

SUPPLY CHAIN MANAGEMENT

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INNOREGIO: dissemination of innovation and knowledge management techniques

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1 DESCRIPTION

1.1 What is the Supply Chain Management (SCM)

The best companies around the world are discovering a powerful new source of competitive advantage. It's called supply-chain management and it encompasses all of those integrated activities that bring product to market and create satisfied customers.

The Supply Chain Management Program integrates topics from manufacturing operations, purchasing, transportation, and physical distribution into a unified program. Successful supply-chain management, then, coordinates and integrates all of these activities into a seamless process. It embraces and links all of the partners in the chain. In addition to the departments within the organization, these partners include vendors, carriers, third-party companies, and information systems providers.



Within the organisation, the supply chain refers to a wide range of functional areas. These include Supply Chain Management-related activities such as inbound and outbound transportation, warehousing, and inventory control. Sourcing, procurement, and supply management fall under the supply-chain umbrella, too. Forecasting, production planning and scheduling, order processing, and customer service all are part of the process as well. Importantly, it also embodies the information systems so necessary to monitor all of these activities.

Simply stated, *"the supply chain encompasses all of those activities associated with moving goods from the raw-materials stage through to the end user."*

Advocates for this business process realised that significant productivity increases could only come from managing relationships, information, and material flow across enterprise borders. One of the best definitions of supply-chain management offered to date comes from Bernard J. (Bud) LaLonde, professor emeritus of Supply Chain Management at Ohio State University. LaLonde defines supply-chain management as follows: *"The delivery of enhanced customer and economic value through synchronised management of the flow of physical goods and associated information from sourcing to consumption."* As the "from sourcing to consumption" part of our last definition suggests, though, achieving the real potential of supply-chain management requires integration--not only of these entities within the organisation, but also of the external partners. The latter include the suppliers, distributors, carriers, customers, and even the ultimate consumers. All are central players in what James E. Morehouse of A.T. Kearney calls the extended supply chain. "The goal of the extended enterprise is to do a better job of serving the ultimate consumer,". Superior service, he continues, leads to increased market share. Increased share, in turn, brings with it competitive advantages such as lower warehousing and transportation costs, reduced inventory levels, less waste, and lower transaction costs. The customer is the key to both quantifying and communicating the supply chain's value, confirms Shrawan Singh, vice president of integrated supply-chain management at Xerox. "If you can start measuring customer satisfaction associated with what a supply chain can do for a customer and also link customer satisfaction in terms of profit or revenue growth," Singh explains, "then you can attach customer values to profit & loss and to the balance sheet."

1.1.1 What is the importance of Supply Chain Management

In the ancient Greek fable about the tortoise and the hare, the speedy and overconfident rabbit fell asleep on the job, while the "slow and steady" turtle won the race. That may have been true in Aesop's time, but in today's demanding business environment, "slow and steady" won't get you out of the starting gate, let alone win any races. Managers these days recognise that getting products to customers faster than the competition will improve a company's competitive position. To remain competitive, companies must seek new solutions to important Supply Chain Management issues such as modal analysis, supply chain management, load planning, route planning and distribution network design. Companies must face corporate challenges that impact Supply Chain Management such as reengineering globalisation and outsourcing.

Why is it so important for companies to get products to their customers quickly? Faster product availability is key to increasing sales, says R. Michael Donovan of Natick, Mass., a management consultant specialising in manufacturing and information systems. "There's a substantial profit advantage for the extra time that you are in the market and your competitor is not," he says. "If you can be there first, you are likely to get more orders and more market share." The ability to deliver a product faster also can make or break a sale. "If two alternative [products] appear to be equal and one is immediately available and the other will be available in a week, which would you choose? Clearly, *Supply Chain Management has an important role to play in moving goods more quickly to their destination.* "

An example of a Supply Chain Management application: To Reduce Cycle Time, Kick Those Bad Habits

..One of the chief causes of excessive order-to-delivery cycle times is the existence of long-standing "bad habits" that result when companies fail to revise internal processes to reflect market changes. The existence of separate, independent departments tends to perpetuate these inefficient practices. Taking the supply-chain management view, on the other hand, helps companies identify the cumulative effects of those individual procedures. Eliminating such bottlenecks improves product availability and speeds delivery to customers--both of which can increase sales and profits.

The case Consultant R. Michael Donovan illustrates the point with the tale of a client that manufactures a made-to-order machine part. Average order-to-delivery time varied between six and nine weeks. As a result, the manufacturer was losing business to "replicators" that could produce low-quality "knockoff" versions in just three weeks. Donovan and his colleagues analyzed the manufacturer's entire supply chain, from order entry and raw-materials supply all the way to final delivery.

They found problems at every step of the way: Handwritten orders were being rekeyed into the materials-planning system on weekends, which meant that some orders were sitting around unprocessed for an entire week. On Monday mornings, production control would be overwhelmed with a week's worth of orders. It often took them several days to plow through the backlog and issue manufacturing orders.

Once those orders had been cut, the engineering department required one week to produce technical drawings. They needed several more days to match up drawings with orders and other documentation. Those information packets then would go to the manufacturing line, where the scheduling system allowed three weeks' time for production. "Orders could be sitting there for almost three weeks before going into production, even though the actual time required to produce an item ranged from a few hours to one full day," Donovan recalls.

The solution Supply Chain experts were able to slash order-processing time, including the generation of engineering drawings, from about two and a half weeks to one day. They made some alterations to the manufacturing process to speed up production. While they were cutting waste out of physical processes, the consultants also were finding ways to speed up the flow of information and to improve the accuracy of production orders. Today, materials flow is closely correlated with information flow, and leadtimes have been cut from an average of six to nine weeks down to fewer than three weeks.

The payoff! The payoff has been enormous. Instead of steadily losing market share to the

replicators, the manufacturer has doubled sales volumes. It has reaped an added benefit as well: Because quality remains very high, the manufacturer has been able to charge more for its products, generating even greater profits.

Donovan proudly notes that this radical change was achieved with technologies the manufacturer already had. "We didn't change the technology, we just changed how it was applied," he says. "The magic is not in the software. Information technology should not be the driver of re-engineering the order-to-delivery process," he concludes. "It should enable you to achieve your objectives."

Source: SUPPLY-CHAIN MANAGEMENT REPORT

"It's about time- Supply-chain management and time-based logistics together can give companies an unbeatable opportunity to increase profits " by Toby B. Gooley -Senior Editor

1.1.2 Supply Chain Management Today

If we take the view that Supply Chain Management is what Supply Chain Management people do, then in 1997 Supply Chain Management has a firm hand on all aspects of physical distribution and materials management. Seventy-five percent or more of respondents included the following activities as part of their company's Supply Chain Management department functions:

- Inventory management
- Transportation service procurement
- Materials handling
- Inbound transportation
- Transportation operations management
- Warehousing management

Moreover, the Supply Chain Management department is expected to increase its range of responsibilities, most often in line with the thinking that sees the order fulfilment process as one co-ordinated set of activities. Thus the functions most often cited as planning to formally include in the Supply Chain Management department are:

- Customer service performance monitoring
- Order processing/customer service
- Supply Chain Management budget forecasting

On the other hand, there are certain functions which some of us might feel logically belong to Supply Chain Management which companies feel are the proper domain of other departments. Most difficult to bring under the umbrella of Supply Chain Management are:

- Third party invoice payment/audit
- Sales forecasting
- Master production planning

Today Supply Chain Management includes services such as:

- Operational Analysis and Design Materials Handling
- Distribution Strategy
- Operational Improvements, Distribution Management
- Computer Systems
- Warehouse Design Project Management
- Operational Commissioning
- Computer Simulation
- Technical seminars

Write-in responses reveal the leading edge of what some Supply Chain Management departments are doing. These include engineering change control for packaging; custom

design packaging; drafting national Supply Chain Management standards; and implementing **SCM software**

1.1.3 Supply Chain Management Tomorrow

The future for Supply Chain Management looks very bright. This year, as well as last year, two major trends are benefiting Supply Chain Management operations. These are

- Customer service focus
- Information technology

Successful organisations must be excellent in both of these areas, so the importance of Supply Chain Management and the tools available to do the job right will continue to expand.

