CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The present chapter begins with the identification of the origination of the problem. The problem is defined subsequently, which is followed by listing the objectives of the present study. A brief overview about the organization of the various constructs from the perspective of the four entities is given. Thereafter, in the initial sections, the theoretical elucidations in favour of the identified critical factors influencing effective implementation of SCM, from the perspective of the OEM, are explained. The factors that cover the aspects of SCM from the perspective of the trading partners are explained in the subsequent sections. The later sections of this chapter present the appropriate conceptual frameworks, hypothesized in the present study, from the perspective of the four entities of the supply chain. The chapter ends by describing the research methodology adopted in the present study.

3.2 PROBLEM GENESIS

Ho et al (2002) observed from their review of extant literature that SCM construct is perceived narrowly as an extension of integrated purchasing and supply management or integrated logistics and transportation management, and concluded that all these limitations stem mainly from the insufficient attention paid to theorizing SCM, especially the inadequate explication of the core elements and the boundaries of the SCM construct. If
SCM is to mature as a discipline there needs to be further progress in clarifying it’s domain, it’s central problems, it’s core components, it’s theories and its theoretical map (Croom et al 2000, Storey et al 2006).

At the end of an extant literature review, it is observed that, from the perspective of the OEM, the work of Chen and Paulraj (2004a, b) is noteworthy in the context of the present study in terms of identifying the critical elements that contribute to the development of SCM. Even though the work of Chen and Paulraj (2004a, b) is quite comprehensive, in our view, it appears lags behind in its ability to:

- capture additional important dimensions of SCM (e.g., Supply chain design, Reverse logistics, Benchmarking, Manufacturing Management, etc), and
- capture individually the dimensions and operating elements of various activities/functions in the entire supply chain across other supply chain partners (entities), namely: (Supplier (Tier-1 and Tier-2), Logistics Service Provider (LSP) and Retailer).

Moreover, research conducted from the supply chain partner’s perspective seems to have concentrated either only on some aspects of services offered by the trading partner, or, on the relationship between the service quality and performance of the trading partner. To address the above-mentioned research gaps certain research objectives are formulated.

3.3 OBJECTIVES OF THE PRESENT STUDY

The definition of SCM by Council of Logistics Management (2000) (Li et al 2005) that SCM is the systematic, strategic coordination of the
traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purpose of improving long-term performance of the individual companies and the supply chain as a whole, is adopted as the platform for the present study. In line with this definition and the evidence from literature about the benefits of effective implementation of SCM, the objectives of the present study are proposed from the perspective of the four entities. The objectives are to

1. Identify the critical dimensions and operating elements of SCM;
2. Identify relationships among the critical factors and proposing conceptual frameworks;
3. Develop and validate four individual instruments to cover the aspects of SCM from the perspective of the four entities;
4. Validate the proposed conceptual frameworks; and
5. Draw appropriate conclusions based on the results obtained.

3.4 SCOPE OF THE PRESENT WORK

The scope of the present work is to develop and validate the critical dimensions of SCM for a manufacturing supply chain, and to propose and validate conceptual framework for SCM in a developing economy, India. The fact that various entities in the supply chain participate and contribute to its success as well as for the effective implementation of SCM encouraged to enhance the scope of the present study to cover the perspectives of the four entities of the supply chain, namely, OEM, Supplier (Tier 1 and Tier 2), LSP and Retailer. The work is planned to primarily cover the manufacturing sector including firms manufacturing products in the Automotive, Heavy
Engineering, Light Engineering, Pharmaceuticals, Petroleum and Home Appliances sectors.

The work involves identifying the critical factors and developing separate instruments covering the aspects of SCM from the perspective of the four entities. The work also involves proposing a conceptual framework and subsequently validating the identified critical factors and the proposed conceptual framework.

The work offers insights to researchers and professional managers about the critical factors that influence effective implementation of SCM and also about the relationship between the identified critical factors of SCM and the measures of performance, from the perspective of the different entities, under a moderated environment.

3.5 CRITICAL DIMENSIONS OF SUPPLY CHAIN MANAGEMENT

The review of literature presented in Chapter 2 is intended only to identify the various research issues with respect to SCM from the perspective of the four entities of the supply chain. In order to identify a comprehensive list of dimensions that could be critical to the effective implementation of SCM, particularly in the context of a developing economy like India, another detailed review of literature on the prescriptive, conceptual, practitioner and empirical literature on SCM has been undertaken, and presented in this chapter.

