expectation “information responsibility”. For managers to produce the information required for their work, the have to address two broad questions:

1) What information do I owe to the people with whom I work, and on whom I depend? In what form? And, in what time frame?

2) What information do I need myself? From whom? In what form? And, in what time frame?

Thus, managers must become aware of how they use information to make decisions and act on an ongoing basis. If they do not know the answers to these questions, there is doubtful that they can expect their people to understand their information responsibilities to each other.

On the other hand, managers also understand how their organization uses information to achieve business results. This second aspect of information responsibility extends to the company or business unit and its capabilities to sense, collect, organize and deploy the appropriate types and quality of information so that people can execute their activities effectively. How effective is the business in using information to create value with customers, innovate with new products and services, manage risks or be efficient in operating business processes?

Rarely will a company be good at all aspects of information use. So general managers must discern what the appropriate mix of information management capabilities are to support both
today’s priorities for running the business effectively and tomorrow’s needs for competing with information in their markets.

2.3.3. Information Management and Information Technology in SCM

If the mindsets of senior managers shape company strategies, project initiatives and investment priorities then their views of how their company approaches supply chain management are critical to appropriately targeting process redesign efforts in IT projects. This is more than a semantic concern. There is no one view of supply chain management in manufacturing and service companies today. Over the last 20 years, there have been several phases of supply chain management (Marchand, 2000).

In manufacturing companies supply chain management has evolved through four major phases. In the mid-1980s, most large manufacturing companies were focused on implementing Manufacturing Resource Planning systems (Vollman et al., 1992), which were intended to rationalize sales forecasting with production planning and control in large companies. The first generation of these systems – Material Requirements Planning or MRP I – focused on the process of forecasting demand, developing a Master Production Schedule, detailed manufacturing capacity plans and material requirements plans for purchasing. The second generation – Manufacturing Resource Planning or MRP II – took advantage of developments in database management systems and faster, more powerful computers, and sought to integrate sales and forecasting, production planning, inventory control and purchasing activities. During this phase, supply chain management was internally focused and product-oriented.

During the late 1980s and early 1990s, manufacturing companies started looking at the entire supply chain, from external suppliers through manufacturing, distribution, marketing and sales as one continuous process, or flow through. The main concern was making the cross-functional flows of products down the supply chain and sales and marketing forecasts up the supply chain as seamless as possible. This required a new generation of Business Process Reengineering (BPR) and IT projects aimed at managing information in real-time across functional departments that, in the first phase, operated independently in most firms. During this third phase, manufacturing companies began to implement the first ERP systems, such as SAP’s R/2 system which centralized information across the supply chain in large databases used by all the functions.

Another major technology behind improved information flow was the advent of electronic data interchange (EDI) during the late 1980s. It offers greatly improved information flows and is an extremely important adjunct within leading organisations in the drive to decrease lead-times (Evans et al., 1993). However, while the introduction of EDI in many companies has offered marked improvement in the speed of transmission of orders as documented by Macbeth and Ferguson (1994) the current information flow in the vast majority of supply chains is still far from ideal.

In the mid-1990s, a significantly different view of supply chain management evolved as manufacturing companies moved from a “product push” to a “customer pull” view of the value chain. Senior managers began focusing on the growing need to respond to customer orders and sales in real time, to speed up order fulfilment and to lower inventory costs along the whole supply chain. A new generation of software applications focused on integrating sales and order fulfilment with distribution and logistics, inventory management, production planning and
control, and supplier management. The intent was clear: customize products to meet customer needs better, speed up order fulfilment and reduce inventory and working capital needs. This phase also coincided with a growing popularity of ERP vendors providing application packages and integrated relational databases to automate the major administrative and operational functions running the supply chain of a company.

Two developments have driven the fourth and most recent phase of supply chain management. First, most manufacturers today recognize that companies do not operate their supply chain in isolation but depend on networks of suppliers, distributors and partners for operations such as logistics and transport. Thus, manufacturing companies compete as members of a network of interdependent companies, against other networks of similarly organized firms (Poirier and Reiter, 1996). Thus the term network competition has evolved to capture this facet of supply chain management. The second development has been due primarily to the rise of the Internet in business-to-business e-commerce and, in particular the use of Internet technology to link networks of interdependent firms together to serve customers. In its most develop form, supply chain management is being replaced with the integrated value chain or integrated value network.

