CHAPTER 4

OVERVIEW ABOUT ENTERPRISE RESOURCE PLANNING AND SUPPLY CHAIN MANAGEMENT TOWARDS SELECTED INDUSTRIAL SCENARIO

4.1 INTRODUCTION ON ERP

Enterprise Resource Planning (ERP) systems integrate internal and external management to find formation across an entire organization embracing finance and accounting, manufacturing, sales and service, customer relationship management, etc. ERP systems automate this activity with an integrated software application. This is ERP’s true ambition. ERP attempts to integrate all departments and functions across a company onto a single computer system that can serve all those different departments’ particular needs. Each of those departments typically has its own computer system optimized for the particular ways that the department does its work. But ERP combines them all together into a single, integrated software program that runs off a single database so that the various departments can more easily share information and communicate with each other. That integrated approach can have a tremendous payback if companies install the software correctly.

4.2 DEFINITIONS

ERP is defined as the ability to deliver an integrated suite of business applications. ERP tools share a common process and data model,
covering broad and deep operational end to end processes, such as those found in finance, HR, distribution, manufacturing, service and the supply chain.

ERP is the acronym of Enterprise Resource Planning. ERP utilizes ERP software applications to improve the performance of organizations resource planning, management control and operational control. ERP software is multi-module application software that integrates activities across functional departments, from product planning, parts purchasing, inventory control, and product distribution, to order tracking. ERP software may include application modules for the finance, accounting and human resources aspects of a business.

“An outgrowth of MRP initiated in the 1970’s as a new computer based approach to planning and scheduling of material requirements and inventory, featuring time phased order point” (Rockford Consulting Group).

“Integrating the enterprise through the internet. Extending the enterprise to the Internet” (IBM).

“Computer-based systems designed to process an organization’s transactions and facilitate integrated and real time planning, production, and customer response” (O’Leary 2000).

### 4.3 ERP IN BUSINESS PRACTICES

There are five major reasons why companies undertake ERP.

1. **Integrate Financial Information:** As the CEO tries to understand the company’s overall performance, he may find many different versions of the truth. Finance has its own set of revenue numbers, sales has another version, and the
different business units may each have their own version of how much they contributed to revenues. ERP creates a single version of the truth that cannot be questioned because everyone is using the same system.

2. **Integrate Customer Order Information:** ERP systems can become the place where the customer order lives from the time a customer service representative receives it until the loading dock ships the merchandise and finance sends an invoice. By having this information in one software system, rather than scattered among many different systems that can’t communicate with one another, companies can keep track of orders more easily, and coordinate manufacturing, inventory and shipping among many different locations at the same time.

3. **Standardize and Speed up Manufacturing Processes:** Manufacturing companies especially those with an appetite for mergers and acquisitions often find that multiple business units across the company make the same widget using different methods and computer systems. ERP systems come with standard methods for automating some of the steps of a manufacturing process. Standardizing those processes and using a single, integrated computer system can save time, increase productivity and reduce head count.

4. **Reduce Inventory:** ERP helps the manufacturing process flow more smoothly, and it improves visibility of the order fulfillment process inside the company. That can lead to reduced inventories of the stuff used to make products (work in progress inventory), and it can help users better plan
deliveries to customers, reducing the finished goods inventory at the warehouses and shipping docks. To really improve the flow of your supply chain, you need supply chain software, but ERP helps too.

5. **Standardize Hr Information:** Especially in companies with multiple business units, HR may not have a unified, simple method for tracking employees’ time and communicating with them about benefits and services. ERP can fix that.

4.3.1 ERP Fit the Ways to do Business

It’s critical for companies to figure out if their ways of doing business will fit within a standard ERP package before the checks are signed and the implementation begins. The most common reason that companies walk away from multimillion dollar ERP projects is that they discover the software does not support one of their important business processes.

4.3.2 Hidden Cost of ERP

Different companies will find different land mines in the budgeting process, those who have implemented ERP packages agree that certain costs are more commonly overlooked or underestimated than others. Armed with insights from across the business, ERP pros vote the following areas as most likely to result in budget overrun.

1. **Training**-Training is the near-unanimous choice of experienced ERP implementers as the most underestimated budget item.

2. **Integration And Testing**-Testing the links between ERP packages and other corporate software links that have to be
built on a case by case basis is another often underestimated cost.

3. **Customization**- Add-on’s are only the beginning of the integration costs of ERP. Much more costly, and something to be avoided if at all possible, is actual customization of the core ERP software itself. This happens when the ERP software can’t handle one of your business processes and you decide to mess with the software to make it do what you want.

4. **Data Conversion**- It costs money to move corporate information, such as customer and supplier records, product design data and the like, from old systems to new ERP homes.

5. **Data Analysis**- Often, the data from the ERP system must be combined with data from external systems for analysis purposes. Users with heavy analysis needs should include the cost of a data warehouse in the ERP budget and they should expect to do quite a bit of work to make it run smoothly.

6. **Replacing Your Best and Brightest**- It is accepted wisdom that ERP success depends on staffing the project with the best and brightest from the business and IS divisions.

7. **Implementation of the Teams** - Most companies intend to treat their ERP implementation as they would any other software project. Once the software is installed, they figure the team that will be scuttled and everyone will go back to his or her day job. But after ERP, you can’t go home again. The implementers are too valuable. Because they have worked intimately with ERP, they know more about the sales process
than the salespeople and more about the manufacturing process than the manufacturing people. Companies can’t afford to send their project people back into the business because there’s so much to do after the ERP software is installed. Just writing reports to pull information out of the new ERP system will keep the project team busy for a year at least. And it is in analysis and, one hope, insight that companies make their money back on an ERP implementation. Unfortunately, few IS departments plan for the frenzy of post-ERP installation activity, and fewer still build it into their budgets when they start their ERP projects. Many are forced to beg for more money and staff immediately after the go live date, long before the ERP project has demonstrated any benefit.

8. **Waiting for ROI**—One of the most misleading legacies of traditional software project management is that the company expects to gain value from the application as soon as it is installed, while the project team expects a break and maybe a pat on the back.

9. **Post ERP Depression**—ERP systems often wreak cause havoc in the companies that install them.

The basic goal is to provide one central repository for all information that is shared by all the various ERP facets in order to smooth the flow of data across the organization.
4.3.3 ERP Vendors

Depending on your organizations size and needs there is a number of enterprise resource planning software vendors to choose from in the large enterprise, midmarket and small business ERP markets.

1. Large Enterprise ERP (ERP TIER I)

The ERP market for large enterprises is dominated by three companies: SAP, Oracle and Microsoft. Source: Enterprise Apps Today; Enterprise ERP Buyers Guide: SAP, Oracle and Microsoft; Drew Robb.

2. Midmarket ERP (ERP TIER II)

For the midmarket vendors include Inform, QAD, Lawson, Epicor, Sage and IFS. (Source: Enterprise Apps Today; Midmarket ERP Buyers Guide; Drew Robb).

3. Small Business ERP (ERP TIER III)

Exact Globe, Sys pro, Net Suite, Visibility, Consona, CDC Software and Activant Solutions round out the ERP vendors for small businesses.

4.3.4 Companies Organize their ERP Projects

Based on our observations, there are three commonly used ways of installing ERP.

- The Big Bang—In this, the most ambitious and difficult of approaches to ERP implementation, companies cast off all their legacy systems at once and install a single ERP system across
the entire company. Though this method dominated early ERP implementations, few companies dare to attempt it anymore because it calls for the entire company to mobilize and change at once. Most of the ERP implementation horror stories from the late 90s warn us about companies that used this strategy. Getting everyone to cooperate and accept a new software system at the same time is a tremendous effort, largely because the new system will not have any advocates. No one within the company has any experience using it, so no one is sure whether it will work. Also, ERP inevitably involves compromises. Many departments have computer systems that have been honed to match the ways they work. In most cases, ERP offers neither the range of functionality nor the comfort of familiarity that a custom legacy system can offer. In many cases, the speed of the new system may suffer because it is serving the entire company rather than a single department. ERP implementation requires a direct mandate from the CEO.

