CHAPTER - I
INTRODUCTION

1.1 Background

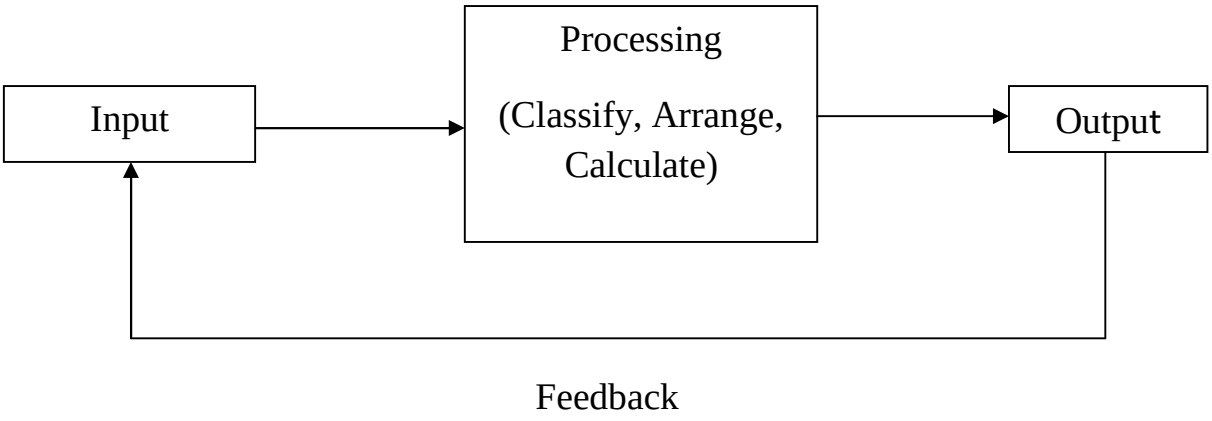
An information system can be defined technically as a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization. In addition to supporting decision making, coordination, and control, information systems may also help managers and workers analyze problems, visualize complex subjects, and create new products. Information systems contain information about significant people, places, and things within the organization or in the environment surrounding it. By information we mean data that have been shaped into a form that is meaningful and useful to human beings. Data, in contrast, are streams of raw facts representing events occurring in organizations or the physical environment before they have been organized and arranged into a form that people can understand and use.

For example, a supermarket checkout counters ring up millions of pieces of data, such as product identification numbers or the cost of each item sold. Such pieces of data can be totaled and analyzed to provide meaningful information, such as the total number of bottles of dish detergent sold at a particular store, which brands of dish detergent were selling the most rapidly at that store or sales territory, or the total amount spent on that brand of dish detergent at that store or sales region.

Three activities in an information system produce the information that organizations need to make decisions, control operations, analyze problems, and create new products or services. These activities are input, processing, and output. Input captures or collects raw data from within the organization or from its external environment. Processing converts this raw input into a more meaningful form. Output transfers the processed information to the people who will use it or to the activities for which it will be used. Information systems also require feedback, which is output that is returned to appropriate members of the organization to help them evaluate or correct the input stage.

Figure 1.1

Functions of an Information System



An information system contains information about an organization and its surrounding environment. Three basic activities—input, processing, and output—produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental factors such as customers, suppliers, competitors, stockholders, and regulatory agencies interact with the organization and its information systems.

Formal information systems can be either computer based or manual. Manual systems use paper-and-pencil technology. Computer-based information systems (CBIS), in contrast, rely on computer hardware and software technology to process and disseminate information. From this point on, when we use the term information systems, we are referring to computer-based information systems—formal organizational systems that rely on computer technology

Using information systems effectively requires an understanding of the organization, management, and information technology shaping the systems. An information system creates value for the firm as an organizational and management solution to challenges posed by the environment.

Information systems are an integral part of organizations. Indeed, for some companies, such as credit reporting firms, without an information system, there would

be no business. The key elements of an organization are its people, structure, business processes, politics, and culture. Most organizations' business processes include formal rules that have been developed over a long time for accomplishing tasks. These rules guide employees in a variety of procedures, from writing an invoice to responding to customer complaints. Some of these procedures have been formalized and written down, but others are informal work practices such as a requirement to return telephone calls from coworkers or customers, that are not formally documented. Many business processes are incorporated into information systems such as how to pay a supplier or how to correct an erroneous bill.

Management's job is to make sense out of the many situations faced by organizations, make decisions, and formulate action plans to solve organizational problems. Managers perceive business challenges in the environment; they set the organizational strategy for responding to those challenges; and they allocate the human and financial resources to coordinate the work and achieve success. Throughout, they must exercise responsible leadership. It is important to note that managerial roles and decisions vary at different levels of the organization. Senior managers make long-range strategic decisions about what products and services to produce. Middle managers carry out the programs and plans of senior management. Operational managers are responsible for monitoring the firm's daily activities. All levels of management are expected to be creative, to develop novel solutions to a broad range of problems. Each level of management has different information needs and information system requirements.

Information technology is one of many tools managers use to cope with change. Computer hardware is the physical equipment used for input, processing, and output activities in an information system. It consists of the following: the computer processing unit; various input, output, and storage devices; and physical media to link these devices together. The Internet has created a new "universal" technology platform on which to build all sorts of new products, services, strategies, and business models. This same technology platform has internal uses, providing the connectivity to link different systems and networks within the firm. Internal corporate networks based on Internet technology are called intranets. Private intranets extended to authorized users outside the organization are called extranets, and firms use such

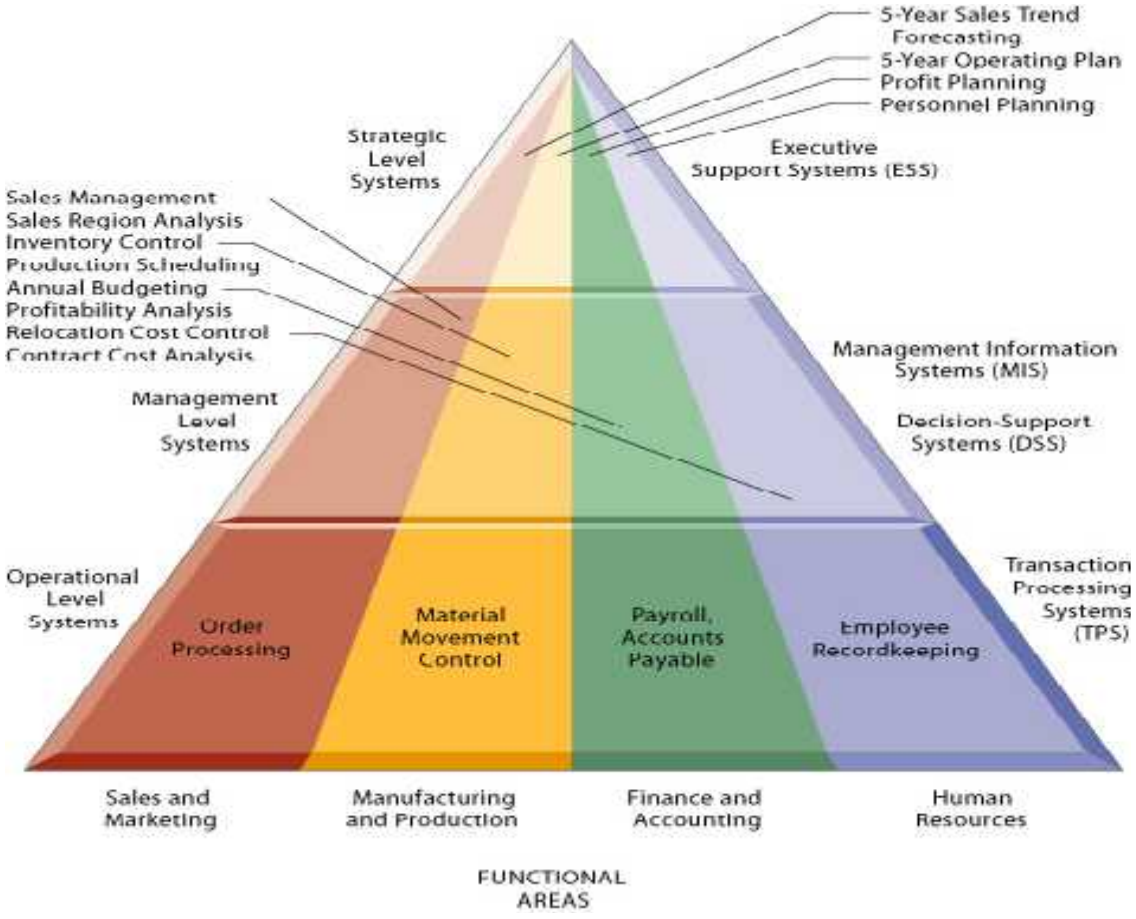
networks to coordinate their activities with other firms for making purchases, collaborating on design, and other inter-organizational work.

1.1.1 Major Types of System

Figure 1-2 shows the specific types of information systems that correspond to each organizational level. The organization has executive support systems (ESS) at the strategic level; management information systems (MIS) and decision-support systems (DSS) at the management level; and transaction processing systems (TPS) at the operational level. Systems at each level in turn are specialized to serve each of the major functional areas. Thus, the typical systems found in organizations are designed to assist workers or managers at each level and in the functions of sales and marketing, manufacturing and production, finance and accounting, and human resources.

Figure 1.2

The four major types of information systems



This figure provides examples of TPS, DSS, MIS, and ESS, showing the level of the organization and business function that each supports.

Table 1.1 summarizes the features of the four types of information systems. It should be noted that each of the different systems may have components that are used by organizational levels and groups other than its main constituencies. A secretary may find information on an MIS, or a middle manager may need to extract data from a TPS.

Table 1.1

Characteristics of Information Processing Systems

Type of System	Information Inputs	Processing	Information Outputs	Users
ESS	Aggregate data: external, internal	Graphics; simulations; interactive	Projections; responses to queries	Senior managers
DSS	Low-volume data or massive databases optimized for data analysis; analytic models and data analysis tools	Interactive; simulations; analysis	Special reports; decision analyses; responses to queries	Professionals; staff managers
MIS	Summary transaction data; high-volume data; simple models	Routine reports; simple models; low-level analysis	Summary and exception reports	Middle managers
TPS	Transactions; events	Sorting; listing; merging; updating	Detailed reports; lists; summaries	Operations personnel; supervisors

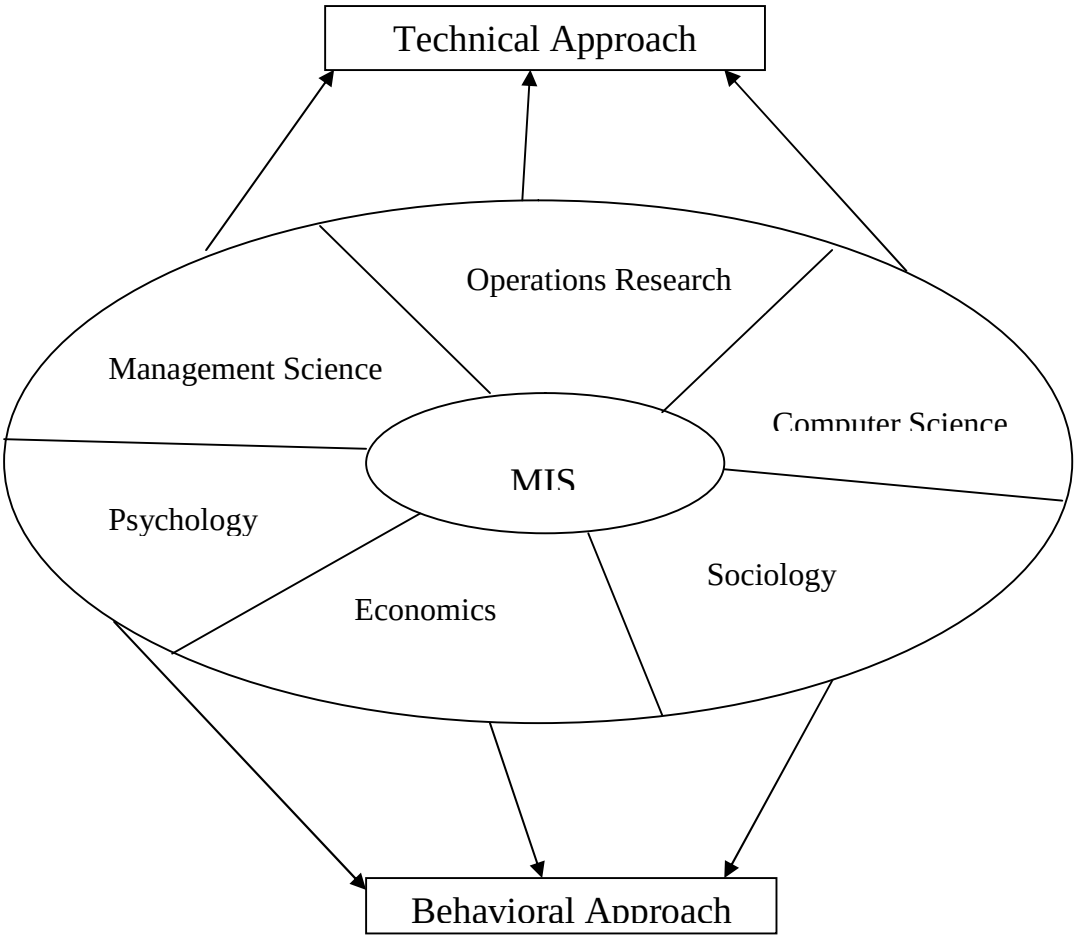
1.1.2 Contemporary Approaches to Information Systems

Multiple perspectives on information systems show that the study of information systems is a multidisciplinary field. No single theory or perspective dominates. Figure 1-3 illustrates the major disciplines that contribute problems, issues, and solutions in

the study of information systems. In general, the field can be divided into technical and behavioral approaches. Information systems are sociotechnical systems. Though they are composed of machines, devices, and “hard” physical technology, they require substantial social, organizational, and intellectual investments to make them work properly.

Figure 1.3

Contemporary Approaches to Information Systems



The study of information systems deals with issues and insights contributed from technical and behavioral disciplines.

Technical Approach

The technical approach to information systems emphasizes mathematically based models to study information systems, as well as the physical technology and formal capabilities of these systems. The disciplines that contribute to the technical approach are computer science, management science, and operations research. Computer science is concerned with establishing theories of computability, methods of computation, and methods of efficient data storage and access. Management science emphasizes the development of models for decision-making and management practices. Operations research focuses on mathematical techniques for optimizing selected parameters of organizations, such as transportation, inventory control, and transaction costs.

Behavioral Approach

An important part of the information systems field is concerned with behavioral issues that arise in the development and long-term maintenance of information systems. Issues such as strategic business integration, design, implementation, utilization, and management cannot be explored usefully with the models used in the technical approach. Other behavioral disciplines contribute important concepts and methods. For instance, sociologists study information systems with an eye toward how groups and organizations shape the development of systems and also how systems affect individuals, groups, and organizations. Psychologists study information systems with an interest in how human decision makers perceive and use formal information. Economists study information systems with an interest in what impact systems have on control and cost structures within the firm and within markets. The behavioral approach does not ignore technology. Indeed, information systems technology is often the stimulus for a behavioral problem or issue. But the focus of this approach is generally not on technical solutions. Instead, it concentrates on changes in attitudes, management and organizational policy, and behavior.

Sociotechnical Approach

This approach consists suppliers of hardware and software (the technologists); business firms making investments and seeking to obtain value from the technology; managers and employees seeking to achieve business value (and other goals); and the contemporary legal, social, and cultural context (the firm’s environment). Together

these actors produce what we call management information systems. The study of management information systems (MIS) arose in the 1970s to focus on the use of computer-based information systems in business firms and government agencies. MIS combines the work of computer science, management science, and operations research with a practical orientation toward developing system solutions to real-world problems and managing information technology resources. It is also concerned with behavioral issues surrounding the development, use, and impact of information systems, which are typically discussed in the fields of sociology, economics, and psychology. The study of information systems has just started to influence other disciplines through concepts such as the information processing view of the firm. Our experience as academics and practitioners leads us to believe that no single approach effectively captures the reality of information systems. The successes and failures of information systems are rarely all technical or all behavioral. Our best advice to students is to understand the perspectives of many disciplines. Indeed, the challenge and excitement of the information systems field is that it requires an appreciation and tolerance of many different approaches. The view we adopt in this book is best characterized as the sociotechnical view of systems. In this view, optimal organizational performance is achieved by jointly optimizing both the social and technical systems used in production. Adopting a sociotechnical systems perspective helps to avoid a purely technological approach to information systems. For instance, the fact that information technology is rapidly declining in cost and growing in power does not necessarily or easily translate into productivity enhancement or bottom-line profits. The fact that a firm has recently installed an enterprise-wide financial reporting system does not necessarily mean that it will be used, or used effectively. Likewise, the fact that a firm has recently introduced new business procedures and processes does not necessarily mean employees will be more productive in the absence of investments in new information systems to enable those processes.

1.1.3 Why Information System?

We are in the midst of a swiftly moving river of technology and business innovations that is transforming the global business landscape. An entirely new Internet business culture is emerging with profound implications for the conduct of business. You can see this every day by observing how business people work using high-speed Internet connections for e-mail and information gathering, portable computers connected to

wireless networks, cellular telephones connected to the Internet, and hybrid handheld devices delivering phone, Internet, and computing power to an increasingly mobile and global workforce. The emerging Internet business culture is a set of expectations that we all share. We have all come to expect online services for purchasing goods and services, we expect our business colleagues to be available by e-mail and cell phone, and we expect to be able to communicate with our vendors, customers, and employees any time of day or night over the Internet. We even expect our business partners around the world to be "fully connected." Internet culture is global. In this text and in the business world, you'll often encounter the term information technology. Information technology (abbreviated IT) refers to all of the computer-based information systems used by organizations and their underlying technologies. Briefly, information technologies and systems are revolutionizing the operation of firms, industries, and markets. The main objective of this book is to describe the nature of this transformation and to help you as a future manager take advantage of the emerging opportunities.

1.1.4 Why Information System Matter?

Let's start by examining why information systems and information technology (IT) are so important. There are four reasons why IT will make a difference to you as a manager throughout your career.

Capital Management

As managers, many of you will work for firms that are intensively using information systems and making large investments in information technology. You will certainly want to know how to invest this money wisely. If you make wise choices, your firm can outperform competitors. If you make poor choices, you will be wasting valuable capital.

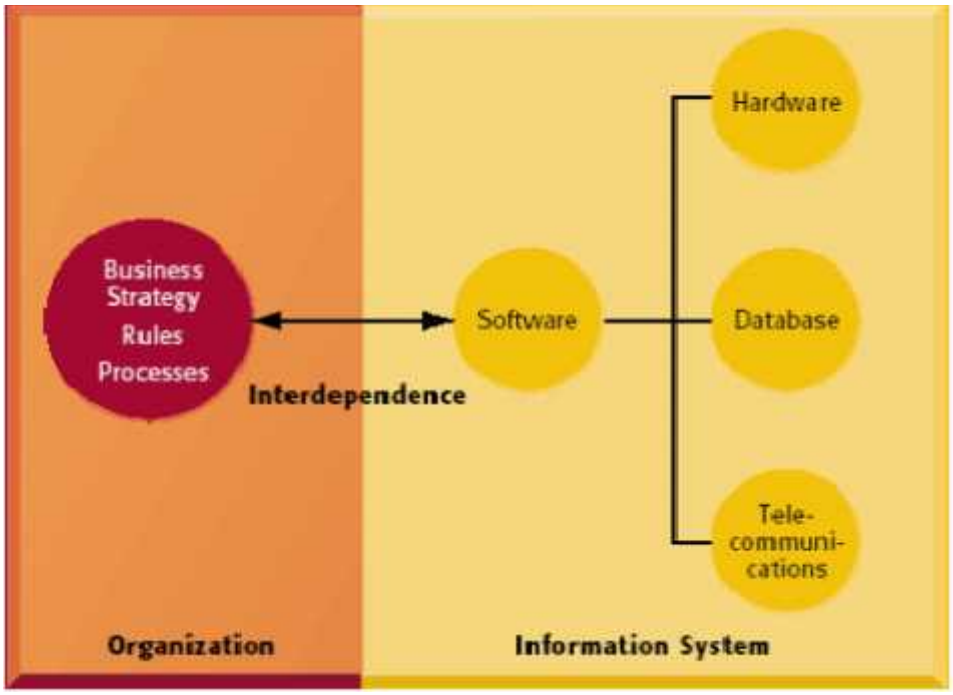
Foundation of Doing Business

Just like offices, telephones, filing cabinets, and efficient tall buildings with elevators were once of the foundations of business in the twentieth century, information technology is a foundation for business in the twenty-first century. There is a growing interdependence between a firm's ability to use information technology and its ability to implement corporate strategies and achieve corporate goals (see Figure 1-4). What

a business would like to do in five years often depend on what its systems will be able to do. Increasing market share, becoming the high-quality or low-cost producer, developing new products, and increasing employee productivity depend more and more on the kinds and quality of information systems in the organization. The more you understand about this relationship, the more valuable you will be as a manager.

Figure 1.4

The Interdependence between Organizations and Information Systems



In contemporary systems there is a growing interdependence between a firm's information systems and its business capabilities. Changes in strategy, rules, and business processes increasingly require changes in hardware, software, databases, and telecommunications. Often, what the organization would like to do depends on what its systems will permit it to do.

Productivity

Today's managers have very few tools at their disposal for achieving significant gains in productivity. IT is one of the most important tools along with innovations in organization and management, and in fact, these innovations need to be linked together. A substantial and growing body of research reported throughout this book suggests investment in IT plays a critical role in increasing the productivity of firms,

and entire nations. For instance, economists at the U.S. Federal Reserve Bank estimate that IT contributed to the lowering of inflation by 0.5 to 1 percentage point in the years from 1995 to 2000. IT was a major factor in the resurgence in productivity growth in the United States, which began in 1995 and has continued until today at an average rate of 2.7 percent, up from 1.4 percent from 1973 to 1995. Firms that invested wisely in information technology experienced continued growth in productivity and efficiency.

Strategic Opportunity and Advantage

If you want to take advantage of new opportunities in markets, develop new products, and create new services, chances are quite high you will need to make substantial investments in IT to realize these new business opportunities. If you want to achieve a strategic advantage over your rivals, to differentiate yourself from your competitors, IT is one avenue for achieving such advantages along with changes in business practices and management. These advantages might not last forever, but then again most strategic advantages throughout history are short-lived. However, a string of short-lived competitive advantages is a foundation for long-term advantages in business, just as is true of any athletic sport or race.

Digital Convergence and the changing Business Environment

A combination of information technology innovations and a changing domestic and global business environment makes the role of IT in business even more important for managers than just a few years ago. The Internet revolution is not something that happened and then burst, but instead has turned out to be an ongoing, powerful source of new technologies with significant business implications for much of this century. There are five factors to consider when assessing the growing impact of IT in business firms both today and over the next ten years.

1. Internet growth and technology convergence
2. Transformation of the business enterprise
3. Growth of a globally connected economy
4. Growth of knowledge and information-based economies
5. Emergence of the digital firm

These changes in the business environment, summarized in Table 1.2, pose a number of new challenges and opportunities for business firms and their managements.

