CHAPTER – 1
INTRODUCTION

The manufacturing sector in India is considered to be a key driver of the Indian economy’s renaissance in recent years. It contributes to about 15% of India’s GDP, with estimated revenue of Rs Thirty lakh crores in 2007–2008. More importantly, the sector contributes a disproportionately large share of nearly 50% to the exports from the country. Besides, around 12% of the workforce today finds employment in this sector. Increasing the competitiveness of Indian manufacturing is critical to sustain the growth of the Indian economy.

However, the contribution of Indian manufacturing to the national GDP has stagnated over the last few years by around 15 per cent, despite the growth in the manufacturing sector per se. The current contribution level is much lower when benchmarked with comparable economies such as China (39.3 per cent), Thailand (35.2 per cent), Malaysia (31.1 per cent), Indonesia (24.7 per cent) and Vietnam (20.8 per cent). The inability of Indian manufacturing to contribute more substantially to GDP can be correlated to its low overall productivity in comparison to comparable countries. The manufacturing value added per capita in India is only USD 83 when compared to USD 496 in China, USD 749 in Brazil and USD 1,001 in Mexico.

A systemic effort across a broad range of initiatives is required to revitalise the Indian manufacturing sector and bring it out of the low productivity-low value trap. Information Technology (IT) is expected to play a major role in this transformation. In spite of a generally good uptake of technology since the 1960s, IT adoption in Indian manufacturing has significantly lagged behind its global peers. India’s spend on IT is only USD 50 per capita while China spent double that amount during 2006.

1.1 IT in Indian manufacturing sector

In order to achieve higher levels of global competitiveness, Indian manufacturing sector needs to continuously strive to increase their efficiency, quality and value propositions. Firms need to increase productivity levels in the value chain
through adopting best-in-class manufacturing practices and infusion of latest technology in their shop floors.

In this, IT will increasingly play an important role by enabling manufacturing firms to achieve dramatic progress in productivity benchmarks through their entire range of manufacturing processes and enabling firms to seamlessly integrate with their domestic and global suppliers and customers. Indian manufacturing companies need to ensure that business processes critical to competitiveness are IT enabled.

The National Manufacturing Competitiveness Council (NMCC) in its National Strategy for Manufacturing 2006 observed that the lack of global competitiveness is partly due to the lack of adequate IT enablement of business processes and management practices in the Indian manufacturing sector. An earlier survey of Indian manufacturing by NMCC in 2001 reveals that despite investments in ERP systems most firm’s barely share relevant information to all members of the supply chain. About 13 per cent of firms used some kind of computer based system that helped them make supply chain decisions, 43 per cent had implemented an ERP or a comprehensive in-house information system, and only 37 per cent of firms used any software for scheduling on shop floors. These are relatively weak indicators of a modern manufacturing environment.

The recent National Association of Software and Service Companies (NASSCOM) 2010 report prepared in association with NMCC has identified streamlined supply chain, developing new business and strengthened customer relationship as benefits reported from IT adoption through a survey of Indian manufacturing firms. Further, they have identified some of the key areas where IT can increase productivity as outbound logistics, marketing and sales and customer relationship management. The report highlights the benefits accrued to Maruti Udyog Ltd., the leading automobile manufacturer, through establishing a nationally networked Dealer Management system, to motivate the Indian manufacturing sector to increase investment in IT.

Faced with increasingly demanding customers and intensifying global competition, Indian manufacturers must find ways to achieve greater efficiency and
speed in their business processes particularly in their downstream supply chain which connects the firm to its customers through distribution channels.

The need of the hour is an IT enabled process that enables visibility into the entire supply chain, allowing manufacturers to make informed decisions based on the most up to date information and flexibility to make decisions based on changing market conditions. IT in the downstream supply chain improves decision making by feeding real-time data about customer demand into the distribution process, improved sales and order forecasting, manufacturing and distribution planning, and matching customer demand to available supply. It improves the movement of goods to deliver the right amount of inventory to the right place at the right time. This helps to keep costs down and ensure prompt and accurate order fulfilment which results in customer satisfaction and thus leads to competitive advantage for the firm.

1.2 Emergence of E-Business

Organizations have been leveraging Information Technology (IT) to enhance their business competitiveness since the era of Information systems in the 1980s. With the launch of the Internet browser in 1993, there has been an increase in the use of Internet for business purposes. Information technology and the internet have transformed business into E-business and this transformation is not about conducting business online. It is about integrating IT and the internet into every aspect of value creation in the organization, from procurement, to customer relationship management.