- **Franchising Strategy**- This approach suits large or diverse companies that do not share many common processes across business units. Independent ERP systems are installed in each unit, while linking common processes, such as financial bookkeeping, across the enterprise. This has emerged as the most common way of implementing ERP. In most cases, the business units each have their own instances of ERP that is, a separate system and database. The systems link together only to share the information necessary for the corporation to get a performance big picture across all the business, or for processes that don’t vary much from business unit to business unit. Usually, these implementations begin with a demonstration or
pilot installation in a particularly open-minded and patient business unit where the core business of the corporation will not be disrupted if something goes wrong. Once the project team gets the system up and running and works out all the bugs, the team begins selling other units on ERP, using the first implementation as a kind of in-house customer reference. Plan for this strategy to take a long time.

- **Slam Dunk**-ERP dictates the process design in this method, where the focus is on just a few key processes, such as those contained in an ERP system’s financial module. The slam dunk is generally for smaller companies expecting to grow into ERP. The goal here is to get ERP up and running quickly and to ditch the fancy reengineering in favor of the ERP system’s canned processes. Few companies that have approached ERP this way can claim much payback from the new system. Most use it as an infrastructure to support more diligent installation efforts down the road. Yet many discover that a slammed-in ERP system is little better than a legacy system because it doesn’t force employees to change any of their old habits. In fact, doing the hard work of process reengineering after the system is in can be more challenging than if there had been no system at all because at that point few people in the company will have felt much benefit.

- **The On-Demand Nibble**-You are most likely to see this approach in a small or midsize business that’s lost its patience for Excel spreadsheets and the fax machine, and in large companies that either have massive operations or will never be able to standardize on one system or have been burned by costly
and not so satisfying ERP rollouts in the past. In this instance, companies turn to a small but growing number of on-demand or software-as-a-service (SaaS) ERP vendors that can offer: faster implementation; easier and more frequent; and cheaper upfront costs (the software price tag can be much cheaper than traditional on premise applications because of subscription pricing that is on as per user, per month basis as well as big reductions in integration and consulting fees). Why companies are just dipping their toes in the on demand and SaaS waters right now is because those companies still have concerns about housing their mission critical and highly sensitive ERP data (such as HR and financial) on a third party’s servers and not their own.

4.3.5 ERP Fit with E-Commerce

ERP vendors were not prepared for the onslaught of E-Commerce. ERP is complex and not intended for public consumption. It assumes that the only people handling order information will be your employees, who are highly trained and comfortable with the tech jargon embedded in the software. But now customers and suppliers are demanding access to the same information your employees get through the ERP system things like order status, inventory levels and invoice reconciliation except they want to get all this information simply, without all the ERP software jargon, through your website. E-Commerce means IT departments need to build two new channels of access in to ERP systems one for customers (otherwise known as Business to Consumer) and one for suppliers and partners (Business to Business). These two audiences want two different types of information from your ERP system. Consumers want order status and billing information, and suppliers and partners want just about everything else. Traditional ERP vendors are
having a hard time building the links between the Web and their software, though they certainly all realize that they must do it and have been hard at work at it for years. The bottom line, however, is those companies with E-Commerce ambitions face a lot of hard integration work to make their ERP systems available over the Web. For those companies that were smart or lucky enough to have bought their ERP systems from a vendor experienced in developing E-Commerce wares, adding easily integrated applications from that same vendor can be a money saving option. For those companies whose ERP systems came from vendors that are less experienced with E-Commerce development, the best and possibly only option might be to have a combination of internal staff and consultants hack through a custom integration.

4.3.6 Demand and Software-as-a-Service ERP Applications Work

A small but growing number of vendors now offer on demand or software as a service (SaaS) ERP applications. These HR and finance applications are hosted by a third party, so there’s no software to install on the company’s servers and PCs. Instead, users access the ERP applications through a Web connection, and on SaaS vendors are trying to make their applications more user friendly than traditional on premise applications. Many businesses and their ever vigilant IT departments still have concerns about keeping their mission critical and highly sensitive ERP data on a third party’s servers rather than on their own. An October 2007 CIO magazine survey of IT executives who currently had an ERP system installed found that just 9 percent reported using a non-traditional on premise model. Those alternatives included SaaS, open source tools and various in house applications. Nearly 54 percent of those responding to the CIO survey said they probably or definitely would not consider moving to an alternative ERP model and while 35 percent of CIOs said they would probably or definitely
consider trying something different, they are not actually doing it yet. The majority of early adopters of the on demand/SaaS ERP alternative are small and midsize businesses, though large companies, perhaps burned by a costly or lengthy ERP rollout, have started to experiment with on demand/SaaS rollouts in certain areas or departments at their companies.

4.3.7 Characteristics of ERP

Enterprise Resource Planning has the following characteristics they are Packaged software, Integrate the majority of a business’s processes, Process the majority of an organization's transactions, Use a data warehouse, Allow access to data in real time Integrate transaction processing and planning Activities.

4.3.8 Functions Represented in ERP


4.3.9 ERP Modules

Modules of ERP according to SAP are Customer Relationship Management, E-procurement, Enterprise portals, Financials, Human Resources, Mobile Business, Marketplace and Supply Chain Management.
4.3.10 ERP Process Flow

![ERP Process Flow Diagram]

**Figure 4.1 ERP Process Flow**

4.3.11 ERP Systems Functions

Consider the U.S. Company - International Sneaker Company (ISC) with worldwide sales using SAP R/3:

- **Ordering** - a sales representative from ISC takes and order from a retailer in Brazil. Entering the data on her personal computer, the sales representative accesses R/3’s sales module. The system checks the price as well as the discounts that the retailer is eligible for. The system also checks the retailer’s credit history to make sure that the firm wants to make the sale.

- **Availability** - R/3 software next checks the inventory. It finds that half the order is available from a warehouse in Brazil and
so that portion of the order can be filled immediately. R/3 finds that the other half of the order will need to be delivered from ISC’s factory.

- **Production** - R/3 alerts the warehouse to ship the portion of the order that is in stock to the retailer. In addition, R/3’s manufacturing software schedules the production of the remainder of the order. An invoice is printed up in Portuguese.

- **Labor** - When scheduling production, R/3 notes that there is a shortage of workers to handle the order. It alerts the personnel manager of the requirement to hire temporary workers.

- **Purchasing** - R/3’s materials planning module notifies the purchasing manager that it is time to order new raw materials and also of the amounts that need to be ordered.

- **Order Tracking and More Ordering** - The Brazilian retailer logs onto ISC’s R/3 system through the Internet and sees that a portion of the order has been completed. In addition, the retailer uses this an an opportunity to place yet another order.

4.4 **ERP Manufacturing Components**

- Advanced Planning and Scheduling

- Customer Relationship Management

- Portals

- Enterprise Application Integration

- Business Intelligence
4.4.1 Advanced Planning and Scheduling (APS)

APS tools offer fast, feasible and optimal solutions for planning and scheduling problems. With APS cycle times, throughput times and inventory can be reduced. Forecasts are more accurate and transportation is optimized. APS is often building on finite capacity scheduling. While ERP systems based on MRP methods do not consider actual availability of production resources (e.g. it is assumed that material can be obtained in the specified lead-time), with finite capacity scheduling many constraints from the resources, processes and materials can be included. Many ERP vendors (e.g. Oracle Corp., J. D. Edwards, People soft) are buying APS software companies and integrate APS engines in their ERP solutions. APS technology replaces former MRP methods. The integration of APS and ERP is important: APS relies on data from ERP (bill of materials, inventory accuracy, routing data).

Figure 4.2 ERP/APS Integrations
4.4.2 Customer Relationship Management

Customer Relationship Management (CRM) manages the customer relationship from the first contact to servicing after the purchase, thus improving the quality of customer services. CRM connects the different systems for sales, marketing, customer service, warranty departments and provides employee with a complete view of customer data. Integrating CRM with ERP allows additional benefits, such as providing real-time information on order status.

CRM applications can be divided into: Front office applications, such as Sales force automation, Prospect information, Customer profiles, Campaign management for direct mailing and special promotions. Back office applications, such as Call center management, Integration with manufacturing, warehousing, transportation, Service and repair and Warranty management.