1.1.4 The Supply Chain Management Pipeline

The **freight transportation industry** has undergone a revolutionary change during the last decade. As deregulation spread to all modes of transport, the number of surviving companies declined. Carriers unprotected by regulation discovered they could not differentiate themselves from the competition on price alone. Successful transportation companies must provide prompt pickup, excellent customer service, and swift, complete and damage-free delivery.

The **motor carrier industry** forges a critical link in a multimodal Supply Chain Management system and must compete against time and service to stay in business. Shippers move cargo over whatever mode provides the best service. Less-than-truckload (LTL) motor carriers find their competition particularly stiff. Parcel carriers constantly increase their maximum shipment weight while truck load carriers now accept partial trailer loads as small as 10,000 pounds.

Shorter cycle times means better service.

Customers' needs have also changed. The growth of Just-in-Time and Quick Response inventory management and third-party Supply Chain Management requires all participants in the Supply Chain Management chain to consider shorter cycle time a competitive advantage. Manufacturers, distributors, and some carriers effectively use information technology to reduce cycle times and improve the quality of freight handling. Package handlers use the technology to great competitive advantage.

LTL* carriers are beginning to adapt their information systems to provide on-line, real-time data on the movement of freight through their systems. To successfully use information technology to speed the movement of freight, these carriers must have low-cost methods to accurately gather and disseminate data. Bar code and radio frequency technologies provide the tools for LTL carriers to survive and thrive.

Traditional **bar codes** uniquely identify every package in the pipeline. Scanning the packages positively confirms custody transfer from shipper to carrier to consignee. Two-dimensional bar codes on shipping documents record the entire bill of lading (BOL). Scanners in drivers' hands provide error-free entry of the BOL in less than a second. Radio communication from the truck cab to central operations immediately informs dispatchers of incoming freight. Similar scanning during delivery shortens the billing cycle and provides positive confirmation of delivery.

Information technology speeds cargo through every phase of LTL operations.

* *Less-than-truckload*

Dock management systems speed cross docking operations. A combination of radio communication and bar code scanning immediately delivers control information to people who need it. From dispatchers to fork operators, every member of the dock team receives immediate information where they work. The system efficiently tracks all packages from inbound docks through staging to outbound docks. No package waits for information.

Yard management systems ensure the delivery of the right equipment to the right location at the right time. Radio communication to yard tractors keeps shuttle drivers working on the highest priority tasks. Real-time communication between yard drivers, hub managers, and information support systems provides positive control of all moving stock. Optimising personnel and rolling stock results in shortened stripping and loading time at the doors.

Consistent application of appropriate **information technology** throughout the Supply Chain Management pipeline results in shortened cycle times and lowered effort. Immediate, reliable information allows managers to optimise their physical and human resources. While maximum benefit comes to those carriers who implement a consistent information strategy throughout their operations, segmentation of the problem allows carriers to phase in their transformation. Each phase provides immediate economic benefits, while improving the strategic position of the carrier.

Co-ordinating Multiple Initiatives through IT

The Supply Chain Management model of LTL carriers offers the greatest advantage and the fundamental vulnerability of the mode. **City terminals, break bulk consolidation, and other cargo transfer techniques** allow LTL carriers to sell economies of scale to shippers with small cargo consignments. However, the same process requires multiple handling and offers frequent opportunities for delays, misshipments, and cargo damage.

Effective use of information technology maximises the advantages and minimises the risks inherent in LTL transportation. Each package must be positively identified every time it is handled. Information about every destination must be checked and double checked to maximise cargo speed while minimising empty trailer miles.

Implementation of competitive information technologies begins wherever carriers feel they need the most assistance. For many, dock management represents a logical starting point. Positive tracking of every package in and out of every hub drastically reduces the possibility of cargo delays and damage. Automatic optimisation techniques simultaneously reduce handling expenses and allow some trailers to bypass consolidation hubs entirely.

When carriers augment a **dock management system with yard management support**, the two projects amplify each other's advantages. Yard management initiatives closely control the movement of trailers and drivers based on information provided by the dock management system.

The dock management system, in turn, profits from data provided by pickup and delivery automation. When shipment information from city drivers immediately flows to the hubs, support systems and supervisors can anticipate requirements. Incoming cargo stays in motion because dock managers already know what is on each inbound truck.

If pickup and delivery systems are not immediately automated, carriers can implement intermediate systems to efficiently feed information to hub management support projects.

Dockside data collection allows operators to enter all data about an inbound truck's cargo at the dock even as operators strip the cargo for consolidation.

Dockside data collection becomes more efficient when carriers encourage their shippers to produce scannable bills of lading. These documents can be produced on existing

printers with specialised software. A **two-dimensional bar code** encodes all necessary shipment information. In less than one second, a dockside scanner captures an entire bill of lading. The same scannable documents can be used when the carrier later implements a pickup and delivery management system.

Effective supply-chain management may be the best way to achieve reduced order-to-delivery cycle time. Instead of treating each function as consisting of discrete activities, supply-chain management considers all functions to be linked and interdependent. As a result, supply-chain management can reveal the cumulative effect of problems anywhere in the chain, not just within Supply Chain Management' areas of responsibility.

1.2 Objectives of Supply Chain Management

The fundamental objective is to "*add value*".

That brings us to the example of the **fish fingers**. During the Supply Chain Management '98 conference in the United Kingdom this fall, a participant in a supply chain management seminar said that total time from fishing dock through manufacturing, distribution, and final sale of frozen fish fingers for his European grocery-products company was 150 days. Manufacturing took a mere 43 minutes. That suggests an enormous target for supply chain managers. During all that time, company capital is--almost literally in this case--frozen. What is true for fish fingers is true of most products. Examine any extended supply chain, and it is likely to be a long one. James Morehouse, a vice president of consulting firm A.T. Kearney, reports that the total cycle time for corn flakes, for example, is close to a year and that the cycle times in the pharmaceutical industry average 465 days. In fact, Morehouse argues that if the supply chain, of what he calls an "extended enterprise," is encompassing everything from initial supplier to final customer fulfilment, could be cut to 30 days, that would provide not only more inventory turns, but fresher product, an ability to customise better, and improved customer responsiveness. "All that add value," he says. And it provides a clear competitive advantage.

Supply Chain Management becomes a tool to help accomplish corporate strategic objectives:

- reducing working capital,
- taking assets off the balance sheet,
- accelerating cash-to-cash cycles,
- increasing inventory turns, and so on.