Table 1.2

The Changing Contemporary Business Environment

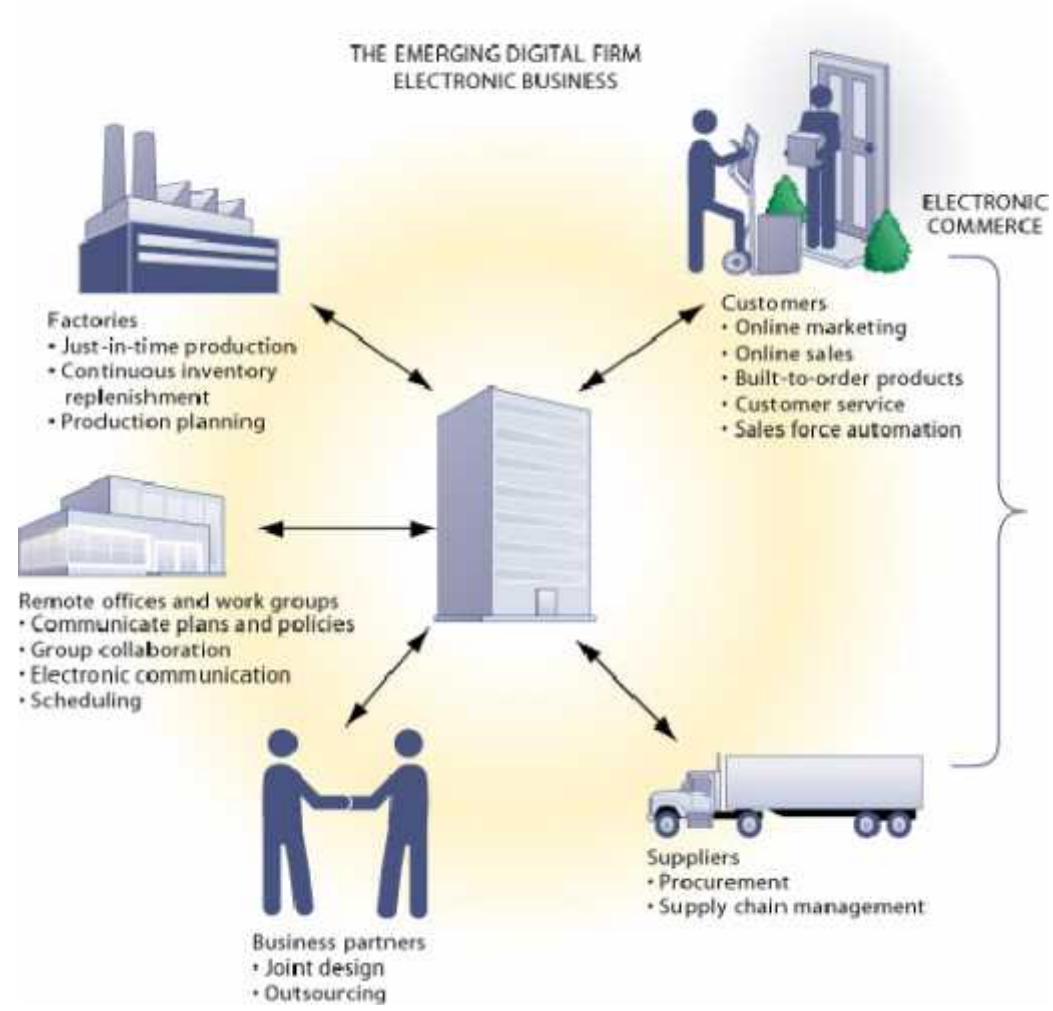
INTERNET GROWTH AND TECHNOLOGY CONVERGENCE - New business technologies with favorable costs - E-business, e-commerce and e-government - Rapid changes in markets and market structure - Increased obsolescence of traditional business models
TRANSFORMATION OF THE BUSINESS ENTERPRISE - Flattening - Decentralization - Flexibility - Location independence - Low transaction and coordination costs - Empowerment - Collaborative work and teamwork
GLOBALIZATION - Management and control in a global marketplace - Competition in world markets - Global workgroup - Global delivery system
RISE OF THE INFORMATION ECONOMY - Knowledge and information based economies - New products and services - Knowledge as a central productive and strategic asset - Time based competition - Shorter product life - Turbulent environment - Limited employee knowledge base
EMERGENDE OF THE DIGITAL FIRM - Digitally enabled relationship with customer, suppliers, and employees - Core business processes accomplished using digital networks - Digital management of key corporate assets - Agile sensing and responding to environmental changes

1.1.5 Emergence of the Digital Firm

All of the changes we have just described, coupled with equally significant organizational redesign, have created the conditions for a fully digital firm. The digital firm can be defined along several dimensions. A digital firm is one in which nearly all of the organization's significant business relationships with customers, suppliers, and employees are digitally enabled and mediated. Core business processes are accomplished through digital networks spanning the entire organization or linking multiple organizations. Business processes refer to the set of logically related tasks and behaviors that organizations develop over time to produce specific business results and the unique manner in which these activities are organized and coordinated. Developing a new product, generating and fulfilling an order, creating a marketing plan, and hiring an employee are examples of business processes, and the ways organizations accomplish their business processes can be a source of competitive strength. Key corporate assets—intellectual property, core competencies, and financial and human assets—are managed through digital means. In a digital firm, any piece of information required to support key business decisions is available at any time and anywhere in the firm. Digital firms sense and respond to their environments far more rapidly than traditional firms, giving them more flexibility to survive in turbulent times. Digital firms offer extraordinary opportunities for more global organization and management. By digitally enabling and streamlining their work, digital firms have the potential to achieve unprecedented levels of profitability and competitiveness. Electronically integrating key business processes with suppliers has made this company much more agile and adaptive to customer demands and changes in its supplier network. Figure 1-5 illustrates a digital firm making intensive use of Internet and digital technology for electronic business. Information can flow seamlessly among different parts of the company and between the company and external entities—its customers, suppliers, and business partners. More and more organizations are moving toward this digital firm vision.

Figure 1.5

Electronic business and electronic commerce in the emerging digital firm



Companies can use Internet technology for e-commerce transactions with customers and suppliers, for managing internal business processes, and for coordinating with suppliers and other business partners. E-business includes e-commerce as well the management and coordination of the enterprise. A few firms, such as Cisco Systems or Dell Computers, are close to becoming fully digital firms, using the Internet to drive every aspect of their business. In most other companies, a fully digital firm is still more vision than reality, but this vision is driving them toward digital integration. Firms are continuing to invest heavily in information systems that integrate internal business processes and build closer links with suppliers and customers.

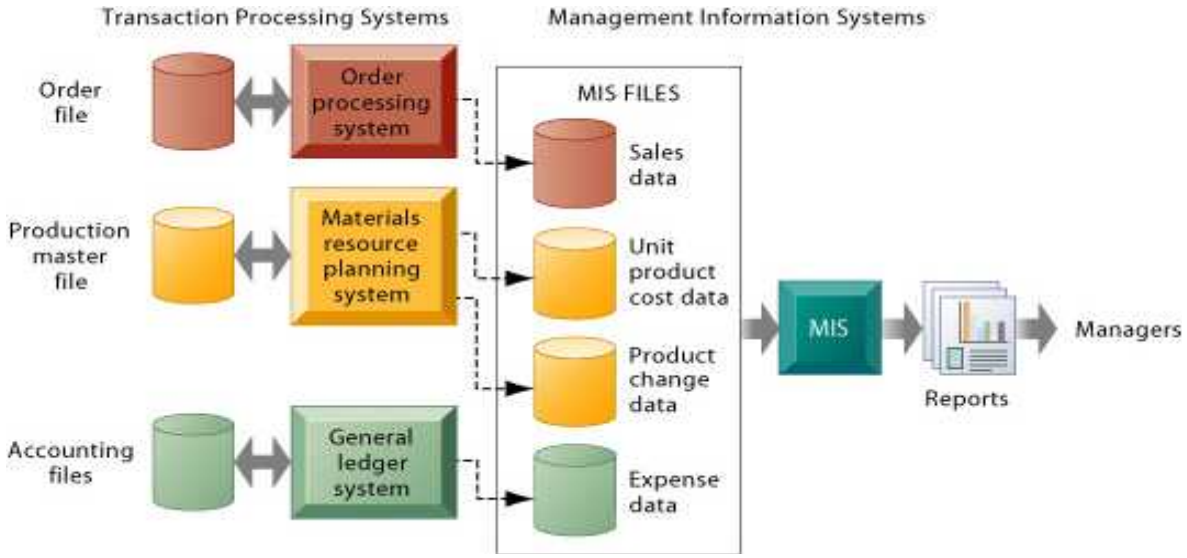
1.1.6 MIS

Management Information Systems (**MIS**) is a general name for the academic discipline covering the application of people, technologies, and procedures — collectively called the information system — to solve business problems. MIS are distinct from regular information systems in that they are used to analyze other information systems applied in operational activities in the organization. Academically, the term is commonly used to refer to the group of information management methods tied to the automation or support of human decision making, e.g. Decision Support Systems, Expert systems, and Executive information systems.

The term management information systems (MIS) also designates a specific category of information systems serving management level functions. Management information systems (MIS) serve the management level of the organization, providing managers with reports and often online access to the organization's current performance and historical records. Typically, MIS are oriented almost exclusively to internal, not environmental or external, events. MIS primarily serve the functions of planning, controlling, and decision making at the management level. Generally, they depend on underlying transaction processing systems for their data. MIS summarize and report on the company's basic operations. The basic transaction data from TPS are compressed and are usually presented in long reports that are produced on a regular schedule. Figure 1-6 shows how a typical MIS transforms transaction level data from inventory, production, and accounting into MIS files that are used to provide managers with reports.

Figure 1.6

How Management Information Systems obtain their data from the Organization's TPS



In the system illustrated by this diagram, three TPS supply summarized transaction data to the MIS reporting system at the end of the time period. Managers gain access to the organizational data through the MIS, which provides them with the appropriate reports.

MIS usually serve managers primarily interested in weekly, monthly, and yearly results, although some MIS enable managers to drill down to see daily or hourly data if required. MIS generally provide answers to routine questions that have been specified in advance and have a predefined procedure for answering them. These systems are generally not flexible and have little analytical capability. Most MIS use simple routines such as summaries and comparisons, as opposed to sophisticated mathematical models or statistical techniques.

MIS is a system consisting of people, machines, procedures, database and data models as its elements. The system gathers data from the internal and external sources of an organization, process it and supplies MI to assist managers in the process of decision making. Here, the word "system" implies that MIS follows a system approach, which means a holistic approach and is based on the concept of synergy, where the output is greater than the sum of its parts. Thus, it clearly indicates that MIS is not a single system rather than it is an integrated system where parts fit into and overall design.

MIS can be defined as the systematic or organized way of providing informational support to the managerial functions of an organization. The system utilizes computer hardware, software, manual procedures, and models for analysis, planning control and decision-making and a database. In other words, “MIS is an automated system which presents information both internal and external to the business that aids in making a specific set of routine decisions”. The few aspects of the above definition that warrant closer scrutiny are

- MIS is an organized or planned effort and not the result of some sporadic attempts.
- Integrated and meaningful information is the output of the system.
- The primary function of MIS is to provide information.
- MIS is a facilitating or supporting system to aid managerial functions and not merely help operational tasks, that is, the MIS provides information that assists managers at different levels in the organization.
- MIS is formed from a number of components, including hardware, software, manual procedures, models and a database.
- MIS is a system of users and machines, the users are as important to the system as the machines.

Different classes of users of MIS will use it differently. Clerical users primarily provide input and data control. First line supervisors use it for operational control and detailed exception reporting. Management uses it for special reports and analysis, often employing a staff specialist to manipulate decision models and perform analysis. Because of the complexity of the process of MIS development and need for judgment, there is a need for comprehensive academic training for MIS professionals.

MIS is a system to support the decision making function in the organization. The difference lies in defining the elements of the MIS. However, in today’s world, the MIS is a computerized business processing system-generating information for the people in the organization to meet the information needs for decision making to achieve the corporate objectives of the organization. MIS helps in optimizing the use of scarce resources, through their improved utilization, and by supporting intelligent decision making a co ordination without wasteful delays. Information management involves the communication of intelligent or knowledge. It appraises and notifies

surprises and stimulates, reduces uncertainty, reveals additional alternatives and helps eliminate irrelevant or poor ones, and influences individual and stimulates them to action. In any organization, information should give early warning and portend the future. Therefore, it is essential that those in the professional lines should be aware of MIS and be included to its effective utilization.

In the conclusion, we can say that MIS is a system using formalized procedures to provide management at all levels in all functions with appropriate information, based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing, and controlling the activities for which they are responsible. The actual process will involve the collection, organization, distribution and storage of organization wide information for managerial analysis and control.

1.1.7 Introduction to Organization and Thesis Topic

Surya Nepal Private Limited (SNPL) is an Indo-Nepal-UK joint venture, which started operations in Nepal in 1986. Surya Nepal is now the largest private sector enterprise in Nepal and a subsidiary of ITC Limited, India, the balance shares are held by 20 Nepalese individual & corporate shareholders and British American Tobacco (Investment) Limited, UK.

Lines of Business

Surya Nepal Limited businesses include manufacture and marketing of cigarettes and readymade garments in Nepal as well as exports of ready-made garments with a total turnover of over US $100 million.

Surya Nepal's commitment to its corporate vision "enduring value for all stakeholders" has been uncompromising through the years and is reflected in every product, process and service provided by the company.

The company was awarded the prestigious FNCCI National Excellence Award during 2007 for being the best-managed corporation in Nepal. The company is also the recipient of various national safety and environmental awards and with our constant focus on systemic work processes, both our cigarette and garment factories are ISO-9001: 2000 certified.

Company Logo

Company logo stands for our ethos and the beliefs we hold true as a company. It reflects our passion for quality and excellence and our compelling vision to create enduring value for all our stakeholders.

The mountain stands for our deep roots in Nepal, and connotes a sense of solidity and permanence, symbolic of our position as the nation's foremost professionally managed company. The rising sun stands for leadership as well as our passion for excellence. It encapsulates the pioneering spirit that inspires us to create and innovate products that adhere to the highest international standards as well as create enduring value for our stakeholders. The sun also represents the optimism that we feel for the future, and our deep conviction that, by generating employment, earning foreign exchange and through our various CSR efforts, help create a better, brighter tomorrow for everyone.

Marketing and Distribution

At Surya Nepal, we build brands. Five large and hugely successful brands in the last 20 years is testimony to the fact. Surya Nepal's Surya Classic, Surya Luxury Kings and Surya Lights, Shikhar, Shikhar Lights, Khukuri Filter, Bijuli and Chautari cater to a wide spectrum of consumer tastes and preferences.

Superior internationally benchmarked quality, strategic and consistent positioning and one of the largest distribution networks in the country comprising over 5,000 wholesalers, and over 85,000 retailers contribute towards making Surya Nepal one of the most efficient and effective marketing companies in Nepal.

Brands

SURYA CLASSIC - The recent launch of Surya Classic, the flagship brand of the Company, in a unique first of its kind shoulder box format has taken the market by storm. Priced at Rs 100 for a packet of 20s, the brand is positioned as a super premium exclusive offer - a cigarette that embodies perfection, inspires passion and evokes pride in the finest made in Nepal creation yet. - Crafted in Nepal, Inspiration for the World.

Surya Luxury Kings - One of the biggest success stories in the history of Surya Nepal. Since its launch in 1989-90, the brand has recorded impressive growth. Positioned on the platform of "inspirational leadership", Surya has always lived up to its reputation of being truly international class. Surya Lights was launched in 2001 and is the largest lights brand in the country today.

SHIKHAR is the largest king-size cigarette brand in Nepal and is positioned on "Safalta ko Life". Shikhar Lights was launched to cater to the needs of a growing lights smoking population.

KHUKURI is the largest selling cigarette brand in Nepal. Positioned as the “Sahashi ko ek Matra Chahana”, this brand spans the length and breadth of the country and the loyalty of its smoker base is legendary.

BIJULI is the largest Plains brand in the country. Together with Chautari, Surya Nepal’s plains brands dominate the rural landscape. Smooth satisfaction has been the brands core proposition.

The Garments Initiative

The company commenced manufacture of garments with leased capacities under the prestigious John Players label, for ITC Limited, India, in January 2004 with a strategy to quickly overcome the learning curve, build sustainable competitive advantage and become a significant player globally.

In the quest to achieve the above, Surya Nepal had to invest substantial sums of money in upgrading infrastructure including plant and machinery. Considerable time and effort was also spent in the training of manpower, introducing work processes, work aids, and quality systems to enable production of international quality garments. Appropriate systems in the area of quality, logistics and finance had to be introduced to enable efficient monitoring and quick decision-making. Considerable effort was also undertaken in recruitment training and development of personnel into a well-knit team, which blended with the value culture and ethos of the company.

The vision is clear – “To make the world wear our quality apparel”. The company’s mission is focused on “creating competitive advantage for its buyers by providing a superior sourcing solution”. Nepal, being a LDC, enjoys preferential access to numerous markets including duty-free access to the European Union & Canada.

Within the first year of commencing operations, our Garments Division has exported more than one million popular segment “John Players” branded formal shirts and semi-formal trousers to ITC Limited for sale in India. The garments have been ranked first in the Product Quality Rating System (ITC’s internal quality evaluation methodology) as against high-end shirts and competitive products from Bangladesh and India.

John Players – Nepal Market

Surya Nepal launched the fashionable and youthful men's apparel brand, John Players, in October 2004. John Player is designed keeping in mind the fashion preference of today's youth and the most contemporary trends. The brand is currently available in over 70 multi-brand outlets across the country. John Players now enjoys high recognition from both consumers and in the fashion industry. The brand won the coveted 'Rising Star Brand of the year' award at the 5th Annual Images Fashion Awards 2005 in India.

John Players provides a complete wardrobe solution for the fashion and quality conscious male in Nepal. The range includes formal, casual and party wear shirts, formal and casual trousers, chinos, corduroy jackets and trousers, sweat shirts, trendy tees, jackets, 100% pure merino wool sweaters, blazers and suit’s. Also available are trendy denims reminiscent of the 70s rock fusion era.

Springwood

After the success of the John Players range of branded men's wear, the company now introduces the SPRINGWOOD range of branded men's wear. The SPRINGWOOD range has now been introduced in the Kathmandu Valley, Butwal, Bhairwaha, Narayanghat, Hetauda, Birgunj , Biratnagar & other key markets across the country.

SPRINGWOOD addresses the needs of quality and price conscious readymade men's apparel consumers in the country, who currently have a limited choice in terms of low quality imported garments.

This is a huge opportunity area for the company, which is being tapped by offering consumers a proud "Made in Nepal" brand with a 100% quality guarantee and at prices that are surprisingly affordable. This strategy is in line with the Corporate Vision of delighting domestic and global customers with a proud "Made in Nepal" label.

This stems from our core values of customer focus, innovation and excellence. This initiative we believe will also contribute towards boosting economic activity in Nepal and in growing the Nepali garment industry by substituting low quality imports. The SPRINGWOOD brand proposition is to offer quality products with a wide range of vibrant colours in checks, stripes, solids and patterns inspired by the colours of nature, with good fits made from high quality fabrics.

SPRINGWOOD apparels conforms to the highest quality standard in the industry with fabrics imported from some of the finest mills abroad, its patterns and fits are generated by Surya Nepal's computerized design development cell taking special care to incorporate body shapes and sizes of Nepalese consumers. The manufacturing is done under close supervision of Surya Nepal's quality assurance team consisting of highly qualified and trained garment engineers and quality inspectors.

Supply Chain Management

Supply chain management encompasses value chain analysis to identify components associated with the product/service flowing through procurement, warehousing and logistics. Supply chain management refers to the close linkage and coordination of activities involved in buying, making, and moving a product. It integrates business processes to speed information, product, and fund flows up and down a supply chain to reduce time, redundant effort, and inventory costs. The supply chain is a network of organizations and business processes for procuring raw materials, transforming these materials into intermediate and finished products, and distributing the finished products to customers. It links suppliers, manufacturing plants, distribution centers,

retail outlets, and customers to supply goods and services from source through consumption. Materials, information, and payments flow through the supply chain in both directions. Goods start out as raw materials and move through logistics and production systems until they reach customers. Returned items flow in the reverse direction from the buyer back to the seller.

A supply chain is the stream of processes of moving goods from the customer order through the raw materials stage, supply, production, and distribution of products to the customer. All organizations have supply chains of varying degrees, depending upon the size of the organization and the type of product manufactured. These networks obtain supplies and components, change these materials into finished products and then distribute them to the customer. Managing the chain of events in this process is what is known as supply chain management. Effective management must take into account coordinating all the different pieces of this chain as quickly as possible without losing any of the quality or customer satisfaction, while still keeping costs down. The first step is obtaining a customer order, followed by production, storage and distribution of products and supplies to the customer site. Customer satisfaction is paramount. Included in this supply chain process are customer orders, order processing, inventory, scheduling, transportation, storage, and customer service. A necessity in coordinating all these activities is the information service network. In addition, key to the success of a supply chain is the speed in which these activities can be accomplished and the realization that customer needs and customer satisfaction are the very reasons for the network. Reduced inventories, lower operating costs, product availability and customer satisfaction are all benefits which grow out of effective supply chain management.

The decisions associated with supply chain management cover both the long-term and short-term. Strategic decisions deal with corporate policies, and look at overall design and supply chain structure. Operational decisions are those dealing with every day activities and problems of an organization. These decisions must take into account the strategic decisions already in place. Therefore, an organization must structure the supply chain through long-term analysis and at the same time focus on the day-to-day activities. Furthermore, market demands, customer service, transport considerations, and pricing constraints all must be understood in order to structure the supply chain

effectively. These are all factors, which change constantly and sometimes unexpectedly, and an organization must realize this fact and be prepared to structure the supply chain accordingly. Structuring the supply chain requires an understanding of the demand patterns, service level requirements, distance considerations, cost elements and other related factors. It is easy to see that these factors are highly variable in nature and this variability needs to be considered during the supply chain analysis process. Moreover, the interplay of these complex considerations could have a significant bearing on the outcome of the supply chain analysis process.