Similarly, over the last ten years the evolution of supply chain management in service companies (banks and insurance companies, for example) has moved from automating back office functions (cheque clearance, payment processing an policy administration) to front-office automation supporting services to customers (or though agents). In addition, as service companies focus on responding to customer demands and on cross-selling banking, insurance and other financial products at the point of sale, the need for integrating product information with services delivered to customers requires integrated databases and ERP-like systems. Finally, the use of Internet Technology to interact directly with customers, agents and fund managers has also led to network-based competition in service companies. Each view of supply chain management for service companies has required different BPR and IT projects aimed at the changing strategic priorities of service firms in various industries.

2.3.4. Information Management: Final words

The most dramatic change that occurred en supply chain management in the final 1990’s was without any doubt the use of the Internet and Word Wide Web networks and technology to rethink customer, partner and supplier relationships and information management. For many senior managers, Internet technology is becoming a catalyst for rethinking the supply chain of their industry and their positioning in networked-based competition with customers, partners and suppliers.

Unfortunately many information strategies have involved far too much bias towards the technology used as opposed to concentrating on fidelity and availability of the actual data transferred. The statement “Too many managers believe that once the right technology is in place, appropriate information sharing will follow” (Davenport, 1994) reflects this trend. EDI offers greater opportunities than just speeding up current information transfer; it can be utilised to radically reassess the demand data flow through the whole supply chain.

Information management responsibilities exist at the level of the individual manager and business unit at the same time. Managers must understand how they use information with those around them and how their company creates business value with information. This dual role creates significant opportunity for managers to “walk the talk” among people in their companies.
about the uses of information in decision-making in the business. Also in creating value for the business and for successful Time Compression Strategies for their Supply Chain Management.

2.4. Conclusions of Literature Review

Simulation results show that the main gains from time compression are only realised when a holistic approach is taken, tackling both the production and the information pipeline and all the participants in the SC. Implementing a time-based strategy while residing in a slow supply chain will usually do relatively little to improve market share of an individual company. However it may be the route to moving towards a forward thinking chain and thereby ensure a bright future for all the players. To move successfully into the next century a supply chain has to appeal to the end consumer and give him what he wants – the right product at the right price at the right time. Although much can be achieved from material flow cycle time reduction, reacting faster to a slow order does not significantly improve control of the supply chain dynamic response to a change in consumer demand.

To improve control of the highly undesirable overshoot effects the supply chain has to provide undistorted order information fast. Therefore to maximise and complement production cycle time compression a supply chain must re-design its order information usage strategy. Time compression of the order pipeline via direct utilisation of the market sales information by each player in the supply chain certainly improves the overall speed of response and lessons the impact of the demand magnification phenomena. Players no longer have to suffer from the distortions that infect traditional supply chains. However, the real power of information flow only becomes evident when it is utilised throughout the supply chain. It takes a visionary world-class supply chain to implement a total time compression strategy, especially from the point of market information sharing for the holistic good. However, for those who take the revolutionary step, the tremendous benefits to speed and control of response to consumer demand will offer a strong competitive weapon. In terms of Information Management is a question of putting the I in IT (Davenport et al., 2000). We have the Technology; the challenge now is to manage information.

3. Hypothesis Formulation

The SCM framework above mentioned encompasses the combination of three closely inter-related elements: the structure of the supply chain, the supply chain business processes, and the supply chain management components (see Figure 2). The authors believed that the combination of these three elements captures the essence of SCM. The supply chain structure is the network of members and the links between members of the supply chain. Business processes are the activities that produce a specific output of value to the customer. The management components are the managerial variables by which the business processes are integrated and managed across supply chain. The implementation of SCM involves identifying the supply chain members with whom it is critical to link, what processes need to be linked with each of these key members, and what type/level of integration of management components applies to each process link.

If the managerial and behavioural components are not aligned to drive and reinforce an organizational behaviour supportive to the supply chain objectives and operations, the supply chain will likely be less competitive and profitable. If one or more components in the physical and technical group are changed, management components in the managerial and behavioural
group likewise may have to be readjusted. Consequently, the groundwork for successful SCM is established by understanding each of these SCM components and their interdependence

3.1. Do supply chain management components have some relation and balance between them?

The first research question can be examined after identifying the three interrelated elements in the supply chain of the case under study by asking the manager what will happen with the rest of the components if we change one of the components either in the physical or behavioural components and/or by trying to discover and further exploring during the interview some spontaneous arising tips on the point.

H1) Management components are interrelated and interdependent. Thus, if you change one of them the others may have to be readjusted.