4.4.3 Portals / Enterprise Information Portals (EIP)

Portals are personalized user interfaces, which enable employees, customers and suppliers to access the information they need for decision making. Sometimes it is called Enterprise Information Portal (EIP) to emphasize the use of a portal for an enterprise in contrast to consumer side portals, such as Yahoo.com. Portals are web based and are accessed with a browser. This makes it easy to deploy portals to a large number of users. While Graphical User Interfaces (GUI) were organized by product functions, portals are organized by the role of their user, i.e. as CFO accessing a portal is shown different information than an employee working in quality assurance. Outward facing portals offer information access to a company’s trading partners. These portals can contain storefront components as well as service information. The functions of a portal are complex. It shows its users data
from structured (databases, ERP) and unstructured (web pages, e-mails) sources. It also includes a search engine and might include groupware products as well as business intelligence tools. Some companies allow customers to use portals to access information, such as bills of material, performance data of production processes and quality system data. ERP vendors are starting to implement portals into their ERP systems.

4.4.4 Enterprise Application Integration (EAI)

Enterprise application integration packages are used to tie ERP systems to internal and external applications. They comprise applications and the underlying messaging and data transformation tools to link the applications. EAI is used to connect ERP and plant floor ERP systems that are used at specific facilities to the corporate ERP system. ERP or applications of one company to those of another company (B2B connectivity) Compared to internally developed middleware, EAI packages provide more flexibility in adding data sources or supporting business process changes. EAI packages are often faster implemented, cheaper and better functioning than point-to-point solutions. They also allow for real time data sharing, thus providing good system integration. They often make use of XML (extensible Markup Language) data exchange and messaging.

EAI products can be divided into 3 categories:

- **Application integration**: Integration at the data level; applications exchange information using some type of data transport layer

- **Business Process Integration**: Supports business processes with application integration
- **Business Community integration**: Links enterprises with suppliers and customers

Connecting applications with those of suppliers and customers is more complicated than those within the firm, because of business issues like:

- Which internal systems have to be linked with which supplier?
- How soon needs a company to respond to the partners purchase order?
- What security is needed? How can it be guaranteed?

### 4.4.5 Business Intelligence (BI)

Business Intelligence (BI) is a decision support tool that enables the user to access and analyze information captured by the company’s information systems. BI allows a rearranging of the data and its analysis for correlations and patterns. It is based on data of the ERP system. Newer ERP system sometimes includes BI solutions. Figure 4.3 explains the operations of Business Intelligence (BI) and supporting tools and data storage it helps in decision support system, customer relationship management and other various operations.
“A data warehouse collects, organizes and processes data from all sorts of transactional systems for reporting purposes.” Date Warehouse databases are running parallel to and separate from operational databases. Data Warehouse has a different structure than databases that are used in transactional systems, normalized data in transactional systems, good for transaction processing, but slow for analysis and collecting management information. De normalized data in DW, built around subject, good for multidimensional analysis and reporting.
4.5 Application Service Provider (ASP)

An application service provider offers enterprise applications. The company that chooses to use an ASP outsources its applications: The applications are run on the server of the ASP and accessed by the company with a web browser via the internet.

- **Advantages** of outsourcing applications: Less money needed than for in house ERP implementation. Good if company itself has not expertise for ERP implementation.

- **Disadvantages** of outsourcing: ASP often offers one size fits all approach, which might not always fit the business scenario. ASP might discontinue product features one relies on ASP might inadvertently disclose sensitive business information of Ones Company.

Now ASP offer applications that can be integrated with an existing ERP system. This partially outsourced model. It reduces the dependency on the ASP. Allows more flexibility in choosing a mix of applications that can fit the business scenario to keeps the control over sensitive data in house, requires often less money than a pure in house ERP System. The integration between ASP application and the in house ERP is critical and might cause problems. Software that analyzes the system maps the applications and discovers missing data links is available.

4.5.1 ERP for SMEs

With a saturated market for ERP in big companies, now ERP vendors target small and medium sized companies (SME). Important market, 96% of all manufacturers in the U.S. have less than 250 employees. The European ERP mid market was over $4 billion in 2000. Reasons for midsize
companies to consider ERP technology include, Pressure from suppliers or customers. Business process reengineering, Computer platform changes midsize companies wish systems that match their business processes, have a low price and are flexible and easy to implement. Some vendors offer accelerated implementation methods that are priced low, but often offer only a minimal fit with existing business processes. Outsourcing ERP functions to an ASP might also be a solution for SME.

4.5.2 Internal Focus of ERP

![Diagram of Internal Focus of ERP]

**Figure 4.4 Internal Focus of ERP**

The figure 4.4 describes the internal focus of ERP with different modules like Finance, Sales, Planning, Inventory, Operation, Administration and Human resource these modules are made to function automatically by without any manual operation.
4.6 ERP APPLICATIONS IN TEXTILE MACHINERY COMPANIES

ERP Software Solutions for Textiles

4.6.1 ERP Business Suite for Textile

Management Information system

The Management Information System (MIS) of the Intex application comprises the following modules. Executive Information System, Sales Information System, Production Information System, Costing Information System and Purchase Information System.

- **Sales**: A smooth order processing and a proactive sales department are essential for the success of your company. You have to make sure, that your customers are always satisfied with your service. Intex assists you with an easy and automated order processing which requires minimum data entry. Your staff can focus on their main tasks without wasting valuable time on data collection.

- **Dispatch**: An optimized sales cycle requires an optimized dispatch handling. As soon as the delivery is released, the goods can be shipped.

- **Material Planning**: The task of the production planning department is to ensure free capacities and material availability, so your customer can receive your goods on time. The planning department has to book the production orders and monitor the order progress. Thereby Intex supports your schedulers. The
Intex availability check is a sophisticated application with graphical displays and automatic alerts.

- **Production Scheduling:** The Intex production planning is the core of the Intex ERP Business Suite. All production processes can be displayed and optimized in Intex. This helps you to increase the efficiency of your production.

- **Inventory and Material Management:** In Intex it is easy to overview your material stocks - both textile and non-textile on all levels.

- **Online Scanning:** Intex offers an online scanning application, which helps you to improve the stock handling and to optimize the booking in the production and shipping departments. This application is integrated directly in Intex and does not have to be integrated by an interface. The Intex application runs on WLAN-scanners, without a further subsystem.

- **Purchase:** In order to deliver to your customers in due time, you have to rely on the supply availability and timeliness of your suppliers. Also the transparency in the value added chain is extremely important nowadays. In case of a customer claim you need to trace back definitely, which purchased batches were processed. By exact timing of deliveries Intex helps you to reduce the storage costs and the capital commitment.

- **Product Development:** The textile specialization of Intex offers many advantages over other generic systems. Especially the administration of the routings offer reliable data at less effort. The order process flow can be generated automatically, depending on article characteristics and requirements.
- **Laboratory and Recipes**: The central administration of recipes and laboratory orders and samples helps you to optimize the cost and time intensive processes of adjusting new dyeing and finishing recipes. The connection of Colorimetric systems simplifies the recipe administration.

- **Quality Management and Inspection**: An important aspect of the Quality Management (QM) is the Quality Assurance. Quality control and inspection, as well as the administration of quality requirements are essential functions of the Intex application. Intex helps you to ensure that your products meet the requirements of your customers and that the quality of your deliveries is up to your standard.

- **Controlling**: The controlling in Intex is the most important part of the Management Information System (MIS). It covers the functions of the costing and the operative controlling.

- **System Administration**: Intex is developed for international use and is available in various languages, and supports different units of measurement and many country specific functions. Intex is very stable and reliable standard software. During normal operation Intex doesn’t burden your staff with system management. The maintenance, optimization and support of the system are very easy to handle. The installation of updates, which are released up to 8 times a year, is quite simple.

### 4.6.2 SAP all in one

Although textile companies produce a variety of diverse products from high tech synthetic yarns to wool fabrics, and from cotton linen to
diapers they share the same challenges of increased globalization, intensive supplier and sales markets, and outsourcing. To overcome these challenges and succeed in today’s market, textile companies are increasing the integration of their supply chains and are maintaining operational costs under strict control. Based on a flexible and open infrastructure, SAP All in One solution for textiles can help you run your integrated business processes beyond today’s boundaries from collaborative product design to manufacturing, sales, and financial and internal success controls.