The importance and necessity for identifying comprehensive critical dimensions and the opportunity to contribute to the growth of SCM in India have led to examine the research work in various disciplines. Literature
review indicates that, from the OEM’s perspective, a common set of constructs does not appear to exist for the field of SCM. Furthermore, there seems to be very little evidence of conceptual studies oriented towards effective implementation of SCM, from the perspective of the trading partners, namely, the Supplier (Tier 1 and Tier 2), the LSP and the Retailer. However, evidence seems to be available on studies that identify factors that influence customer satisfaction and thereby organizational performance. The following points need to be highlighted with regards to the present study:

- To reduce the complexity of the present work, Freight Forwarding, Warehouse/ Distribution and Transportation are considered under the perspective of the LSP.

- All the four entities have some common constructs, namely: *Top Management Commitment, Customer Orientation and Involvement of Employees, Information Technology, Returns Management* and *Benchmarking of SCM Activities*.

- The Suppliers, LSPs and Retailers have *Supply Chain Orientation* as one of their constructs.

- *Manufacturing Management* under Supplier perspective is similar to the one under OEM.

- *Supply Management* in the Supplier perspective is the abridged version of the constructs *Strategic Purchasing* and *Trading Partner Management* that are considered under OEM.

- *The factors of Integration of Supply Chain Logistics* is applicable to only LSPs in as much as *Store Management* and *Materials Management* are applicable to Retailers.
- The performance constructs are explained separately in section 3.9, covering the measures of performance of all the entities of the supply chain. The measures of performance of a particular entity depend on the activities handled by that particular entity.

- The constructs of SCM from the perspective of the four entities are presented here in Table 3.1 for better understanding, and have been dealt with in detail and appropriately in the forthcoming sections.

A brief description of the identified critical dimensions of SCM from the perspective of OEM is given in Section 3.6. The theoretical elucidations for each of the constructs under the OEM’s perspective are described in the sections starting from section 3.7. As regards to the common constructs shared by all the four entities, the arguments put forth in the OEM’s perspective appropriately hold good for other trading partners also. However, additional points for the constructs, if any, are presented under the respective entity’s sections along with the factors applicable to the particular entity.
Table 3.1 Constructs of SCM: Perspective of all entities

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<th>Critical Dimensions</th>
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<td>Competitive Priorities</td>
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<td>Supply Chain Design, Structure and Operations</td>
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# - Indicates the factors (at a gross level) have been adopted from the work of Chen and Paulraj (2004a, b) to the OEM’s perspective framework in the present study. However, the corresponding items have been appropriately modified and new items are also added in each of such factors.

✔ - Indicates that the construct is considered from the perspective of the particular entity.

S: Supplier (Tier-1 and Tier-2), OEM – Original Equipment Manufacturer, LSP-Logistics Service Provider, R-Retailer.
3.6 BRIEF DESCRIPTION OF THE CONSTRUCTS OF SCM: PERSPECTIVE OF OEM

Competitive Priorities (CPri): ‘Competitive Priorities’ denote a strategic emphasis on developing certain manufacturing capabilities that may enhance a plant’s position in the marketplace. Such emphasis guides decisions regarding the production process, capacity, technology, planning, and control.

Top Management Commitment (TMC): Top-level managers have a better understanding of the needs of SCM because they are the most cognizant of the firm’s strategic imperatives to remain competitive in the marketplace. Top management support, leadership, and commitment to change, are the important antecedents to the implementation of SCM.

Customer Orientation and Involvement of Employees (CEI): SCM should lead to the satisfaction of end-user requirements. These requirements give rise to the fundamental reason for the supply chain in the first place. The concept of SCM emphasizes on cross-functional and inter-organizational relationships and participation of people across functions and across organizations concerned, which is an implicit requirement to make SCM effective and efficient.

Information Technology (IT): Information Technology is the key enabler to supply chain. SCM, based on the need for coordination between supply chain partners, has been particularly influenced by the growth and development of information technology.

External Logistics Integration (EXL): External logistics integration is of strategic importance as it can have a significant impact on the agility performance of both the supplier and buyer firms. Collaborative
interdepartmental integration involves a predominantly informal process based on trust, mutual respect and information sharing, the joint ownership of decision, and collective responsibility for outcomes.

**Strategic Purchasing** (*StP*): Without good suppliers and without superior purchasing, supply chains would not compete as effectively in the marketplace. The increased emphasis on utilizing a strategic approach to Purchasing /Supply Management involves expanding its core manufacturing processes to include activities such as: supplier coordination, supplier development, supplier market research, cost analysis, sourcing strategy formulation, benchmarking, and outsourcing decisions.