Figure 5 shows a rich picture representation of the optimised order information pipeline, in which each echelon receives the data directly. This technique we call the information enrichment model is achieved via an EPOS (electronic point of sales). Hence utilising the market sales information throughout the supply chain allows all “players” to have an undistorted view of the consumer thereby enabling the supply chain to operate effectively without the added burden of the magnification effect described by the “Law of Industrial Dynamics”. Also Table II shows activities for TC with the use of Information Technology techniques.

3.2. Do the existence of an undistorted view of the consumer throughout the supply chain by using some or all of the different techniques mentioned in Table II allowed a more effective supply chain operation?

The second research question can be examined by identifying the technique/techniques in use in the case under study and by comparing some operational indicators, like time to market, improved flow lead time of funds, diminishing of errors or misunderstandings, e.g., with and without its existence.

H2) The existence of an undistorted view of the consumer throughout in the supply chain allows but not assures a more effective supply chain operation.

Stalk and Hout (1990) specifically warn of the dangers of slow information lead-times, summing up the problems with information delays when they state “The underlying problem here is that once information ages, it loses value, and old data cause amplifications, delay and overhead. The only way out of this disjointed supply system between companies is to compress information time so that the information circulating through the system is fresh and meaningful.” However, sharing information is only simple in theory: in practice attitudes must also be changed. It does not help if the other players in “our” supply chain are frequently regarded as “the enemy” (Macbeth and Ferguson, 1994).

3.3. Do trust be an imperative in order to facilitate the appropriate information sharing in the SCM?
The third research question can be examined with different questions like, a) Do you put any limit to the information you shared in your SCM? b) Why? c) Type of information you share and type you don’t share?

**H3) The development of trust between the participants of the supply chain is a prerequisite for an effective time compression strategy through information management.**

If the mindsets of senior managers shape company strategies, project initiatives and investment priorities, then their views of how their company approaches supply chain management are critical to appropriately targeting process redesign efforts in IT projects. This is more than a semantic concern. There is no one view of supply chain management in manufacturing and service companies today. Over the last 20 years, there have been several phases of supply chain management.

**3.4. Do all the participants in the supply chain have the same view and approach on SCM?**

The forth question can be examined in the case by identifying directly the opinion of the different participants attitudes in the SCM, technology in use by them and behavioural aspects of the relation.

**H4) Information sharing in the SCM requires similar views of SCM by its participants.**

A basic assumption is that managers and their people shape the use and deployment of information in companies. Information technology (IT) practices and investments, while important to managing information in business, do not lead directly to improved business results. Although we will address the role of IT in enabling companies to manage information effectively in their business, we share the view advance so eloquently by Tom Davenport (1997) that:

> Information and knowledge are quintessentially human creations, and we will never be good at managing them unless we give people a primary role.....The status quo approach to information management, invest in new technologies, period, just doesn’t work.

**3.5. Does learning play an essential role for Information Management and Time Compression in the Supply Chain?**

The fifth question can be examined by identifying the process of the recent implementation of the ERP in the company under study in the case, and through the way its personnel relates and developed the relation with a new client.

**H5) Learning is an imperative for an appropriate Information Management orientation in order to succeed with time compression strategies in SCM.**
It is the unique responsibility of general and senior managers to develop an integrative view of how to manage people information and IT in a business to implement strategies and achieve results. General Managers are necessarily generalists rather than specialists who must approach information management with a holistic perspective and critical eye. General Managers must exercise their judgment in deciding when IT investments and applications are appropriate. While General Managers may not be expected to be information specialists in their business, they are expected to create the conditions in a business for effective information use.

3.6. Is top management involved in the Information Management orientation in the SCM?

This question may be addressed by asking the manager with whom he relates when he establishes a new business relation with a participant of the supply chain and/or who and why backs the one he relates to.

H6) Top management involvement and support is essential for a successful Information Management orientation in the participants supply chain management.

4. Research Methodology

In sections number 1 and 2 we have explored with the help of the literature review some of the main important aspects of SCM, TC and IM. Firstly we have selected a SCM framework and its elements that we would like to contrast further with a real case situation. Specifically the intention is to draw the SCM framework of the real case and to explore on it the relation between the different management components, as one of the elements mentioned in the literature. Secondly, we saw the main aspects of time compression and selected information technology techniques and trust as some important aspects to be contrasted in the real case. Finally we enter the arena of Information Management from different points and we would like to contrast SCM participant’s views, learning and top management involvement as some of the key factors to succeed on it. The different hypothesis with the aspects mentioned to be contrasted were further developed in section number 3 including the way the questions will be addressed to validate or not the hypothesis established.