4.7 ERP APPLICATIONS IN AUTO COMPONENT COMPANIES

The Indian Automobile Component Industry has emerged as a sunrise sector of the Indian manufacturing industry and a key stakeholder in the global automobile manufacturing industry. A well implemented ERP gives visibility into strategic information at every juncture. An ERP solution improves business processes and enhances collaboration. With visibility throughout the operation and embedded support for a wide variety of manufacturing processes including make to stock, make to order, configure to order, engineer to order, Just In Time (JIT) manufacturing and materials control, and lean operations, ERP for Automotive helps gain operational excellence.

According to ACMA, more than a third (36 percent) of Indian auto component exports head for Europe, with North America featuring a close second at 26%. The composition of exports in terms of the proportion of Original Equipment Manufacturer (OEM) and aftermarket has undergone a sweeping change since the past decade. The ratio of OEM to aftermarket has changed from 35:65 in the 1990s to 75:25 in 2006. The quality consciousness of the industry matches global standards now. This is corroborated by the fact that nine Indian companies in the automotive sector have received the coveted Deming Prize, which is the largest number outside Japan. Recognizing the
potential of the Auto Component Industry, the Government of India has not only provided an enabling policy framework but also invested substantially to provide state of the art infrastructure for the industry.

4.7.1 IT Adoption in the Auto Component Industry

Studies have shown that the adoption of IT based technologies can increase the performance of firms. Despite these advantages, IT adoption among manufacturing firms in India is rather low. While policy initiatives to encourage adoption have been explored, it is equally important to understand the process of IT adoption by firms along with the constraints faced by them. The diversity in the Indian manufacturing sector is very high; apart from differences in firm size, sector specific peculiarities can also play a role in the process of IT adoption. Given this huge diversity, it is important that the right sub-segments are identified for IT diffusion initiatives so that they have appropriate demonstration and spillover effects. The auto component manufacturing sector in India has seen tremendous growth in recent years and therefore one expects this sector to be ahead of others in IT adoption. An understanding of IT adoption processes in this sector can be useful in defining adoption strategies for this as well as other sectors. Given the linkages of the Auto Component Industry with other sectors mentioned earlier in this chapter, faster growth of this sector can have significant ripple effects in the rest of the economy. A large majority of the firms (over 85 %) in the Auto Component Industry are SMEs.

These firms serve both the OEM as well as replacement demands and work with a variety of technologies in areas of machining, electronics, plastics and rubber molding, welding, casting and forging, etc. These SMEs also vary considerably in terms of their capabilities depending upon, often, on the markets that they serve, i.e., exports or domestic and within domestic national or regional. Increasing IT penetration in the SME segment of the
auto component sector is a critical enabler for enhancing their competitiveness. Detailed firm level interviews conducted during the study have highlighted that the key business challenges faced by the auto component manufacturers relate to raw material availability and their price fluctuations, gaps in real-time availability of business information and lack of smoothness in business processes. Once the firms develop smooth information channels, it enables them to track costs as well as delays in the various functional processes of the enterprise. The study also reveals that supply chain is one of the most critical components of the auto component business and that it has to be integrated for the timely and orderly flow of material as well as finished products. The need of organizations to integrate various functions and processes has driven them to implement ERP, SCM and other similar packages, and as a result, in firms that have implemented IT, there has been a considerable increase in the productivity as well as revenues. However, very few firms adopt a clutch of applications to maximize the potential of efficiency gains and this obviously has an adverse effect on the efficacy of IT adoption.

4.7.2 Business Challenges and Current State of IT Adoption

As mentioned in the previous chapter, a primary research of 148 auto component firms in different parts of the country was undertaken to collect information on their business challenges and IT adoption. Of these, 46 firms were small (with a turnover between Rs 20-99 crores), 86 were of medium size (turnover in the range of Rs 100-299 crores) and 16 large (with turnover between Rs 300-500 crores). In 88 firms, business heads were interviewed while in the remaining 60, information was collected from IT heads. The discussion, in this section is primarily based on the analysis of this dataset.
1. **Challenges Faced By Business Heads**

Any investment decision in a firm is influenced by the challenges that the management faces and IT related investments are no exception. Apart from maintaining price competitiveness and meeting customer demand for product quality, availability and volatility in costs of raw material seem to be the major challenges that business heads in Indian auto component firms face. The cost of raw materials must be strictly controlled as it has a direct impact on the overall cost of production and therefore competitiveness. Similarly, the procurement and the timely availability of raw material also pose a concern for the surveyed firms as it affects their ability to meet their customer’s demands within due dates. In addition, firms face problems while responding quickly to the customer demands of consistent product quality within the agreed delivery time. Another important business challenge faced by the business heads is quick access to business information. Apparently, the auto component manufacturers are faced with disparate systems including manual paper based processes that lead to disconnect amongst the value chain partners.

2. **New Channels**

In order to increase their reach over global market, vendors are offering their products through reseller. All large ERP vendors are developing reseller channel. Microsoft has advanced this concept and adopted partnership programme for their ERP offerings, where their partners, in addition to reselling, also take active part in product development.

3. **Rapid Implementation Methodology**

ERP implementation is difficult and expensive, due to the necessity of rigorous reengineering of business process and IT platform. ERP vendors
are, now providing tools and methodologies for easier implementation. ERP vendors are offering pre configured products depending upon clients’ requirement. The product is then implemented through rapid action implementation methodologies provided by the vendor, instead of formal project management methodology, as is normally used by IT managers.

4. **New Business Verticals**

New business verticals for hitherto under represented market such as Government, Health care, financial service and retail, has been delivered by established ERP vendors. Also, new/ smaller companies have brought various niche products to target a specific segment of the industry.

5. **Extending Value of Back End ERP**

Vendors are moving into specialized areas and offering dedicated solutions in the field of Supply Chain Management, Product Lifecycle Management, Customer Relationship Management and Sales Force Automation. One of the interesting trends is that the large ERP vendors mostly followed the route of acquisition instead of in house development, in getting these solutions.

6. **Web Enabling**

ERP vendors are increasingly using web technology, adding E-Commerce capability to their products and adopting open standards.

From the Table 4.1 describes the Average rank of challenges faced by firms with different characteristics and challenges in small, medium and large firms export percentages, foreign collaboration are explained.
Table 4.1  Average Rank of challenges faced by Films with different characteristics

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Firm size</th>
<th>Foreign collaboration</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
<td>Medium</td>
<td>Large</td>
</tr>
<tr>
<td>Meeting customers demand in product quality</td>
<td>6.44</td>
<td>4.03</td>
<td>6.33</td>
</tr>
<tr>
<td>Meeting customers demand in timelines</td>
<td>6.20</td>
<td>7.53</td>
<td>4.00</td>
</tr>
<tr>
<td>Difficulty in estimating demand</td>
<td>7.53</td>
<td>8.43</td>
<td>11.00</td>
</tr>
<tr>
<td>Quick or easy access to critical information</td>
<td>8.24</td>
<td>8.53</td>
<td>5.33</td>
</tr>
<tr>
<td>Maintaining price competitiveness</td>
<td>6.62</td>
<td>6.65</td>
<td>6.67</td>
</tr>
<tr>
<td>Fluctuation in raw materials</td>
<td>5.27</td>
<td>6.18</td>
<td>7.67</td>
</tr>
<tr>
<td>Ease of procurement of raw materials</td>
<td>8.71</td>
<td>8.80</td>
<td>9.00</td>
</tr>
<tr>
<td>Challenges</td>
<td>Firm size</td>
<td>Foreign collaboration</td>
<td>Export</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>-----------</td>
<td>-----------------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>Medium</td>
<td>Large</td>
</tr>
<tr>
<td>Timely availability of raw materials for production</td>
<td>8.22</td>
<td>8.73</td>
<td>7.33</td>
</tr>
<tr>
<td>Track or trace production timeliness across manufacturing cycle</td>
<td>7.91</td>
<td>8.75</td>
<td>6.67</td>
</tr>
<tr>
<td>Track or trace production cost across manufacturing cycle</td>
<td>8.84</td>
<td>7.73</td>
<td>4.67</td>
</tr>
<tr>
<td>High attrition rates among employees</td>
<td>9.43</td>
<td>10.33</td>
<td>11.00</td>
</tr>
<tr>
<td>Training and development of employees</td>
<td>9.84</td>
<td>8.88</td>
<td>9.67</td>
</tr>
<tr>
<td>Availability of good IT technology for business</td>
<td>10.49</td>
<td>8.15</td>
<td>9.33</td>
</tr>
<tr>
<td>Implementing IT technology in business</td>
<td>10.62</td>
<td>9.80</td>
<td>12.67</td>
</tr>
<tr>
<td>Resistance to new IT technology among employees</td>
<td>11.00</td>
<td>9.93</td>
<td>10.00</td>
</tr>
<tr>
<td>Infrastructure bottlenecks</td>
<td>10.56</td>
<td>10.60</td>
<td>14.67</td>
</tr>
</tbody>
</table>
Current directions - However, some of the more recent trends, are indicated below:

1. **Adoption of Application Service Provider (ASP)**

   **Model:** This model enables an organization to use ERP on a transactional (pay as you use) basis instead of buying an ERP product based on traditional licensing systems. Under ASP, the service provider hosts the ERP product which is accessed by the users of the organization. ASP model is a viable option for SMB segment which lacks IT skill and resources. This model may also be a viable option for large organizations where the organization cuts back its internal IT establishment and concentrates on their core business. However, there are limitations to this model where the organizations need to adopt vanilla version of the ERP software as little customization is allowed by the service provider.

2. **Cloud Computing:** Cloud computing is becoming a popular mode of operating ERP. This is due to the fact that little upfront expense is involved, minimum time is required to deploy and operational cost is also minimal. Cloud computing may be broadly described as Software as an Service (SAAS) where the organizations do not need to install their own hardware or software in house but obtain SaaS ERP over web. The key driver of SaaS ERP is the overall less cost of ownership, scalability where new users of the organization are linked to the system easily from anywhere in the globe and upgradability, where new version of the ERP is easily adopted.

Auto component firms with or without foreign collaboration face similar major challenges. But there are other interesting differences. Availability of good IT solutions for business is more of a challenge for firms with foreign collaboration than for the ones without it. Presumably, the former are looking for such technologies more actively. In a similar vein, tracking production costs is more of a concern for collaborating firms, while
estimation of demand is more challenging for firms without foreign collaboration. Dealing with fluctuations in raw material costs is the most important challenge for both Exporting and non-exporting firms but it is somewhat more critical for the latter. Timeliness of delivery and product quality on average are more critical for exporting firms while tracking production costs is more of an issue for non-exporting firms.

4.7.3 Challenges Faced By IT Heads

The expectations of the BU heads in a firm will not be adequately met if the IT function of the firm is not able to implement IT initiatives appropriately. But IT heads face their own challenges in IT implementation. The survey responses reveal that the most critical challenge faced by the IT heads is the lack of alignment between business goals and IT initiatives. At times, it also becomes difficult for the IT head to justify the current levels of investments in any IT initiative, as the time for the complete deployment of the initiative is quite long compared to many other business function initiatives. Besides, the impact of these IT initiatives and their effectiveness is also felt after a period of time. Linked to this is the difficulty faced by the IT heads of proving the value of IT. While some IT spending lends itself to somewhat.

4.7.4 Measuring IT Adoption Effectiveness

The most common measure of IT effectiveness, amongst the auto component manufacturers is increased productivity. While the measure of increased productivity for IT effectiveness is the most preferred choice for both BU heads as well as IT heads of firms of all sizes, it is not entirely clear as to how it is measured. It may be recalled that one of the key expectations of business heads from IT is to meet the customer requirements of product quality and timelines. This results in increased customer satisfaction, which is
also a key measure for evaluating IT effectiveness by auto component manufacturers. Interestingly, in many firms, none of the measures that were mentioned are actually used to find out the IT effectiveness. The primary reason probably is that there are many IT related investments for which a cost benefit analysis is not possible. Similarly, calculating the value of ongoing IT operations spending on hardware, system and software is even more difficult, because the discrete investments made in IT become a part of the broader business.

4.7.5 IT Adoption Implemented Applications/Systems

Enterprise Resource Planning (ERP) is the most widely adopted IT application among auto component firms. Some effort is also being undertaken to integrate the firm’s production facilities with the other constituents of the supply chain, so that real time accurate information on the inventory, production schedule and materials is available as and when required. A significant proportion of firms that were surveyed have also implemented wireless LANs to achieve this, whereas large organizations have also deployed Virtual Private Networks. Broadly, large firms are ahead of small and medium firms in the adoption of all application systems except Customer Relationship Management (CRM) and Sales Force Automation (SFA) where adoption rates are similar. In the adoption of networking and groupware systems also, large firms are generally ahead of the small and medium firms. From the Figure 4.5 describes the function of Adoption of IT applications/systems. Table 4.2 describes the combination of ERP, SCM, CRM and IT frequency and Percentage is calculated from the observed frequency. Figure 4.6 explains the future investment plans in ERP, SCM and CRM for enterprise application system.
Figure 4.5 Adoption of IT applications/systems

Table 4.2 Combinations of selected applications adopted by sample firm’s mutually exclusive cases

<table>
<thead>
<tr>
<th>Combination of select application adopted</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP, SCM, CRM and IT</td>
<td>3</td>
<td>3.4</td>
</tr>
<tr>
<td>ERP, SCM, CRM but not IT</td>
<td>5</td>
<td>5.7</td>
</tr>
<tr>
<td>ERP, CRM and IT but no CRM</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>ERP, CRM and IT but no SCM</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>SCM, CRM and IT but no ERP</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>ERP and SCM but not CRM and IT</td>
<td>7</td>
<td>8.0</td>
</tr>
<tr>
<td>ERP and IT but not SCM and CRM</td>
<td>8</td>
<td>9.1</td>
</tr>
<tr>
<td>CRM and IT but not ERP and SCM</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>ERP and CRM but not SCM and IT</td>
<td>5</td>
<td>5.7</td>
</tr>
<tr>
<td>SCM and IT but not ERP and CRM</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>SCM and CRM but not ERO and IT</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Only ERP</td>
<td>17</td>
<td>4.5</td>
</tr>
<tr>
<td>Only CRM</td>
<td>4</td>
<td>1.1</td>
</tr>
<tr>
<td>Only IT</td>
<td>1</td>
<td>4.5</td>
</tr>
<tr>
<td>None of ERP, SCM, CRM, and IT</td>
<td>30</td>
<td>29.5</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>100</td>
</tr>
</tbody>
</table>
4.8 ERP APPLICATIONS IN ELECTRONIC GOODS MANUFACTURING COMPANY

Electronics manufacturers are more than ever experiencing increased pressure to get their products to the market faster due to increased competition and reduced product life cycle. Those in the business of producing electronic connectors, appliances, computers, scientific equipment, cabling, circuit boards, or semiconductors require functional electronics ERP software that will ensure that all electronics manufacturing operations are streamlined. The challenges faced by electronic manufacturers can be turned into competitive advantages using the robust and functional features of an electronics ERP solution:

1. **Procurement Planning.** This ERP feature effectively manages different suppliers to bring about collaboration and harmony in procurement of materials and components. Since key suppliers are provided with concurrent shop floor
activities, they are able to align their goods with the company’s production priorities.

2. **Advanced Planning and Scheduling.** Electronics ERP software can be used to streamline a company’s products with its production capabilities. The software also enables faster delivery of products to consumers, increases customer satisfaction, and optimizes capital intensive resources.

3. **Management of Bills of Materials (BOMs).** Electronics manufacturing comes with complex multi-level BOMs. This, therefore, requires electronics ERP to effectively manage its many components.

4. **Supply Chain Integration.** This feature will benefit electronics manufacturers through automated file exchange and enhanced communication in the supply chain department. This will then reduce administrative costs and speed up the company’s supply chain.