1.3 Supply-Chain Principles/ Methodology & Solutions

1.3.1 Supply-Chain Principles

If supply-chain management has become top management's new "religion," then it needs a doctrine. Andersen Consulting has stepped forward to provide the needed guidance, espousing what it calls the "Seven Principles" of supply-chain management. When consistently and comprehensively followed, the consulting firm says, these seven principles bring a host of competitive advantages.

The seven principles as articulated by Andersen Consulting are as follows:

1. **Segment customers based on service needs.** Companies traditionally have grouped customers by industry, product, or trade channel and then provided the same level of service to everyone within a segment. Effective supply-chain management, by contrast, groups customers by distinct service needs--regardless of industry--and then tailors services to those particular segments.
2. **Customise the Supply Chain Management network.** In designing their Supply Chain Management network, companies need to focus intensely on the service requirements and profitability of the customer segments identified. The conventional approach of creating a "monolithic" Supply Chain Management network runs counter to successful supply-chain management.
3. **Listen to signals of market demand and plan accordingly.** Sales and operations planning must span the entire chain to detect early warning signals of changing demand in ordering patterns, customer promotions, and so forth. This demand-intensive approach leads to more consistent forecasts and optimal resource allocation.
4. **Differentiate product closer to the customer.** Companies today no longer can afford to stockpile inventory to compensate for possible forecasting errors. Instead, they need to postpone product differentiation in the manufacturing process closer to actual consumer demand.
5. **Strategically manage the sources of supply.** By working closely with their key suppliers to reduce the overall costs of owning materials and services, supply-chain management leaders enhance margins both for themselves and their suppliers. Beating multiple suppliers over the head for the lowest price is out, Andersen advises. "Gain sharing" is in.
6. **Develop a supply-chain-wide technology strategy.** As one of the cornerstones of successful supply-chain management, information technology must support multiple levels of decision making. It also should afford a clear view of the flow of products, services, and information.
7. **Adopt channel-spanning performance measures.** Excellent supply-chain measurement systems do more than just monitor internal functions. They adopt measures that apply to every link in the supply chain. Importantly, these measurement systems embrace both service and financial metrics, such as each account's true profitability.

The principles are not easy to implement, the Andersen consultants say, because they run counter to ingrained functionally oriented thinking about how companies organise, operate, and serve customers. The organisations that do persevere and build a successful supply chain have proved convincingly that you can please customers and enjoy growth by doing so.

1.3.2 The Methodology of a Supply chain Management project- solutions **The best supply-chain management programs display certain common characteristics.**

For one, they focus intensely on actual customer demand. Instead of forcing into the market product that may or may not sell quickly (and thereby inviting high warehousing costs), they react to actual customer demand. And by doing so, these supply-chain leaders minimise the flow of raw materials, finished product, and packaging materials at every point in the pipeline.

To respond more accurately to actual customer demand and keep inventory to a minimum, leading companies have adopted a number of speed-to-market management techniques. The names by now have become part of the Supply Chain Management vernacular JIT manufacturing and distribution, quick response (QR), efficient consumer

response (ECR), vendor managed inventory (VMI), and more. These are the tools that help build a comprehensive supply-chain structure.

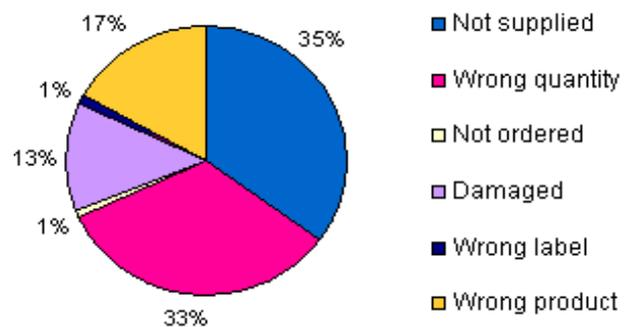
A Four Step integrated Approach

In view of the importance of Supply Chain Management to commercial success, making the right decision about which system is best is vital. Before deciding how to develop new service Supply Chain Management chains and economical distribution centres, many factors must be considered, such as, the required customer service levels, optimum location, stock holding policies and EDP systems. To help organisations make the best decisions, the Miebach Supply Chain Management Group employs an integrated planning approach, consisting of four steps from planning to realisation:

"The integrated planning process helps to find solutions that best match clients requirements and the technical demands of the problem", states Dr Joachim Miebach, Chairman of the Miebach Supply Chain Management Group. "The only way to manage the growing complexity in international Supply Chain Management chains is through the integration of strategy, engineering and IT systems and methods."

- **Potential analysis**
- **Concept study**
- **Detailed planning**
- **Project or change management**

The main feature of Miebachs integrated approach is the simultaneous consideration of strategy, engineering and IT at every step to arrive at an optimum Supply Chain Management solution, the problem".



1.4 Expected Results / Benefits

Where the Supply Chain Creates Value

Supply chain management's ability to affect profitability and shareholder value should come as no surprise. As Richard Thompson, a partner in Ernst & Young's supply chain practice, points out, supply chain management affects virtually every aspect of a company's business. "Everything is involved," he says. "*Supply chain management [influences] plan-buy-make-move-and-sell.*"

Enhanced revenues, tighter cost control, more effective asset utilisation, and better customer service are just the beginning.

Thompson and his colleagues have identified five areas in which supply chain management can have a *direct effect on corporate value*. They include:

* **Profitable growth.** Supply chain management contributes to profitable growth by allowing assembly of "perfect orders," supporting after-sales service, and getting involved in new product development. The bottom-line numbers give the answer. According to A.T. Kearney's research, inefficiencies in the supply chain can waste up to 25 percent of a company's operating costs. With profit margins of only 3 to 4 percent, the consultants point out, even a 5-percent reduction in supply-chain waste can double a company's profitability.

* **Working-capital reductions.** Increasing inventory turns, managing receivables and payables, minimising days of supply in inventory, and accelerating the cash-to-cash cycle all are affected by supply chain execution. Thompson cites the case of a consumer-products company that took 20 minutes to make a product and five and a half months to collect payment for it. "If you can cut the cash cycle down, there are millions of dollars there," he says.

* **Fixed-capital efficiency.** This refers to network optimisation--for instance, assuring that the company has the right number of warehouses in the right places, or outsourcing functions where it makes more economic sense.

* **Global tax minimisation.** "There's a ton of money here," Thompson says, if companies look at assets and sales locations, transfer pricing, customs duties, and taxes.

* **Cost minimisation.** This largely focuses on day-to-day operations, but it also may involve making strategic choices about such issues as outsourcing and process design.

Based on experience with companies participating in MIT's Integrated Supply Chain Management Program, there has been found that the most commonly reported bottom-line benefits are centred on reduced costs in such areas as inventory management, transportation and warehousing, and packaging; improved service through techniques like time-based delivery and make-to-order; and enhanced revenues, which result from such supply-chain-related achievements as higher product availability and more customised products.

The companies studied by Metz have recorded a number of impressive supply-chain accomplishments, including:

- a 50-percent inventory reduction.
- a 40-percent increase in on-time deliveries.
- a 27-percent decrease in cumulative cycle time.
- a doubling of inventory turns coupled with a nine-fold reduction in out-of-stock rates.
- a 17-percent revenue increase.