One view of E-business is that, it involves the establishment of an electronic channel to an organization’s customers, suppliers or both. IBM’s Advanced Business Institute defines E-business as, “an organizational strategy linking Information Technology and the World Wide Web to create strategic advantage through operational efficiency, customer relationships, innovative products and services, and speed”.

Information technologies that use the Internet and Web applications for communication are termed in the literature as e-business technologies (Balakrishnan and Geunes, 2004; Vakharia, 2002). These technologies have made it possible to share large amounts of information between organizations and today companies are
increasingly joining networks of customers, suppliers and even competitors to generate e-business value. The expectations of competitive advantage, from IT and e-business investments, have made firms to use IT across functions such as research and development, production, purchasing, marketing and sales and service support.

The role of Information Technology has received increasing attention from researchers as a potential enabler of competitive advantage for firms (Humphreys et al., 2001; Sanders and Premus, 2002). IT provides various interfaces, both internally across the functional departments in the organization and externally with the suppliers and the distribution network, which leads to a competitive advantage, through the improved capability that result when IT is adopted and used effectively in the organization (Humphreys et al., 2001 and Porter, 2001).

Practitioners and academicians have high expectations for the benefits of IT. The potential benefits from investments in IT have initially been found to be questionable by scholars (Kettinger et al, 1994, Powell and Dent-Michallef, 1997). Thatcher and Oliver (2001) note that the “IT productivity paradox” has been debated in literature since the 1970s. Since then, concerns about productivity of IT has led researchers to do a number of studies on IT productivity and IT impact on firm performance and recent assessments have provided a more optimistic view of its benefits (Rai, et al., 2006; Dehning et al., 2007; Li et al., 2009).

Chuang and Shaw (2005), while suggesting a road map for e-business implementation, have identified Supply Chain Management (SCM) as one of the core components of e-business. Zhang and Dhaliwal (2009) have in fact, used the terms ‘e-business’ and ‘IT-enabled supply chain’ interchangeably. Today almost all organizations are engaged in the process of adopting some type of e-business technology, to streamline their supply chain activities.

Indian manufacturers have in recent years therefore made substantial investments in IT in the supply chain though investing in applications like enterprise resource planning (ERP), supply chain management (SCM) and customer relationship management (CRM). This study aims at studying the impact of Information technology on firm marketing performance in their downstream supply chains. This assessment is
expected to provide valuable insights both to supply chain researchers and practitioners in the country.

1.3 The supply chain

The supply chain involves all activities associated with the flow and transformation of goods from the raw material stage, through to the end user, as well as the associated information flows. A series of integrated organizations share information and coordinate physical movement to ensure a smooth flow of goods, services, information and cash through the pipeline. The three flows – goods, information and cash – are very important features of the supply chain. Customers expect their orders to be delivered in good condition and on time, which is ensured by the product flow. There is a two way information flow – forward information flow like order status and inventory availability and a reverse information flow, which is about demand and feedback about the products. Financial flows happen in reverse as payments for the goods received. Faster cash flows help companies to reduce their working capital requirements.

A strategic view of the supply chain would be to regard it as network of organizations that are involved through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate customer (Christopher, 1992). Thus a supply chain consists of suppliers in the upstream, distribution channel partners in the downstream and the final customer as part of the supply chain.

1.3.1 Objectives of the supply chain

Well managed supply chains are expected be ones with low costs, high service levels and improved operating quality (Lancioni, 2000). The fundamental objective of a high performance of supply chain is to produce products to meet customer demand and provide the greatest value possible to them. The supply chain plays a huge role in the creation of customer value. As Lambert and Cooper (2000) point out: “.... Individual businesses no longer compete as solely autonomous entities, but rather as supply chains...... Instead of brand versus brand or store versus store, it is now supplier-brand-store versus supplier-brand-store, or supply chain versus supply chain”.
Several other key objectives such as improved profitability and customer value/satisfaction are provided by several researchers. For instance, a key objective of supply chain is to lower costs required to provide the necessary level of customer service to a specific segment (Jones and Riley 1985; Stevens 1989). The other key objective is to improve customer service through increased stock availability and reduced order cycle time (Cooper and Ellram 1993). In a supply chain, customer service is achieved through focusing on the three flows of products services and information described in Section 1.3. Thus, supply chains improve both efficiency (cost reduction) and effectiveness (customer service) in a strategic context, through creating value and satisfaction, which leads to a competitive advantage that ultimately brings profitability (Mentzer et al 2001).