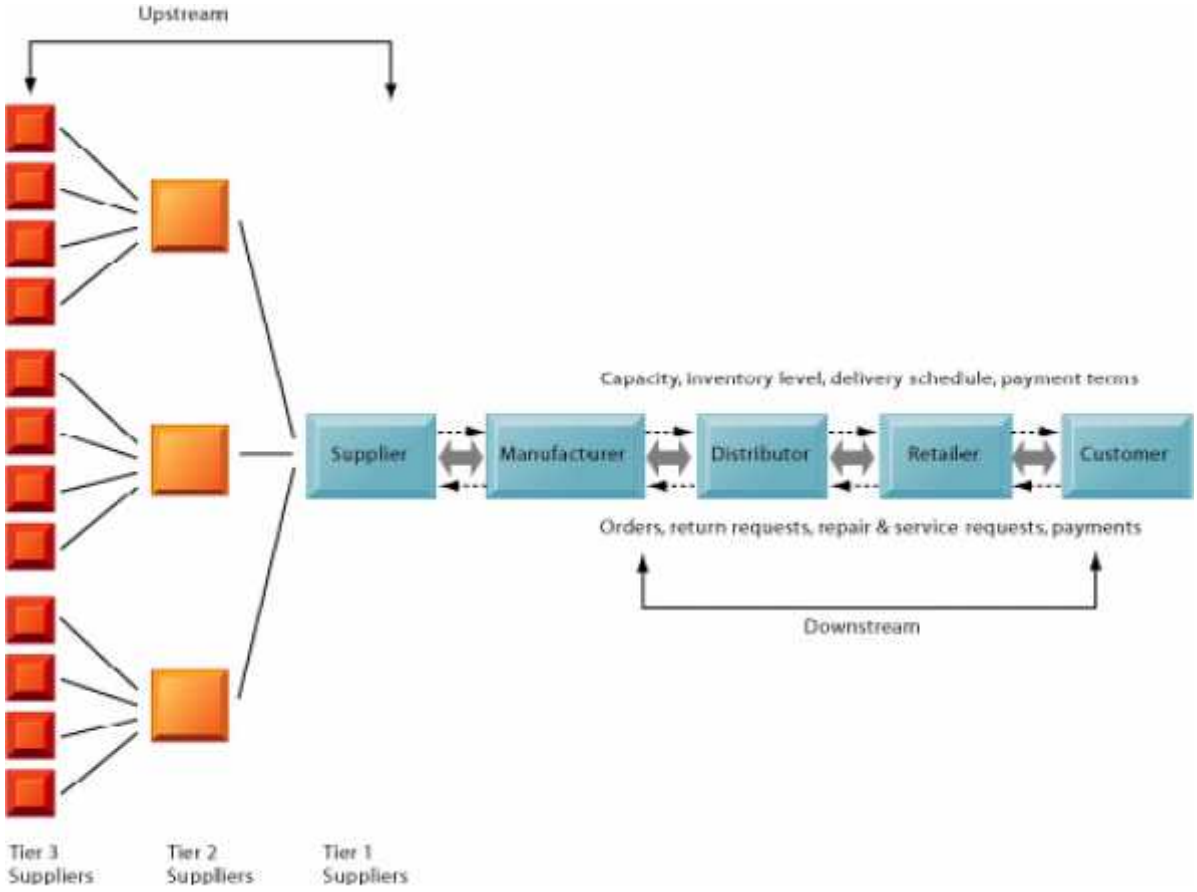
There are six key elements to a supply chain:

- Production
- Supply
- Inventory
- Location
- Transportation, and
- Information

Figure 1.7 provides a simplified illustration of a supply chain, showing the flow of information and material among suppliers, manufacturers, distributors, retailers, and customers. The upstream portion of the supply chain includes the organization's suppliers and their suppliers and the processes for managing relationships with them. The downstream portion consists of the organizations and processes for distributing and delivering products to the final customers. The manufacturer also manages internal supply chain processes for transforming the materials, components, and services furnished by suppliers into finished goods and for managing materials and inventory.

Figure 1.7

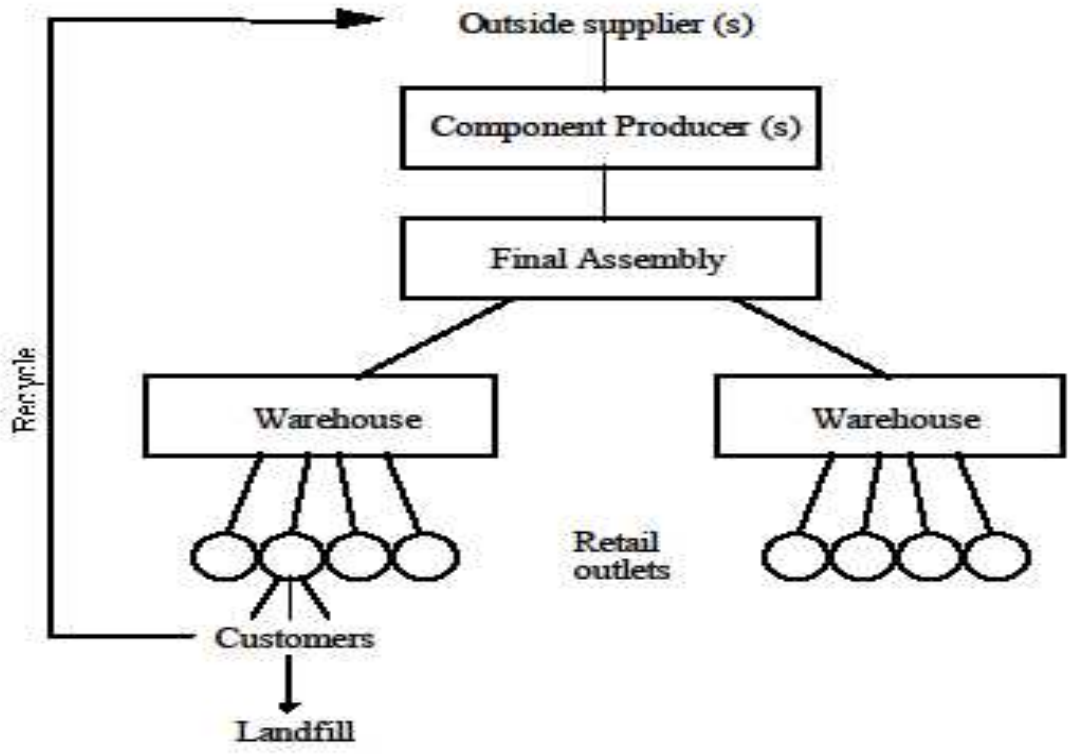
A Supply Chain



This figure illustrates the major entities in the supply chain and the flow of information upstream and downstream to coordinate the activities involved in buying, making, and moving a product. The wide arrows show the flow of materials between supply chain members, and the dotted line and arrows show the flow of information. Suppliers transform raw materials into intermediate products or components, and then manufacturers turn them into finished products. The products are shipped to distribution centers and from there to retailers and customers. Materials flow downstream from raw material sources through manufacturing facilities that transform the raw materials into intermediate products (also referred to as components or parts). These are assembled on the next level to form finished products. The products are shipped to distribution centers and from there to retailers and customers. Most supply chains, especially those for large manufacturers such as automakers, are multitiered, with many thousands of primary (Tier 1), secondary (Tier 2), and tertiary (Tier 3) suppliers.

The just-in-time supply method reduces inventory requirements of the customer, whereas stockless inventory enables the customer to eliminate inventories entirely. Deliveries are made daily, sometimes directly to the departments that need the supplies.

Figure 1.8
A schematic of a Supply Chain



Supply chain management (SCM) systems are more outward facing, focusing on helping the firm manage its relationship with suppliers to optimize the planning, sourcing, manufacturing, and delivery of products and services. These systems provide information to help suppliers, purchasing firms, distributors, and logistics companies coordinate, schedule, and control business processes for procurement, production, inventory management, and delivery of products and services.

Supply chain management systems are one type of inter-organizational system because they automate the flow of information across organizational boundaries. A firm using a supply chain management system would exchange information with its suppliers about availability of materials and components, delivery dates for shipments of supplies, and production requirements. It might also use the system to exchange information with its distributors about inventory levels, the status of orders being fulfilled, or delivery dates for shipments of finished goods. The ultimate objective is to get the right amount of their products from their source to their point of consumption with the least amount of time and with the lowest cost. Supply chain management systems can be built using intranets, extranets, or special supply chain management software.

Supply Chain Management Applications

The central objective of supply chain management systems is information visibility—open and rapid communication and information sharing between members of the supply chain. Correct movement of accurate information makes it possible to time orders, shipments, and production properly to minimize stocking levels and expedite deliveries to customers. Supply chain management systems automate the flow of information between a company and its supply chain partners so they can make better decisions to optimize their performance.

In essence, supply chain software can be classified as either software to help businesses plan their supply chains (supply chain planning) or software to help them execute the supply chain steps (supply chain execution). Supply chain planning systems enable the firm to generate demand forecasts for a product and to develop sourcing and manufacturing plans for that product. Such systems help companies make better operating decisions, such as determining how much of a specific product to manufacture in a given time period; establishing inventory levels for raw materials, intermediate products, and finished goods; determining where to store finished goods; and identifying the transportation mode to use for product delivery. For example, if a large customer places a larger order than usual or changes that order on short notice, it can have a widespread impact throughout the supply chain. Additional raw materials or a different mix of raw materials may need to be ordered from suppliers. Manufacturing may have to change job scheduling. A transportation carrier may have

to reschedule deliveries. Supply chain planning software makes the necessary adjustments to production and distribution plans. Information about changes is shared among the relevant supply chain members so that their work can be coordinated. One of the most important—and complex—supply chain planning functions is demand planning, which determines how much product a business needs to make to satisfy all of its customers' demands. Supply chain execution systems manage the flow of products through distribution centers and warehouses to ensure that products are delivered to the right locations in the most efficient manner. They track the physical status of goods, the management of materials, warehouse and transportation operations, and financial information involving all parties. Table 1-3 provides more details on supply chain planning and execution systems.

Table 1.3

Supply Chain Planning and Execution Systems

Capabilities Of Supply Chain Planning Systems Order Planning: select an order fulfillment plan that best meets the desired level of service to the customer given exixting transportation and manaufacturing constaraints. Advance Schulding And Manufacturing Planning: provide detailed coordination of scheduling based on analysis of changing manaufacturing process and supplier logistics. Demand Planning: generate demand forcasts from all business units using statistical tools and business forcasting techniques. Distribution Planning: creat operating plans for logistics managers for order fulfillmenat, based on input from demand and manufacturing planning modules. Transportation Plannning: trac and analyze inbound, outbound, and intracompany movement of materials and products to ensure that materials and finished goods are delivered at the ritht time and place at the minimum cost.
Capabilities Of Supply Chain Execution Systems Order Commitments: enable vendors to quote accurate delivery dates to customers by providing more real-time detailed information on the status of orders from availability of raw materals and inventory to production and shipment status. Final Production: organise and schedule final subassembles required to make each final product. ReplenishmenT: coordinate component replenishment work so that warehouses remain stocked with the minimus amount of inventory in the piepeline. Distribution Management: coordinate the process of transporting goods from the manufaturer to destribution ceners to the final customr. Provide online customer access to shipment and delivery data. REVERSE DISTRIBUTION: track the shipment and accounting for returned goods or remanufactured products.

1.2 Focus of the Study

The thesis effort is to study the process of flow of materials in and outside of the company. Basically the theses will emphasize the five supply chain management processes which consist of many sub-processes too.

Plan: Consists of processes that balance aggregate demand and supply to develop a course of action to meet sourcing, production, and delivery requirements.

Source: Consists of processes that procure goods and services needed to create a specific product or service.

Make: Consists of processes that transform a product into a finished state to meet planned or actual demand.

Deliver: Consists of processes that provide finished goods and services to meet actual or planned demand, including order management, transportation management, and distribution management.

Return**:** Consists of processes associated with returning products or receiving returned products, including post delivery customer support.

Logistics plays an important role in these processes, dealing with the planning and control of all factors that will have an impact on transporting the correct product or service to where it is needed on time and at the least cost. (A Logistics account for 12 to 14 percent of a typical manufacturer's cost of goods sold.) Supply chain management provides an opportunity to optimize the movement of materials and goods among different members of the supply chain. To manage the supply chain, a company tries to eliminate redundant steps, delays, and the amount of resources tied up along the way as it manages relationships with other supply chain members. Information systems make supply chain management more efficient by providing information to help companies coordinate, schedule, and control procurement, production, inventory management, and delivery of products and services.

1.3 Statement of the Problem

Supply chain management is the important task to implement MIS in organizations which conclude the efficient delivery mechanism. The ICT in Nepal is not so pronounced and in process of development. People still need to spend effort in managing delivery mechanism through use of ICT. In other words the important of supply chain management is not understood so much by concerned people. Few companies using effective supply chain management can be counted in fingers. In Nepal many private organizations has entered into the computerize system. They are using different application software to manage delivery mechanism. Enterprise resources planning for most of the companies in Nepal are odd or unheard name till yet. The implementation of supply chain management highly depends upon the enterprise resource planning of an organization with effective utilization of ICT. This thesis summarizes the use of enterprise software to manage SCM and also provide solution for the bullwhip effect in SCM in Surya Nepal. Furthermore SCM problem in Surya Nepal can be summarized as follows.

- Lack of information flow in the ERP system
- No access for dealers and wholesalers in ERP system
- Problem of bullwhip effect in the SCM
- Lack of integration in delivery and stock.
- Problem in timely stock clearance.

1.4 Objective of the Study

The objective of this thesis is to study and evaluate the implementation of Supply Chain Management adopted by Surya Nepal. Moreover this thesis will explore the following matter.

- To decide when and what to produce, store, and move
- To understand rapid communicate orders
- Knowing how the system track the status of orders
- To check inventory availability and monitor inventory levels
- To reduce inventory, transportation, and warehousing costs
- To plan production based on actual customer demand
- To understand the Rapid communicate about changes in product design

1.5 Rational of the Study

Supply chain management systems enable firms to streamline both their internal and external supply chain processes and provide management with more accurate information about what to produce, store, and move. By implementing a networked and integrated supply chain management system, companies can match supply to demand, reduce inventory levels, improve delivery service, speed product time to market, and use assets more effectively. Companies that excel in supply chain management have been found to produce higher rates of growth in their market value than the average for their industries. Effective supply chain management systems enhance organizational performance in the following areas:

1. Improved customer service and responsiveness. If a product is not available when a customer wants it, that customer will likely try to purchase it from someone else. Having the right product at the right place at the right time will increase sales.

2. Cost reduction. Supply chain management helps companies contain, and often reduce, some or all of the costs associated with moving a product through the supply chain. These costs include material acquisition, inventory carrying, transportation, and planning costs. (Inventory carrying costs may amount to 30 or 40 percent of the value of the entire inventory.) Total supply chain costs represent the majority of operating expenses for many businesses and in some industries approach 75 percent of the total operating budget. Reducing supply chain costs can thus have a major impact on firm profitability.

3. Cash utilization. The sooner a company delivers a product, the sooner that company will get paid. Companies leading in supply chain efficiency have cash available two to three months faster than companies that do not have this capability.

1.6 Limitation of the Study

As much as possible this thesis tries to cover the overall SCM of Surya Nepal. But in broad sense it is limited by date availability, Budget and time. There is no

comparative study with any other organization. This project only sketch about the SCM of Surya Nepal.

- It is hard to get complete data so it serves the limited area.
- This thesis only summarized the delivery mechanism of Surya Nepal but not in detail.
- The thesis is derived by the self effort. So it may lack expertise.

1.7 Organization of the Study

The study will be organized on the following standardized pattern of usual sequence of topics:

Chapter – I Introduction
Chapter- II Review of literature
Chapter – III Research Methodology
Chapter – IV System analysis, design and data presentation
Chapter – V Summary, Conclusion and Recommendations

The introduction chapter includes general background, discussion of MIS, introduction to thesis topics, the focus of the study, statement of the problem, objectives of the study, rationality of the study and the limitations of the study.

In the second chapter, the review of literature is done. It contains the conceptual review about SCM, review of articles and review of related research studies.

Similarly, the third chapter includes research methodologies to be used in the study.

The forth chapter is about the system analysis, design and data presentation of SCM in relation to Surya Nepal. This is the body of the thesis. It concludes organization structure, sources of information, DFD analysis, analysis of existing technology, limitation of the existing system, finding of the system, cost benefit analysis and feasibility analysis of the system.

The last chapter will contain the summary, conclusions and recommendations with bibliography and annexes.

CHAPTER -II
REVIEW OF LITERATURE

2.1 Conceptual Reviews

2.1.1 Supply Chain Management Systems

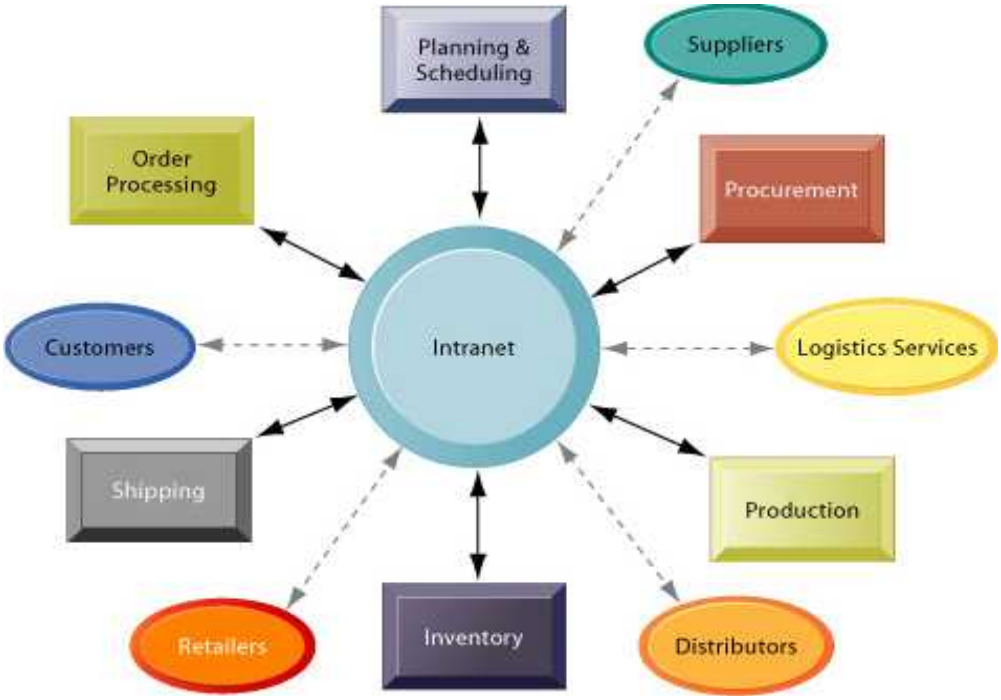
Today's competitive business environment calls for companies to pay much more attention to how they manage their supply chains. Customers are insisting on greater value, faster order fulfillment, and more responsive service when they make purchases. Shorter product life cycles, global sourcing, and greater product variety have increased supply chain costs and complexity. The value chains of so many businesses are linked together that competitive advantage may be based on entire supply chains rather than individual firms. Supply chain management (SCM) today is not limited to order fulfillment but is tied to such strategic issues as the ability to create and deliver new products or to create and implement new business models.

2.1.2 Supply Chain Management and the Internet

In the pre-Internet environment, supply chain coordination was hampered by the difficulties of making information flow smoothly among disparate *internal supply chain* systems for purchasing, materials management, manufacturing, and distribution. It was also difficult to share information with external supply chain partners because the systems of suppliers, distributors, or logistics providers were based on incompatible technology platforms and standards. Enterprise systems could supply some integration of internal supply chain processes but they were not designed to deal with external supply chain processes. PeopleSoft Demand Forecasting software enables users to create forecasts based on statistical analyses of demand history, causal factors such as promotional events and new product introductions, and input from other members of the organization or trading partners. Some supply chain integration can be supplied inexpensively using Internet technology. Firms can use *intranets* to improve coordination among their internal supply chain processes, and they can use *extranets* to coordinate supply chain processes shared with their business partners.

Figure 2.1

Intranets and Extranets for Supply Chain Management



Intranets can be used to integrate information from isolated business processes within the firm to help them manage their internal supply chains. Access to these private intranets can also be extended to authorized suppliers, distributors, logistics services, and, sometimes, to retail customers to improve coordination of external supply chain processes. Using intranets and extranets, all members of the supply chain can instantly communicate with each other, using up-to-date information to adjust purchasing, logistics, manufacturing, packaging, and schedules. A manager can use a Web interface to tap into suppliers' systems to determine whether inventory and production capabilities match demand for the firm's products. Business partners can use Web-based supply chain management tools to collaborate online on forecasts. Sales representatives can access suppliers' production schedules and logistics information to monitor customers' order status. The low cost of providing this information with Web-based tools instead of costly proprietary systems encourages companies to share critical business information with a greater number of suppliers.

2.1.3 Global Supply Chain Issues

As more and more companies outsource manufacturing operations, obtain supplies from other countries, and sell abroad, they must operate supply chains extending

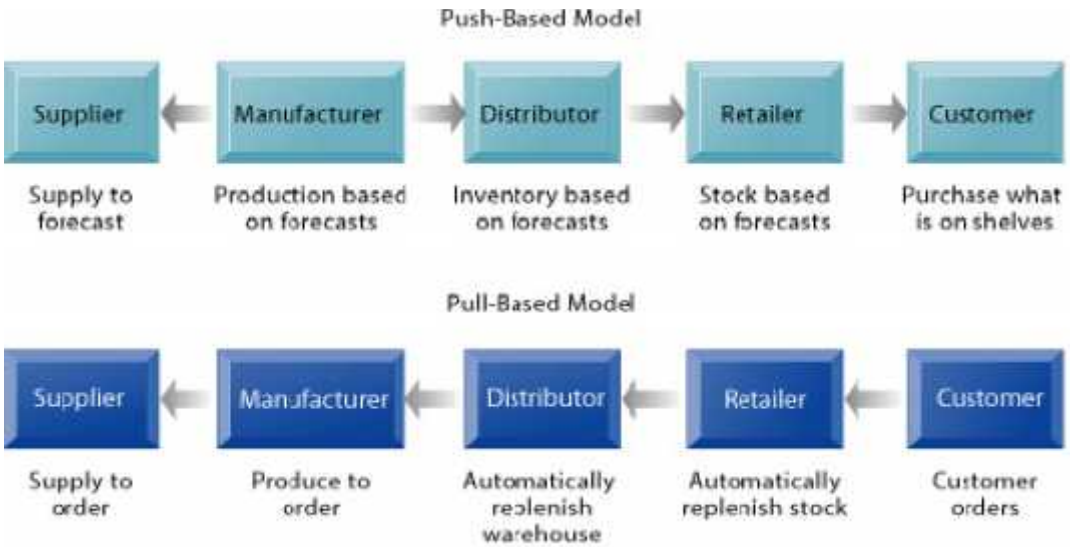
across multiple countries and regions. Global supply chains typically span greater geographic distances and time differences than domestic supply chains, with participants from many different countries. The Internet provides a standard set of tools that can be used by companies all over the world to coordinate overseas sourcing, transportation, communications, financing, and compliance with customs regulations.

2.1.4 Demand-Driven Supply Chains: from push to Pull Manufacturing and efficient Customer Response

Internet-based supply chain management applications are clearly changing the way businesses work internally and with each other. In addition to reducing costs, these supply chain management systems facilitate efficient customer response, enabling the workings of the business to be driven more by customer demand. Earlier supply chain management systems were driven by a push-based model (also known as *build-to-stock*). In a push-based model, production master schedules are based on forecasts or best guesses of demand for products, and products are "pushed" to customers. With new flows of information made possible by Web-based tools, supply chain management can more easily follow a pull-based model. In a pull-based model, also known as a *demand-driven model or build-to-order*, actual customer orders or purchases trigger events in the supply chain. Transactions to produce and deliver only what customers have ordered move up the supply chain from retailers to distributors to manufacturers and eventually to suppliers. Only products to fulfill these orders move back down the supply chain to the retailer. Manufacturers would use only actual order demand information to drive their production schedules and the procurement of components or raw materials, as illustrated in Figure 2.2.