**Manufacturing Management** (*MM*): The function at the core of most companies is manufacturing, which has an important role in helping companies become strategically flexible. The goal of manufacturing strategy is to achieve strategic flexibility, and the function of manufacturing is to provide that capability. Manufacturing flexibility enables the manufacturing system to be responsive to changes in demand, product design, process technology, material supply, etc.

**Supply Chain Design, Structure and Operations** (*STe, STo*): The starting point in moving towards supply chain excellence is designing the supply chain to suit the customer and product being served. Mismatch between the type of product and the type of chain is the root cause for most supply chain problems. To function effectively, supply chains need sound structural design that must be adapted to the physical nature of the product that it moves, along with the supply and demand characteristics of its marketplace. The design should incorporate appropriate effective supporting tools to coordinate and better control the activities of the supply chain. This construct is considered under the sub-constructs: SCM Techniques, and SCM Supporting Tools.
**Returns Management (RM):** The application of environmental management principles to the supply chain has emerged as a new way to address the sustainability challenge, and it includes activities such as reverse logistics, product recovery, and remanufacturing. Economic, regulatory, and consumer pressure drive the product returns worldwide, which has also gained momentum because of fierce global competitiveness, heightened customer expectations, pressures on profitability and superior supply chain performance.

**Benchmarking of Supply Chain Activities (BM):** Competitive benchmarking and the functioning of continuous improvement teams are some of the leading edge practices that could enhance the competitive advantage in SCM. Benchmarking helps to understand the business, its processes and performance, and identifying ‘gaps’ between best practice and the current operating environment. Effective SCM companies are those that deliver customer service expectations at a level of satisfaction that will assure them the position of the ‘most preferred’ supplier with the customer.

**Trading Partner Management (Sel, Trc, Cft, Ltr):** The quality of an OEM’s final product can only be as good as the quality of the inputs they receive from suppliers, and OEMs rely on suppliers to achieve major reductions in product cost. SCM integrates suppliers, manufacturers and distribution centers to get the right products to the right place at the right time, and in the right condition. The relationships with the trading partners can be characterized by long-term relationships with a reduced number of suppliers, selection of suppliers based on quality, supplier quality certification, visits to suppliers plants, supplier reward and recognition of quality improvements, supplier training, intensive communications and information sharing with suppliers, and supplier involvement in the buyer’s new product development process. In the present study Trading Partner Management is considered under the sub
constructs, namely, Selection; Trust and Commitment; Cross Functional Teams; and Long-Term Relationships.

**Performance** \((FP, TP, BP, CP)\): An important component in supply chain design and analysis is the establishment of appropriate performance measures. A performance measure, or a set of performance measures, is used to determine the efficiency and/or effectiveness of an existing system, or to compare competing alternative systems. Implementation of SCM requires that the internal perspective of performance measures be expanded to include both "inter-functional" and "partnership" perspectives, and avoid inward-looking and self-focused attitudes in the management approach. The measures of performance considered from the perspective of OEM are Financial, Trading Partner, Business, and Customer Related Performance.

### 3.7 THEORETICAL ELUCIDATION OF SCM CONSTRUCTS: PERSPECTIVE OF OEMs

It is conceived in this study that the OEM, in principle, is the one who plans, designs, implements and maintains the exclusive supply chain, resulting in an effective and efficient SCM. The following sub-sections give details of the arguments made by previous researchers in favor of the particular construct, which qualifies the consideration of the items in this study as well.

#### 3.7.1 Environmental Uncertainty

Environmental uncertainty plays a central role in strategy formulation, for it affects not only the availability of resources to the firm and the value of its competencies and capabilities, but also customer needs and requirements, as well as the competition (Jabnoun et al 2003). Uncertainty is
one of the main drivers for close co-operation in a supply chain and especially in cases that are characterized by a lead-time gap (Christopher 1998 and van Donk and van der Vaart 2005). Davis (1993) identified three distinct sources of uncertainty in supply chains: supplier uncertainty (caused by supplier’s variability of performance due to late or defective deliveries and degree of inconsistency), process uncertainty (resulting from unreliability of the production process, due to machine breakdowns, etc.) and customer or demand uncertainty (arising from volatile demand or inaccurate forecasts). The author found that uncertainty has significant effect on supply chain performance. Jabnoun et al (2003), through literature review, grouped the environmental uncertainties into various dimensions such as Macro-environmental (political, regulatory, statutory and economic conditions), Competitive, Market (and demand) and Technology uncertainty.