The practitioner’s dilemma of trying to find a balance between good customer satisfaction and supply chain efficiency has been highlighted by Stevens (1989) when he stated that: “The objective of managing the supply chain is to synchronize the requirements of the customer with the flow of materials from suppliers in order to effect a balance between what are often seen as conflicting goals of high customer service, low inventory and low unit cost”.

Supply chain performance is therefore no longer a matter of operational and functional areas of the firm. Today, it is a strategic issue demanding top-level management attention as it is a key driver for achieving competitive advantage through creating superior customer value. This brings out a situation that competitors might focus on developing superior supply chain performance to gain market dominance. Accordingly, Indian companies will have to manage their supply chains strategically and find or develop metrics to constantly measure the performance of their supply chains to do better than their competitors.

1.4 Supply chain management

Ever since the introduction of the term Supply Chain Management(SCM) in the management lexicon by consultants in the early 1980s, there has been a tremendous momentum in the adoption of SCM practices in organizations and interest in this practice by both researchers and practitioners. There was some early confusion as to how SCM is different from its precursor Logistics, which was clarified and laid to rest
by the Council for Logistics Management (CLM) in the year 1998, which announced
the revised definition of logistics as: “Logistics is that part of the supply chain process
that plans implements and controls the efficient, effective flow and storage of goods,
services and related information from point of origin to point of consumption in order to
meet customer requirements.”

The modified definition explicitly declares CLM’s position that logistics
management is only a part of Supply Chain Management (Lambert and Cooper, 2000).
A survey undertaken by the Council of Supply Chain Management Professionals
(CSCMP) in 2004 among its members led to the acceptance of the following definition
(Gibson et al., 2005):

“Supply chain management encompasses the planning and management
of all activities involved in sourcing and procurement, conversion,
demand creation and fulfillment and all Logistics Management activities.
Thus it also includes coordination and collaboration with channel
partners which can be suppliers, intermediaries, third party service
providers and customers. In essence Supply Chain Management
integrates supply and demand management within and across
companies.”

Thus a broader understanding of the SCM concept of a simplified supply chain
network includes the information and product flows in the supply chain and the
business processes that happen within and across the supply chain. SCM involves the
integration of these business processes and provide products, services and information
that add value for customers. The operational goal of SCM is to reduce uncertainties,
such as demand, delivery times, quality and competition in the supply chain.

Hence SCM is essentially a set of practices aimed at managing and coordinating
the supply chain from raw material suppliers to the ultimate consumer (Heikkila, 2002).
This view is echoed in earlier definitions like “Supply chain management deals with the
total flow of materials from suppliers through end users” (Jones and Riley, 1985), “A
supply chain is a system the constituent parts of which include material suppliers,
production facilities, distribution services and customers linked together…” (Towill et
al, 1992) and Supply Chain Management is “… an integration philosophy to manage
total flow of a distribution channel from suppliers to the ultimate user” (Cooper et al., 1997). It is to be significantly noted that these definitions of SCM include the customer as a final part of the supply chain.

According to Mentzer et al (2001), organizations that adopt supply chain as a management philosophy concentrate on achieving the following:

1. A systems approach to viewing the supply chain as a whole, and to managing the total flow of goods and inventory from the supplier to the ultimate customer.
2. A strategic orientation towards cooperative effort to synchronize intra-firm and inter-firm operational and strategic capabilities into a unified whole.
3. A customer focus, to create unique and individualized sources of customer value leading to customer satisfaction.

To bring about this integration in their processes, organizations have turned to the employment of IT in their supply chains. If deployed well, IT is expected to give firms a clear competitive advantage (Porter, 2001).

1.5 Information Technology in Supply chain management

Information Technology (IT) is used in Supply Chain Management to coordinate information between internal and external customers, suppliers, distributors, and other partners in a supply chain. According to Simchi-Levi et al. (2003), the objectives of IT in SCM are:

- Providing information availability and visibility;
- Enabling a single point of contact for data;
- Allowing decisions based on total supply chain information; and
- Enabling collaboration with supply chain partners.