We have selected a real case (an existing company) with an in deep interview (recorded) to its General Manager as the qualitative research methodology to apply. The company description is the content of section number 5. The questions as said before were the one’s established in section 3. The results (answers) to those close and open questions are the content of section number 6. In section number 7 you will find my discussion of the findings of each of the six hypotheses and in section number 8 some implications for future research.

It is useful to mention that as stated in this work by different authors SCM has a long run to go in the academy and executive fields. The same but with less development happens with Time Compression. The developments in TC are mainly referred to the industrial sector. Little evidence of TC in SCM in the service sector was found. But when we go forward and we enter the arena of Information Management for TC in SCM with a real case in a service company, few references can be found up to today. This was one of the most exiting aspects of the work and its possible findings.

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5. The Company

The company, Procura SL, gives the total Integrated MRO (Maintenance, Repair and General Operations) Material Supply service, basically to the Industry, with a high technological support of Internet Client-Server Transactional Technology. Even the company bets strongly on Business-to-Business (B2B) Information Technology, the main priority is a custom-made service to its growing community of industrial clients.

Established in 2003 the company is the pioneer provider of integrated MRO material supply in Spain. Based in Barcelona, Procura is an international company and has been offering the total solution of non-strategic supplies in other countries since 1998.

5.1. General Information

5.1.1. Company’s Proposal

The company’s proposal as seen in Figure 6 is to concentrate on it (the integrated supplier) the non-strategic supply management of a large industrial clients community mainly linked directly through Internet leading to a significant reduction of the total supply cost through paperless on-line purchasing for example. Its clients outsource non-strategic supply to the company, focusing only on their "core strategic supplies” with lighter overheads.

Linked to the company the end-users of different industrial companies can order on-line catalogued items organized like a "virtual industrial supermarket” or non-catalogued items through the company’s customer service with professionals giving technical support.
5.1.2. Personnel

The company has specialized and expert personnel in:

1. Local sales
2. Imports
3. Logistics
4. General services
5. Supply Chain management
6. Internet client service technology

Its specialty is Purchasing and Supply Chain Management aiming at strengthening its leadership in those subjects. The company is frequently consulted about Purchasing Systems and SCM varying from the reengineering of purchasing organizations and its systems to giving advice on complex negotiations. The staffs in Barcelona include four full time executives.

5.1.3. Technology, Services and Benefits

Being connected to the company’s link and equipped with an original paperless automatic Kanban system is welcomed by most of production and maintenance personnel which dislike paperwork. The company’s system is a complete e-procurement solution able to run under any platform, by using an Internet navigator. The application allows any authorized user to access our electronic catalogues of products with pre-negotiated prices and to carry out all the necessary transactions of the procurement cycle as ordering, authorizing, receiving, auditing and statistical querying. It also easily handles requisitioning of non-catalogue products.

The company’s system can be used either as a stand-alone application including all the information and transactions the end-users need to purchase (which can be transferred to their PCs by importing through Access or Excel) or as an interfaced system. In the second case the company system is interfaced with the client main system. For the present the company has developed Navision interface, SAP interface is well under way and the company is planning the development of new interfaces.

There are a lot of services and benefits for the customers working with the company. Most of the products managed by the company (with the exception of those administered on behalf of the client) do not need client warehouse administration (this avoids stocks, catalogue's maintenance and warehouse systems). The introduction of the company into the supply chain, far from being an additional link makes it much simpler because:

- Simplifies the "internal administration" of the client as end-users can make non-stop purchases directly to the integrated supplier without the intermediation of the Purchasing Department (though they previously control and audit the process). Inventories administration and Accounting are also simplified which represents significant savings to the company.
- Simplifies the "external administration" of client supply chain because the buying volume aggregation of the Integrated Supplier makes possible to purchase directly to the producer or importer, getting rid off retailing and sub-distribution and permitting to obtain better purchasing prices as far as volume increases.
- Many categories of products that are commonly used by most industrial companies represent the smaller part of the total purchasing but on the other hand also represent most of purchasing operating expenses as the consequence of the large quantity of associated items and vendors. If we also consider the significant inventory and logistic costs related to these common items, we can reach the conclusion that a large-scale
supply operation serving a community of industrial companies through an Integrated Supply system will significantly reduce the supply cost of the total system and consequently the supply cost of each community member.

- The Integrated supply lower cost can be obtained from economies of scale, achieved by organizing the supply service for a number of companies and by negotiating aggregated purchasing volumes. The total volumes compromised by the company on its suppliers are precisely established through a constant planning and an accurate statistical client consumption monitoring of each category.

- Outsourcing non-strategic supply to the company, the clients Purchasing Departments lighten by reducing overhead costs and focus on strategic administration at a considerably lower total supply cost, following the worldwide trend of less transactional and more strategic purchasing activities.