On a broader scale, research conducted by Mercer Management Consulting reveals that organisations with the best supply chains typically excel in certain pivotal performance areas. Specifically, they outperform their counterparts along such key metrics as reducing operating costs, improving asset productivity, and compressing order-cycle time. In a separate study, Mercer found that close to half of all senior executives surveyed had specific supply-chain improvement projects among their top 10 corporate initiatives. This is a resounding affirmation at the highest levels of supply-chain management's competitive potential.

A study by the management consulting firm of A.T. Kearney has come at the supply-chain payback from another angle--the costs of not paying careful attention to the supply-chain process. The Kearney consultants found that supply-chain inefficiencies could waste as much as 25 percent of a company's operating costs. Thus, assuming even a relatively low profit margin of 3 to 4 percent, a 5-percent reduction in supply-chain waste could double a company's profitability.

Finally, the PRTM study cited earlier documented the powerful advantages of supply-chain management across a range of critical measures. The leading companies, for example, enjoyed a cash-to-order cycle time that was fully one-half of the median

companies'. Similarly, their inventory days of supply turned out to be 50 percent less than the median. The best-in-class companies, moreover, met their promised delivery dates 17 percent more often than the rest of the pack.

1.4.1 Opportunity Areas (examples)

These are some of the big-picture numbers. Most companies, though, find it more meaningful to focus on the payback potential of specific activities within the total supply-chain process. The following examples illustrate the kinds of benefits that can be realised. Individually, these improvements can bring important cost savings and service enhancements. Collectively, they can lead to dramatic breakthroughs in profitability and market share.

Morehouse believes that Supply Chain Management and supply chain management also can play key roles in increasing a company's market share--"... not by cutting price, but by doing such a superb job that you attract profitable market share," he says. In other words, a company needs to have not only the right product, but also the right processes for the market.

Distribution network optimisation. Optimising the distribution network--that is determining the best location for each facility, setting the proper system configuration, and selecting the right carriers--brings immediate cost advantages of 20 to 30 percent. That's the figure determined by *IBM's* Wholesale Distribution Industry Segment, based on consulting engagements in a wide range of industries. "This typically breaks down into transportation savings of 15 to 25 percent and improvements in inventory-carrying costs of 10 to 15 percent," says Mark Wheeler, national solutions manager for the IBM consulting unit.

Shipment consolidation. A proven, though often overlooked, supply-chain lever lies in shipment consolidation. Nabisco offers an instructive example. For one retail customer, the company had been delivering product from multiple plants via six different LTL deliveries. Through the use of a third-party SCM provider, it was able to consolidate these multi-vendor loads into two truckloads. By strategically consolidating the shipments, reports Rick D. Blasgen, senior director of product supply, Nabisco cut its transportation costs by half. On top of that, it reduced inventory levels, increased inventory turns, cut lead-times, improved on-time delivery, and enhanced case-fill rates.

Cross docking. Another supply-chain technique with proven payback potential is cross docking. This is the practice of receiving and processing goods for reshipping in the shortest time possible and with minimum handling and no storage. According to Maurice Trebuchon of Coopers & Lybrand's SysteCon Division, cross docking can yield savings of 25 percent or more over conventional warehousing. Speaking at this year's annual CLM meeting, Trebuchon cited one manufacturer that used cross docking to achieve a net savings of \$0.84 per ton of freight processed. The savings came from the elimination of costs related to putaway and picking and storage.

Supplier management. Research from McKinsey & Co. demonstrates the substantial improvements possible through aggressive supply management. An article by McKinsey consultants in the Winter 1998 issue of *SCM Review* mentions a client in the automotive industry that had successfully integrated vendors into its product-development process. On one particular team, the integration paid dividends in triplicate: the parts count dropped by 30 percent, the number of assembly steps and material specifications was reduced by half, and development time shrank from years to months.

Supplier integration. The abundant advantages of supplier integration were again evident in a two-year study conducted by the Global Procurement and Supply Chain Initiative at Michigan State University. Drawing on responses received from around the globe, the study showed that companies that involved suppliers earlier on in the product-design and -development process consistently outperformed those that did not. This was true across a range of supply-management metrics. The comparative improvement in purchased material costs alone was 15 percent.

Industry experts say most of those barriers fall into one of three broad categories:

- information sharing,
- integration,
- or the people themselves.

Until these barriers are dismantled, products will not flow swiftly to customers and companies will not achieve the benefits promised by supply chain management.

Given the extensive time, effort, and commitment of resources involved, is design and execution of a comprehensive supply-chain strategy really worth it all?

1.4.2 There for the Taking

The examples given above merely illustrate the kinds of competitive advantages that can be captured through aggressive supply-chain management. In actuality, opportunities for cost savings and enhanced service abound at all points in the chain--from initial sourcing all the way to the point-of-sale business transaction.

For those companies that act quickly and decisively to capitalise on supply-chain opportunities, the long-term, bottom-line benefits are there for the taking. Just look at the acknowledged supply-chain leaders--from Wal-Mart on down. As for those organisations that choose the business-as-usual approach to moving goods to market...well, OK. But keep in mind this admonition from Damon Runyon: The race does not always go to the swiftest or the strongest, but that's the way to bet.

1.5 Characteristics of firms/ organisations and service providers

The most important characteristic of firms that could apply SMC is the will to accept innovations and new methods of working. Of course there should be a physical movement of goods. From raw material to the final consumer, firms should also have an adequate managerial and organisational depth to capitalise the benefits that SCM brings to a business. Service providers should have a profound experience in organising the supply chain using a sound methodology in applying organisational change. Service providers should also have to adapt into their solutions SCM software systems in order to facilitate the installation of the system into the organisational structure of a firm.

2 APPLICATION

2.1 Where the technique has being applied

Do it right first time makes you think about the Toyota principles, Kaizen and other strategies that have been deployed to improve manufacturing processes and enable production lot sizes of one unit. Japanese companies have been forerunners to implement quality check procedures directly into the manufacturing and assembly process. The objective was to finish each single process step without defects thereby ensuring that following processes are not disturbed. What have they done to achieve this? Toyota pioneered the Total Quality Methods and provided every single employee with the

responsibility for his process. If an error occurred he had the power to stop the production or assembly line, even if many fellow workers would be impacted. This responsibility sharpened the operators sense for quality.

Quality was measured at every single process step and depicted in process charts. Quality deviations could be spotted easily. Mistakes were allowed, but only once. Any occurrence was investigated to the root and actions have been taken to rectify the mistake such that it does not happen again. Teams have been put in place to continuously develop ideas for improvement. Performance feedback was given instantly to show the workers what they have achieved.

Why the intense, widespread interest in this emerging management technique? The answer is simple: Companies increasingly recognise the tremendous payoff potential in successful supply-chain management. They read about Wal-Mart's leveraging of the chain to achieve a dominant position in the retail marketplace. They hear of companies like Dell Computer reconfiguring the supply chain to respond almost immediately to customised orders. They're intrigued by the bold measures taken by M&M Mars to virtually eliminate standing inventory from the pipeline.