Information Technology (IT) plays a crucial role in SCM activities (Kearns and Lederer, 2003), as it permits sharing of large amounts of information among supply chain partners. The use of IT in managing supply chain processes has drawn lot of attention across organizations. The implementation of IT in the supply chain can enable a firm to develop and accumulate knowledge about its customers, suppliers and market demand which in turn influences firm performance (Tippens and Sohi, 2003). IT
enabled supply chain capabilities can therefore serve as a catalyst in transforming IT related resources into higher value for a firm (Wu et al., 2006).

Lancioni (2000) opines that in order to create ideal supply chains it is necessary to integrate all supply chain activities through the use of common organizational and IT standards at every echelon in the system. A research study by Sanders and Premus (2005) found that IT has a direct positive impact on organizational performance, internal collaboration and external collaboration. In their research regarding benefits of IT in SCM, Auramo et al (2005) concluded that improvements in customer service, improved process efficiency, improved information quality and improved collaboration and agility of the supply network arise out of IT usage in SCM through eighteen in-depth case studies. They advise that IT usage has to be accompanied by process redesign to gain strategic benefit. IT investment also enables firms to have near real-time information about products, customers and order fulfillment across the supply chain and thus ensure that they deliver customer service that surpasses the competition.

Pereira (2009) describes the unstable business environment which makes it difficult for firms to predict demands, plan production and synchronise orders. In such a situation supply chain risk exposure has increased. He advocates the usage of IT as a tool that can aid Information Management and speed up the information flow thus making the supply chain more robust and resilient without undermining its efficiency.

Organizations globally, and in India are recognizing the value of IT and are investing substantially in IT to collect analyze and make effective use of supply chain information. According to AMR research, the supply chain management applications global market in 2006 was $6 billion in total revenue. The estimates by AMR Research suggest that with moderate growth in this market, it will reach a total of $7.9 billion in 2011.

Indian organizations have in recent times focused their energies on improving the operational efficiencies of their supply chains against the backdrop of liberalization and the consequent increasing competition from global companies in their home market. The focus of SCM initially, was more on satisfying their needs for efficiency (reducing costs and increasing profits) than on satisfying the needs of the customer for
speed or service). Customer satisfaction was however expected as an outcome, through the lowering of prices made possible by reduction in costs.

Several years of intense focus on cost reduction has made most Supply Chains operationally efficient but they are not tuned to the volatile competitive environment, which is confronting them today. Customers are more demanding now. They want low cost, high availability and a wide choice of products, and they want it immediately. Customers now expect Web-based order-status tracking facilities, proof of delivery report, call centers to address their service problems and personalized interaction with organizations. There is evidence that IT investments such as IT based SCM systems, are likely to provide tangible business value when well targeted, well timed and well managed (Barua and Mukhopadhyay, 2000).

IT changes the way firms operate and interact with their suppliers and channel partners thus enabling them to create more responsive supply chains. Forrester research indicates that manufacturers are able to improve supply chain agility, reduce cycle time, achieve higher efficiency and deliver products to customers in a timely manner (Rajdou, 2003). Indian organizations have been quick to recognize that a rigid supply chain will be incapable of fully meeting customer expectations and have made substantial investments in IT in the supply chain to bring about process improvements that will have a definite impact on market performance, for example dynamically reallocating inventory to accommodate surges in demand.

IT enables timely and cost-efficient sharing of information among suppliers, manufacturers, distributors, logistics service providers and customers. Information, along with materials and money must flow across the supply chain to enable the planning execution and evaluation of all operations in the supply chain. A wide range of information is needed for a supply chain to perform well. Demand visibility, customer orders, delivery status, inventory levels, and production schedules are needed to take knowledge-driven effective decisions.

For example, information on delivery and shipping locations, routes, rates, transportation time and quantities to be transported allow supply chain managers to determine their transportation policies. Retailers may need sales figures, distributors
need warehouse inventory information, transporters need supply locations, suppliers need production forecasts and manufacturers need supplier lead time information. IT enables this information flow to happen in the different stages of the supply chain even from distant supplier and customer locations.

1.5.1 The role of IT in SCM

Information is crucial to supply chain performance because it provides the basis of decisions taken by managers. In the absence of information, managers cannot know what customers want, what is in stock and how much should be produced or transported. Information makes the supply chain visible to the manager. The volume of information available in organizations is so huge that IT needs to be harnessed to manage such information for taking better and faster decisions. IT consists of the hardware, software and, people in the supply chain who gather, analyze and execute upon information. IT serves as the eyes and ears of management – capturing and analyzing information necessary to make a good decision. The fundamental tasks that IT does to support SCM are:

*Information exchange and reporting:* IT is used to collect information and provide information to different people within and outside the organization who need such information in a timely and effective manner. Examples are information flows between the organization and warehouses, transporters and distributors.