- When it comes to non-strategic supply most of medium and large-sized industrial companies consume more or less similar items. Many companies build up inventories of these items in their non-productive warehouses with significant inventory costs (including obsolescence and financial costs) being attractive to reduce or eliminate them. The company’s proposal firmly attacks client inventory costs.

### 5.1.4. Products and Categories

The company catalogues can be custom-made for each client (with selected categories and particular conditions and prices) or general (all the categories with standard prices and conditions)

Abrasives, Belting, Chemical products, Drugstore, Electric and Electronic materials, Ferrous metals, Fuels, Glass materials, Home appliances, Industrial hardware, Kitchenware, Lighting, Safety equipment, Tools, Valves, Wiring, are some of the hundred of thousands of products catalogued.

Maintenance, Catering, Decoration, Event organization, Electrical services, Chemical Analysis/Laboratory, Gardening, Instruments repairs, Laundry, Mechanization, Photography, Tool repairs, are some of the hundred of services categories for the different products catalogued.

### 5.1.5 Customers and Suppliers

After one year and a half of operations the customers and suppliers of the company varies in quantity, size, activity (see figure 7), and purchasing/selling volume. Thirty five customers have been visited during that period. Fifteen are frequent buyers. In terms of suppliers, fifty five have been visited in the same period and in between forty to fifty are frequent sellers.

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6. Results

The way that this section has been worked is the following. The paper aims to contrast the SCM Framework selected and six hypotheses. Literal answers to the questions mentioned are going to be transcripted in the General Manager Answers (GMA) after each hypothesis. The way the SCM Framework is going to be worked in the paper is explain in the next section.

6.1. Procura’s SCM Framework

It was showed the SCM Framework selected to the General Manager (GM) and asked him to draw his Company’s one and to make free comments about it. Figure 8 is quite a similar representation of what he did. GM Literal comments on the framework were the following:

- “Our inbound and outbound logistics are outsourced with a logistic operator with whom the company arrived to an agreement. Our company doesn’t touch any product”.
- “What we called IT is of a tremendous importance in our company and in this trend for our SCM success. And we outsourced the IT function. We need the best specialists and state of the art knowledge. It is one of our core activities. IT includes Telecommunications Systems (internal and external), Procurement Software development for the Company’s core business, WEB pages and presence management and catalogues design, maintenance and actualization”.

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• “Other services like Tax, Accountancy, Human Resources and Legal are also outsourced”.
• “Continuous product development and commercialization is another key process for us. This is a people oriented service, a user oriented service that needs strong personalization. We need to spend time with the different final users, look for their needs (which are totally different and influenced by a lot of structural and emotional aspects in the different companies, structures and functions) and try to find together the best solution for their needs. And do the same process up to the point we reach the habit of working and thinking with and in our company, when they need a product”.
• “Yes, I share the existence of the processes mentioned in the framework and the assumption that supported it related to the fact that its integration up and down in the chain is essential for a better understanding of what a SCM means and its success. But up to the point we are know and with our year and a half of existence as an integral supplier in Spain, just with few customers and suppliers we have been already able to integrate certain activities involved in some of the process mentioned. I think that we need more work and time on the field to have more empirical evidence on the fact. And my belief is that is not just a question of time. There are a lot of things on what making a true relation with a customer means, and not only just precisely processes integration”. But, yes, agree with the model.

Figure 8
Supply Chain Management: Integrating and Managing Business Processes Across the Supply Chain of Procura SL

6.2. Hypothesis Testing

H1) Management components are interrelated and interdependent. Thus, if you change one of them the others may have to be readjusted.

Q.1. Do supply chain management components have some relation and balance between them?

The first research question can be examined after identifying the three interrelated elements in the supply chain of the case under study by asking the manager what will happen with the rest of the components if we change one of the components either in the physical or behavioural components and/or by trying to discover and further exploring during the interview some spontaneous arising tips on the point.