Relative to developed countries, developing nations tend to have a less organized economic system, poor transportation, a less educated workforce, and more restricted movement of capital and materials. These characteristics tend to increase the level of uncertainty within the supply chain and thereby add extra costs (Prasad and Babbar 2000). Increased globalization, competition, customer expectations, liability risks, infrastructure issues, policy/tax changes and technological innovations are the key trends/challenges in the market place in India (Upendram et al 2004). Increased risk and uncertainty in supply chains can lead to significant inefficiencies and the inability to deliver products to final consumers (Zsidisin 2003). Sahay et al (2006) found from the survey done in India that highlighted weakest areas such as uncertainty in government policies; infrastructural deficiencies; unsatisfactory corporate and financial management of both private and public sector enterprises; inept corporate boards; insufficient attention to human development; low productivity; undependable quality; inadequate customer orientation and negligible investment on R&D, with
special reference to information technology. The various uncertainties considered under the present study are: Trading Partner (TPU), Customer (CSU) and Technology and Infrastructure uncertainty (TIU), and the uncertainties would be at the level at which the OEM (respondent) perceives it.

3.7.2 Competitive Priorities

“Competitive Priorities” denote a strategic emphasis on developing certain manufacturing capabilities that may enhance a plant’s position in the marketplace. Such emphasis may guide decisions regarding the production process, capacity, technology, planning and control (Boyer and Lewis 2002). The author noted that the trade-off model (Skinner 1969, 1974) called for managers to choose their plant’s competitive priority, then design and operate the manufacturing system accordingly; concentrating efforts on developing assets and practices that help achieve their goals. It also emphasized that plants should focus on one priority at a time as each capability required different operational structures and infrastructure for support.

aesthetics and perceived quality. Ward et al (1998) considered the first six in their survey, as aesthetics and perceived quality are inherently difficult to measure. Besterfield et al (2004) included response and reputation to the list of quality category. Chen and Paulraj (2004a) noted from extant literature that supply chain strategy should not be based on cost alone, but rather on the issues of quality, flexibility, innovation, speed, time and dependability. Sengupta et al (2006), while comparing manufacturing and services supply chain, suggested that practicing managers should identify appropriate benchmarks and competitive priorities before pursuing specific supply chain strategies. Fisher’s (1997) supply chain classification scheme points out the potential negative consequences of a mismatch between supply chain and its products.

### 3.7.3 Top Management Commitment

Without senior management commitment all the way up to the CEO, the vision needed for supply chain success cannot emerge (Fawcett et al 2006). Top-level managers have a better understanding of the needs of SCM because they are the most cognizant of the firm’s strategic imperatives to remain competitive in the market place (Hahn et al 1990). Mentzer (2001b) noted that top management support, leadership and commitment to change, as important antecedents to the implementation of SCM.

Stevens (1990) suggested that objectives and policies for the supply chain must be developed in terms of overall business strategies if SCM is to be used as weapon for competitive advantage. The interview conducted by Fawcett et al (2006) revealed Top Management Commitment as one of the four vital types of commitments to SCM implementation. The author concluded that achieving competitive advantages through collaborative breakthroughs require higher levels of sustained managerial commitment than
are typically in place in today’s business world. Lummus and Vokurka (1999) viewed supply chain strategy as the pattern of decisions related to sourcing product, capacity planning, conversion of finished product, deployment of finished product, demand management and communication and delivery and stressed that linking supply chain strategy to the business strategy involves defining the key business processes involved in producing a company’s product or service. Chopra and Meindl (2001) emphasized that there should be a strategic fit between the competitive and supply chain strategies i.e., there should be a consistency between the customer priorities that the competitive strategy is designed to satisfy and the supply chain capabilities that the supply chain strategy aims to build. The authors suggested that a company’s success or failure is closely related to: the degree of fit between the competitive strategy and all functional strategies; each functional strategy should support the other functional strategies; and appropriate restructuring of all processes and resources to execute the strategies successfully.

Based on the review of literature, Krause and Ellram (1997) listed Top Management Commitment as one of the elements critical to supplier development efforts. Monczka et al (1993) noted that top management must commit the time, personnel and financial resources to support the suppliers who are willing to be long-term partners of the company through supplier development. ISO 9001:2000 standards also state that Top Management should ensure availability of adequate resources in the organization.