Figure 2.2

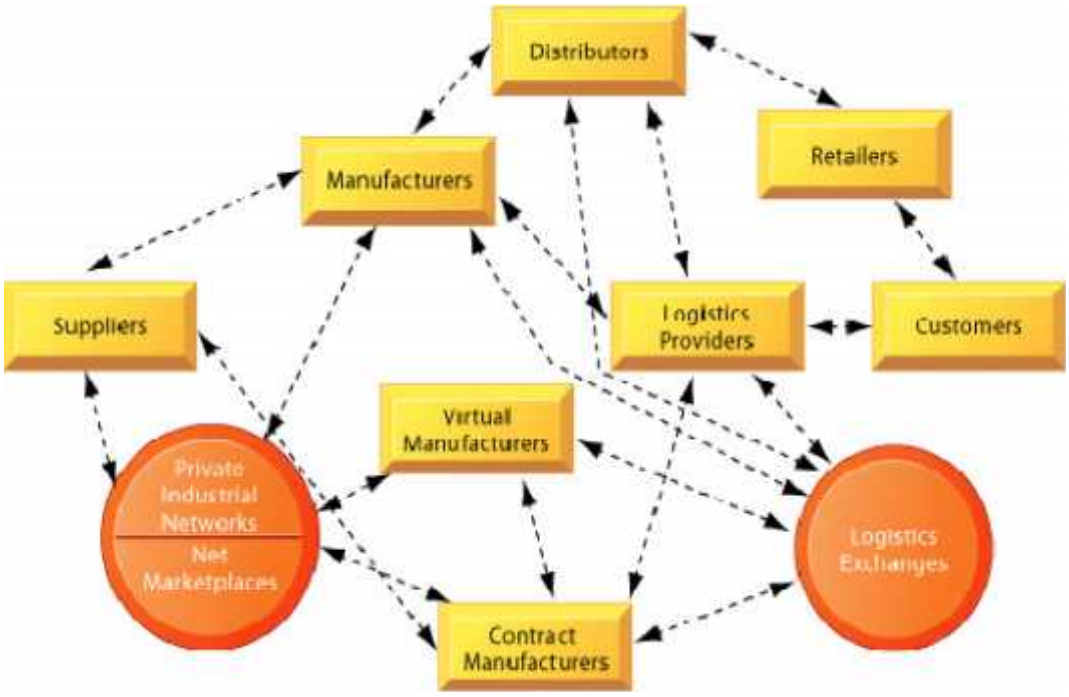
Push- versus Pull-based Supply Chain Models



The difference between push and pull-based models is summarized by the slogan "Make what we sell, not sell what we make." The Internet and Internet technology make it possible to move from sequential supply chains, where information and materials flow sequentially from company to company, to concurrent supply chains, where information flows in many directions simultaneously among members of a supply chain network. Members of the network can immediately adjust to changes in schedules or orders. Ultimately, the Internet could create a "digital logistics nervous system" throughout the supply chain. This system would permit simultaneous, multidirectional communication of information about participants' inventories, orders, and capacities, and would work to optimize the activities of individual firms and groups of firms interacting in e-commerce marketplaces (see Figure 2.3).

Figure 2.3

The Future Internet-Driven Supply Chain



The future Internet-driven supply chain operates like a digital logistics nervous system. It provides multidirectional communication among firms, networks of firms, and e-marketplaces so that entire networks of supply chain partners can immediately adjust inventories, orders, and capacities.

Table 2.1

How Information Systems Facilitate Supply Chain Management

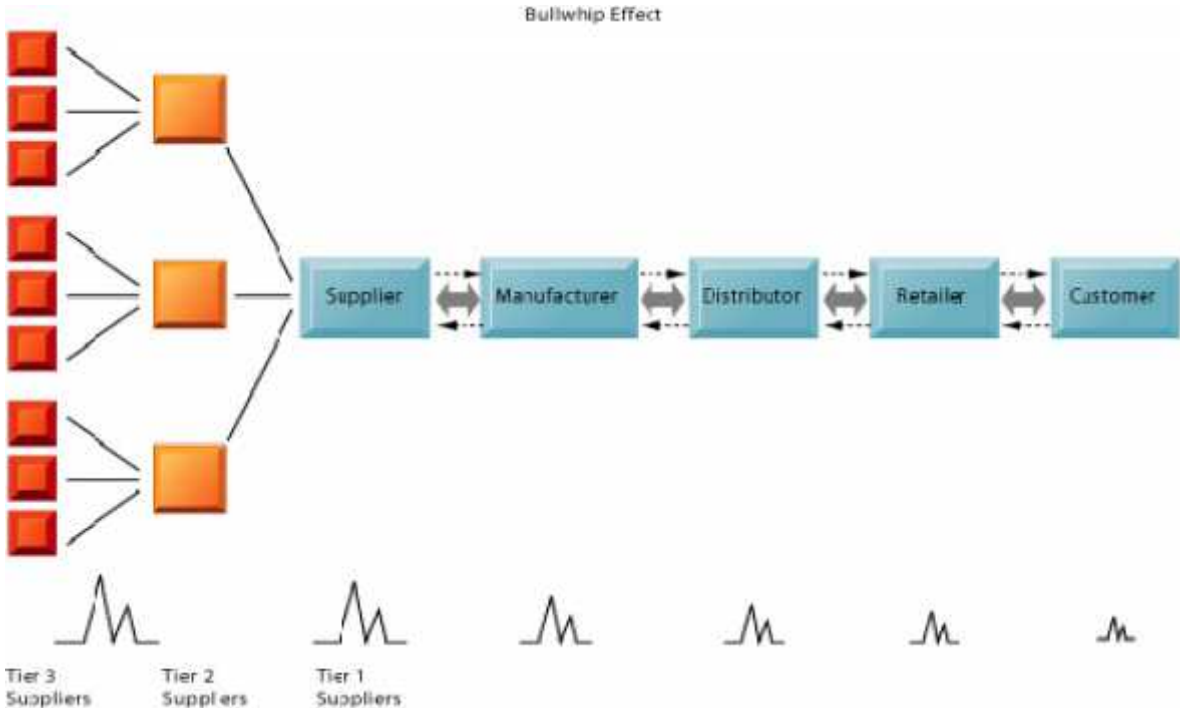
Information from Supply Chain Management Systems Helps Firms:
) Decide when and what to produce, store, and move
) Rapidly communicate orders
) Track the status of orders
) Check inventory availability and monitor inventory levels
) Reduce inventory, transportation, and warehousing costs
) Track shipments
) Plan production based on actual customer demand
) Rapidly communicate changes in product design

2.1.5 Information and Supply Chain Management

Inefficiencies in the supply chain, such as parts shortages, underutilized plant capacity, excessive finished goods inventory, or runaway transportation costs, are caused by inaccurate or untimely information. For example, manufacturers may keep too many parts in inventory because they do not know exactly when they will receive their next shipment from their suppliers. Suppliers may order too few raw materials because they do not have precise information on demand. These supply chain inefficiencies can Caste as much as 25 percent of a company's operating costs. If a manufacturer had perfect information about exactly how many units of product customers wanted, when they wanted them, and when they could be produced, it would be possible to implement a highly efficient just-in-time strategy. Components would arrive exactly at the moment they were needed and finished goods would be shipped as they left the assembly line. In a supply chain, however, uncertainties arise because many events cannot be foreseen —uncertain product demand, late shipments from suppliers, defective parts or raw material, or production process breakdowns. To satisfy customers, manufacturers often deal with such uncertainties and unforeseen events by keeping more material or products in inventory than what they think they may actually need. The safety stock acts as a buffer for the lack of flexibility in the supply chain. Although excess inventory is expensive, low fill rates are also costly because business may be lost from canceled orders. One recurring problem in supply chain management is the bullwhip effect, in which information about the demand for a product gets distorted as it passes from one entity to the next across the supply chain. A slight rise in demand for an item might cause different members in the supply chain— distributors, manufacturers, suppliers, secondary suppliers (suppliers' suppliers), and tertiary suppliers (suppliers' suppliers' suppliers)—to stockpile inventory so each has enough "just in case." These changes ripple throughout the supply chain, magnifying what started out as a small change from planned orders, creating excess inventory, production, warehousing, and shipping costs (see Figure 2.4).

Figure 2.4

The Bullwhip Effect



Inaccurate information can cause minor fluctuations in demand for a product to be amplified as one move further back in the supply chain. Minor fluctuations in retail sales for a product can create excess inventory for distributors, manufacturers, and suppliers. For example, Procter & Gamble (P&G) found it had excessively high inventories of its Pampers disposable diapers at various points along its supply chain because of such distorted information. Although customer purchases in stores were fairly stable, orders from distributors would spike when P&G offered aggressive price promotions. Pampers and Pampers' components accumulated in warehouses along the supply chain to meet demand that did not actually exist. To eliminate this problem, P&G revised its marketing, sales, and supply chain processes and used more accurate demand forecasting. The bullwhip can be tamed by reducing uncertainties about demand and supply when all members of the supply chain have accurate and up-to-date information. If all members of the supply chain could share dynamic information about inventory levels, schedules, forecasts, and shipments, they would have a more precise idea of how to adjust their sourcing, manufacturing, and distribution plans. Supply chain management systems provide the kind of information that can help members of the supply chain make better purchasing and scheduling decisions.

2.2 Review of literature

2.2.1 Wireless Supply Chain Management and Radio Frequency Identification (RFID)

Contemporary supply chain management (SCM) systems are a fertile area for mobile wireless technology because of the need to provide simultaneous, accurate information about demand, supply, production, and logistics as goods move among supply chain partners. SCM software vendors include capabilities for mobile support and wireless capture of data on movements of goods and other events. mySAP Supply Chain Management software offers a number of mobile capabilities. Manufacturing employees can view work instructions on wireless handheld devices anywhere on the factory floor. Supervisors can use wireless handhelds to call up data from process control systems to monitor production-line behavior. A firm that needs to ship out goods can use my SAP SCM to create a shipment order and tender it to a selected freight forwarder. The forwarder can access this tendering application from a mobile device and accept, reject, or modify the planned order. If the forwarder rejects the tender or does not reply within an anticipated time frame, the supply chain management software triggers a text message alert to the logistics manager's mobile phone to expedite the search for another forwarder. mySAP SCM also uses mobile technology for warehouse management tasks such as picking, packing, unpacking, freight loading and unloading checks, and inventory queries. Some of these activities use radio frequency identification technology (RFID) technology. Because RFID technology is such a powerful tool for supply chain management, let's take a closer look.

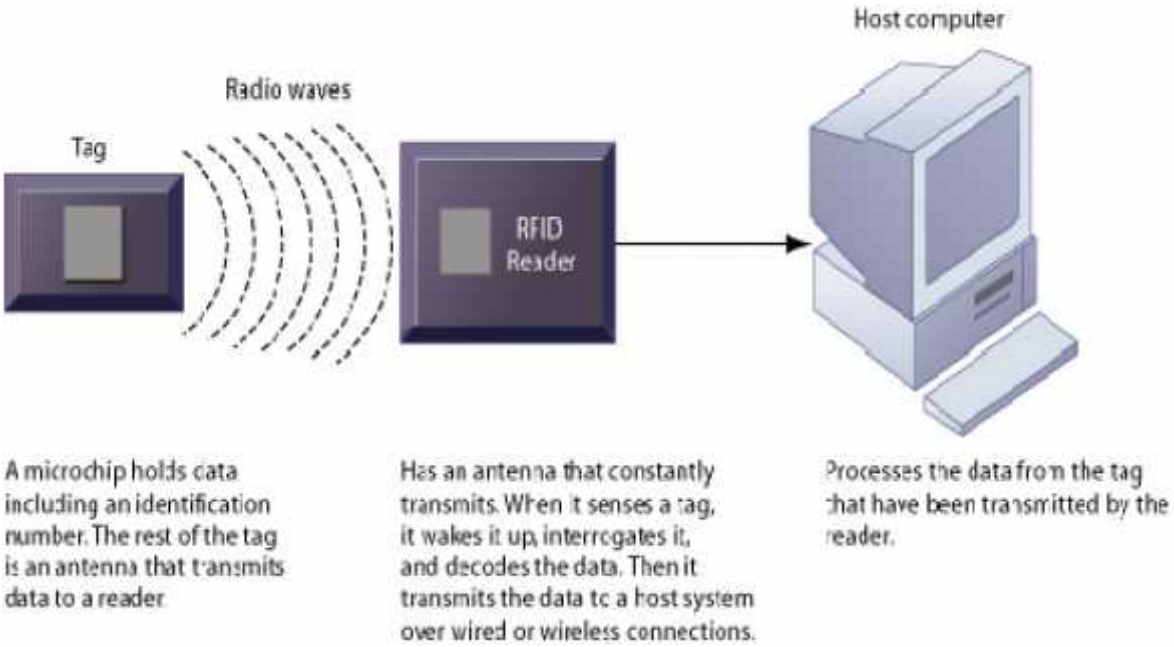
Radio Frequency Identification (RFID)

Radio frequency identification (RFID) systems provide a powerful technology for tracking the movement of goods throughout the supply chain. RFID systems use tiny tags with embedded microchips containing data about an item and its location to transmit radio signals over a short distance to special RFID readers. The RFID readers then pass the data over a network to a computer for processing. Unlike bar codes, RFID tags do not need line of sight contact to be read. The transponder, or RFID tag, is electronically programmed with information that can uniquely identify an item, such as an electronic identification code, plus other information about the item, such

as its location, where and when it was made, or its status during production. Embedded in the tag is a microchip for storing the data. The rest of the tag is an antenna that transmits data to the reader. The reader unit consists of an antenna and radio transmitter with a decoding capability attached to a stationary or handheld device. The reader emits radio waves in ranges anywhere from 1 inch to 100 feet, depending on its power output, the radio frequency employed, and surrounding environmental conditions. When a RFID tag comes within the range of the reader, the tag is activated and starts sending data. The reader captures these data, decodes them, and sends them back over a wired or wireless network to a host computer for further processing (see Figure 2-5). Both RFID tags and antennas come in a variety of shapes and sizes.

Figure 2.5

How RFID works



RFID uses low-powered radio transmitters to read data stored in a tag at distances ranging from 1 inch to 100 feet. The reader captures the data from the tag and sends them over a network to a host computer for processing. RFID tags are categorized as either active or passive. Active RFID tags are powered by an internal battery and typically enable tag data to be rewritten and modified. Such tags might be used, for example, when manufacturing a part to give a machine a set of instructions and have the machine report its performance to the tag. The tag would capture these data so that

they are added to the history of the tagged part. Active tags generally have a longer read range, but they are larger in size, cost more, and have a shorter operational life (up to 10 years) than passive tags. Automated toll-collection systems such as EZ Pass use active RFID tags. Passive RFID tags do not have a separate power source and obtain their operating power from the radio frequency energy transmitted by the RFID reader. They are smaller, lighter, and less expensive than active tags with a virtually unlimited operational lifetime. They also have shorter read ranges than active tags and require a higher powered reader.

Passive tags are usually read-only and are programmed with data that cannot be modified RFID systems operate in a number of unlicensed frequency bands worldwide.

Low frequency systems (30 kilohertz to 500 kilohertz) have short reading ranges (inches to a few feet) and lower system costs. Low-frequency systems are often used in security, asset tracking, or animal identification applications. High-frequency RFID systems (850 MHz to 950 MHz and 2.4 GHz to 2.5 GHz) offer reading ranges that can extend beyond 90 feet and have high reading speeds. High-frequency RFID applications include railroad car tracking or automated toll collection for highways or bridges. A RFID tag with an integrated circuit will never be as inexpensive as a bar code label, and RFID systems will not supplant bar codes entirely. However, RFID systems will become popular where bar codes or other optical technologies are not effective. In inventory control and supply chain management, RFID can capture and manage more detailed information about items in warehouses or in production than bar-coding systems. If a large number of items are shipped together, RFID can track each pallet, lot, or even unit item in the shipment. Manufacturers using RFID will be able to track the production history of each product for better understanding of product defects and successes. The real savings from RFID come from the way it can improve an entire business process. Data from suppliers can be carried on tags and uploaded into the receiving company’s enterprise system or supply chain management system the moment a component is delivered. RFID systems can give suppliers, manufacturers, distributors, and retailers much more detailed and real-time data for control over inventory, shipping, and other logistics. RFID could even change the way invoices are paid by triggering an electronic payment to the shipper once a tagged

pallet enters a retailer's warehouse. RFID has been available for decades, but widespread use was held back by the expense of the tags, which ranged from just under $1.00 to $20.00 each. Now the cost of a tag has dropped to about 19 cents and could drop to 5 cents within a few years. At these prices for tags, RFID becomes cost-effective for many companies, including Wal-Mart, Home Depot, Delta Airlines, FedEx, and Unilever. The top 100 suppliers to Wal-Mart stores and thousands of suppliers to the U.S. Department of Defense are required to use passive RFID tags on cases and pallets they ship to these organizations. Wal-Mart expects RFID-tagged shipments will help it track and record inventory flow. Coors UK, Scottish & Newcastle, and other large British brewing companies are using RFID to improve tracking of kegs that are shipped out and returned. Breweries lose on average 5 to 6 percent of their kegs each year, and RFID tracking has cut those losses in half (*Hellweg*; 2004).

Boeing Company and Airbus S.A.S., the world's largest airplane makers, are requiring more than 2,000 of their suppliers to begin RFID tagging of aircraft and engine parts. Seventy percent of the purchase orders that Airbus receives from its customers contain incorrect part numbers and pricing data. If parts for Airbus planes had RFID tags, they could be scanned to generate accurate replacement orders, saving Airbus as much as $400 million per year. RFID tagging of Boeing airplane parts would provide more accurate information than what mechanics enter manually, preventing unapproved parts from being used in finished products. This application of RFID could save Boeing $100 million per year in Federal Aviation Administration fines and part replacement time *(Kontzer;* 2004). Steep costs and extensive planning and preparation are required for successful deployment of RFID. A Forrester Research study estimated that a supplier that was required by Wal-Mart to implement RFID technology might spend $9.1 million in startup and maintenance fees for one year (*Overby*; 2004). In addition to installing RFID readers and tagging systems, these companies may need to upgrade their hardware and software to process the massive amounts of data produced by RFID systems—transactions that could add up to tens or hundreds of terabytes. Special middleware is required to filter, aggregate, and prevent RFID data from overloading business networks and system applications. The middleware translates RFID data into formats that applications can use. Applications will need to be redesigned to accept massive volumes of RFID-generated data

frequently and to share those data with other applications. Major enterprise software vendors, including SAP, Oracle, and PeopleSoft, now offer RFID-ready versions of their supply chain management applications. Privacy activists have objected to RFID technology applications that could lead to more tracking and monitoring of individual behavior. They fear it could someday enable marketers, the government, or insurers to compile details about individuals' shopping habits or even enable people's movements to be tracked. The Window on Organizations explores this topic.

2.3 Review of Related Research Studies

2.3.1 Supply Chain Management and Efficient Customer Response Systems

A powerful business-level strategy available to digital firms involves linking the value chains of vendors and suppliers to the firm's value chain (*Kopczak and Johnson; 2003*). Digital firms can carry integration of value chains further by linking the customer's value chain to the firm's value chain in an efficient customer response system. Firms using systems to link with customers and suppliers are able to reduce their inventory costs while responding rapidly to customer demands. By keeping prices low and shelves well stocked using a legendary inventory replenishment system, Wal-Mart has become the leading retail business in the United States. Wal-Mart's continuous replenishment system sends orders for new merchandise directly to suppliers as soon as consumers pay for their purchases at the cash register. Point-of-sale terminals record the bar code of each item passing the checkout counter and send a purchase transaction directly to a central computer at Wal-Mart headquarters. The computer collects the orders from all Wal-Mart stores and transmits them to suppliers. Suppliers can also access Wal-Mart's sales and inventory data using Web technology. Because the system can replenish inventory with lightning speed, Wal-Mart does not need to spend much money on maintaining large inventories of goods in its own warehouses. The system also enables Wal-Mart to adjust purchases of store items to meet customer demands. Competitors, such as Sears, have been spending 24.9 percent of sales on overhead. But by using systems to keep operating costs low, Wal-Mart pays only 16.6 percent of sales revenue for overhead. (Operating costs average 20.7 percent of sales in the retail industry). Wal-Mart's continuous inventory replenishment system uses sales data captured at the checkout counter to transmit orders to restock merchandise directly to its suppliers. The system enables Wal-Mart

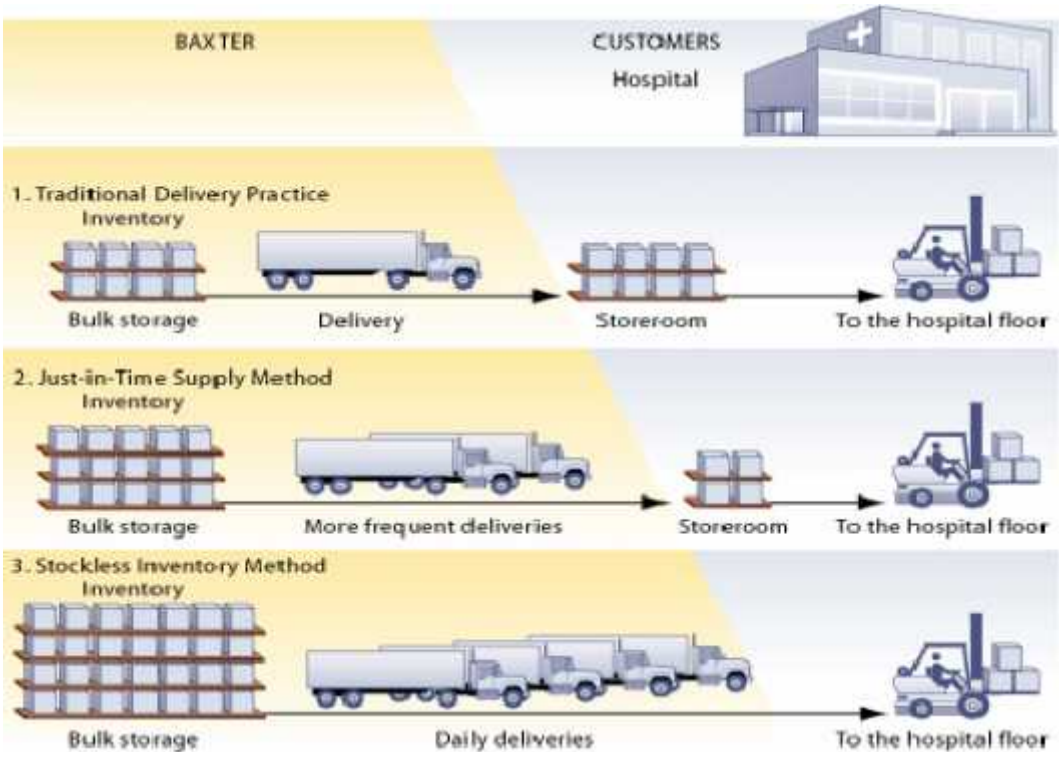
to keep costs low while fine-tuning its merchandise to meet customer demands. Wal-Mart's continuous replenishment system is an example of efficient supply chain management, which we introduced in Chapter 2. Supply chain management systems can not only lower inventory costs, but they also can deliver the product or service more rapidly to the customer. Supply chain management plays an important role in efficient customer response systems that respond to customer demands more efficiently. An efficient customer response system directly links consumer behavior to distribution and production and supply chains. Production begins after the customer purchases or orders a product. Wal-Mart's continuous replenishment system provides such an efficient customer response. Dell Computer Corporation's assemble-to-order system, described earlier, is another example of an efficient customer response system.