The supply-chain payoff can come in many forms. It might be a reduction in transaction costs through eliminating unnecessary steps in moving product to market. It could be enhanced customer service that comes from closer co-ordination among sources and vendors upstream--and carriers, distributors, and customers downstream. Or maybe it's the improved market share that flows from better customer service or lower costs. In any case, successful supply-chain management brings compelling bottom-line benefits. All you have to do is look at supply-chain leaders like Xerox, IBM, Chrysler, Nabisco, Procter & Gamble, and Becton-Dickinson, says David M. Bovet, a vice president of Mercer Management Consulting. "There is definitely a strong correlation between companies that are paying attention to the integrated supply chain and business success," Bovet observes.

The research and consulting firm of Pittiglio Rabin Todd & McGrath (PRTM) has attempted to quantify this correlation. Through its comprehensive Integrated Supply Chain Benchmarking Study, PRTM found that best-practice SCM companies enjoyed a 45-percent total supply-chain cost advantage over their median competitors. Specifically, their supply-chain costs as a percentage of revenues were anywhere from 3 to 7 percent less than the median, depending on the industry.

Applied to manufacturing environments those methods have proven to deliver results. What can we learn from that and transfer to warehouse processes:

1. Total Quality Management
2. People are the key to success
3. Tight process control and review
4. Simplify, Omit and Integrate

These are some typical examples of SCM application to Greek enterprises:

- **ASTRA HELLAS S.A** - *using the SEN Enterprise resource planning software*
- **PAPOUTSANIS S.A.** - *using the "BAAN & SFI" Enterprise resource planning software*
- **ELVO** - *using the "BAAN" Enterprise resource planning software*
- **ATTIKO METRO** - *using the "BAAN" Enterprise resource planning software*
- **ISOBAU HELLAS S.A.** (aluminium panel production) - *using the SEN Enterprise resource planning software*

2.1.1 How can Supply Chain Management (SCM) be applied to an organisation?

Domino Effect

The most important thing is to first understand the customer's true needs.

Companies that want to improve their competitive position by reducing their order-to-delivery cycle are looking to supply-chain management to help them achieve that goal. Because SCM encompasses all processes involved in producing and delivering a product to the customer, it offers the opportunity to identify bottlenecks that can slow down activities along the entire supply chain.

Youngberg gives *the example* of an automaker that wants to build individual cars to order for delivery within one week. A supply-chain analysis might discover that the seat supplier doesn't have the capability to produce and deliver seats in a variable colour sequence--jeopardising the car manufacturer's ability to offer its customers the kind of service it envisions. Inevitably, such problems will affect delivery to the final customer, much as a domino falling at the front of a line eventually causes the one at the end to topple, too.

To obtain the greatest possible improvement in the total product cycle, it may be helpful to think of the supply-chain dominoes falling backward. In other words, under a supply-chain management philosophy, customer demand is what drives the activities required to fulfil that customer's demand, all the way back to raw-materials suppliers at the beginning of the production process. That is why it is important to first understand the customer's true needs, then work back from that, Morehouse says: ***Once the correct information is in hand, companies can design their supply-chain processes to provide what the customer really needs.*** Without that information, says Youngberg, companies risk falling into the "wasted excellence" trap, providing a higher service level or faster cycle time than is necessary. "It doesn't provide you with a competitive advantage, but it saddles you with costs that may not [yield] you anything," he explains.

Here is an example of a company that uses chemicals stored in tanks to manufacture its products. The chemical supplier discovered--to its surprise--that the most important thing to the manufacturer was not how quickly it delivered the raw material, but rather how well the vendor monitored the supply of the chemical to ensure that it never ran out. For the customer, reliability outweighed all other considerations.

How can it be accomplished? Ideally, product is received and put away to a location from where you will pick it. While picking the product it should be placed directly in the shipping carton. A weigh scale checks each picked orderline. As errors are found they are corrected immediately. The last step in the process would be to insert the invoice, seal the carton and apply a shipping label. During this process product has been handled only for put away (only cross-docking can eliminate that) and for picking. No other product handling. Handling steps are reduced to the most basic needs. Such processes are possible and they don't require a lot of automation. They need a WMS, RF terminals for put away and picking and well maintained product information. The process delivers an error free shipment, completed in one handling step, provides a direct quality feedback to the operator and allows you to manage each worker based on his or her individual performance = quality + output.

2.2 Types of firms /organisations Supply Chain Management can be applied

Supply Chain Management could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organisations that satisfy the following criteria:

- Minimum Number of employees: 20 (at least 4 in management positions).
- Strong management commitment to new ways of working and innovation.

2.3 Duration and implementation cost of Supply Chain Management

Looked at from a cost standpoint, SCM's true potential becomes evident. One recent study found that total supply-chain costs represent the majority share of operating expenses for most companies. In some industries, in fact, these costs can approach 75 percent of the operating budget. Given the dollars on the table, it's not surprising that top management has become keenly interested in supply-chain management. A Mercer Management Consulting study conducted among senior corporate executives confirms the high-level interest. Close to one-half of the executives surveyed reported that the programs to improve the supply chain were among the top 10 percent of all companywide initiatives.

The implementation of a SCM consulting project costs 15.000 Euro approximately and its duration is 8 months. The implementation of CSM software, which is based in the outcomes of the consulting work varies from 70.000 Euro (SMEs) to 1 million Euro (corporations) depending on the business size and complexity.

2.4 Conditions for implementation (infrastructures required etc.)

Achieving gains of the magnitude explained above, requires much more than efficient operations. It requires changing the process. It demands both executive-management-level commitment and superb execution at the operational level. On the other hand, today's Supply Chain Management professionals must become conversant with information technology.

IT is not a functional adjunct to supply-chain management. Rather, it is the enabler, the facilitator, the linkage that connects the various components and partners of the supply chain into an integrated whole. Electronic data interchange, on-board computers, satellite and cellular communications systems, warehouse-management software, enterprise-wide systems solutions, and now the Internet...these are among the information enablers of successful supply-chain management.

In developing its seven principles, Andersen Consulting stressed the importance of information technology, grouping **IT requirements** into three distinct categories.

- **First**, there are the *short-term* systems that can handle routine day-to-day transactions like order processing and shipment scheduling.
- **Then**, from a *longer-term* perspective, the technology must facilitate planning and decision making. These systems support such activities as demand planning and master production scheduling to optimally allocate resources.
- **Finally**, *longer-range* information systems must enable strategic analysis by providing modelling and other tools that synthesise data for use in high-level "what-if" scenario planning. These forward-looking systems help managers evaluate distribution centers, suppliers, and third-party service options.

Regardless of their current knowledge level, Supply Chain Management managers widely recognise the need to become even more conversant with information technology if they are to assume a future leadership position. An important finding from the 1996 Ohio State University Survey of Career Patterns in Supply Chain Management underscores the point. The researchers asked the Supply Chain Management professionals surveyed what they

would study if they could return to college for 90 days. Topping the list of more than a dozen subjects mentioned was information technology.

Miebach Supply Chain Management experienced through numerous warehouse optimisation projects: ideally, warehouse processes should be defined on those principles.

- Total Quality Management requires a review of all processes, provided equipment and the management of the operation.
- Human performance in picking is and will be unmatched for most products in most warehouse operations. (however, there are exceptions)
- Design the picking process with care and use automation where it supports people or helps to eliminate simple but unergonomic tasks.
- Create processes that immediately alert operators about mistakes and don't carry such mistakes through to a final quality check. Have errors corrected immediately. This provides feedback regarding performance not only on speed, but also on quality.
- Eliminate unnecessary handling steps. Handling product is the costly part in the warehouse. Do not try to use one warehouse process for all order types whatever size and service requirements they might have. Segmentation and integration of processes are keywords.