GMA:

- “Again I found the elements of the SCM Framework clear to understand, and that for a better integration of the different processes mentioned the situation of these elements should be taking into account. What I see is that this elements should also be integrated between participants, and perhaps if could not be integrated, considered at last at the moment to manage the relations in the SCM”
- “According to my previous experience in other companies I see a necessary balance between the two parts of the Management Components. In our company some examples could be for example the relation between the Culture and Attitude on the right side and the Planning and Policy Making Methods on the left side of Figure 8, and specifically between Trust and Policy of Pricing. Trust with our customers and suppliers is an essential cultural and attitude managerial skill for our company success. I can not take advantage of a market opportunity for instance to make a bigger mark up on a product on behalf of a customer that perhaps I am sure that he is not going to realize ever that strong mark up or market opportunity on my interest if I did it. My right side, trust, should be balanced with a Pricing and Control Policy that guaranties that value. Is the company’s credibility, you can’t play with that.”
- “Other example, Management Method/Culture/Attitude vs. Control. I can’t say no to a request of what would be called a non significant order coming for instance from a very stubborn secretary of a manager of our customer. For us that is order, and we have to accomplish with it.
- “Oh, perhaps a better example that came to my mind is between Organization/Facility Structure and Power Leadership Structure. In one moment we were considering to relocate some of our staff ant the facilities of our logistic operator. That would have implied some actions on the Power Leadership Structure to balance the situation with the people involved.
- “But, I also think that some more considerations should me made in this field. Our organization is a small one yet both in terms of people and operations. We, the four consultants work together, in the same room; we do everything, from managerial tasks to the more basic operational ones. And by this way we all know and share what’s going on with the company. I believe that the level of seniority of the people involved have some importance in this question of the balance of the two blocks of management components. Because of this seniority, information sharing and knowledge of what is really going on with the company, I think that the people could compensate some imbalance between the
blocks. If we all know that everybody is doing everything, that perhaps we are also facing some problems, I believe and the experience up to know confirms the fact that you have some margin for not balanced situations. Perhaps is the size of the organization, our little history, our lack of product/sector specialization up to know in the senior people, but for sure there are some aspects to consider when we referred to the necessity of the balance of the two blocks, which again I share”.

- “And I believe that seniority of the personnel have some influence to the importance given to the different blocks. My point is that junior people pay much more attention to the left side (hard), than to the right (soft) side and vice versa. For sure that with management skills and leadership you can manage the situation. But when you are speaking about balance between blocks this is something also to consider.

H2) The existence of an undistorted view of the consumer throughout in the supply chain allows but not assures a more effective supply chain operation.

Q.2 Do the existence of an undistorted view of the consumer throughout the supply chain by using some or all of the different techniques mentioned in Table II allowed a more effective supply chain operation?

The second research question can be examined by identifying the technique/techniques in use in the case under study and by comparing some operational indicators, like time to market, improved flow lead time of funds, diminishing of errors or misunderstandings, e.g., with and without its existence.

GMA:

- “We used the Internet in order to share information and to compress the lead times of information. With few customers we have reach what I define a perfect level of integration technologically speaking. In that level I enter directly to the heart of the customer system and by allowing this he avoids paper work flow of orders and data input in its management system. I sent directly to these customers FTP files, that through an electronic workflow of orders directly makes the data input in the customer’s ERP. Perfect situation for both parts, ideal for us because this means that we reach a level of intimacy which is essential for our business. But I don’t see yet indicators of better flow of funds, better service or increase volumes of operations up to know. What I see is a need of the customer solved, which is the diminishing of errors mainly in the cost units imputations. With the rest of the customers and suppliers that we don’t have this way of doing things, directly through e-mail we manage the situation. And yes, when we you do things electronically you improve time, facilitate recoveries, avoid errors and/or misunderstandings”.

- “After reading to him Q2, he answered: “Yes, but up to a limit when you look in the entire SCM. There are what I called border situations, like volumes, lead times of products, type of products (Strategic or MRO)validity of customers sales forecasts, credit risks, new technologies appearances of scarcity of raw material, environmental catastrophes, or track record, fidelities, and others, mainly commercial decisions that could influence the performance. So, we can tend to optimize to be more efficient having all the same view but the effectiveness is not guaranteed”.

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• “You know why perhaps, all the participants in my SCM are in a lot of others SCM, both if we go up and down of the SCM, and in this information age with further and closer links between them. So you found a network of SCM and links, and people and decisions that no always follows the efficiency principle. And is true that if we share the same view we can anticipate, better plan, and so on, but this does not mean that is going to happen. There could be a lot of surprises. This is SCM, so management, and this implies risk taken, and deal with not operative situations. We have to do the effort to make the most operative we can, to have a more effective SCM, but let me say, I don’t think that we are going to reach the perfect SCM. But that’s the trend for sure and the way we have to work”.

• “Furthermore another fact to consider is the type of information you share. You are speaking about an undistorted view of the customer. But what type of information is that. I mean, you can share let say formal information, for example an order of a thousand belts. But perhaps that customer tells you that if you provide first to him, you are going to solve a lot of financial problems for him that are going to make more feasible the conversion on cash of the accounts receivables due to your company. This could be part of informal information, not shared but that is going to affect the effectiveness of the SCM”.