The convenience and ease of using these information systems raise switching costs (the cost of switching from one product to a competing product), which discourages customers from going to competitors. Another example is Baxter International's stockless inventory and ordering system, which uses supply chain management to create an efficient customer response system. Participating hospitals become unwilling to switch to another supplier because of the system's convenience and low cost. Baxter supplies nearly two-thirds of all products used by U.S. hospitals. When hospitals want to place an order, they do not need to call a salesperson or send a purchase order—they simply use a desktop computer that links electronically to Baxter's supply catalog either through proprietary software or through the Web. The system generates shipping, billing, invoicing, and inventory information, providing customers with an estimated delivery date. With more than 80 distribution centers in the United States, Baxter can make daily deliveries of its products, often within hours of receiving an order. Baxter delivery personnel no longer drop off their cartons at loading docks to be placed in hospital storerooms. Instead, they deliver orders directly to the hospital corridors, dropping them at nursing stations, operating rooms, and supply closets. This has created in effect a "stockless inventory," with Baxter serving as the hospitals' warehouse. Figure 2-6 compares stockless inventory with the just-in-time supply method and traditional inventory practices. Whereas just-in-time inventory enables customers to reduce their inventories by ordering only enough material for a few days' inventory, stockless inventory enables them to eliminate their

inventories entirely. All inventory responsibilities shift to the distributor, which manages the supply flow. The stockless inventory is a powerful instrument for locking in customers, thus giving the supplier a decided competitive advantage. Information systems can also raise switching costs by making product support, service, and other interactions with customers more convenient and reliable (*Vandenbosch and Dawar; 2002*).

Figure 2.6

Stockless Inventory Compared to Traditional and Just-in-time Supply Methods



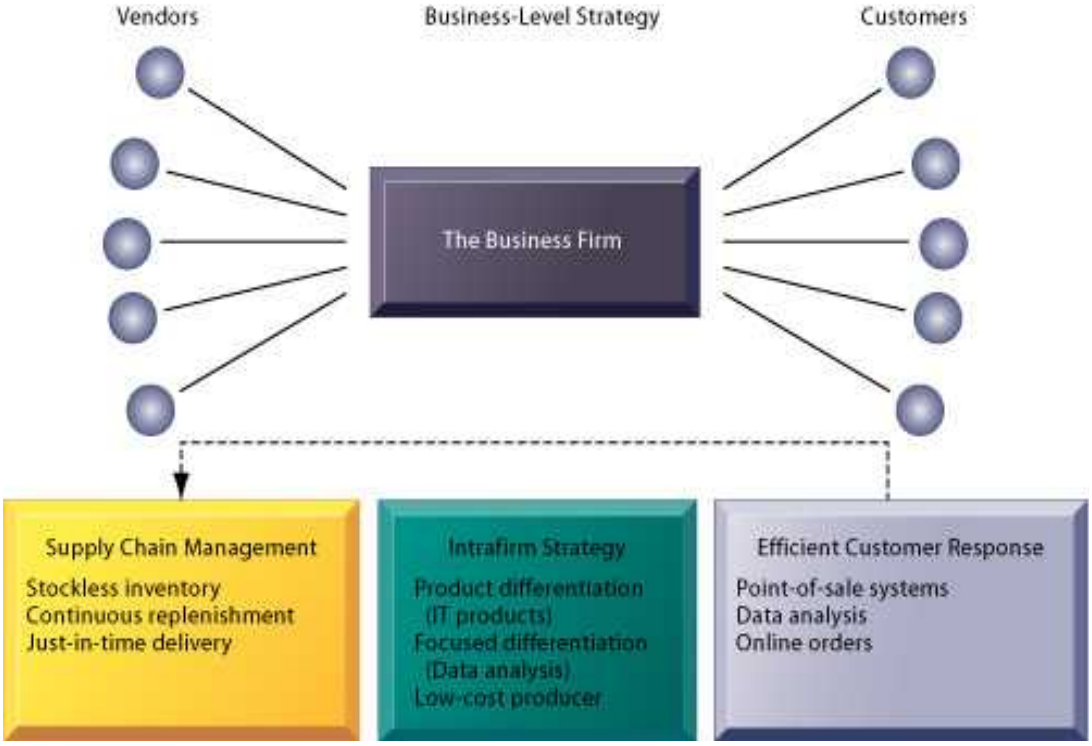
The just-in-time supply method reduces inventory requirements of the customer, whereas stockless inventory enables the customer to eliminate inventories entirely. Deliveries are made daily, sometimes directly to the departments that need the supplies.

Supply chain management and efficient customer response systems are two examples of how emerging digital firms engage in business strategies not available to traditional firms. Both types of systems require network-based information technology infrastructure investment and software competence to make customer and supply chain data flow seamlessly among different organizations. Both types of strategies

have greatly enhanced the efficiency of individual firms and the U.S. economy as a whole by moving toward a demand pull production system and away from the traditional supply-push economic system in which factories were managed on the basis of 12-month official plans rather than on near-instantaneous customer purchase information. Figure 2.7 illustrates the relationships between supply chain management, efficient customer response, and the various business-level strategies.

Figure 2.7

Business-level Strategy



Efficient customer response and supply chain management systems are often interrelated, helping firms lock in customers and suppliers while lowering operating costs. Other types of systems can be used to support product differentiation, focused differentiation, and low-cost producer strategies.

2.3.2 Haworth Overhauls Supply Chain Management

Haworth Incorporated, headquartered in Holland, Michigan, is the world's second largest designer and manufacturer of office furniture and workspaces. The company offers a full range of furniture known for its innovative design including desks, chairs, tables, partitions, and storage products. Haworth operates in more than 120 countries,

with 9,000 employees, 40 manufacturing locations, 60 showrooms, and more than 600 independent dealers around the world. Haworth was particularly successful during the booming economy of the late 1990s, which stimulated demand for new offices and office space. But the company was hit hard when many dot-coms went under because these companies glutted the market with their slightly used Haworth products. To bring costs back in line with declining revenue, Haworth started an ambitious overhaul of its supply chain management systems in 2002. Haworth's 15 North American manufacturing facilities are located in North Carolina, Arkansas, Michigan, Mississippi, Texas, Ontario, Alberta, and Quebec. These facilities supply inventory to distribution centers in Michigan, Pennsylvania, Georgia, and Arkansas. Haworth needed to coordinate order fulfillment from multiple distribution centers with products received from all of its manufacturing facilities. The distribution centers needed to communicate more effectively with the manufacturing facilities to better plan the processing of customer orders. Haworth's existing distribution system was an old-style mainframe locator application that could only handle inventory data for a single building and could not differentiate between facilities. Each distribution center used a different version of the system based on the computer system it interfaced with. The system did not provide a way to preplan shipments, so Haworth could not cross-dock material directly to an outbound shipment as efficiently as it desired, raising labor and freight costs. Cross-docking enables goods earmarked for a specific customer to move directly from the receiving dock to the shipping dock without being checked into the system and picked from inventory. To solve these problems, Haworth implemented a new Warehouse Management System (WMS) based on Irista Warehouse software from Irista in Milwaukee. WMS tracks and controls the flow of finished goods from the receiving dock at any of Haworth's distribution centers to the customer site. The system has cross-docking capabilities to reduce labor costs in the warehouse. WMS interfaces with the various enterprise resource planning (ERP) applications running in the four distribution centers and with Haworth's Transportation Management System (TMS). Acting on shipping plans from TMS, WMS directs the movement of goods based on immediate conditions for space, equipment, inventory, and personnel.

The Transportation Management System (TMS) uses optimization and carrier communication software from Manugistics Group in Rockville, Maryland. The

system examines customer orders, factory schedules, carrier rates and availability, and shipping costs to produce optimal lowest-cost delivery plans. These plans are generated daily and updated every 15 minutes. TMS has an automated interface that enables Haworth to negotiate deliveries with its carriers. To find the minimal freight cost for deliveries, TMS maps out more efficient routes that minimize "less-thantruckload" shipments and damage to goods. TMS also electronically sends carriers "tenders," which are requests to bid on a shipment. These tenders are transmitted over a private network or the Web, and carriers transmit bids back automatically. In the past, that process required two phone calls. If a carrier doesn't reply within a specified time, the system automatically contacts another carrier. Both TMS and WMS run on server Computers from Hewlett-Packard using the Unix operating system. They interface with two sets of order entry, manufacturing planning, and shipping systems that service two different furniture markets. To tie these applications, Haworth uses special "middleware" software from SeeBeyond Technology in Monrovia, California. The middleware passes customer orders, shipping plans, and shipping notifications among the applications. According to Jim Rohrer, a business applications process manager and key liaison between Haworth's information systems and supply chain operations, the new systems haven't merely optimized business processes— they've transformed them. Haworth used to have a "signpost" system where distribution centers received information on labels or on screens and then decided what to do with it. Now the system is more directed. TMS sets up a plan, feeds it to WMS, and WMS specifies the tasks that need to be accomplished. The payoff from these systems was considerable: Warehouse worker productivity increased 35 percent, freight costs were reduced 16 percent, and "less-than-truckload" shipments and damaged goods in transit declined 50 percent. Haworth's investment in these supply chain management systems paid for itself in just nine months. (*Gary H. Anthes*, "Refurnishing the Supply Chain" and "Haworth's Supply Chain Project," Computerworld, June 7, 2004; Irista Inc., "Haworth: Synchronizing the Supply Chain," www.irista.com, accessed August 18, 2004; and www.haworth.com, accessed August 18, 2004).

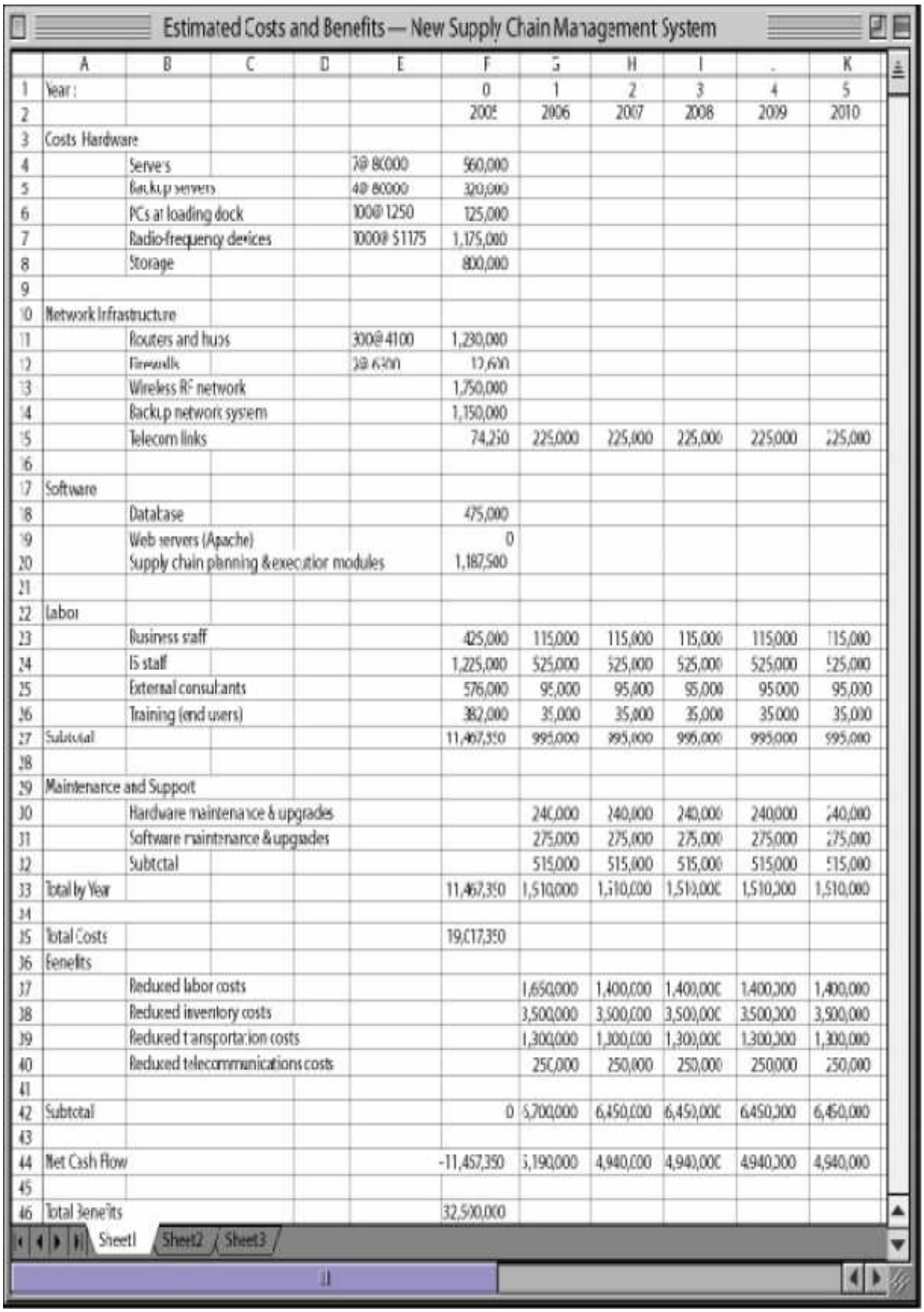
2.3.3 Case Example: Capital Budgeting for a New Supply Chain Management System

Let's look at how financial models would work in a real-world business scenario. Heartland Stores is a general merchandise retail chain operating in eight mid western states. It has five regional distribution centers, 377 stores, and about 14,000 different products stocked in each store. The company is considering investing in new software and hardware modules to upgrade its existing supply chain management system to help it better manage the purchase and movement of goods from its suppliers to its retail outlets. Too many items in Heartland's stores are out of stock, even though many of these products are in the company's distribution center warehouses.

Management believes that the new system would help Heartland Stores reduce the amount of items that it must stock in inventory, and thus its inventory costs, because it would be able to track precisely the status of orders and the flow of items in and out of its distribution centers. The new system would reduce Heartland's labor costs because the company would not need so many people to manage inventory or to track shipments of goods from suppliers to distribution centers and from distribution centers to retail outlets. Telecommunications costs would be reduced because customer service representatives and shipping and receiving staff would not have to spend so much time on the telephone tracking shipments and orders. Heartland Stores expects the system to reduce transportation costs by providing information to help it consolidate shipments to retail stores and to create more efficient shipping schedules. If the new system project is approved, implementation would commence in January 2005 and the new system would become operational in early January 2006. The solution builds on the existing IT infrastructure at the Heartland Stores but requires the purchase of additional server computers, PCs, database software, and networking technology, along with new supply chain planning and execution software. The solution also calls for new radio-frequency identification technology to track items more easily as they move from suppliers to distribution centers to retail outlets. Figure 2-8 shows the estimated costs and benefits of the system. The system had an actual investment cost of $11,467,350 in the first year (year 0) and a total cost over six years of $19,017,350. The estimated benefits total $32,500,000 after six years. Was the investment worthwhile? If so, in what sense? There are financial and nonfinancial answers to these questions. Let us look at the financial models.

Figure 2.8

Costs and Benefits of the New Supply Chain Management System



Estimated Costs and Benefits — New Supply Chain Management System

	A	B	C	D	E	F	G	H	I	J	K
1	Year:					0	1	2	3	4	5
2						2005	2006	2007	2008	2009	2010
3	Costs Hardware										
4		Servers			7@ 80000	560,000					
5		Backup servers			4@ 80000	320,000					
6		PCs at loading dock			1000@ 1250	125,000					
7		Radio-frequency devices			1000@ $1175	1,175,000					
8		Storage				800,000					
9											
10	Network Infrastructure										
11		Routers and hubs			300@4100	1,230,000					
12		Firewalls			2@ 6500	13,000					
13		Wireless RF network				1,750,000					
14		Backup network system				1,150,000					
15		Telecom links				74,250	225,000	225,000	225,000	225,000	225,000
16											
17	Software										
18		Database				475,000					
19		Web servers (Apache)				0					
20		Supply chain planning & execution modules				1,187,500					
21											
22	Labor										
23		Business staff				425,000	115,000	115,000	115,000	115,000	115,000
24		IS staff				1,225,000	525,000	525,000	525,000	525,000	525,000
25		External consultants				576,000	95,000	95,000	95,000	95,000	95,000
26		Training (end users)				382,000	35,000	35,000	35,000	35,000	35,000
27	Subtotal					11,467,350	995,000	995,000	995,000	995,000	995,000
28											
29	Maintenance and Support										
30		Hardware maintenance & upgrades					240,000	240,000	240,000	240,000	240,000
31		Software maintenance & upgrades					275,000	275,000	275,000	275,000	275,000
32		Subtotal					515,000	515,000	515,000	515,000	515,000
33	Total by Year					11,467,350	1,510,000	1,510,000	1,510,000	1,510,000	1,510,000
34											
35	Total Costs					19,017,350					
36	Benefits										
37		Reduced labor costs					1,650,000	1,400,000	1,400,000	1,400,000	1,400,000
38		Reduced inventory costs					3,500,000	3,500,000	3,500,000	3,500,000	3,500,000
39		Reduced transportation costs					1,300,000	1,300,000	1,300,000	1,300,000	1,300,000
40		Reduced telecommunications costs					250,000	250,000	250,000	250,000	250,000
41											
42	Subtotal					0	5,700,000	6,450,000	6,450,000	6,450,000	6,450,000
43											
44	Net Cash Flow					-11,467,350	5,190,000	4,940,000	4,940,000	4,940,000	4,940,000
45											
46	Total Benefits					32,500,000					

Sheet1 Sheet2 Sheet3

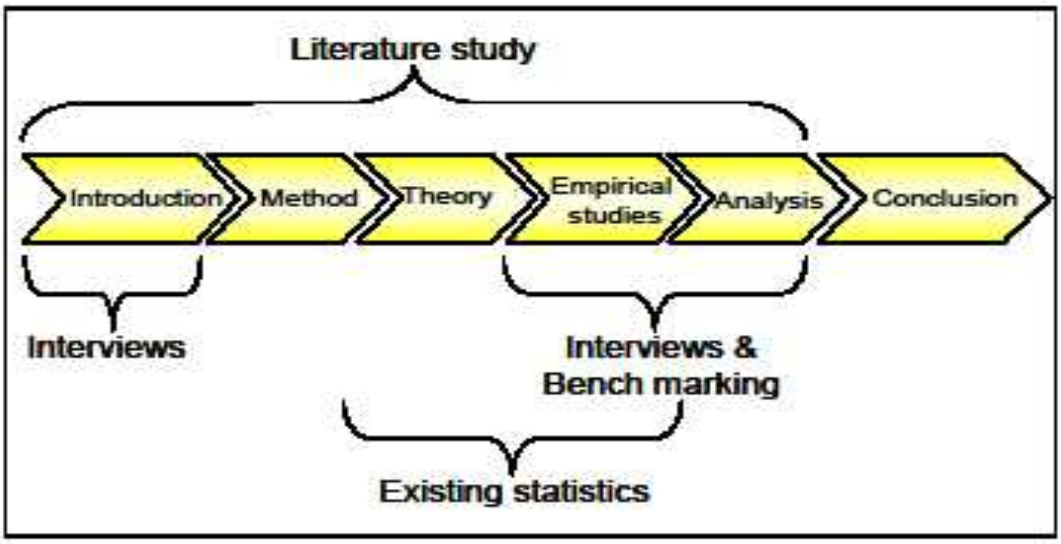
This spreadsheet analyzes the basic costs and benefits of implementing supply chain management system enhancements for a midsized mid western U.S. retailer. The costs for hardware, telecommunications, software, services, and personnel are analyzed over a six-year period (*Laudon & Laudon, Management Information Systems-the Digital Firm; 2006: 721).*

CHAPTER-III
RESEARCH METHODOLOGY

This thesis aims at the summarized presentation of the SCM of Surya Nepal. So the methodology used here are purposeful to meet the requirement of analyzing the supply chain system of the company. The methodology describes the research design used, the method of data collection, selected tools and procedures used in the analysis. Furthermore it can be described as follows.

Figure 3.1

Working Procedure



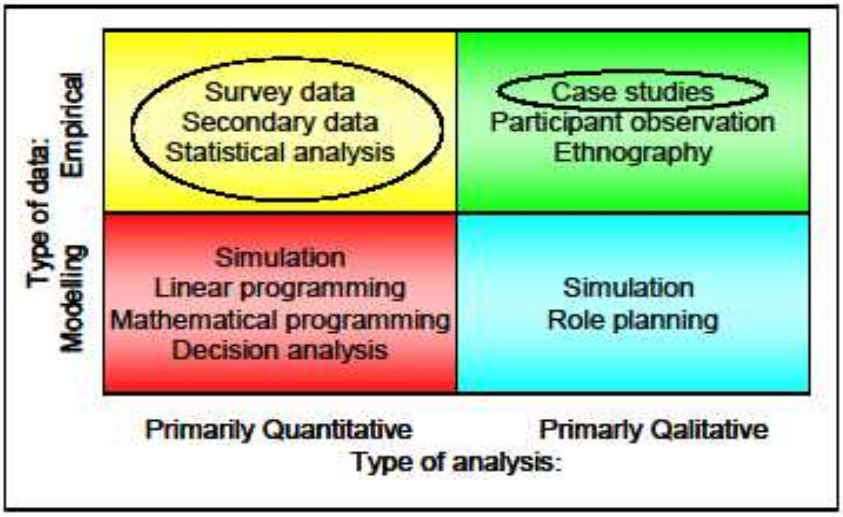
3.1 Research Design

First of all the necessary data related with Surya Nepal were gathered. For the collection of data, I have visited to Surya Nepal and met the officers of IT department and marketing department. Collection of data consists of filtering the data that is useful for the study of the thesis. Then I made a thorough study of all the data collected. After this the necessary data were sorted and analyzed in a systematic manner. Personal interviews and observation were also conducted as per the requirement. Thus, after the collection of primary and secondary data, the final thesis was prepared. This thesis is designed in such a manner that it describe the overall supply chain of the company. It is all about the supply chain system adopted by the company.

Figure 3.2 presents a sample of techniques. We gathered data for analysis from the real world, i.e. empirical data. We used both qualitative and quantitative methods. Consequently, our work belongs to the two upper boxes in the table.

Figure 3.2

Different Research Designs



In a case study a few studies are conducted but many aspects are being taken into account whereas in a survey many observations are made but regarding only a few aspects. Concerning our problem analysis, a survey approach was not suitable. We needed to cover many factors of a complex system and therefore we considered a case study as a preferable method

3.2 Sources of Data

Once the purpose of statistical investigation has been defined, the next step is to collect the data, which are relevant for analysis in a meaningful manner Thus, the collection of data is considered as an integral part of the research activity. The sources of information are generally classified as primary and secondary.

Data collected by the researcher or through agent for the first time from related field and possessing original character are known as primary source data. Primary data are also called field source. On the other hand, data collected by some one else, used already and are made available to others in the form of published statistics are known as secondary data. Once primary data have been used, it loses its primary

characteristics and becomes secondary. Keeping in the view of explorative nature of the study, primary source is the main source of information and data. Data required for this project is acquired from both primary and secondary sources. The primary data are collected by me and the secondary data used in this project is from the magazine, annual reports of the bank, web page, etc.

Data which are used in this project is collected both primarily and secondarily. The choice between the two sources viz. primary and secondary data depends on:

- Nature, scope and object of inquiry/study.
- Availability of financial resources and time.
- Degree of accuracy desired.
- The status of the investigator.