2.5 European Organisations Supporting the Implementation of the method

CLASP (Central Logistics Association for Supply-Chain Partnerships)

<http://www.clasp.org.uk/>

CLASP is the Regional Supply Network Group supporting best practice in supply chain management. The principles of the Supply Chain Management concern "the whole manufacturing and service provision, from strategic planning to operations on the shop floor. Supply Chain Management involves ways of thinking about technology and people in organisations". (ISCAN 1995)

Society of Logistics Engineers SOLE <http://www.sole.org/>

The International Society of Logistics is a non-profit international professional society composed of individuals organised to enhance the art and science of logistics technology, education and management. Commercial Products -- The purpose of the Commercial Division is to focus attention on the application of logistics disciplines in the commercial sector. We will set forth a clear vision of the SOLE logistics philosophy and to create a symbiosis between commercial and government logistics communities with SOLE acting as the bonding link. As we enter the new century, everyone is talking about finding new ways to do business. One reason they seek out these new ways is to increase profits. Yet another is to just stay in business. But from the logistics standpoint, we need to be on top of the changes in order to ensure that the end product is supportable throughout its life cycle and even beyond.

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3 IMPLEMENTATION PROCEDURE

3.1 Steps-actions/Phases

Subsequent actions to implement the supply-chain agenda, which Kearney says should be carried out by individual project teams, typically fall into these broad categories:

- **Designing** the long-term supply-chain structure to position the company in the right roles in the right supply chains with the right customers and suppliers.
- **Re-engineering supply-chain processes** to streamline product, information, and funds flow internally and externally.
- **Reinforcing** the supply chain's functional foundation by improving quality and productivity within operational areas such as warehousing, transportation, and fleet management.

A Flexible Approach

specialises in the design, development and implementation of solutions to Supply Chain Management problems.

Consultancy approach is tailored to suit the particular requirements of a client's project. This ensures the provision of the most appropriate form of assistance, from a full traditional consultancy assignment, to a placement working within a client's team.

- **Strategic Analysis**
- **Specification**
- **Implementation**

Strategic Analysis

It's the study of the current and future needs of business and development of such solutions to meet these requirements. This normally involves the use of computer models to gain a full understanding of the key issues and to examine the practical alternatives. A recommendation follows with the most appropriate and cost effective solution. This approach:

- gives confidence in the recommended solution.
- identifies a clear way forward.
- determines the associated cost and timescales.
- enables the next stage of the project to be planned.

Specification

In this stage, any recommendations have to include operational detail, enabling systems, equipment or buildings to be procured to meet the exact requirements of the solution. This provides:

- correct logical emphasis on each aspect of the solution.
- a clear specification of proposals, minimising the risk of unforeseen cost.
- finalised project cost budgets.
- competitive equipment procurement.
- agreed implementation timescales.

Implementation

Refers to responsibility for the tendering of equipment and supplier selection, contract negotiation and placement.

Contract Management through to completion to ensure that the project is progressed in accordance with the requirements of time, cost and quality.

Work with the client on preparing any organisational changes and training to ensure a smooth start to the new operation.

There has been found that many companies have not thought comprehensively about the design of their supply chains. Often, their attempts to achieve excellence have been focused on perhaps one or two supply chain building blocks--and not, as they should be, on all of the dimensions required for world-class performance.

The framework below outlines the five key dimensions of supply chain management through the implementation procedure that are required to achieve superior performance. These areas must be addressed iteratively and, generally, in a hierarchical fashion:

1. **Strategy**--specifically, the alignment of supply chain strategies with the overall business direction. Key decision points for managers here include:

- What is required to align the supply chain with the business strategy?
- What level of customer service must we provide to each customer segment to compete effectively?
- Which channels of distribution best meet our goals and our customers' needs?

2. **Infrastructure**, which affects cost-service performance and establishes the boundaries within which the supply chain must operate. Pertinent questions include:

- How must the physical network of plants and distribution be structured?
- Can we rationalise our current network?
- Can we use contract manufacturing or third-party logistics capabilities?
- What transportation services can best link together the network of facilities?
- Which activities should we outsource?

3. **Process**--the drive to achieve functional excellence and integration across all major processes. Managers must ask themselves the following:

- What are the core supply chain processes driving the business?
- How can we adapt best-in-class approaches to our core processes (e.g., manufacturing, integrated demand planning, procurement, cycle-time compression, dynamic deployment)?
- How can we build linkages with our suppliers and customers?

4. **Organisation**--providing the critical success factors of cohesion, harmony, and integration across organisation entities. Questions to consider include:

- What level of cross-functional integration is required to manage core processes effectively?
- How can we leverage cross-company skills and abilities?
- What performance-measurement and reporting structure can help us achieve our objectives?

5. **Technology**, which empowers the supply chain to operate on a new level of performance and is creating clear competitive advantages for those companies able to harness it. Companies should address the following points:

- Do our IT platform and core applications software support world-class SCM?
- Where will advanced decision-support capabilities have the greatest impact on business performance?
- What data are required to manage the core business processes outlined above?
- How can we capitalise on advanced communications (e.g., intranets and the Internet) in managing the supply chain?
- How can we leverage enhanced visibility of customer demand and other key operating parameters?

From a different point of view the consulting firm of A.T. Kearney has developed an instructive framework for establishing a strategic supply-chain agenda and then implementing it. To spearhead the effort, Kearney recommends creation of a supply-chain assessment team that works under the aegis of a companywide steering committee. The agenda-setting process proceeds along 4 key steps.

- The team's first task is to assess the supply-chain competitiveness of the organisation. The evaluation begins with a comparison of business objectives against existing capabilities and performance. This exercise typically reveals where the existing supply chain can achieve immediate competitive advantage (Kearney calls these the "early wins") and where inefficiencies may be leaving the company vulnerable to the competition.
- Step two in the agenda-setting process is to create a vision of the desired supply chain. Through a series of "visioneering" sessions that might also include key customers and suppliers, the team considers how such trends as globalisation, channel shifts, and new technology will affect the desired supply-chain configuration. That exercise addresses such questions as, What supply-chain factors and performance levels drive customer buying decisions? What would make one supply chain a winner over others?
- Step three in the A.T. Kearney approach defines those actions required to close the gap between tomorrow's supply-chain vision and today's reality. The team identifies possible re-engineering, restructuring, or other actions that could help narrow any gaps. At this stage, the team also works closely with management to assess the organisation's readiness to pursue needed changes.
- Finally, step four prioritises the action items identified in the preceding step and then commits the appropriate resources. The end result of this task is a unified commitment to a supply-chain strategy and a clear agenda to achieve that strategy.

3.1.1 Implementing a competitive approach to Warehousing and Distribution

An organised approach to warehousing and distribution is crucial to the continued growth of any business. With emerging technologies and the pressure to deliver a high level of customer service and turnaround of stock, tradition methods of warehousing and distribution are being replaced by those that are more sophisticated, aimed at reducing costs and maintaining that all important competitive factor.

Implementing a carefully structured, cost-effective approach to warehousing and distribution issues now, will inevitably see an organisation through to its long term business objectives and provide tangible financial pay backs.