*Information alerts:* Programs are written to bring to the notice of people specific information on transactions happening in the supply chain. For example alerts could be triggered when stocks reach minimum levels, when high value transactions occur and when large orders are placed by distributors. Such IT programs aid better decisions.

At an advanced level, IT is used for analyzing data to discover trends in demand and sales of products and for forecasting demand based on these trends. Building simulation models to understand and implement policy changes in the supply chain can also be done with the use of IT in the supply chain. IT also provides organizations the means to measure their supply chain performance through IT-based business intelligence.
To summarize, IT plays the following four functional roles in SCM:

- Transaction execution in the supply chain
- Collaboration and coordination among supply chain partners
- Decision support in supply chain systems
- Supply chain performance measurement.

1.6 Supply chain Management applications

According to the Datamonitor report of December 2009, the Indian software market generated total revenues of $2.5 billion in 2009, representing a compound annual growth rate (CAGR) of 35.4% for the period spanning 2005-2009 of which 30.30% is accounted for by software for business productivity, cross industry and vertical applications like ERP (Enterprise Resource Planning), SCM and CRM (Customer relationship management) software. India has displayed the strongest growth in its software market. Despite some forecast deceleration going forward to 2014, Datamonitor expects the revenue expansion in Indian software industry to remain very strong.

The growth in the number of software companies in India and the emergence of new categories of software product lines for supply chain are indicative of their efficacy in providing good business solutions. It is for this reason that it is important to study the impact of the usage of IT software on the supply chain. IT includes hardware, implementation services and networking support which are all crucial to making IT effective. Within a supply chain however, the capabilities provided by IT have as their building block the capabilities of the software that is used to manage the supply chain. SCM software have been developed for execution, collaboration and decision support applications and they are described in the following sections.

1.6.1 Supply chain execution applications

Supply chain execution application tools like ERP carry out key tasks from the time the order is placed until it is fulfilled. This software focuses on day-to-day activities required to buy make and deliver the materials that flow through the supply chain. Traditionally these tools have focused on order management, warehouse management, inventory management and transportation management.
Today they have a broader scope of functionality that encompasses procurement, supplier relationship management, manufacturing execution and shop floor control, and customer relationship management. The ERP system allows information to be entered once and made available to all users in all related business functions.

As the ERP systems are expanding in scope to include supplier relationship management, customer relationship management and other supply chain components, the connection between Supply Chain Information systems (SCIS) and ERP is growing stronger. Downstream supply chain members can access information through the ERP system to find out inventory availability, production schedules and delivery information.

ERP applications are therefore expected to provide the much needed inventory visibility, improved data accuracy, higher inventory turns, control over transportation costs and improved customer service. Typical ERP software spans operations across demand and supply planning, procurement, manufacturing, warehousing, order fulfillment, transportation and supply network collaboration and acts as a vital link between the organization and its suppliers, downstream channel members and customers. ERP thus integrates across all business processes of an organization and develops good cross-functional visibility leading to improved overall decision making.

1.6.2 Supply chain collaboration applications

Supply chain management extends across suppliers and channel members as such IT applications are needed to be employed to ensure that supply chains are managed across the supplier, channel and customer organizations. The ability to work with suppliers to source raw materials and components from them and to share information with them real time over the Internet is now made possible with Supplier relationship management software(SRM). On the other end of the supply chain, Customer relationship management (CRM) is being employed to keep track of the organization’s interactions with its customers downstream in the supply chain to better understand their needs.
SRM applications software focuses on the interaction between the enterprise and suppliers that are upstream in the supply chain. SCM applications software focuses on the operation internal to the enterprise. It includes all processes involved in planning for and fulfilling a customer order. Demand and supply planning, order fulfillment and field service processes are all enhanced with SCM software applications. Collaboration is achieved through integration of the SRM, SCM and CRM software deployed by organizations.