Primary Data

Primary data are generally used in those cases where the secondary data do not provide and adequate basis for analysis. In certain cases both data may be employed.

Direct Personal Investigation (Or Observation)

The data for this project are collected directly through personal observations of the bank. I have spent some times in the bank and had conversation with the personnel to know about the working condition.

Indirect Oral Investigation (Personal Interviews)

Detailed interviews of some IT personnel are conducted to collect primary data. As the data are specific in nature I have met the IT department head to have the first hand data. The priority is given to the importance of the question while taking interviews.

Secondary Data

The reason why secondary data are being increasingly used is that published data are now available covering diverse fields so that the researcher find required data readily available to him/her in many cases. Besides these, the availability of finance and time are also taken into consideration. The data collected secondarily are the brochures of NIB, annual report of NIB, NIB website, published official documents, magazine and published reports/statements.

3.3 Analytical Tools and Technology

The following tools are used in this project to represent the data that provide meaningful information for the reader.

Graph and Table

Various graphs and tables are used to present the data and information of the bank. Since the visual presentation of data is much better than that of data only. The reader can quickly gain the knowledge through the analysis of graph and table.

Data Flow Diagram

For the graphical representation of data flow process in the organization the data flow diagram is used. Process modeling involves graphically representing the functions, or processes, which capture, manipulate, store, and distribute data between a system and its environment and between components within a system. A common form of a process model is a data flow diagram. Data flow diagram is a picture of the movement of data between external entities and the processes and data stores within a system. Over the years, several different tools have been developed for process modeling. In this project, we focus on data flow diagrams, the traditional process modeling technique of structured analysis and design and the technique most often used today for process modeling. Data flow diagramming is one of several notations that are called structured analysis techniques. Although not all organizations use each structured analysis technique, collectively techniques like data flow diagrams have had a significant impact on the quality of the systems development process.

Data flow diagrams are versatile diagramming tools. With only four symbols, you can use data flow diagram to represent both physical and logical information systems. Data flow diagrams are not as good as flowcharts for depicting the details of physical systems; on the other hand, flowcharts are not very useful for depicting purely logical information flows. In fact, flowcharting has been criticized by proponents of structured analysis and structured design because it is too physically oriented. Flowcharting symbols primarily represent physical computing equipment, such as punch cards, terminals, and tape reels. One continual criticism of system flowcharts has been that reliance on them tends to result in premature physical system design.

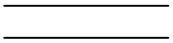
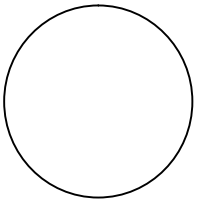
Consistent with the incremental commitment philosophy of the SDLC, you should wait to make technology choices and to decide on physical characteristics of an information system until you are sure all functional requirements are right and accepted by users and other stakeholders. DFDs do not share this problem of premature physical design because they do not rely on any symbols to represent specific physical computing equipment. They are also easier to use than flow charts as they involve only four different symbols.

There are two different standard sets of data flow diagram symbols, but each set consists of sour symbols that represent the same things: data flows, data stores, processes, and sources/sinks (or external entities). The set of symbols we will use in this project was devised by DeMarco and Yourdon.

A ***data flow*** can be best understood as data in motion, move g from one place in system to another. a data flow could represent the results of a query to a database, the contents of a printed report, or data on a data entry computer display form. A data flow is data that move together. Thus, a data flow can be composed of many individual pieces of data that are generated at the same time and flow together to common destinations. A ***data store*** is data at rest. A data store may represent one of many different physical locations for data, for example, a file folder, one or more computer based file, or a notebook. A data store might contain data about customers, students, customer orders, or supplier invoices. A ***process*** is the work or actions performed on data so that they are transformed, stored, or distributed. When modeling the data processing of a system it doesn't matter whether a process is performed manually or by a computer. Finally, a ***source/sink*** is the origin and /or destination of the data. Source/sinks are sometimes referred to as external entities because they are outside the system. Once processed, data or information leave the system and to some other place.

Figure 3.3

Data Flow Diagram Symbols

Object	**DeMarco & Yourdon symbols**
External Entity	
Data Flow	
Data Store	
Process	

CHAPTER-IV

SYSTEM ANALYSIS, DESIGN AND DATA PRESENTATION

4.1 Centralized Versus Decentralized Organization

There are several arguments for both centralized and decentralized organizations. Here the purchasing function, warehouses and transports are analyzed regarding this eternal question.

4.1.1 How to Structure the Purchasing Function?

The main question is whether the purchasing function in a company should be centralized or decentralized. Centralized purchase gives several advantages such as: larger volumes, which further result in better negotiation position and better prices. Furthermore it is possible to utilize specialized purchasers in a centralized function and it is also easier to coordinate the activities between the company and the suppliers when having a centralized organization. A reduction of the supplier base is significantly easier to facilitate when it is handled by a centralized purchasing organization. One disadvantage with centralized purchasing function is that it removes responsibility from the different decentralized business units. Often the business units are convinced that they can reach better conditions and lower prices on their own. The advantage with decentralized purchase is the nearness between the purchase and the end user of the products, the production for example. If purchasing is an integrated function with the production it is impossible to keep that contact fully when purchasing is centralized. There are advantages with both options; therefore the choice of purchase organization will always be a compromise. The main issue is to try to get the good pieces out of both types of organizations. The centralized purchasing function could for example be combined with purchasers localized at the production plant handling the purchase of critical components that has a close connection to the core production processes. On the other hand a decentralized organization could be combined with corporate agreements where the aggregated volume is negotiated and that means that the scale of the purchase is achieved. Centralized or decentralized, there is no perfect organization. Companies will constantly try to achieve the advantages of the organization that they do not use. The type of organization used can be seen as a pendulum over time, moving between different levels centralization.

Basically the compromises often result in that standardized components and commodities used in several production units is centrally purchased, while special components that are important for only one production unit are purchased decentralized close to the production. In other words; the greater the commonality is between the different business units, the greater are the benefits of a centralized purchase. Another parameter to consider is the geographic location; due to cultural differences it may seem more complicated to have a centralized approach when the business units are far away from each other geographically. Supplier base structure also affects the choice, the fewer and stronger the suppliers are in a segment the stronger the need is for a centralized structure to get a more equal power balance. Sometimes expertise is required in the purchase, for example if the price of a commodity is exposed to significant price fluctuations it is easier to handle those challenges with a centralized approach.

The discussion whether to centralize purchasing operations is interesting from an outsourcing point of view. As mentioned a centralized purchase could negotiate better prices. Many organizations have experienced a lack of leverage when they have outsourced some of their production. Therefore, many organizations have tried to regain the leverage in their purchase by negotiating the aggregated volume covering both the internal need of components and the need of components at the outsourced manufacturer. Such global agreements have proven to be efficient if the material and order flow still is direct between the supplier and the manufacturer. It makes little or no sense for the buying organization to receive the components and distribute them to the manufacturer. The only reason for such choice should be to gain control of the usage and costs of components at the manufacturer. In such case it is probably more efficient to invest in better information system in order to gain this sort of control. The most inefficient strategy is to physically store the components before delivering them to the manufacturer. This involves potential errors, delay in time, damage, wasted handling costs etc. This could only be reasonable if the need of kitting is extremely high or if the manufacturer is only used temporary and the buying organization therefore neglect to give the manufacturer authority to order them by them self.

4.1.2 Centralized Warehouse

The modern information technology has enabled the possibility to manage and structure a huge amount of data. This facilitates that different organizations could exchange information without any delay. This has enabled a new distribution structure. The new distribution structure is based on a centralization of both the warehouses and the administrative operations. The previously most common structure was a vertical organization of the warehouses, containing central warehouses and regionally controlled regional warehouses. However, there are several signs indicating that the centralized structures lead to decreased costs and furthermore also increased service levels. The reasons for these effects, which can be summarized in the following points, are:

- The **whole assortment is available** at the central warehouse. Therefore the lead-time is fixed, short and well known. Furthermore the transport cost is also fixed and well known. This would be very difficult to accomplish with several regional warehouses.

- The product flow through a centralized warehouse is much easier to control. If two warehouses are merged, the **total safety stock could be decreased** because the demand from the different customers is never 100% correlated i.e. the maximum demand do not occur at the same time for both warehouses. When safety stock is lower, cost of tied capital in inventory is decreased. The reduction in safety stock as an effect of centralization can be defined as the Portfolio Effect. The portfolio effect is affected by a number of variables: the number of past stocking locations that are merged into a centralized warehouse, sales correlation between the past stocking locations and the standard deviation of sales of the different stocking location.

- **Economies of scale.** When doing all the administration at the same place, investments in automatic processes and computer tools pay off faster, i.e. more effective tools and a higher level of automation can be used to handle the goods. When handling all warehouse operations at the same place, savings in personnel could be done.

- **Savings in Learning**. Fast introduction of new components and less scrapping costs when replacing an old article.

- **Reduction of the Bullwhip Effect**. The bullwhip effect is directly correlated to the number of stocking points in the supply chain. Therefore, centralized warehouse structure reduces the bullwhip effect. Estimates that have been done indicate that the bullwhip effect is amplified to the double for every level of warehouses in the supply chain.

- **Less Non-Value Adding Activities**. With a centralized warehouse the number of non-value adding moments such as loading, un-loading, packaging, sorting and controlling is decreased. The number of warehouses should be determined by the required lead-time i.e. the only reason why an extra warehouse should be built is to meet lead-time requirements. It is very important that the required lead-time is determining how many warehouses that is optimal.

4.2 Structure of Supply Chain Management

The information system that should be used to manage the centralized warehouse should be linked directly to customer needs. When the customers place an order, the order should immediately be transferred to a replenishment order at the central warehouse. The speed of the information system enables production and replenishment to be based on point of sales data combined with forecasts. As a result the administrative lead-time should be close to zero and all information gathered at all the different markets should immediately be available to the distribution administration. The management of a supply chain must reflect the product characteristics. A functional product with stable demand suffers a hard price competition. Therefore, it is crucial to optimize such a supply chain in terms of optimal order quantities and minimized inventory levels. This could be achieved when the forecast is accurate, which facilitates better production planning. An innovative product on the other hand with unstable demand and a lot of variants must prioritize the lead-time rather than the price, since the incentive to bring new products to market as soon as possible is high. A responsive supply chain rather than optimized, fits for innovative products.

Hub and Spoke

Hub and Spoke is a type of network structure for the distribution of goods. Rather than to route goods directly from origin to final destination the Hub and spoke structure connects the different points of origins and destinations in one or several hubs. If there is more than one hub these are connected to each other with higher volume pathways. Single transports are gathered in a central point in the supply chain, the hub, where the goods are cross-docked and sent via channels, spokes, to their destinations. The hub then resembles a central warehouse. An example where this structure is used is in the air travelling business. Passengers from one city going to different destinations travel on the same flight to a hub where they are regrouped, with passengers from other cities, and travel to another hub or their final destination.

The transports to and from a hub become frequent and therefore a company could take advantage of economies of scale in the hub operations. There is also a great difference in the number of relations, or transport combinations, in a hub and spoke system compared to a conventional system. When the number of terminals is high, the reduction in the number of contacts is very high. At the same time the requirements of the hub increases with a higher number of terminals. The hub requires an advanced material handling system to keep track of all the goods. The hub and spoke system can be further developed so that the terminals work as points where the goods are cross docked or split up into smaller orders for a lower tier in the structure. The necessary number of vehicles for transportation is lowered with the decreased number of transport relations. That results in a higher loading ratio in the vehicles.

E-Commerce Solutions

It is crucial to make transactions in a supply chain in a system that fits with the requirements in each relation. In high frequency relations it is more beneficial to invest in an automatic transaction tool. There are different systems in which transactions could be made all with some positive and negative aspects:

ERP Solutions

ERP (Enterprise resource planning) systems reduce the manual activities related to the financial, inventory, customer order activities and capture data from the transactions. ERP systems use a single data model that decides how data should be stored and

transferred. Thus, ERP achieve a high level of integration. However, to use the same data model within a supply chain and even in larger companies has proven to be difficult. The single data model should represent and fit how companies work in best practice. Nevertheless, the problem many companies experience during implementation of an ERP system is that they both have to implement the ERP system and change the way they work in order to fit with the ERP system. This results in a very painful and time-consuming implementation process. Unlike today's ERP systems, a supply chain solution must be able to cope with all the different information systems in the supply chain. The benefit with ERP systems is the high level of integration that it involves and the downside is the inflexibility. Therefore ERP solution is recommended for single companies but it could be very difficult to implement it in a whole supply chain.

EDI Communication

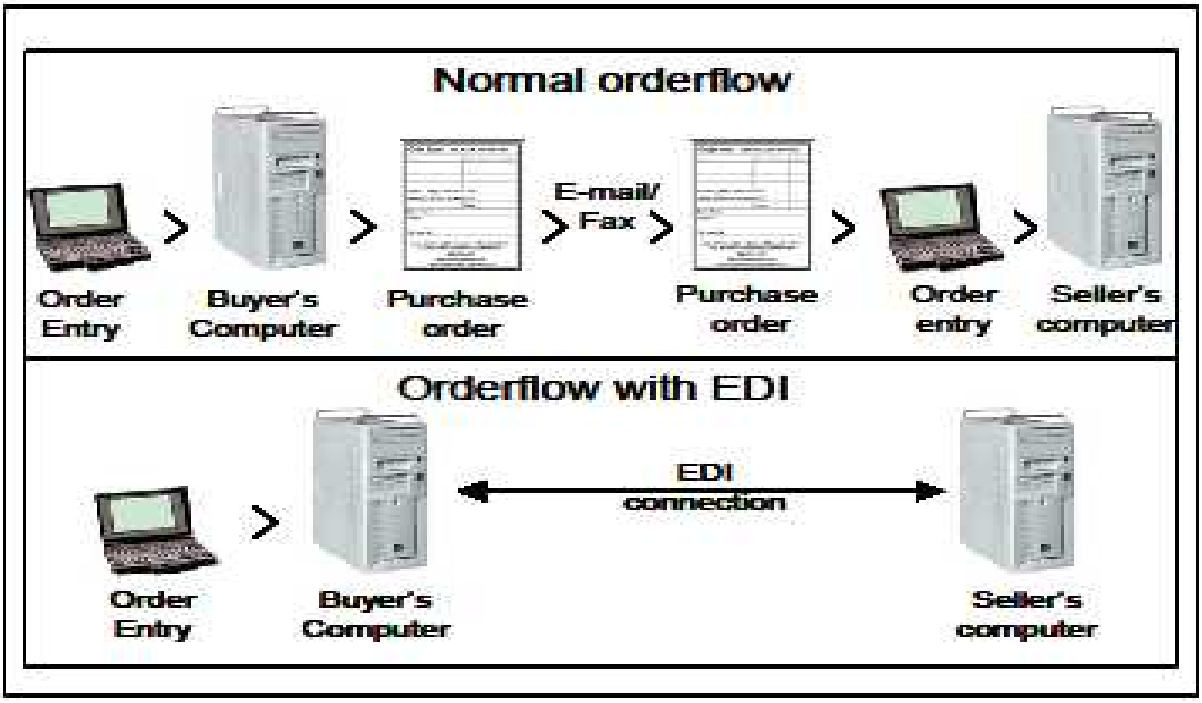
The ordering process between two companies could be significantly more efficient using an EDI connection. EDI, which is the acronym of Electronic Data Interchange, is a predefined protocol that enables direct communication between the companies computer system. The difference that this involves for the order flow is illustrated in Figure 4-1. EDI facilitate more effective order flow. Same level of improvement could be seen in other contacts in the purchasing process such as order confirmation and invoice handling. The potential benefits of EDI are therefore:

- Reduced paperwork
- Improved precision due to reduction in manual processing
- Increased speed in the transmission of the order and other data
- Reduced clerical/administrative work in data entry, filling, mailing, and related tasks
- Reduced inventory due to improved precision and reduced order cycle time

The benefit of EDI must be weighted against the cost that one connection involves. An EDI connection could be established between two companies directly. However, with complex supply networks, that course of action involves a risk. The risk is that several independent systems evolve causing an expensive and redundant network. That is the benefit with a hub solution where several companies connect to the same hub administrating the orders by EDI.

Figure 4.1

Normal Order Flow versus EDI



Hub Solution

A hub has the benefits that every company in the network gets one single interface towards the other companies in the system. A hub could furthermore act as a converter if two companies do not use the same data standard for communication. The frequency in the information flow in the connection to the hub is higher than the information flow in one single direct connection. Therefore the investment in an EDI-connection pays off faster using a hub solution than when investment is made in individual direct connections. A hub solution is therefore beneficial for supply networks. A hub is easier to implement if there is a strong company in the supply network that initiate the implementation of such a hub and thereby force the other companies in the network to cooperate with the hub.

4.3 System of Surya Nepal

As we discuss above that ERP (Enterprise Resource Planning) can help the organization in every aspect with perfect control. Supply Chain Management is also easy by adopting the perfect ERP. With respect to this the SURYA NEPAL is using

Ramco Marshal a perfect ERP which can also better manage the SCM of the company. Furthermore it has been discussed below.

4.4 Enterprise System

Around the globe, companies are increasingly becoming more connected, both internally and with other companies. They want to be able to react instantaneously when a customer places a large order or when a shipment from a supplier is delayed. Managers want to know the impact of these events on every part of the business and how the business is performing at any point in time. Enterprise systems provide the integration to make this possible. Let's look at how they work and what they can do for the firm.

4.4.1 Overview of Enterprise Systems

A large organization typically has many different kinds of information systems that support different functions, organizational levels, and business processes. Most of these systems were built around different functions, business units, and business processes that do not "talk" to each other and thus cannot automatically exchange information. Managers might have a hard time assembling the data they need for a comprehensive, overall picture of the organization's operations. For instance, sales personnel might not be able to tell at the time they place an order whether the items that were ordered were in inventory; customers could not track their orders; and manufacturing could not communicate easily with finance to plan for new production. This fragmentation of data in hundreds of separate systems could thus have a negative impact on organizational efficiency and business performance. Figure 4-2 illustrates the traditional arrangement of information systems.

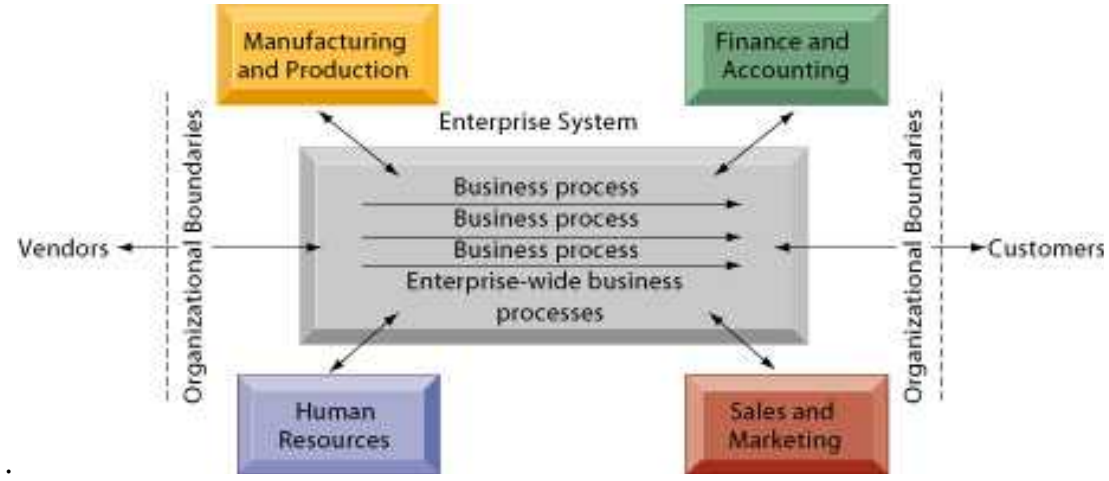
Figure 4.2

Traditional View of Systems

In most organizations today, separate systems built over a long period of time support discrete business processes and discrete segments of the business value chain. The organization's systems rarely include vendors and customers. Enterprise systems, also known as enterprise resource planning (ERP) systems solve this problem by providing a single information system for organization-wide coordination and integration of key business processes. Information that was previously fragmented in different systems can seamlessly flow throughout the firm so that it can be shared by business processes in manufacturing, accounting, human resources, and other areas. Discrete business processes from sales, production, finance, and logistics can be integrated into company-wide business processes that flow across organizational levels and functions. Figure 4.3 illustrates how enterprise systems work.

Figure 4.3

Enterprise Systems



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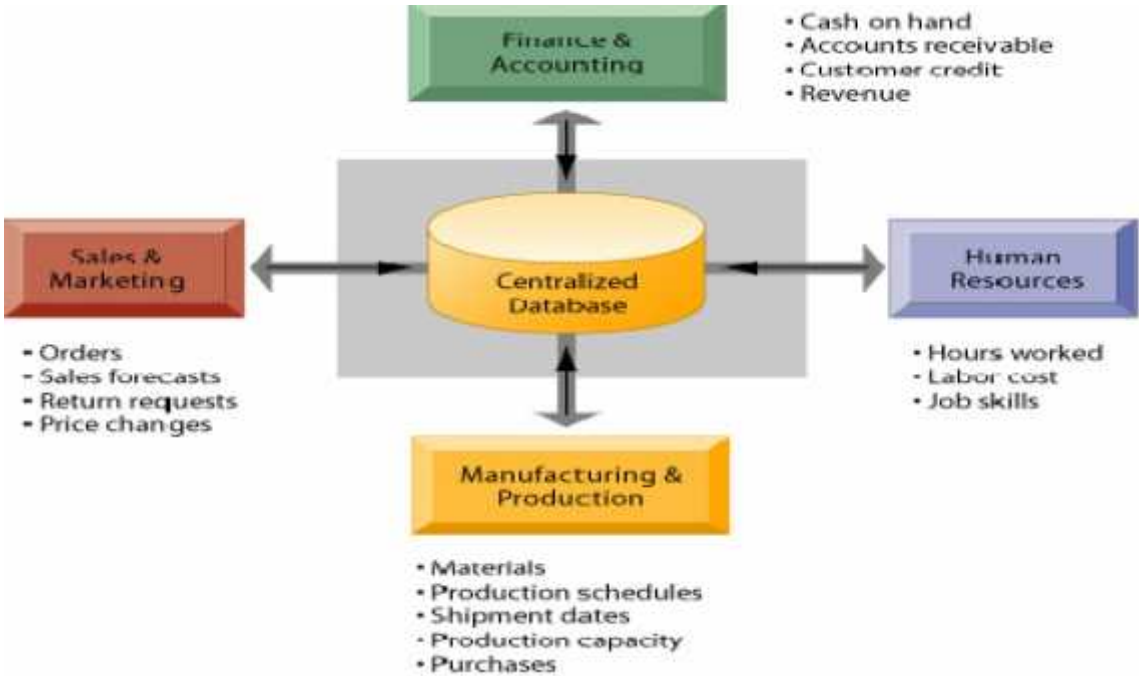
Enterprise systems integrate the key business processes of an entire firm into a single software system that enables information to flow seamlessly throughout the organization. These systems focus primarily on internal processes but may include transactions with customers and vendors. The enterprise system collects data from various key business processes in manufacturing and production, finance and accounting, sales and marketing, and human resources and stores the data in a single comprehensive data repository where they can be used by other parts of the business. Managers emerge with more precise and timely information for coordinating the daily operations of the business and a firm wide view of business processes and information flows.