5. **Product Configuration and Engineering Change Management.** A product configuration can be used to display to consumers the detailed information about electronic products such as quality documents and CAD drawings, while effectively concealing the complex part structures in these products. Such an electronic ERP software can benefit a company during sales order processes by effortlessly managing electronic components and part structures that are used to build its products.

6. **Management of Sub-Contractors.** Out-sourcing has become a necessity in production operations due to intense
competition, short lead times, and price pressures. Electronics manufacturers are forced to concentrate on their core competencies and outsource other manufacturing operations. Since administering sub contractors for both similar R&D and different components is a complex process, electronics ERP can be implemented to take over the task. Benefits of implementing this feature include easy management of electronic components, sub contractors and their part numbers, and suppliers who provide the different part numbers.

7. **Serial Tracking.** Electronic manufacturers must be able to track the distribution of their products. An electronic ERP system can generate full serial numbers for each product during production or upon completion.

8. **Instant Reporting.** This feature eliminates having to wait for batch updating and end of month rollovers. This in turn benefits electronic manufacturers through generation of instant, up to date reports which can be referred to when needed.

9. **Features to Manage Complex Supply Chains.** It’s critical that high tech and electronics manufacturers communicate in real time via a Web-based supplier portal. This allows them to share data with suppliers using a single solution, replacing manual methods including emails, phone calls and faxes. The goal is paperless, real time communication across the supply chain to improve visibility, performance and operational excellence.
10. **Integrated Solution for Enhanced Traceability.** An ERP system must easily track product serialization, providing detailed product data through the entire process.

11. **Full Machine Integration**- Most generic ERP systems can’t offer specific machine integration.

12. **Improved Visibility.** Finally, high tech and electronics manufacturers must implement a system that provides real-time visibility across the entire enterprise. This means it must be intuitive to track people, materials, machines, processes and suppliers.

ERP’s origins can be traced to the beginning of the Database and Material Requirements Planning (MRP), in particular, relational databases and its founder Edgar Frank Ted Code. Good current examples are SAP, Oracle and Microsoft Dynamics. The concept has evolved around Data warehouse functionality. ERP software attempts to link all internal business processes into a common set of applications that share a common database. It is the common database that allows an ERP system to serve as a source for a robust data warehouse that can support sophisticated decision support and analysis. Data Warehouse design can also involve a process of Extract, Transform, load (ETL) that allows business intelligence software to perform its queries and predictive analysis. Recently, Business Intelligence (BI) has driven the adoption of ERP systems due to its ability to sit on top of a data warehouse and perform intelligent querying of data through Data Mining, OLAP and Business Performance Management (BPM). In particular, it is the BPM aspect that MDs/CEOs utilize the most as it becomes a decision support system, providing dash boards for all sorts of performance indicators allowing management quick synopsis of any given situation, allowing quicker decision making.
4.9 INTRODUCTION ON SCM

Supply chain management (SCM) is the management of a network of interconnected businesses involved in the provision of product and service packages required by the end customers in a supply chain. Supply chain management spans all movement and storage of raw materials, work in process inventory, and finished goods from point of origin to point of consumption. Another definition is provided by the APICS Dictionary when it defines SCM as the design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally.

Supply chains encompass the companies and the business activities needed to design, make, deliver, and use a product or service. Businesses depend on their supply chains to provide them with what they need to survive and thrive. Every business fits into one or more supply chains and has a role to play in each of them. The pace of change and the uncertainty about how markets will evolve has made it increasingly important for companies to be aware of the supply chains they participate in and to understand the roles that they play. Those companies that learn how to build and participate in strong supply chains will have a substantial competitive advantage in their markets. The practice of supply chain management is guided by some basic underlying concepts that have not changed much over the centuries. Several hundred years ago, Napoleon made the remark, “An army marches on its stomach.” Napoleon was a master strategist and a skillful general and this remark shows that he clearly understood the importance of what we would now call an efficient supply chain. Unless the soldiers are fed, the army cannot move. Along these same lines, there is another saying that goes, “Amateurs talk strategy and professionals talk logistics.” People can discuss all sorts of grand
strategies and dashing maneuvers but none of that will be possible without first figuring out how to meet the day to day demands of providing an army with fuel, spare parts, food, shelter, and ammunition. It is the seemingly mundane activities of the quartermaster and the supply sergeants that often determine an army’s success. This has many analogies in business. The term “supply chain management” arose in the late 1980s and came into widespread use in the 1990s. Prior to that time, businesses used terms such as “logistics” and “operations management” instead.

![Figure 4.7 Supply Chain Management](image)

### 4.9.1 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 fulfillment, could be cut to 30 days, that would provide not only more inventory turns, but fresher product, an ability to customize 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 to reducing working capital, taking assets off the balance sheet, accelerating cash-to-cash cycles, Increasing inventory turns, and so on.

4.9.2 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. **Customize 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.
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 organize, operate, and serve customers. The organizations that do persevere and build a successful supply chain have proved convincingly that you can please customers and enjoy growth by doing so. 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, they react to actual customer demand. And by doing so, these supply-chain leaders minimize 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.

### 4.9.3 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 centers, many factors must be considered, such as, the required customer service levels, optimum location, stock holding policies and EDP systems. To help organizations make the best decisions, the Miebach Supply Chain Management Group employs an integrated lanning approach, consisting of four steps from planning to realization: The integrated planning process helps to find solutions that best match client’s 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. Figure 4.8 explains the supply chain management in IT model.
4.9.4 Characteristics of Firms/ Organizations 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 organizational depth to capitalize the benefits that SCM brings to a business. Service providers should have a profound experience in organizing the supply chain using a sound methodology in applying organizational 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 organizational structure of a firm. 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 supply chain management innoregio project S. Zygiaris, Msc, BPR Engineer BPR Hellas SA 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 operator’s sense for quality.

4.9.5 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

Management department functions are 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 fulfillment process as one co-ordinate 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.

4.9.6 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
4.9.7 Coordinating 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, midshipmen’s, and cargo damage. Effective use of information technology maximizes the advantages and minimizes 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 maximize cargo speed while minimizing 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 optimization 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 trucks 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 scan able bills of lading. These documents can be produced on existing. 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 scan able 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.

### 4.9.8 Opportunity Areas

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 realized. 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.
1. **Distribution Network Optimization.** Optimizing 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.

2. **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.

3. **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 and 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 put away and picking and storage.

4. **Supplier Management.** Research from McKinsey and Co. demonstrates the substantial improvements possible through aggressive supply management. An article by McKinsey consultants in the winter 2008 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.

5. **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.
6. **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 capitalize on supply chain opportunities, the long term, bottom line benefits are there for the taking. As for those organizations that choose the business-as-usual approach to moving goods to market. 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.

7. **Types of Firms/Organizations.** Supply Chain Management can be applied and it could be implemented to all firms (manufacturing firms, retailers, services, etc.) and public organizations 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.

4.9.9 **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 Euros (corporations) depending on the business size and complexity.

4.9.10 Conditions for Implementation

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.

- 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 un ergonomic 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.

4.9.11 SCM Implementation Procedure

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.

A Flexible Approach specializes 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.
• **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.

• **Implementation**

It refers to responsibility for the tendering of equipment and supplier selection, contract negotiation and placement. Contract Management, through to completion it ensures that the project is progressed in accordance with the requirements of time, cost and quality. Work with the client on preparing any organizational 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.

4.9.12 **Implementing a Competitive Approach to Warehousing and Distribution**

An organized 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 are 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.

4.10 SUPPLY CHAIN MANAGEMENT IN AUTO COMPONENT COMPANIES

The automotive industry is a key contributor to the Indian economy, accounting for about percent of the Indian economy. The last few years have seen greater integration of the Indian industry with its global counterparts. What is interesting about this is its almost democratic nature, in that a large part of the industry has seen significant changes.