Developing the best strategy required is a complex issue. A wide range of parameters needs to be considered; business growth, purchasing, stock levels, customer requirements. The impact of changes over the next 5 to 10 years must be understood in order to assess the available options and develop appropriate solutions. Is it possible to take advantage of high technology to guarantee the future cost base, without sacrificing flexibility?

Making the right decisions, with so many issues to take into account, is not an easy undertaking.

3.2 Partial techniques and tools included in each step

The tools and techniques are explained in each step in the ANNEX

3.3 Related software (existing or being prepared)

The tools and techniques are explained in each step in the ANNEX

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Annex

Software Types

Though some companies are content with data-capture and communication systems, other companies rely heavily on the third category of supply chain technology--business software. Computer software makes it possible to manage thousands of transactions and make intelligent decisions required to match distribution flow to demand.

Software developers have devised a host of solutions to handle specific supply chain tasks. For instance, there are **warehouse management systems (WMS)**, which oversee the use of labour and equipment in a distribution centre. This type of software first emerged at the United States in the mid-1970s, as an alternative to the construction of mechanised and automated warehouses. Today, it's become the cornerstone of many supply chain initiatives.

Another type of software commonly used in SCM is **transportation management software (TMS)**. This application co-ordinates inbound shipments, manages delivery requirements, and selects carriers. Another popular solution--advance planning and scheduling (**APS**) **software**--allows manufacturers and retailers to gauge inbound and outbound inventory demand. Other packages facilitate order management or keep track of international shipping requirements.

Over the past year, a wave of mergers has swept the software industry, resulting in the emergence of companies that offer a broad array of applications. Although no company yet offers a complete supply chain suite that includes order management, planning, and execution applications, most analysts believe that these combinations eventually will result in the creation of an all-encompassing category of software called supply chain planning and execution suites.

In the meantime, both single-point distribution solutions and software suites will have to be linked to older legacy systems, particularly to **enterprise resource planning (ERP) systems**, which historically have overseen finance and manufacturing in corporations. Because these disparate programs lack a common format, systems integrators often have to write custom interfaces to allow the exchange of data between distribution and ERP applications.

Another category of software--**enterprise application integration (EAI)**--has emerged to enable companies with different computer systems and software to link their systems together. "Supply chain management is about integrating different applications," says Art Mesher, a sales director at software developer Descartes Systems in Waterloo, Ontario. "There's a new class of 'middleware' geared toward tying ERP applications together. It's called EAI software. If you had [software created by] three different WMS vendors and by SAP (a large ERP vendor), you would use EAI software to make them work together." As a result of recent mergers and acquisitions, several companies now offer suites of software modules for logistics operations. Industry analysts refer to these packages of distribution-related programs as **logistics execution software (LES)**.

ERP systems

There's a powerful new presence to be reckoned with in the planning arena--the major **ERP (enterprise resource planning)** vendors. These software giants, whose enterprisewide products are grounded in financials or manufacturing, now are

incorporating supply-chain planning functionality into their offerings. They're either developing this capability in house--the path taken by SAP--or acquiring it. These are some of the big ERP vendors are positioning their supply-chain planning capability:

- SAP, the biggest of the ERP providers, now offers a product called SCOPE--supply-chain planning, optimisation, and execution. The module is integrated into the company's core R/3 enterprise application. It enables users to optimise performance and cost across the entire supply chain, according to the vendor.
- Oracle recently announced that it would offer i2 Technologies' suite of planning and scheduling products as part of Oracle's enterprise solution for the industrial sector. The company says that its planning products are designed for customers with complex supply-chain planning requirements who need to make real-time optimisation decisions.
- With the acquisition of Red Pepper in 1997, PeopleSoft became a major supply-chain planning player. Among the products now offered is the Supply Chain Collaborator, which allows companies to share planning data with suppliers and customers on a real-time basis. This capability lets multiple supply chains function as one large enterprise, PeopleSoft says.

A new survey has found that it takes an average of 23 months to implement an enterprise resource planning (ERP) or enterprise resource management (ERM) system. ERP/ERM systems traditionally provide the corporate information backbone, handling such functions as accounting, manufacturing, and logistics.

For its study, the Meta Group of Stamford, Conn., surveyed some 60 companies that recently had installed ERP or ERM systems. (The Meta Group prefers the term "ERM" to the more common term "ERP" because ERM encompasses both corporate planning and operations whereas ERP deals primarily with operations.) The survey noted that average implementation time for those applications ranged from 17 to 26 months.

Average Implementation Time for ERP Solution	
Baan	24 months
JD Edwards	21 months
Lawson	22 months
Oracle	26 months
PeopleSoft	24.5 months
SAP	21 months
SSA	17 months
Overall Average	23 months
Source: Meta Group	

The Meta Group said that the average total cost of ownership for an ERP/ERM system amounted to \$15 million. Total cost of ownership is defined as the expenses for hardware, software, services, and internal staff required for a software installation plus two years of post-installation support.

The study also found that it took 2.5 years from project initiation to achieve any kind of quantifiable benefit from such a system. Ninety percent of these quantified benefits came through cost reduction. Most often, cost reduction occurred in either logistics or manufacturing.

When examined from a strictly financial perspective, the study found, the ERP/ERM solutions placed the company in the red. It noted that average median savings from an implementation were a negative \$1.6 million. "On a pure dollar basis, the chief financial officer would not be happy," says Barry Wilderman, analyst in the applications delivery strategy at Meta Group. "But it's important not to take a simplistic view. You've got to look beyond the quantifiable benefits to the intangible benefits." The study pointed to such intangible benefits as increased access to information, improved customer satisfaction, and reduced time for closing financial books.

Despite the lack of quantifiable benefits, the Meta Group study noted that companies still were forging ahead and implementing ERP systems. Many times, they did so for such reasons as to address Year 2000 remediation problems or to modernise ageing computer applications that were economically beyond salvage. Systems also were installed to address needs of a new business requirement or to achieve a desired level of competitive advantage.

SAP™ (Systems, Applications, and Products in Data Processing) profile

SAP is the world's largest inter-enterprise software company and the **world's fourth-largest independent software supplier**, overall. In its most recent fiscal year, ending Dec. 31, 1998, SAP AG reported revenues of DM 8.47 billion. SAP employs over 20,500 people in more than 50 countries who are dedicated to providing high-level customer support and services.

SAP is listed on several exchanges including the Frankfurt stock exchange and NYSE under the symbol "SAP."

The ability of SAP to deliver customer-centric, open, personalised and collaborative inter-enterprise solutions on demand is the foundation of mySAP.com. It enables companies of all sizes and industries to fully engage their employees, customers and partners to capitalise upon the new Internet economy.

Industry-Specific Functionality

Aligned with customer requirements, SAP software offers solutions specific to 19 different industries with functionality designed to address requirements unique to each of those industries' business objectives:

- Aerospace and defence
- Automotive
- Banking
- Chemicals
- Consumer products
- Engineering and construction
- Health care
- Higher education
- High technology
- Insurance
- Media
- Mill products
- Oil and gas
- Pharmaceuticals
- Public sector
- Retail
- Telecommunications
- Transportation
- Utilities

For each of the above industries, SAP has created a solution map that lays out the breadth and depth of each industry's specific business process requirements and maps them to SAP as well as complementary partner solutions to complete the end-to-end business process, including Web-enabled processes. Accessible through the Internet, solution maps give customers a powerful planning tool for continuing to enhance and refine their business processes for greater efficiency and investment return. SAP partners have created numerous additional industry-specific solutions.