1.6.3 Supply chain decision support applications

Strategic, tactical and operational levels of decisions are facilitated through SCM software. Strategic decisions are taken regarding the supply chain network design to determine the location size and optimal number of suppliers, plants and distributors in the network. Tactical decisions are taken regarding what is to be produced at what plants and in what quantity and which suppliers must be chosen to supply the raw materials and components. Operational decisions are taken regarding demand planning, production scheduling, inventory planning and transportation planning.

The wide applications, utilities and applications of ERP, SCM and CRM delineated above have led to its purchase and widespread usage in Indian manufacturing companies in the recent years. They are now interested in knowing the payoffs from such investments and are interested in the performance measurement of their IT enabled supply chains.

1.7 IT in supply chain performance measurement

Extensive investment in IT in SCM has logically led companies to measure the performance of their businesses. They are focusing on using IT to measure their supply chain process outcomes to know if they are improving. Business intelligence software tools are being used for this purpose. Data from the execution software are fed into a data warehouse and analyzed for fresh insights which are sent again to the users for effective planning and decision making.

Beyond the use of ERP, SCM and CRM software, to link, integrate and improve the coordination of various business activities of enterprises, organizations have also
invested in creating real time electronic linkages with their branch offices which they have established across the country. Such linkages facilitate the access to and transmission of information across the branch offices and their head office in a real time basis. This real time sharing of information is a pre-requisite for accurate and timely decision making at branch offices across the country and greatly enhance supply chain performance.

It is thus evident that the performance of supply chains is closely tied to the extensive utilization of IT in the upstream and downstream supply chain processes in the form of hardware, software and connectivity. The extensive use and massive investment in such technologies warrants that organizations need to discover the impact of such usage on their firm’s performance.

### 1.8 Downstream supply chain

As stated in Section 1.3, the supply chain consists of upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate customer.

While the flow of materials components and parts and products moves downstream (from the initial supply sources to the end customers), the flow of information regarding the demand for the product is moving upstream (from the end customer to the initial supply source). The flow of information regarding availability of physical goods, pricing and the status of orders is moving downstream.

Within the supply chain, there are many different organizations performing unique activities. For each organization in the supply chain, its customer is the succeeding organization in the supply chain and its supplier is the preceding organization in the chain. Figure 1 illustrates the flows in the supply chain in the upstream and downstream channels.

Underpinning the successful performance of the supply chain is the value-added exchange of information between partners, meaning that information on downstream demand or usage is made visible to all the upstream members of the supply chain.
Creating ‘visibility’ along the pipeline ensures that the manufacture and delivery of product can be driven by real demand rather than by a forecast and hence enables all parties in the chain to operate more effectively.

In a competitive business environment, IT enablement of these processes in the downstream supply chain facilitates the sharing of these vast amounts of information that help the firm to meet their customers’ demand very efficiently and effectively.

**Figure 1: Flows in the upstream and downstream supply chain.**

Organizations have conventionally been forecast-driven rather than demand-driven. Reverse information flows enable supply chains to become demand-driven as a result of better visibility of real demand. Real demand occurs at the end of the supply chain and as that information is captured and shared upstream, the dependency on inventory reduces. So the focus has now shifted on managing the downstream supply chain processes to gain competitive advantage in the market.
1.8.1 Downstream supply chain processes

The downstream supply chain processes involve distribution, delivery, marketing, sales and service processes. Integrated IT based SCM systems enhance such processes in many ways. For instance, production schedules are used to plan for advertising and promotion activities, demand forecasts are used to plan inventories and their movement to warehouses. Distribution channel members as well as customers are now able to place orders with the knowledge of it availability in inventory in the company. They are able to track the status/progress of their orders within the company. The processes that are triggered by a customer order within the sales and marketing function is illustrated in Figure 2.

Figure 2: Path of a customer order in the downstream supply chain

A customer order triggers a check of the inventory records and if the product is available the order is processed the invoice is raised and sent to the warehouse for arranging transportation to the customer. If the inventory is not available, it is treated as a back order and the item is either purchased externally or produced internally and then the order is processed for invoicing. The invoiced item is then withdrawn from the
warehouse where it is stocked and logistics arranges for the transportation of the ordered item to the customer. Customer order status is available for tracking both to the company and to its distributors and the customer. Essentially inventory maintenance, order processing and delivery are crucial operations in the downstream supply chain that lead to efficiencies in the sales and distribution processes and lead to higher customer satisfaction.