Under going their own set of changes. KPMG in India has been fortunate enough to see this transformation take place, while participating in a small way, through its work with key parts of the automotive supply chain. The wave of change started with overseas OEMs Wanting to enter the country. A natural fall out of this was the large suppliers who entered the country as part of the ‘follow source’ doctrine. The last couple of Years have seen significant interest from Indian players who are actively looking a exciting markets to enter as well as attractive targets to acquire. We have Watch demand assisted a number of players, whether it was assistance related to their ‘India/Oversea Strategy’, or assistance in Mergers and Acquisitions, or advice on ‘tax’, or advice on how to ‘manage risks’. Going forward, OEMs as well as auto component players will evolve further as they become more and more ‘global’ in nature. For OEMs, this would mean Rising competition in the domestic market, and hence then eyed to diversify you to India. For
auto component players, this would mean the need to achieve global Manufacturing standards and emerge as supplier of choice for global companies. These changes would have a significant impact on the automotive supply chain. Clearly the need of the hour is for various players to identify key challenges facing the industry and develop strategies to help mitigate these.

The objective of this study was to analyze the key challenges facing different Sections of the Indian auto industry, identify areas which need significant attention, and identify opportunities for service providers, who could assist auto players in meeting some of these challenges. This report contains there suits of our analysis including a dip stick primary survey with supply chain heads of key auto companies. We are grateful to CII for giving us this opportunity and to all respondents, who contributed to this study. We hope this document serves as a quick primer for Issues facing the Indian automotive supply chain. It also seeks to provide Answers to some of the key questions related to supply chain management (SCM) facing the industry.

4.11 SUPPLY CHAIN MANAGEMENT APPLICATIONS IN TEXTILE MACHINERY COMPANIES

To keep all the systems in textile industry in order, it is ideal to have a proper supply chain management, emphasize B Basu and Aarti Sharma, who highlight the mode of supply chain, the pros and cons of each system and present the fact as to how the Supply Chain Management has become an integral part of business in textiles. Supply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies. It is said that the ultimate goal of any effective supply chain management system is to make products
available when needed. Supply chain management flows can be divided into three main flows, Product flow, Information flow, Finances flow.

The product flow includes the movement of textiles from a supplier to a customer, as well as any customer returns or service needs. The information flow involves transmitting orders and updating the status of delivery. The financial flow consists of credit terms, payment schedules, and consignment arrangements. Some SCM applications are based on open data models that support the sharing of data both inside and outside the enterprise. By sharing this data “upstream” (with a company’s suppliers) and “downstream”, SCM applications have the potential to improve the time to market of products, reduce costs, and allow all parties in the supply chain to better manage current resources and plan for future needs. Supply chain management is typically viewed to lie between fully vertically integrated firms such as Reliance who produce the raw material polyester yarn and also the finished product Vimal a single firm and those where each channel member operates independently. Coordination between the various players in the chain is key in its effective management.

4.11.1 Strategy of the Supply Chain

With comprehending the need of the first changing business environment in textile, apparel and in the supply of raw materials such as polyester, cotton, etc, it requires proper business and planning strategy without which the supply chain management will not be successful. The following are the strategies and planning, Foresight of the business, i.e., right idea, right supply at right time, Proper market survey for the customers’ requirements, demand and supply, Proper production planning at supply end and that of consumer end with proper information technology, Product consignment to match the demand supply curve, Business expansion strategy, Marketing and distribution strategy, Strategic industry studies, Predicting
industry trends, Market entry strategy, Financial planning, Market feasibility studies, Strategic Alliances, Mergers and acquisitions and Tap management recruitment/training.

4.11.2 The Difficulties faced at Supply Chain

The following difficulties are being faced in supply chain in textile industry for yarn, cloth, apparel, garment, industrial yarn, etc.

- Distance: Larger the distances, larger are the difficulties in reaching the materials at proper time at customers end.
- Improper production planning at both manufacturer and consumer end. It becomes more erratic when there are fluctuations in demand of consumer product.
- Transportation cost: Larger the distance, larger is the transportation cost; some customers are not in a position to get the right raw material from the right resource because of high cost of transportation.
- Government policies
- Taxation

In case of raise in market demand, the supply becomes more critical because of non-availability of trucks, manpower and resource problem. At that time, the manufacturers are unable to cope up with the growing demand of their customers need because of their limited capacity. In such case a thorough vision in planning is must to maintain demand supply. Outsourcings are being done to meet the demand supply through proper supply chain. In such cases the transporters, the concerned loaders and unsolders start demanding more wages disturbing the chain link. In case of increasing the uncertainty in the international market, the customers start
stocking of the materials and hence, subsequent problems arise in logistics and distribution. At that time, it is necessary to see customer profile, his routine demand and accordingly distribution is made. Importance is being empathized on valuable customers for up keeping the customer’s business online. Sometimes any special customer needs any special product at remote place where logistic becomes difficult but to fulfill the customer need it requires to know the presence of other customers in the nearby areas, so that proper distribution can be made at a reasonable logistic cost. During off season, say in heavy rain, bad road condition, natural calamities, etc, it becomes difficult to dispatch the material at customers end in time but to keep the supply chain on; adequate materials are being dispatched by keeping the proper information with the dealers and the customers.

4.11.3 Mode of Transportation

For a perfect supply chain management the mode of transportation is an essential integrated part, which can be international or inter-modal. It can be either by ship, train, truck, inland barge.

In the worst scenario,

- Sea transport by container is 72 to 73%
- Rail transport 3 to 14%
- Road transport 14% to 24%

4.11.4 Difficulties Faced in Transport during Supply Chain

1. Road Transport/Surface Transport

Within India the majority of the supply chain is done through road transport and the following are difficulties faced, Non-availabilities of proper type of trucks to load the required quantity of the customer. For example, in
India 80% trucks are Punjab body (both sides closed), which makes difficulties in loading the trucks through Fork Lifter from all sides. It becomes time consuming, chances of material damage; less quantity loaded than the standard practices and enhanced costing. Because of road conditions materials get damaged even with proper packing and it creates misunderstandings among the suppliers and customers.

2. **Sea Transport**

   It is the cheapest and the best way to send the materials from one country to another. But because of certain policy matters, sometimes the consignment gets delay from the manufacturers end to Port. Then it is transported either by truck or by train, which creates more material handling and damage. It requires proper implementation of supply chain management.

3. **Rail Transport**

   It is cheaper but time consuming. The customers need to wait for the loading/unloading operation at goods yard. During monsoon, etc, the textile material has got the bad impact if proper care is not taken in time. Sometimes it takes more time to reach the destination and customers suffer.

4.12 **SUPPLY CHAIN MANAGEMENT IN ELECTRONIC GOODS MANUFACTURING COMPANIES**

   Together with a wealth of knowledge from the electronic component, PCB and distribution world, our experience in supply chain management enables us to continually develop and enhance our customers’ entire supply chain, thus reducing cost, minimizing lead-times and protecting from risk including jobs.
• **Cost Reduction**- We understand the needs of our Customers to manage cost, particularly in today’s challenging markets. Combining the strengths of our Materials Supply Chain with our engineering expertise and experience, AEI can offer an unrivalled service to effectively manage and reduce the cost of our Customers products.

• **Global Sourcing**- Icon has established relationships with key global players in the Electronic and Electro-mechanical Industry giving us access to the best pricing worldwide. We also boast an unequalled reputation for quality and reliability within our Industry both with Suppliers as well as Customers. Let us demonstrate what we do differently to your business.

• **Obsolescence Management**- Icon boasts a wealth of experience in Materials Management and Component Sourcing. We are able to provide a dynamic BOM management service, tracking the life cycles and availability of all your BOM items. We highlight in good time any risks in the supply chain and research and present a viable solution where required.

• **Pipeline Inventor Management**- We have developed this innovative supply chain solution enabling us to obtain the best possible pricing whilst maintaining impressively low inventory levels.

• **VMI(Vendor Managed Inventory)**- We have experience in developing unique supply chain solutions for our Customers. To support the need for an extremely lean pull system for one of our high volume OEM customers, we have developed a VMI
system which has drastically reduced costs and management time for our customers.

- **Industry Challenges and Financial Performance**- The electronics supply chain has continuously evolved from the traditional, vertically integrated structure of the past to a complex network of participants linked to multiple end-markets.

- **Mass Customization**- Customers increasingly demand electronics companies to produce highly customized to order products rapidly and at a low cost. As a result, there is a tremendous amount of pressure on electronics companies today to create responsive and cost-effective supply chains. Many companies have turned to postponement strategies: creating finished products by configuring sub assemblies after receipt of an order.