H3) The development of trust between the participants of the supply chain is a prerequisite for an effective time compression strategy through information management.

Q.3. Do trust be an imperative in order to facilitate the appropriate information sharing in the SCM?

The third research question can be examined with different questions like, a) Do you put any limit to the information you shared in your SCM? b) Why? c) Type of information you share and type you don’t share?

GMA:
• “Yes I put limits on the information I share in my SCM”.
• “And mainly because trust, confidence. Or in others words, the relation didn’t arrive to a point that assures me that I am not going to have the risk of being jumped or avoided, for different reasons, not just economical ones”.
• “The type of information I share with suppliers is for example customers opinion about products, new products uses, new requirements, failures, trends, and with customers trends, products new releases, and with both things to improve”. I don’t share SCM participant’s names and product prices”.

H4) Information sharing in the SCM requires similar views of SCM by its participants.

Q.4. Do all the participants in the supply chain have the same view and approach on SCM?

The forth question can be examined in the case by identifying directly the opinion of the different participants attitudes in the SCM, technology in use by them and behavioural aspects of the relation.

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GMA:

- “I am sure that we all now that we are in business and that in part means that your work with customers and suppliers. So that is evident that a Supply Chain (SC) exists. But after knowing that to understand what does that mean for everybody in the chain, I have serious doubts. The term SC is clear enough, what SCM in an implicit and explicit way means, my believe according to my experience of this year and a half is that it is in its Jurassic period. Most of my suppliers and customers look at me as “another one”, don’t understand the concept of strategic alliances yet, nothing to say about integral supplier.

- “With those I reached a more closed relation that I have the technology link in placed usually we share the same view of SCM. For example with one customer, the Purchasing Division selected us as Integral MRO Supplier. But this does not mean for the moment that all the personnel in that company are going to follow the pattern. For instance in this case, the Software Programming Manager of the company, which is paid and receives incentives according how his unit does the programming of the software needed for the company, is not possible for us to take an order from him for the provision of toner cartridges, Why? Because this is something that he has been doing since the last 20 years, he is old, “he has his manias” (they tell me) and for the Purchasing Division Director is not a relevant battle to give. Perhaps if the products we supply have different importance, strategically speaking the story should be different”

H5) Learning is an imperative for an appropriate Information Management orientation in order to succeed with time compression strategies in SCM.

Q.5. Does learning play an essential role for Information Management and Time Compression in the Supply Chain?

The fifth question can be examined by identifying the process of the recent implementation of the ERP in the company under study in the case, and through the way its personnel relates and developed the relation with a new client.

GMA:

- “In order to select and do the implementation of the ERP, we made the recommended best practices before buying. But as with any new technology the key is the way you use it and for this you need to learn. So, inside the price and agreement of buying and implementation of the ERP we took 200 hundred hours of learning. And all the people in our company were involved in that process. This is the only way you can approximate “to all playing the same music” and have replacements in case of any contingencies. Part of the product we sell is technology, for us the learning was a must. And with the path technology develops almost nobody in the near future in any SC could be able to survive being ahead of similar process of learning of how to manage technology, not to say information”.

- “With every customer and with all of its end users we spent the necessary time in order to explain our front end to put and manage orders and information. We make demo’s and do not avoid any efforts up to the moment we feel that the person feels confident”.

- “Now we are in the process to do the same with suppliers. Although we use internet and PDF files to manage the relation up to know we need to develop a similar front
end for them, and this also linked with our back end, our ERP. We make some mistakes at the beginning with technology in our SCM”.

**H6) Top management involvement and support is essential for a successful Information Management orientation in the participants supply chain management.**

**Q.6. Is top management involved in the Information Management orientation in the SCM?**

This question may be addressed by asking the manager with whom he relates when he establishes a new business relation with a participant of the supply chain and/or who and why backs the one he relates to.

**GMA:**

- “In terms of customers our relation is with General Managers or Purchasing Managers/Directors. When we go to suppliers we usually acceded to commercial people”.
- “From the customers point of view of customers, to see the benefits of our proposal is a must for us to be understood and to have some success, to speak with people with a global vision. With suppliers, commercial people are the ones motivated to sell us”.
- “We have to deal with to at last two facts with customers. The first is that when you go down in the structure of an organization the global vision turn into a narrow one. The second is that we depend on how the information is shared in that organization. In order to better explain me, if it is the first time that the General Manager calls the MRO responsible and explains the global vision, and the benefits and the strategic trend of the market and the company, what do you think that this manager is going to do with our proposal? Do you think that we are going to be in his first five priorities?”