SAP Software Solutions: Reflecting the Modern Enterprise

All software marketed by SAP is deliverable to customers through mySAP.com and is accessible through the open and extensible mySAP.com Workplace, a role-based business portal. Software functionality is organised according to user roles so that users can have full access to the applications they need to fulfil their responsibilities. The following are among the applications available through mySAP.com:

- Comprehensive business-to-business and business-to-consumer applications for e-commerce (selling and procurement) improve the flow of information between key suppliers.
- The Customer Relationship Management applications support business scenarios enabling companies to put their customers at the heart of their business. Recognising the strategic importance of customer-centricity, SAP is now offering its intelligent Customer Relationship Management as a key component of the mySAP.com environment. Its business scenarios, including Internet Sales, Internet Service and Service Interaction Centre, are supported by a shared relationship intelligence layer and cover all key Customer Relationship Management challenges.
- Business intelligence applications provide a holistic, closed-loop system that offers the most current, nearly real-time information encompassing operational data, analytical intelligence and contextual knowledge. Using these tools, decision-makers can make informed business decisions, drive the decisions to operational systems and monitor the results.

Specific business intelligence components from SAP are as follows:

- ◊ The SAP Business Information Warehouse (SAP BW) application converts business data into business intelligence for decision-support needs. Including a broad range of predefined reporting templates with industry-specific and user role-based functionality, SAP BW has been one of the top-selling data warehousing solutions since its introduction in 1998.
 - ◊ The SAP Strategic Enterprise Management (SAP SEM) application vertically extends integrated data to support business managers and senior executives in making key business decisions with new value-based management processes such as strategic planning, risk management and value communication. It includes a corporate performance monitor complemented by rich scenario planning and is designed to provide a sophisticated dashboard for management that can enhance the long-term value of a company by providing the right information at the right time for making management decisions.
- Applications for supply chain management include these:
 - SAP Advanced Planner and Optimizer (SAP APO) that improves demand-forecasting and increases production efficiency.
 - SAP Logistics Execution System (SAP LES) that enables the efficient flow of goods along the supply chain with greater speed and accuracy.
 - The core enterprise applications for financial accounting, logistics and human resources, originally launched in 1992 as SAP System R/3®, help companies link their business processes, tying together disparate business functions to synchronise an entire enterprise to run more smoothly. SAP R/3 is the most widely accepted enterprise application product on the market today. With more than 22,000 installations world-wide, it has become a de facto standard platform for enterprise application software.

SAP Service and Support

The world-wide SAP service and support organisation is available to customers 24 hours a day, 365 days a year. SAP supports the entire customer lifecycle, including evaluation, implementation and continuous business improvement of SAP software. With its TeamSAP approach, SAP demonstrates its commitment to the SAP partner ecosystem for

successful implementations. With roughly 45,000 consultants around the world trained in SAP software, SAP and its partners team up using defined processes and tools for the fastest implementation possible as well as products designed to optimise businesses with the latest Internet functionality.

Analogous to the SAP Solution Maps, the SAP Services Map provides customers of all sizes with a clear view of services and their scope to support customers' investment in SAP solutions, illustrating how SAP and partner services effectively and comprehensively support a business's life cycle.

SAP Training and Education

SAP is one of the largest information technology training companies in the world, offering standard classroom training with more than 150 instructors teaching more than 200 courses at 85 training centers world-wide for SAP customers and business partners. SAP also offers remote training in various formats, including live Internet training with real-time interaction between instructors and students; the SAP University Alliance Program provides to universities and colleges of all sizes the software, installation and technical support, assistance in curriculum development, and training and instructional materials for faculty and staff to ensure that college graduates are equipped with the latest training on how technology supports business objectives.

A representative clients list in Greece

Customers	Industry	Modules	Status(started/live 1/1/xx)
ABB	Construction	All	(97/98)
Agrevo	Chemical	FI/CO/MM/SD	Live 97
Air Tour Greece	Tour Operator	FI/CO/MM/SD	Live 96
Aluminium of Greece	Aluminium	All	(96/98-99)
BDF	CPG	FI/CO/MM/SD	Live 98
Bosch Siemens Pitsos	House Electric	All	97/98
Cartellas	Paper	All	(96/98)
Carlsberg (CY)	Drinks	All	98
Colgate Palmolive	CPG	All	98
Continent	Super Market	FI/CO/MM/SD	98
Cosmocar	Car importers	All	98
Cyprus Import Corp.	Auto	FI/CO/MM	Live 98
DEPA	Natural Gas	All	98
Diamont Winter	Equipment	FI/CO/MM/SD	98
Digital	Computers	SD	Live 96
Dow Chemicals	Chemical	FI/CO/MM/SD	Live 93 (R/2)
Elais/Algida	Food	FI/CO/MM/SD/PP	Live 98
Electricity Authority of Cyprus	Utility	All	(97-98/99)
Ericsson	Telecom	FI/CO/MM/SD	98
Ford	Auto	AM	Live 97
Goodyear	Tires	FI/CO/MM/SD	(97/98)
Hellenic Technodomiki	Construction	FI/CO/MM/PS/HR	Live 97
Hellenic Aerospace	Aerospace	All	98/99
Henkel Ekolab	Pharmaceuticals	FI/CO/MM/SD	98
Hoechst	Chemical	FI/CO/MM/SD	Live 97
Ideal Standard	WC Goods	FI/CO/MM/SD/PP/P M	Live 97
Infoquest	H/W dealer	FI/CO/MM/AM/SD	98

Interamerican	Insurance	All	Live 98
Janssen-Cilag	Pharma	FI/CO/MM/SD	Live 98
KEO (CY)	Drinks	All	98
Lambrakis Press Org.	Publishing	FI/CO/MM/SD	Live 98
Lanitis Bros (CY)	CPG	FI/CO	Live 98
Lever Hellas	CPG	FI/CO/MM	Live 97
Marion Roussel	Chemical	FI/CO/MM/SD	Live 97
MacCann Ericcson	Electrical	FI/CO/MM/SD	98
Mercedes Benz	Auto	FI/CO/SD/MM	Live 96
Milloi Kritis	Mills	All	98
Mobil	Oil	FI/CO/MM/SD	Live 93 (R/2)
Motor Oil	Oil	All	(97/98)
Osram	CPG	FI/CO/MM/SD	Live 96
Papageorgiou Hospital	Hospital	FI/CO/MM/PM/IS-H	(95/97) Live in parts
Papaellinas Companies	CPG	FI/CO/MM/SD	97/98
Pirelli	Tires	SD	Live 1996
Procter & Gamble	CPG	FI/CO/MM/SD	(97/98)
Reemtsma	Cigarettes	FI/CO/MM/SD	98
Solvay	Chemicals	MM/SD	Live 97
Sony	CPG	FI/CO/MM/SD	97/98
SHELL	Oil	All	98
Stet Hellas	Telecoms	FI/CO/SD/MM	Live 96
Titan	Cement	FI/CO/MM/SD/PP	Live 96
Varvaressos Textiles	Textiles	All	(97/98)
Vivechrom	Paints	All	(98/98)
Whirlpool Hellas S.A.	White Goods	FI/CO/MM/SD	Live 98