4.4.2 Enterprise Resource Planning

Enterprise resource planning (ERP) systems are based on a suite of integrated software modules and a common central database. The database collects data from and feeds the data into numerous applications that can support nearly all of an organization's internal business activities. When new information is entered by one process, the information is made immediately available to other business processes.

Figure 4.4

Enterprise System Architecture



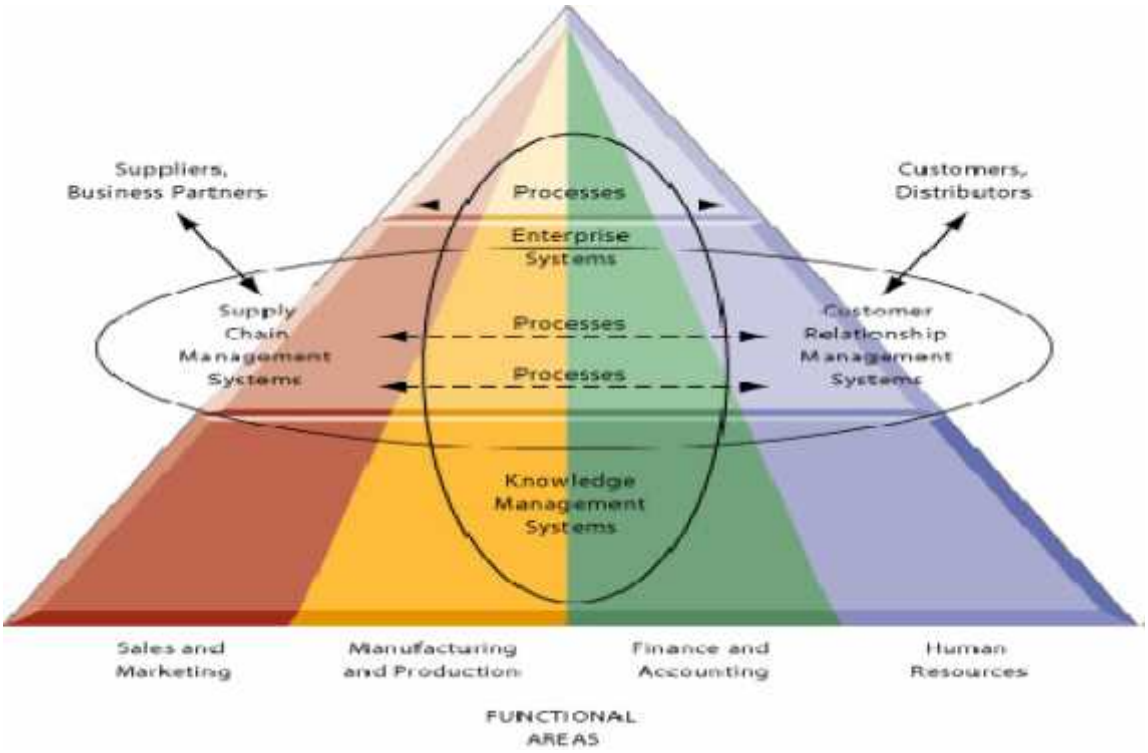
Enterprise systems feature a set of integrated software modules and a central database that enable data to be shared by many different business processes and functional areas throughout the enterprise. If a sales representative places an order for tire rims, for example, the system would verify the customer's credit limit, schedule the shipment, identify the best route, and reserve the necessary items from inventory. If inventory stock was insufficient to fill the order, the system would schedule the manufacture of more rims, ordering the needed materials and components from suppliers. Sales and production forecasts would be immediately updated. General ledger and corporate cash levels would be automatically updated with the revenue and cost information from the order. Users could tap into the system and find out where that particular order was at any minute. Management could obtain information at any point in time about how the business was operating. The system could also generate enterprise-wide data for management analyses of product cost and profitability.

4.4.3 Systems for Enterprise-wide Process Integration

Today's firms are finding that they can become more flexible and productive by coordinating their business processes more closely and, in some cases, integrating these processes so they focus on efficient management of resources and customer service. Enterprise applications are designed to support organization-wide process coordination and integration. These enterprise applications consist of enterprise systems, supply chain management systems, customer relationship management systems, and knowledge management systems. Each of these enterprise applications integrates a related set of functions and business processes to enhance the performance of the organization as a whole. Generally, these more contemporary systems take advantage of corporate intranets and Web technologies that enable the efficient transfer of information within the firm and to partner firms. These systems are inherently cross-level, cross functional, and business process oriented. Figure 4-5 shows that the architecture for these enterprise applications encompasses processes spanning the entire organization and, in some cases, extending beyond the organization to customers, suppliers, and other key business partners.

Figure 4.5

Enterprise Application Architecture



Enterprise applications automate processes that span multiple business functions and organizational levels and may extend outside the organization. Enterprise systems create an integrated organization-wide platform to coordinate key internal processes of the firm. Information systems for supply chain management (SCM) and customer relationship management (CRM) help coordinate processes for managing the firm's relationship with its suppliers and customers. Knowledge management systems enable organizations to better manage processes for capturing and applying knowledge and expertise. Collectively, these four systems represent the areas in which corporations are digitally integrating their information flows and making major information system investments.

4.5 Ramco Systems

Ramco Systems arrived in the United States in 1994 after penetrating the Asian market and commencing operations in Europe. Our goal was to understand the needs of potential ERP (Enterprise Resource Planning) customers in the United States so that we could build solutions to these needs into our software suite, Ramco Marshal. As we undertook this task, continued aggressive forays into the European and Asian markets resulted in impressive contracts with companies such as ETA SA (the

production corporation for Swatch) and in Ramco Systems Limited being named one of the ten hottest IT (Information Technology) companies of 1997 by Computerworld magazine, Switzerland's premier IT publication.

During our introduction into the United States market, we achieved contracts with companies like Rohm Semiconductor, Orbit Semiconductor, and SNC Manufacturing. We also focused on Microsoft technologies such as Windows NT and SQL Server. As a result, we became a Microsoft Solution Provider and Bill Gates of Microsoft launched version 3.0 of Marshal.

Building on our experiences with our early United States customers, we expanded our operations, especially in marketing and product support, and opened new offices in Atlanta and Chicago. We have been commercially operational since December 1997, and our recent customers include Hoosier Energy, Columbia Helicopters, and Sunkist. We have also recently formed strategic partnerships with implementation experts Robert Abair and Associates, T. A. Carlson and Company, and the Strategic Concepts Group in Canada. The current version of Marshal, version 3.1, is fully 32-bit compatible and has been certified as Year 2000 compliant by the Information Technology Association of America (ITAA).

RAMCO MARSHAL

Overview

Our enterprise management solution, the ITAA*2000 certified Ramco Marshal, has been developed with an understanding of the forces of change in the business world. Supply chain requirements and customer support issues force many companies to operate from multiple locations and with multiple currencies and multiple languages. Organizational growth and diversity cause businesses to require a broad range of applications and features. Continual business process reengineering is necessary to stay competitive. To respond to forces such as these, Ramco Marshal provides a unique approach featuring distributed computing, breadth of applications, and flexibility.

Distributed Computing

Marshal divides the processing load between the client and the server. Application logic that does not require any external data and the graphical user interface are placed on the client. Application logic that requires access to external data resides on the server. Overall, Marshal allocates about half of the computing load to the server, which minimizes network traffic. Marshal also allows the application modules to be distributed over multiple servers, which balances the processing load even more effectively. At the same time, Marshal provides transparent access across this distributed area, making all the databases appear to be a single, integrated database. In addition, to simplify widely distributed computing, Marshal provides support for multiple companies, locations, currencies, and languages.

Breath of Applications

Marshal consists of 35 applications in 9 functional areas: Process Production, Discrete Production, Sales, Treasury, Financials, Human Resources, Logistics, Plant Maintenance, and Statistical Process and Quality Control. Marshal also includes security features and various productivity tools such as an Application Configurator, Dcube (a data drill down tool), the Workflow engine and the Report Writer.

Flexibility

Each of Ramco Marshal’s application modules are capable of working alone or with other Marshal or third party applications in any configuration, in order to meet specific business needs. Marshal is fully scalable, allowing the addition or subtraction of users, functions, applications, servers, or locations with minimal effort. Marshal’s tools and utilities facilitate customization on every level from the entire user interface to individual data fields - for a single user, an entire organization, or any number in between. In addition, Marshal was created using industry standard tools (Visual C++ for Microsoft Windows NT and SQL Server) to simplify future addition to or modification of the source code.

OTHER KEY FEATURES

Ease in use

Marshal's intuitive graphic user interface dramatically shortens learning curves and reduces training time and costs. Information list boxes and defaults reduce code

memorization and redundant data entry. The comprehensive printed documentation and context-sensitive, cross-referenced on-line help included with each application enhance Marshal's ease-of-use.

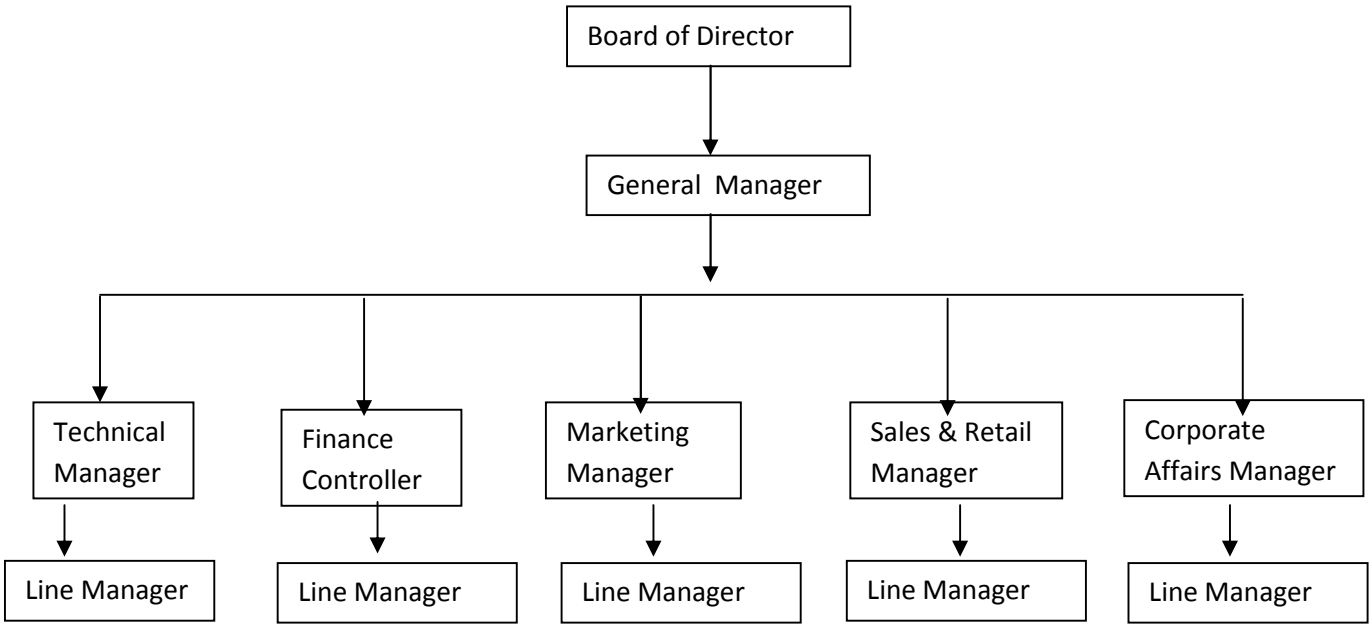
Security

Security permissions may be defined and customized for application modules, roles, users, and/or transactions, based upon organizational structure and/or company policy. Marshal also allows generation of an audit trail for specific transactions to track changes to the data.

4.6 Organization Structure

Figure 4.6

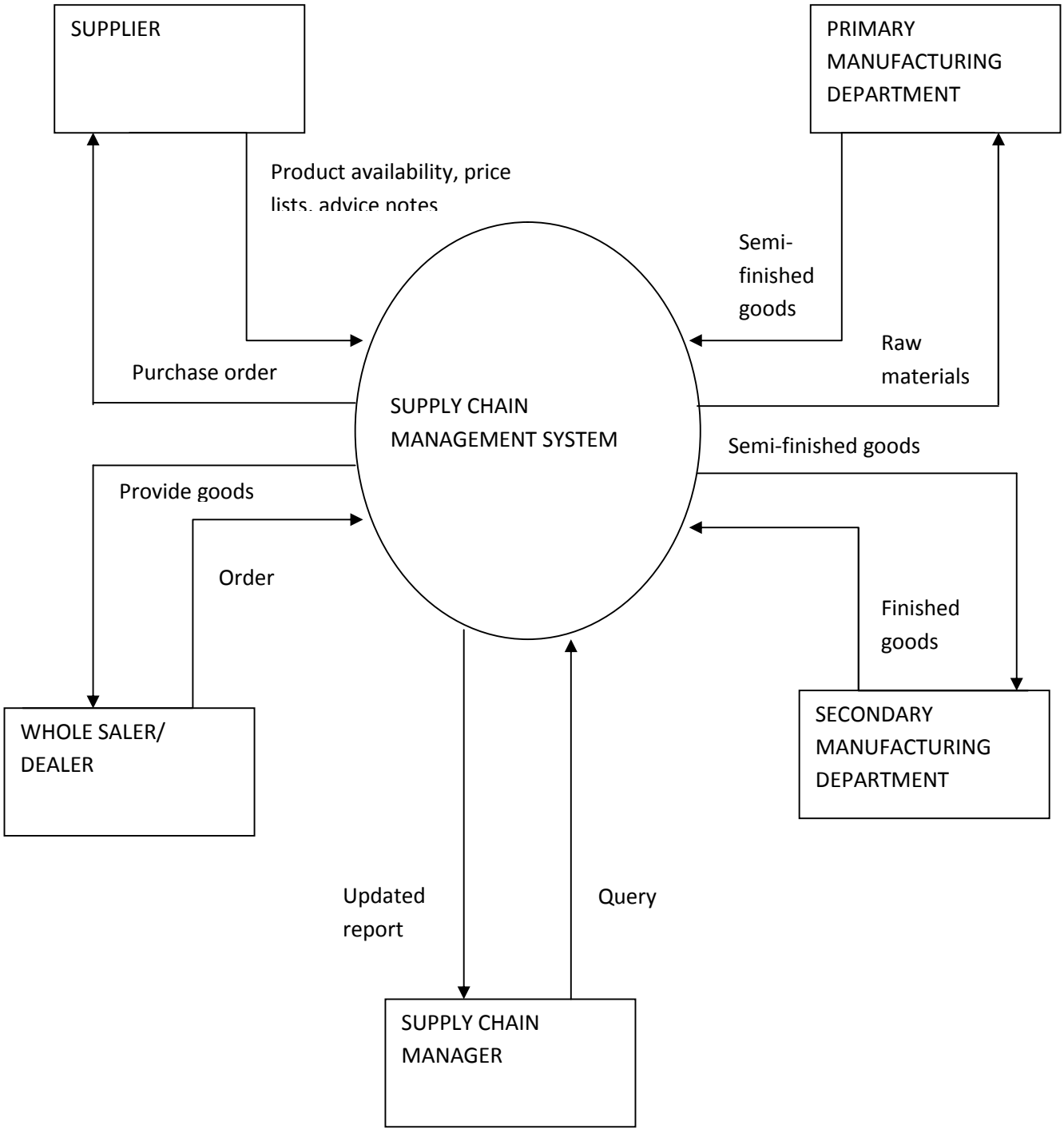
Organization Structure



4.7 DFD of Existing System

Figure 4.7

DFD of Existing Supply Chain Management System



The above diagram is about the data flow of external entities (source/sink) of SCM of SURYA NEPAL. The brief descriptions of the flow of data are set forth as follows.

ENTITIES

Supplier

Suppliers are those who provide goods, price lists and advice notes. The company gets necessary goods and technology through the domestic and international supplier. SCM system defines the economic order quantity to be ordered. Similarly the supplier provide invoice to the system for payment.

Primary Manufacturing Department

SCM system provides necessary raw materials to the primary manufacturing department and receives semi-finished goods from it. The department orders the necessary raw materials and report about the work in progress.

Secondary Manufacturing Department

SCM system transfers the semi-finished goods to the secondary manufacturing department and receives finished goods from it. Necessary order are being made by the department and its report its work in progress to the SCM system

Wholesaler Dealer

Wholesaler receives goods from the SCM system in bulk and distribute to retailers and secondary wholesaler. Secondary wholesaler too transfers goods to retailers. Finally the goods are made available to the customer by retailers. The SCM system provides goods to the dealer and record the report.

Supply Chain Manager

Manager is to planning and controlling the whole SCM system effectively. Manager receives necessary information as report as he queries the SCM system to the overall flow of goods.

4.8 Analysis of Existing Technology

The company is using high performance technology. For the overall management of the company activities ERP software Ramco Marshal is performing in full flex mode. Its serve all the functional areas of the company including SCM. All the technologies existing in the company is as per the requirement of its ERP i.e. Ramco Marshal. Short description of the technologies used in the existing system is as follows.

Mobile

Mobile is the device to communicate through making call or sending SMS (Short Message Service). In the SCM system after accomplishment of the every transaction the information is updated in the system through SMS. It is a easy and fast communication device which enhance quick reporting and decision making.

ERP

Enterprise system is that which can look after overall activities of the company and provide prompt decision making tools. In SURYA NEPAL the SCM system is handle by the ERP called Ramco Marshal. Each and every data related to SCM is updated to the SCM system in Ramco Marshal immediately. This enhances better performance of the overall company.

Incentive Software's

Besides of the Ramco Marshal the company is using various incentive software's for better performance. It has been using various data entry software too. Which, finally support the ERP Ramco Marshal.

Computer/Intranet/ VSAT

No need to say that the company is using high yielding computer system. It has its own intranet. For this network it has also its own VSAT. The data and information transfer so seamlessly from factory to corporate house and vice-versa.

4.9 Limitation of Existing System

The time is ripe to radically rethink the application architectures, delivery, and supporting business models from technology providers, consumers, and services firms that connect the dots to deliver complete applications to manufacturing companies to support operations excellence across integrated manufacturing operations. The urgency is to support that growing demand for manufacturing systems that enable demand-driven manufacturing.

The global manufacturing community needs to recognize that force-fitting monolithic applications into manufacturing operations is costly, risky, and ultimately creates

systems that hinder agility, defeating the original intent. While adopting ERP the company has to change its structure according to the requirement of the ERP. Ramco marshal, thought is a high performance ERP it has some limitations also.

Here's a quick recap of what's wrong with existing ERP of SURYA NEPAL.

- Inflexible ERP (Ramco Marshal) architectures don't scale for multisite rollouts.
- Inflexible ERP business processes don't mesh with the realities of detail manufacturing operations.
- ERP can not cope with constant reconfiguration and requirements to support lean and Six Sigma initiatives.
- ERP has functional inadequacies when faced with multiple manufacturing styles with their own characteristic data models.
- Deployment of ERP applications requires significant and increasingly scarce engineering skills.
- Adapting ERP to manufacturing requires domain knowledge that corporate IT business groups don't have.
- The complexity and cost of ERP deployments and traditional hard-wired automation approaches have created an automation threshold, and it's been difficult to justify the ROI for manufacturing software investments below it.

Despite the Excellency of Ramco Marshal the company is not letting its distributers to access information through its intranet. Because of this the distributors are unable to get updated information about the product and the supply chain system. So there is the effect of bullwhip.

4.10 Major Finding of the Existing System

Enterprise systems promise to integrate diverse internal business processes of a firm into single information architecture, and that integration can have a very large payback if firms install and use enterprise software correctly. Enterprise systems can produce value both by increasing organizational efficiency and by providing firm wide information to help managers make better decisions. Finding of existing system Ramco Marshal are discussed below.

A more uniform Organization

Companies can use enterprise systems to support organizational structures that were not previously possible or to create a more disciplined organizational culture. For example, they might use enterprise systems to integrate the corporation across geographic or business unit boundaries or to create a more uniform organizational culture in which everyone uses similar processes and information. An enterprise-enabled organization does business the same way worldwide.

More efficient Operations and Customer-driven Business Processes

Enterprise systems can help create the foundation for a more customer-driven organization. By integrating discrete business processes in sales, production, finance, and logistics, the entire organization more efficiently respond to customer requests for products or information, forecast new products, and build and deliver them as demand requires. Manufacturing is better informed about producing only what customers have ordered, procuring exactly the right amount of components or raw materials to fill actual orders, staging production, and minimizing the time that components or finished products are in inventory.

Firm Wide Information for Improved Decision Making

In addition to monitoring operational activities such as tracking the status of orders and inventory levels, enterprise systems also improve organization-wide reporting and decision making. Enterprise systems create a single, integrated repository of data for the entire firm. The data have common, standardized definitions and formats that are accepted by the entire organization. Performance figures mean the same thing across the company and can be provided automatically without human intervention. Senior management can more easily find out at any moment how a particular organizational unit is performing. For example, an enterprise system might help management immediately determine which products are most or least profitable. Enterprise software includes analytical tools for using data captured by the system to evaluate overall organizational performance. Ramco Marshal’s enterprise software includes analytics for profitability management, product and service cost management, overhead cost management, risk management, balanced scorecard, value-based management investment planning, and other tools for giving managers a comprehensive view of firm performance.

4.11 Concept of Modifying the System

Besides the company is running high performance software Ramco Marshal, it has to improve in its utilization. The company is using the ERP for its internal entities only; it must expand the use of the ERP to the external entities too i.e. for the distributors. The company is leader in Nepalese market. It doesn't mean that it has to stop enhancing the system. While distributors get limited information about the supply system there is the problem of bullwhip effect. So to remove this problem the company system must include distributors too or must let its distributors to access some limited data from the supply system.

Accurate data about the demand from the customer and the availability of the product in certain time help the company to reduce its operating costs. When there is the close system the distributors can't know about the availability of the product and the company itself doesn't know when and what quantities of product are necessary to meet the customer demand. This might cause the bullwhip effect such as distributors ask for more products suspecting that the price will go up or the demand will be high, this effect the company production and the company has to increase its production for the abstract demand which really doesn't exist. So for the effective supply chain system the information must be shared by all entities.

4.11.1 Causes of Bullwhip Effect

It is important for us to understand the causal factors that create supply chain oscillations. Here are some examples:

- **How does Sporadic Sales Promotions Impact Demand Patterns, Cost and Margins?**

Many companies that conduct sales promotions that effect current inventory and the supply pipeline do not understand the impact, on a quantitative and qualitative basis, of what their sales promotion policies and practices actually do. After gaining a complete and accurate understanding of what sales promotions do for you vs. what sales promotions do to you, most companies are left with the need to answer the question, "What sales promotion policies and practices should we change?" A *common* complaint from the manufacturing side of the business, and a common

reason for severe demand distortions that cause supply chain oscillations, are unforecasted and “unknown” sales promotions. These unplanned for sales promotion events ripple throughout the supply chain creating excess costs which border on the incalculable.

⟩ Does your Sales Incentive Plan Contribute to Demand Distortions?