**7) Discussion**

This section is going to be worked first by discussing the findings on the SCM Framework selected and then in order on each of the six hypothesis.

**SCM Framework:** We have the confirmation that the case is about of a pure service company when he said “our company doesn’t touch any product” and the most important, the reaffirmation that in service companies SCM comprise IM, basically as the main flow to manage. Strong evidence of an example of a Network Company (Castells, 1999) and the role of Outsourcing in the networked era as a way of lower transaction costs, better and best of the art service and technology accessibility for the company related to the IT part, and mainly lowering transaction costs to the other outsourced services. We got some evidence of the importance of human interaction with the final user, personalization and habit development for success. The validation of the framework was very important, but I kept on thinking two aspects. On the one side what he really meant about the need “for more evidence on the fact” of process integration. I suspect that he was not just referring to the need of more time-experience or track record. I believe that in his mind, was something near to “oh yes, is a nice to have”. But, how is this possible in any company’s context? On the other side, some evidence or way to look for an
answer of the first aspect mentioned could be to further explore “what making a true relation with a customer means” for him.

**H1** - The confirmation and validation in this case of the three elements of the SCM framework. The confirmation of the Hypothesis 1, due to that for this manager and according to this case he supports that Management Components are interrelated and interdependent. Thus, if you change one of them the others may have to be readjusted. But of great importance for me and the possibility of further exploration in the future were the topics of volume, seniority, management style, information sharing and work design and its relation to the interrelation and interdependence (balance or unbalance in the GM words).

**H2** - Perhaps the first research question I made at the beginning was not the best for the hypothesis although I felt comfortable with some of the points mentioned by the GM for hypothesis validation. Factors of lack of track record of the company would also affect the validity of the answers. But although they are doing the first deals with important customers and suppliers, the diminishing of errors and misunderstandings valued by the customers and suppliers are a strong indicator of the effectiveness of sharing the same view. It has raised again the question of confidence, trust and intimacy as a basic goal for the company and for the SCM. Although I have no evidence, if this last aspect is of the importance mentioned by de GM, further research and more history in the company operation should explore the validity of improvement of the other indicators mentioned for broader explore the hypothesis.

When I directly read the Q2 to the GM the answer and validation of the hypothesis was evident. I found interesting the treatment of what he called border situations and the type of information your share for the search of more effectiveness in the SCM.

**H3** – In the case under study and with the GM answer I consider that the hypothesis was validated. Trust, was mentioned as mandatory in order to share information in SCM.

**H4** - The hypothesis has been in a big portion validated by the GM. There are different views of SCM and this impact on information sharing. Furthermore even if we have the same view of SCM the approach would be different because of the people factor (behaviour and attitudes all across the hierarchies). Some distortion to generalize the hypothesis is given according to my point of view by the fact that we are dealing with non strategic products.

**H5** – The Company’s ERP implementation, the work they do with customers, the importance of what they are developing for the supplier’s relation, gives a lot of sense to the importance of technology in SCM and validates the hypothesis putting learning as an essential role to play in IM form TC in the SCM. Supporting this, conclusive evidence in the GM words about some mistakes they made with technology at the beginning.

**H6** – I consider that the hypothesis in the case under study has been validated. The taste of scepticism in the final words of the GM confirm that Top management is a necessary condition for IM, but his support (understood by follow what happened or being in his frequent agenda for example) is quite a sufficient condition to have some success with IM orientation in the SCM. Some other tips arise from the GM answer. Suppliers seem to be more behind the SCM concept than customers and again behavioural attitudes are a must in IM for TC in SCM.
8) Implications for Future research

While significant findings were obtained and most of the hypothesis were contrasted and validated, certain characteristics of the research could be seen as limitations and thus provide extensions for future exploration. There may be some concerns over the hypothesis validation due to what was mentioned about the type of products of the SC in the sense of not being strategic ones. And also with the limited track record in the field of the company. Factors not addressed in this research that arise in the General Manager words should also be included in future research on the subject. However, strong evidence of the importance of an Information Management Orientation for Time Compression Strategies in the Supply Chain Management was raised with the case and research methodology used. The field cover with a real case of a service company according with the scarcity of research of that type existent today could be considered also a contribution of some importance for future works on related topics.
9. References


this group moved with Dr. Lambert to The Ohio State University and became The Global Supply Chain Forum. Beginning January 1999, the group will be jointly involved with OSU and UNF.


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