1.8.2 IT in downstream supply chain

IT in downstream supply chain improves the outbound processes in a number of ways over traditional supply chain functions. Accurate order and delivery information help to communicate order status to customers and enhance the customer service and support processes. Better visibility of demand assists in decision making regarding inventory at warehouse locations and optimize transportation costs. IT based downstream supply chains allow for flexible manufacturing based on customer orders, fulfilling their requirements and adding value both to the customer and to the firm through achieving higher customer satisfaction.

IT based systems allow for continuous strategic focus on market development. Tracking demand changes and fluctuations, customizing pricing and promotions and developing and supporting new products help companies to realize their maximum market share and profitability (Dehning et al., 2007).

With recent advances in IT, more organizations are interested in achieving higher levels of information exchange and coordination with their channel partners. They need to work closely with their suppliers and distributors to reduce unnecessary inventory, which usually leads to cost reduction and to competitive pricing of products (Porter and Millar, 1985).

Distributors have to work closely with their inbound suppliers and outbound retailers to reduce inventory costs at their end (Waller et al., 2000). Retailers also need to share information about consumer preferences to serve them better by advising firms to incorporate these preferences in new products (Chandra et al., 2001). IT investment in downstream supply chain is now becoming more critical than because of the competitive business environment and the need to strive for efficiencies in the crucial area of supply chain processes.
1.9 Need for the research

The discussion in the earlier sections leads to the well settled conclusion that the Indian manufacturing sector needs to acknowledge that the backbone of the supply chain processes in organizations is IT, which is used to acquire, process, and transmit information among supply chain partners for more effective decision making.

IT can be viewed as an essential enabler of SCM activities (Mabert and Venkataraman, 1998) and is seen as playing a critical role in SCM activities (Kearns and Lederer, 2003). Managements today have adopted a wide variety of IT applications which are costly and rapidly changing with the anticipation that will directly lead to measurable benefits. Because IT has become an integral component in SCM, it is important to examine its impact on today’s organizations.

Byrd and Davidson (2003) have stated that the empirical research on this topic is sparse. Subsequently, there has been a focus on empirical research, on assessing the impact of IT deployed in the supply chain on firm performance (Li et al., 2006; Seggie et al., 2006; Wu et al., 2006; Dehning et al., 2007; Sanders, 2008 and Li et al., 2009). Sachan and Datta (2005) in their review paper on SCM research have urged researchers to look at supply chain issues of developing countries which are now becoming either the sourcing centers or markets of many companies.

There is currently only limited research in the area of IT in SCM in India. In the Indian context, the research on Supply Chain Management (SCM) has been done on supply chain management practices (Sahay and Mohan, 2003), identifying SCM areas for increasing competitiveness (Sahay et al., 2006), how the Internet is used in SCM in Indian companies (Rahman, 2004) and identifying the sectoral dissimilarities in the practice of SCM among Indian companies (Jharkaria and Ravishankar, 2006), an investigation of SCM performance measurement in the automotive sector (Saad and Patel, 2006) and single site case studies on SCM at Titan Industries (Kannabiran and Bhaumik, 2005), a paint company (Seghal et al., 2006), Tata Steel (Kumar and Keshan, 2009) and Godrej Consumer Products Ltd (Kaushik, 2009).
Indian manufacturing companies have been investing in IT in their supply chain to streamline their processes. It is necessary to examine the benefits of such investments and therefore requires a study on the performance impact of IT in the downstream supply chain. This study proposes to address this gap in the research and examine empirically, the performance impact of IT in the downstream supply chain in Indian manufacturing companies.

Accordingly, the dependent variables in the study are taken as operational and strategic marketing benefits with competitive marketing performance as the outcome. The competitive business environment, extent of IT use, IT advancement, IT alignment and supply chain capabilities are taken as independent variables. It is expected that the study will lead to interesting findings for Indian manufacturing companies in terms of deployment and usage.

1.10 Focus of the research

The use of IT in the downstream supply chain is necessitated by the competitive business environment. The use of advanced and well aligned IT leads to supply chain capabilities that is likely to yield operational and strategic marketing benefits and affect the competitive marketing performance of the firm. In recent times a number of researchers, (Wisner, 2003; Byrd and Davidson, 2003; Wu et al., 2006; Li et al., 2006, Kim et al., 2006 and Fawcett et al., 2008) have therefore, included measures of marketing performance benefits in assessing the impact of IT in the supply chain.