- **Shrinking Product Life Cycles**- As electronics become commodity items, manufacturers are forced to make regular new product introductions to command a premium price, sustain profits and preserve market share. This leads to very short product life cycles which complicate the prediction of consumer demand since these new products may have functionality or capacity enhancements that are as yet untested. Furthermore, most forecasting algorithms work best when they have a reasonable (at least one year) amount of sales history for similar products. Accordingly, manufacturers must work very closely with retailers and resellers. Market demand can only be managed effectively by getting closer to the customer and using collaborative planning techniques.
Managing Inventories Subject to a Rapid Depreciation-
Semiconductor and component manufacturers are constantly introducing enhanced functionality at lower price points. Not surprisingly, product manufacturers feel obliged to integrate these new components into products to maintain or gain a competitive advantage. At the same time, product manufacturers have to use the existing inventory as soon as possible to maintain margins. While the cyclical nature of the semiconductor industry presents significant challenges in aligning capacity with demand and maximizing return on investment, it can provide considerable benefits. It has been estimated that a ten-day reduction in inventory is equivalent to a 1% increase in profit.

Supply And Demand Misalignment-The electronics industry is a material constrained industry. New products are constantly being introduced and older products are redesigned to use components with enhanced functionality. All of this occurs in an environment in which consumer demand is extremely difficult to predict. To succeed in this marketplace, manufacturers must work in collaboration with suppliers to fulfill demand, similar to how they need to work with retailers to predict demand. With ‘time to market’ being the cornerstone of success, manufacturers that use collaborative planning techniques are the ones best equipped to succeed.

Pressure From Retailers And Resellers To Supply Products At The Right Place And The Right Time Is Placing A Great Strain On Manufacturers-Although it is not always possible to provide the products exactly according to demand, it is
critical to set the right expectations. This naturally requires collaboration and communication. Retailers and resellers need the manufacturer to commit to firm delivery dates in order to avoid failed promotions or the huge cost of fulfilling rain checks. Similarly, retailers need a window in the fulfillment process so that there are no surprises. In addition to collaborative planning early on in the process, manufacturers and retailers must collaborate on demand fulfillment. Despite these challenges, companies that manage the supply chain effectively are better positioned to emerge as market leaders. In addition to maximizing profit, they will be able to deliver products on the date and hour requested by the customer, while maximizing inventory turns and the cash-to-cash cycle. In fact, effective supply chain management is already playing an increasing role in determining the financial success of companies in the electronics industry.

4.13 SUPPLY CHAIN MANAGEMENT PAST, PRESENT AND FUTURE

- Relationships

Like most of the world, customer-supplier relations in America have followed the Golden Rule: “He who has the gold rules.” In the past, customers demanded high quality and low price. Suppliers sacrificed on wages and maintenance because they needed the business. For example, it was common for the American automobile corporations to push their suppliers past the point where quality suffered. In the long run, the car companies also suffered when failed parts caused customer unhappiness and warranty repairs. The high technology industries, such as medical devices and
aerospace, started implementing a partnership approach to their suppliers. This was partly due to demanding regulations and high consequences of failure. On the other hand, the low technology industries, such as food, chemicals, and service, were very harsh on suppliers. For example, some firms suffered greatly while attempting to meet the Wal-Mart demand for absolute lowest price and just-in-time inventory controls.

The Great Worldwide Recession of 2008 changed many things. Governments and enterprises were forced to reduce services and production. Money stopped flowing and fear was high. As the enterprise reduced production, they let employees and suppliers go. Many firms closed their doors, never to operate again. As the recession ended and funds began to circulate again, some customers had to look for different suppliers. Many of the suppliers had invested in newer equipment and modern management methods. They would no longer accept impossible demands from their customers. The Government loans to the American automobile industry forced those large enterprises to pursue modern management principles. These principles included a systems approach to quality, safety, and environment. These new ways are now being used by the automotive suppliers and sub-suppliers. The relationship between customer and supplier is becoming more of a partnership. This is very pleasing to ASQ members, as we know this is the proper relationship.

- **Outsourcing**

Since the beginning of this new century, America has gone through an intense period of outsourcing both manufacturing and services. Processes that used to be performed by the Government or the enterprise were being performed by specialty firms. Examples include call centers in Manila and contract software development in Bangalore. Product packaging, distribution,
and repairs were being contracted to outside firms. This should have resulted in higher quality at less cost. Results were often disappointing. Contractors were assigned work without the necessary background knowledge, so there was a steep learning curve. Cultures were different and customers became unhappy. Some significant failures attributed to outsourcing include the melamine contamination of pet food and the delays in getting the Boeing 787 Dream liner to market.

While outsourcing still occurs, it is becoming more focused. Where it makes sense, such as production of the iPhone at Foxconn, it works well. However, Government and industry are bringing many processes back in-house. This is beneficial, in that the processes can be re-engineered to be more modern and efficient. Bringing work home may also reduce costs. It can allow the enterprise to regain control over design and service. However, it can be challenging, in that the workers with memory of the processes are no longer with the firm. One of the biggest outsourcing challenges facing American medical device manufactures is the need to employ smart process validation controls. This is being stressed by our Food and Drug Administration regulators, as machines become more automated. Decisions formerly made by humans are now being made by software programs. While the major medical device manufacturers understand the principles of validation, many of their outsource contractors do not. Expect to see even more attention to this matter by customer auditors as they review outsourced operations overseas.

- **Workforce**

  Before the Great Worldwide Recession, we still had a great many processes performed by manual labour. These processes included stamping, assembling, and shaping parts. They included inspecting shipments and
finished work. They included distributing documents and copying records. In fact, all basic processes (production, support, and interface) were performed through manual labour. Advanced skills were not necessary for a good-paying job. All of that changed during and after the Recession, as manufacturers, Governments, and their suppliers began to automate processes formerly done by humans. The demand for higher skills increased, but the educational infrastructure is not able to produce people with these special skills. That is another of the many reasons why the unemployment in America remains high.

This increased automation and redesign of work has affected professional staffing as well. In the past, the purchasing professionals and the quality professionals had very little integration. Safety and environmental professionals were rarely consulted in supply chain management. Today, we see the beginnings of a team approach. Purchasing, quality, environment, safety, and engineering are starting to understand the importance and efficiency of working together. Perhaps more significant is the increasing use of software to generate and execute legal contracts between customers and suppliers. This is reducing the need for humans to think. As a result, customers are not clearly stating what they really want, and suppliers are forced to make assumptions. For example, large manuals of general requirements are forced on all suppliers, regardless of where they are located and what they provide. There is no customization, because the computer code developers did not include that feature.

4.14 EMERGING ISSUES

American consumers are paying more attention to the country of origin. Politicians and media are urging us to buy locally. Made in America is becoming a powerful brand for many items, such as clothing, furniture, and appliances. When it makes sense, items and processes formerly outsourced
are coming home. In purchasing goods and services made locally, we believe we can reduce environmental damage and keep jobs and skills. We are also seeing more emphasis on scientific development, as promoted by China’s general secretary Mr. Xi Jinping. When making purchasing decisions, American firms are now considering environmental, sustainability, and social responsibility consequences. This is coming from business principles as well as Government policies. I believe the second term of American President Barak Obama will continue this trend. In addition to the human-machine challenges I mentioned earlier, automation is causing security problems with our various networks. Customers and suppliers are linked through the Internet. Reliability and data protection are serious issues. Service providers are having their networked databases compromised. Automated controllers for our electrical grid and transportation systems are seriously vulnerable to attack. These security issues must be addressed by Government, industry, and their supplier partners.

4.15 CONCLUSION

Of a much more exploratory nature are this study’s findings regarding the impact of current ERP systems on these SCM trends. The general conclusion to be taken from the study that ERP from SCM in extended enterprises. Perhaps this is not surprising. ERP systems have become a de facto standard in business because they replace a patchwork of local legacy systems. Once ERP is installed, there exists a process-oriented enterprise transaction backbone that can support within a single firm development in many business areas including SCM.