Sales targets, quotas and commission accelerators when applied to an extended quota period, such as three months, will often cause demand distortion. Management needs to examine the rationale for sales incentives to be based on shorter-intervals rather than three months or longer. Typically, shorter measurement periods promote a smoothing of demand resulting in decreased ordering lumps resulting in a dampening of the “Bullwhip Effect”.

⟩ Are you the victim of False Orders and Subsequent Cancellations?

Two common causes for false orders are:

1. The customer does not have confidence in your ability to rapidly and reliably supply product. In other words, your customers do not believe you will ship their orders on-time. As a result, customers will hedge by placing higher than projected demand on the manufacturer in the hope they will receive what they need, when they need it and then, when product availability is considered satisfactory, cancel the balance of future orders. These “false” orders often result in excess purchased material in inventory and in the pipeline as well as underutilized capacity.

2. Sales personnel who will not meet their quota for a time period that would accelerate commissions and qualify them for a bonus, will often have added or change orders placed by a cooperative customer to achieve quota. The customer in turn may later cancel, or return, part or all of the order, as well as expects some concessions and/or special treatment from the salesperson in the future for providing the “service”.

⟩ Do Transportation Incentives Cause Demand Lumps?

Transportation discount incentives for volume orders will often cause customers to accumulate orders and then release lumps of demand. After thoroughly examining the

impact that this incented distortion has on hampering your own supply chain planning capabilities, and the resultant associated costs, it may be time to examine your freight incentive practices.

) Have you Developed Partnerships Based on Trust with your Customers?

With distributors often leery of a manufacturer's ultimate intentions, especially with the possibility the distributor will be removed from the sales chain, and, the manufacturer selling directly to end-users, there is no desire to frequently share customer volumes, demand patterns and inventory positions. On the other hand, this mistrust contributes to demand oscillations, stock outs, higher inventories and lost sales for the manufacturer and distributor. Developing a workable and effective solution is essential. For whatever individual or combination of causes that creates demand surges and oscillations, these lumps of demand explode out through your supplier network and their supplier network often extending lead times due to unexpected, and often false, increases in demand. Then, the supplier network may not be able to get raw material in a short enough lead time which reverses in the supply chain as it causes theirs and your delivery lead time to lengthen. Then, the product manufacturer tells their distributors who tell their dealers that lead times have increased due to supply problems. The "Bullwhip Effect" is now traveling the other way - - down the supply chain. And, it may get worse with another "Bullwhip Effect" going up the chain again as longer lead times cause customer's replenishment planning systems to "kick-out" new, and very often, false demand for future supply coverage. This new surge in demand often causes decisions to be made that will increase capacity unnecessarily as the demand ultimately dissipates.

Other factors that cause oscillations in the supply chain are:-

1. 1 Forecast errors
2. Overreaction to backlogs
3. Lead time (of information-orders and of material) variability
4. No communication and no coordination up and down the supply chain
5. Delay times for material and information flow
6. Batch ordering (large orders result in more variance)
7. Rationing and shortage gaming

8. Price fluctuations
9. Free return policies
10. Inflated orders

4.12 Comparisons between New and Existing System

The new system is all about improving the existing system i.e. maximizing the utilization of current ERP Ramco Marshal. Currently ERP is only been used in intranet and the new system try to expand its use in extranet too i.e. distributors. In the new system some limited information about the stock, production and demand for the product are make available to the distributors to minimize the problem of bullwhip effect. The distributors get regular information about the availability of product and they maintain their stock and order rationally.

4.12.1 Impact of Bullwhip Effect

The variability that results from Bullwhip effect can cause numerous problems for the manufacturers.

- Excessive inventory investments: Since the Bullwhip effect makes the demand more unpredictable, all companies need to safeguard themselves against the variations to avoid the stock outs.
- Poor customer service levels: Despite the excessive inventory levels mentioned in the first consequence, demand unpredictability may cause stock outs anyways.
- Lost Revenues: In addition to the poor customer service levels of the second consequence, stock outs may also cause in lost revenues.
- Reduced Productivity: Since revenues are lost, operations are less cost efficient.
- More difficult decision making: Decision makers react to demand fluctuations and adapt (production and inventory) capacities to meet peak demands.
- Sub-Optimal transportation: Transportation planning is made more difficult by demand uncertainties induced by the Bullwhip effect.
- Sub-Optimal production: As transportation, greater demand unpredictability causes missed production schedules.

4.12.2 Cracking the Bullwhip Effect

Essential to minimizing the "Bullwhip Effect" is to first, specifically understand what drives customer demand planning and inventory consumption as they are the triggers for replenishment order quantities at various points in the supply chain. The most effective process for smoothing out the oscillations of the "Bullwhip Effect" will be customers and suppliers understanding what drives demand and supply patterns and then, collaboratively working to improve information quality and compressing cycle times throughout the entire process. More than likely, you will find opportunities for improvement by adopting some or all of the following actions, among others, to minimize the "Bullwhip Effect" and increase business performance.

- Minimize the cycle time in receiving projected and actual demand information.
- Establish the monitoring of actual demand for product to as near a real time basis as possible.
- Understand product demand patterns at each stage of the supply chain.
- Increase the frequency and quality of collaboration through shared demand information.
- Minimize or eliminate information queues that create information flow delays.
- Eliminate inventory replenishment methods that launch demand lumps into the supply chain.
- Eliminate incentives for customers that directly cause demand accumulation and order staging prior to a replenishment request, such as volume transportation discounts.
- Minimize incentivized promotions that will cause customers to delay orders and thereby interrupt smoother ordering patterns.
- Offer your products at consistently good prices to minimize buying surges brought on by temporary promotional discounts.
- Identify, and preferably, eliminate the cause of customer order reductions or cancellations.

Even the most modern of Supply Chain Management systems, with all the bells and whistles, cannot automatically stop the "Bullwhip Effect". It's a demand management process problem with very broad implications because it often encompasses policies, measurements systems, practices and, in some cases, the very core of an

organization's value and belief system. However, the degree of negative effect it can have on sales, market share, cost and profits can be enormous. Certainly a tough but very necessary problem to solve.

4.13 Application Modeling

We view a supply chain as a network consisting of suppliers, manufacturers, distributors, retailers, and customers. At the operational level, this network supports three types of flows that require careful planning and close co-ordination:

Material flows: which represent physical product flows from suppliers to customers as well as the reverse flows for product returns, servicing, and recycling.

Information flow: which represent order transmission and order tracking, and which coordinate the physical flows.

Financial flows: which represent credit terms, payment schedules, and consignment and title ownership arrangements.

The Network, in turn, is supported by Three Pillars:

Processes, which embed the firm's capabilities in logistics, new product development, and knowledge management;

Organizational Structures, which encompass a range of relationships from total vertical integration to networked companies as well as management approaches, and performance measurement and reward schemes; and

Enabling Technologies, which include both process and information technologies.

4.13.1 An Integrated Model of the Supply Chain

Supply chains perform two principal functions: the *physical* function of transformation, storage and transportation, and the *market mediation* function of matching demand and supply. While the physical function has been extensively studied within the production control and inventory management literature with a

view to locally minimize cost, innovative approaches to the market mediation function were suggested only recently. Supply chain design is concerned not only with the specification of customer zones, selection of manufacturing and distribution facilities, and allocation of product families to these sites, but also with the prioritization of the capabilities to be developed and retained internally, and the forging of new partnerships with other entities along a supply network. Supply chain design ought to be thought of as a dynamic process of assembling chains of capabilities and not just collaborating organizations. This *dynamic* view is particularly important in a fast-evolving world where new products and emerging distribution channels necessitate a continuous review of supply chain design decisions. We will refer to the rate of change in products, processes, technologies, and organizational structures within an industry as that industry's *clockspeed*. Just like product design has an enormous impact on manufacturing performance, superior supply chain design offers significant payoffs in managing and coordinating supply chain activities. This dynamic view may necessitate different perspectives (or mappings) for supply chain design. These perspectives include: organizational supply chain, capability supply chain, and technology supply chain.

An *organizational* map shows all the entities in a company's extended supply chain and illustrates all value-adding activities performed by each organization along the chain.

A focus on *technology*, on the other hand, traces the lines of dependency upstream to the suppliers and downstream to the customers, who provide and use, respectively, key technologies along the supply chain.

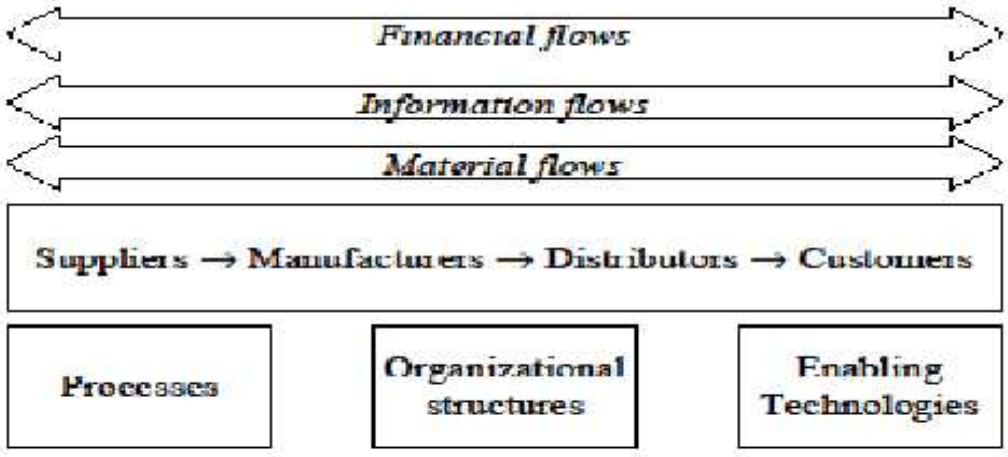
Finally, a focus on *capability* aims at identifying the key business process capabilities, which currently exist as well as which are desirable, along the supply chain.

Matching Demand and Supply in a Supply Chain

Supply chain coordination, is concerned with the coordination of the three types of flows once the supply chain design is finalized. Effective supply chain strategies (Figufifre 2) combine a range of approaches from operational flexibility such as the make-to-order (MTO) or postponement capability, channel alignment (e.g., vendor-

managed inventories, VMI), and joint decision making through information deployment (e.g., collaborative planning, forecasting and replenishment, CPFR). These approaches, in turn, typically lead to new forms of organizational structures (e.g., process orientation) and new forms of interorganizational collaboration (e.g., outsourcing via third-party service providers or contract manufacturers). This transformation has coincided with the emergence of information and communication technologies facilitating closer collaboration and promoting supply chain transparency. Technological breakthroughs, particularly in information technology, can significantly enhance both the efficiency of the network operations and the effectiveness of customer service on a global basis. Fine (1998) argues that all competitive advantage is temporary. From this perspective, supply chain solutions can, at best, be temporary as well. In other words, supply chain management is a *dynamic* challenge that requires a series of solutions in the face of changing industry requirements. The validity of a particular supply chain solution is therefore determined by the clockspeed of the industry, which reflects the rate of change in products, processes, technologies, and organizational structures in that industry.

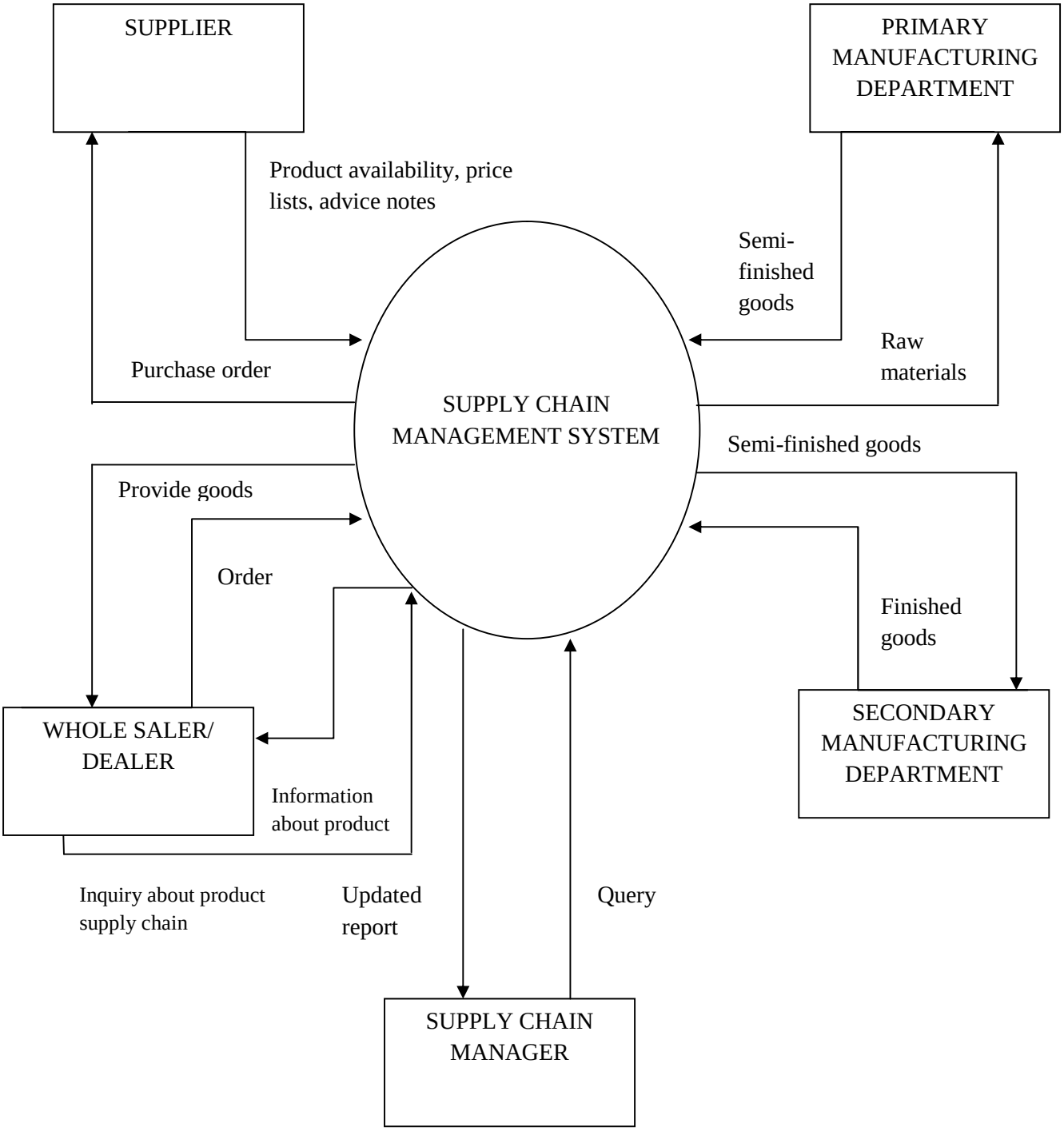
Figure 4.8
An Integrated Model of the Supply Chain



4.14 DFD of New System

Figure 4.9

DFD of New System



Since the new system is all about eliminating the bullwhip effect in supply chain system, effort is made here to enhance the use of system to its dealers. So the new DFD of supply chain management is as same as the existing one for the other entities except dealers/ wholesalers. In new system the dealers can enquiry about the product supply chain such as availability of the product, total production, production processes or stages and the system provides these information in return. These ensure the smooth running of products. There is no over stock by dealer and the company also get exact information about the demand and reduce operation cost.

4.15 Cost benefit Analysis and Feasibility Analysis of New System

Adopting the new system cost is equal to zero. In other hand the new system will reduce the operation cost of the company and smooth flow of the products. The system enhances the company to manage the real demand and stop over production and under production too. Such as: in garment segment the company has over production practice, because of this it has to clear its stock at discounted rate. This too increase the operation cost for the company. Eliminating the bullwhip effect will also ensure dealers for the availability of the product and reduce their stock cost. Production will be just equal to the demand of the product. This will benefit both the cigarette and garment section.

The new system is highly feasible as it is all about enhancing the use of the ERP Ramco Marshal. In the new system the dealer can also access the supply chain system. It means only limited access.

CHAPTER - V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

SURYA NEPAL is one of the leading company in Nepal regarding its production line: cigarette and garments. While in matter of using ICT in manufacturing and management it is the number one company. Since being UK based company it has standardized system. No doubt that the company has perfect ERP for the overall management of MIS, i.e. Ramco Marshal. Every single data is entered into the ERP and can be accessed by the whole entities.

The production line of the company is cigarette and garments. In garment segment the company usually produces somehow large number of goods and at the end of season it has to clear its stock by offering discount. So far in matter of clearing the stock it has to offer the scheme like buy 1 and get 1 free or buy 2 and get one free. The company produces the products with the knowledge that there is the large demand for the product and by the end of season it realized the problem of over production. The information flow over the SCM is exaggerated that's why there is the problem of over production. In true picture the demands for the garment are small from the customer and while the information flow from bottom to company it has been exaggerated. This is the effect of bullwhip in SCM.

Thought the SCM system is also being managed by Ramco Marshal, there is the lack of full utilization of it. The information for the external entities (wholesalers and retailers) is lacking. External entities can't access to the SCM data. That's why they don't know about the finished goods, production capacity, goods in production process and the stock of semi and finished good. Because of this initially they demand more being afraid that they will not get enough goods despite the small demand from customer, which results over production. So to eliminate this problem (bullwhip) the company must use its ERP fully for effective SCM with giving appropriate information access for its external entities too.

5.2 Conclusion

Several management and academic writers have recently asserted that the advent of the network economy is fundamentally changing prevailing business models in general and supply chain management in particular. The relevant entity for analyzing potential business success is no longer the individual firm, but the chain of delivering and supplying organizations; the individual firm is only a single part of this network. This greatly increases the importance of supply chain management for corporate survival. 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 — developments in many business areas, including SCM. But ERP systems were never designed just to support SCM, and certainly not across multiple enterprises. Their architectural advantage of being fully integrated for one firm becomes a strategic disadvantage in this new business environment, where modular, open and flexible IT solutions are required. Time will tell if these solutions will be generated on top of, complementary to, or instead of ERP systems, and if these solutions will be owned by the current ERP software vendors or other parties. But time alone will not be sufficient. More in-depth research is also required, which may fill the current gap in timely academic research on the business impact of ERP systems. Since the organization of the workshop, the rapid development of more open, modular, and flexible IT solutions has been encouraging. The emergence of the Internet and its communication protocol along with voluntary industry-specific standards will certainly facilitate interfacing the individual ERP implementations. Moreover, these technologies and concepts aid significantly in creating ‘plug and play’ infrastructures, in which specific solutions for specific problems can ‘easily’ be added to an existing ERP environment.. This would enable the creation of a seamless supply chain and the realization of tangible benefits from the significant IT investments of the past decade. While the advances in information and communication technology infrastructure rendered supply chain transparency easy to achieve, supply chain collaboration is still an ill understood concept. Research in supply-chain-wide performance assessment and incentive design is necessary to provide a sound theoretical basis to complement these technological advances.

The concept of this thesis is to crack the bullwhip effect which in return minimize operation cost and maintain smooth flow of the products. For make-to-stock production systems, which are included in different supply chains, the production plans and activities are based on demand forecasting. The orders are supplied by stock inventory, in which policy emphasizes the immediate delivery of the order, good quality reasonable price, and the standard products. The customers expect that delays in the order are inexcusable, so the supplier must maintain sufficient stock. It has been recognized that demand forecasting and ordering policies are two of the key causes of the Bullwhip Effect. The Bullwhip effect is a wasteful phenomenon that occurs due to lack of information across the supply chain. Basically the Bullwhip effect is the safety stock for the safety stock; because dealers hold extra stock for their customers the same way retailers hold extra stock for their customers. Wholesalers need safety stock for the safety stock. Situations where information is not shared between the manufacturer and the wholesalers may cause a heavier burden on the safety stock or a greater expenditure in shortage cost. The negative effect on business performance is often found in excess stocks, quality problems, higher raw material costs, overtime expenses and shipping costs. In the worst case scenario, customer service goes down lead time lengthen, sales are lost, costs go up and capacity is adjusted. An important element to operating a smooth flowing supply chain is to mitigate and preferably eliminate the Bullwhip effect.

5.3 Recommendations

The system of SURYA NEPAL is fine. Effort is made here to improve the current supply chain system of the company by upgrading its ERP Ramco Marshal. Discussion is made here in three aspects: mass customization, standardization and global IT/ERP systems.

Mass Customization

Mass customization, tailoring a product to meet the specific needs of an individual customer or groups of specific location , involves the delivery of a wide variety of customer-specific goods or services quickly, efficiently, and at low cost. Mass customization therefore combines the advantages of mass production. Such as: customizing the cigarette segment with different quality brand and in the garment segment too. ERP supports mass customization only if customers can configure their

products as a combination of a number of predefined options. The emergence of "configurators'" in the ERP ecosystem supports this aspect of mass customization. A configurator in this context is a computer program that translates individual customer demands into feasible product specifications. Using such a configurator, it becomes possible to start an assemble-to order process. The integration provided by the ERP system would ensure that the unique product ordered by the customer is properly translated into the appropriate production orders. Moreover, the sophistication of current ERP systems makes it possible to construct catalogues containing a large number of standard end products. As with almost any type of functionality, a rich industry of best-of-breed solutions running on top of ERP does exist. The level of sophistication provided by these solutions varies from "modest" (just click on the options you want) to "very high" (where rule-based expert system functionality supports the user in defining the best product configuration meeting a set of functional requirements, while checking on completeness and consistency).

Standardization

We consider standardization from two different points of view: the enterprise-internal perspective and the supply chain-wide perspective. Starting with the former, an enterprise wide ERP system does have a huge impact on standardization of both processes and data. ERP allows for efficient processing of, for example, engineering changes in bills of material or updates in customer data. Regarding standardization of processes, ERP almost enforces processes through its use of best-practice templates. It facilitates consistent behavior among all supply chain partners by having harmonized processes and by providing access to a single source of data. In addition, by standardizing data and processes, ERP technically enables consistent performance measurement for their own enterprise as well as for monitoring their partners' performance. Seen from the supply chain perspective, some ERP vendors have set a *de facto* standard in certain industries (e.g. *SAP* in Oil & Gas; *Baan* in Aerospace). This helps in the standardization of business processes and data models across entire sectors, even more so because ERP implementations are often based on best-practice process templates. Such a convergence around process templates may create uniform information flows and process structures within an industry. This convergence may make dynamic reconfigurations of supply chains within that industry easier.

Global it

Globalization of businesses requires worldwide ERP implementations. The main issue with global ERP implementations is not as much technology: state of the art in IT allows for accessing an ERP system from any location in the world. Moreover, as ERP systems are increasingly Web-enabled, the technical limitations diminish even further. Compared to the old legacy systems, ERP does provide significant benefits: some of them lie in their technical architecture (client/server computing), others stem from their functional (multi-lingual, multicurrency and time-zone capabilities). The *real* issues in 'global IT' are mostly of an organizational nature. In other words, some organizational choices have to be made prior to technology deployment. These choices include: To what extent does a global company really *need* -or *want*- harmonized processes? Where does one draw the line between local and global processes? Should the company standardize systems or interfaces? The former option enforces similar- processes on a global scale; the latter option allows local-for-local processes, but ensures standardized communication channels between any parts of the organization. If one truly believes in the networked economy, the latter option is the preferred one, as it supports dynamic supply chain design. In particular, the configuration of the enterprise as a "network of cooperating business units" will evolve continually: with a high frequency business units will enter and leave the network. Having a monolithic, global ERP system will put severe constraints on this agility.

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