The current study explores the impact of IT on competitive marketing performance in the context of the resource based view (RBV) of the firm. According to RBV of the firm internal resources give competitive advantage only when they are unique and inimitable by competitors (Barney, 1991; Porter, 1991). These resources include firm’s various assets, capabilities, organizational processes, knowledge, technologies and information (Barney, 1991; Collis, 1994).

RBV argues that when IT facilitates information exchange and sharing it can lead to such internal capability of firms as information collection and knowledge creation and provide competitive advantage. Following the RBV framework, the current
study examines the impact of IT on competitive marketing performance as shown in Figure 3.

**Figure 3: Conceptual framework of the study**

![Conceptual framework of the study](image)

Specifically the current study investigates how IT resources such as IT advancement and IT alignment affect supply chain capabilities and address whether IT resources affect competitive marketing performance through the usage of Supply chain capabilities which deliver operational and strategic marketing benefits.

Within the RBV framework, the study focuses on whether the supply chain capabilities are enhanced by IT advancement and IT alignment with channel partners, and identifies the capabilities that are created. It also explores how the supply chain capabilities influence firm performance through operational and strategic marketing benefits. It analyzes the empirical relationship between supply chain capabilities as a mediator that will lead to firm performance (Wu et al, 2006). This study measures operational and strategic benefits, which are considered to be first order organizational benefits that are expected to impact second order benefits for the firm (Mukhopadyay and Kerke, 2002). Overall competitive marketing performance is considered as the final outcome variable in this study.

Finally, the extent to which IT is a resource for firm competitive advantage will be evaluated from the RBV perspective. In this study an investigation of the impact of IT usage in the downstream supply chain and its effect on competitive marketing performance will be done, which will provide an insight into the conditions under which IT gives competitive advantage and will provide valuable implications for both researchers and managers.
1.11 Expected outcomes from the study

Several theoretical and managerial outcomes are expected from this study. The first theoretical contribution of this study is the evaluation of IT advancement and IT alignment as firm resources leading to supply chain capabilities. RBV claims that internal technology can be resources for competitive advantage of firms. However, RBV does not consider technology associated with inter-firm information exchange and other channel activities as resources for competitive technology. If IT resources are linked to marketing performance of firms through improved supply chain capabilities, then there is a theoretical justification for IT investments directed at enhancing supply chain capabilities.

This study attempts to test the impact of IT resources from the selling firm perspective and not the buying firm as focused earlier. The primary focus is on the downstream supply chain and on IT usage in distribution channels. The impact of such usage on Competitive Marketing Performance of the selling firm is expected to be presented. The current study will present the impact and implications in the downstream supply chain specifically from the seller point of view. Also, by examining whether or not IT has impact on firm marketing performance in the context of IT and supply chain management, the study will contribute to RBV literature.

This research is expected to provide important implications for managers in SCM and IT. First, it will reveal empirical evidence that IT investment leads to competitive marketing performance. The study further seeks to find when IT investments will lead to performance. This will help managers make more informed decisions on IT investments. This study will highlight the role of mediator (supply chain capabilities) in securing the operational and marketing benefits from IT investment. Only when IT creates these capabilities, it leads to an impact on competitive marketing performance through the realization of operational and marketing benefits. The research will reveal the importance of the mediating construct that links IT resources to firm performance to managers.
1.12 Overview of the remaining chapters

Chapter II – Literature Review This chapter offers a review of the previous research in the topic of current study.

Chapter III – Scope and objectives of the research This chapter will detail the scope and objective of the study and present an overview of the conceptual model and list the hypotheses to be tested.

Chapter IV – Research Methodology The research instrument is explained and the pilot study and data collection methods are discussed. The statistical methods used for data analysis are explained. The limitations of the present research study are set out. The profile of the respondents and their organizations is presented.

Chapter V – Data Analysis and Interpretation This chapter enumerates the descriptive statistics of the data along with the interpretations and includes tests for convergent and discriminant validity, reliability for the constructs. The analysis and interpretation of the results of the Structural Equation modeling, Multi dimension scaling, dimension and item level regression analysis and Canonical correlation are presented.

Chapter VI – Summary of Key Findings This chapter presents the summary of findings related to the impact of IT on the Competitive Marketing Performance of the firm.

Chapter VII – Theoretical and Practical Implications This chapter discusses the findings and the implications of the results from the theoretical and practical perspectives.

Chapter VIII – Conclusion and Directions for future research The last chapter presents the conclusions of the study and spells out the scope for future research.
REFERENCES