Love et al (2003) asserted that making quality management an integral element of the supply chain, companies could strive to meet the demands of their supply chain customers more proactively. Total quality management (TQM) literature indicates that many authors (e.g., Saraph et al 1989, Flynn et al 1994, Ahire et al 1996, Samson and Terzirovski 1999, Joseph et al 1999) have made rigorous efforts to identify critical elements of TQM.
Samson and Terziovski (1999) considered Continual Improvement and Joseph et al (1999) considered the top management’s *Customer Focus* and its effort in ensuring employee focus, defining measuring and monitoring systems, evolving competitive benchmarking an improvement of quality, effective recognition and reward systems, among other things, in their study. Flynn and Flynn (2005) examined the potential that quality management has for the performance of SCM. Their findings indicated that organizations with stronger quality management practices achieved better supply chain performance.

Co-operative agreements with suppliers require far greater top management and inter-functional contact within the purchasing organization as well as across peer functional in the supplier’s organisation (Leenders et al 1994). Upendram et al (2004) pointed out that while product features and price are key differentiators to attract customers, pre-sales and post-sales service experience is increasingly becoming an important factor to retain them. In such a competitive environment efficient SCM enables organisations to achieve high service levels at low cost of operations. Lummus and Vokurka (1999) stressed that organizations must evaluate the effectiveness of the supply chain strategy using a new set of measures and that the typical rewards aimed at improving performance of functions or departments must be revised to strive to improve overall supply chain performance.

### 3.7.4 Customer Orientation and Involvement of Employees

SCM is emerging into a *customer-driven value chain management*, which in addition to pursuing improvements in efficiency, recognizes the importance of consumer needs, and attempts to capture the subtleties of consumer value as a source of differentiation in the supply chain (Zokaei and Hines 2007). The supply chain should support the satisfaction of end-user
requirements. These requirements give rise to the fundamental reason for the supply chain in the first place (Ayers 2001). Customer satisfaction and marketplace understanding are crucial elements for consideration when attempting to establish a new supply chain strategy (Christopher and Towill 2001). Increasingly, manufacturing and service organizations are using customer satisfaction as the measure of quality (Besterfield et al 2004). Frazelle (2004) suggested ranking and categorizing customers and stock keeping units (SKUs) in preparation for creating a customer service policy, which sets the service requirements for each logistics process, including inventory management, supply, transportation and warehousing. Besterfield et al (2004) emphasized that customer feedback must be continually solicited and monitored and customer complaints, even though reactive, are very vital in gathering data on customer perceptions. The more attention a company pays to researching its customer base in order to identify customer needs, the more rewarding the exchange transaction in the supply chain will be for that company (Carson et al 1998 and Chen and Paulraj 2004b). Customer satisfaction evaluation involves measuring customer perceptions about products or services, discovering areas of improvement and evaluating trends to assess the results of product/service changes (Evans and Lindsay 2002 and Gowen III and Tallon 2003). Close customer relationship allows an organization to differentiate its product and from competitors, sustain customer loyalty and dramatically extend value it produces to its customers (Magretta 1998).

Employee Involvement (EI) is a process designed to empower members of an organization to make decisions and to solve problems appropriate to their level in the organization (Pace 1989). The logic of EI is that the people closest to a problem or opportunity are in the best position to make decisions of the improvement if they have control of the improvement process (Sun et al 2000). Owusu (1999) defined Employee Involvement (EI)
as “the participation of the entire firm’s workforce to improve the working environment, product quality, equipment productivity and eventually, company competitiveness”. The participation of employees occurs through cooperative relationships, open communication and group (team) problem solving and decision-making through participative management approach. To achieve the objectives of SCM, supply chain managers must first adopt a supply chain orientation and begin to think about supply chain as a singly value system (Mentzer 2001b). Mohanty and Deshmukh (2004) listed a set of core competencies required, namely: (a) enriching the customer; (b) co-operating with suppliers and customers to enhance competitiveness; and (c) leveraging the power of information technology and system, for being a successful SCM professional. Sun et al (2000) pointed out that increased involvement of employees meant more responsibility, which in turn would require higher level of skills and suggested that training should be provided to allow employees to attain higher skills in both techniques, such as statistical methods and managerial skills in decision making, leadership, team building, etc. Gowen III and Tallon (2003) studied the impact of human resource factors on the competitive advantage of SCM practices. The results suggested that an interactive role of managerial and employee support to enhance the effectiveness of employee training and to mitigate the adverse effect of implementation barriers on the success of SCM practices. As supply chains evolve with increasing numbers of organizations and greater complexities, employees will be required to utilize the tools of scientific management and enhance their abilities to communicate across various organizational functions and entities. The authors asserted that a firm’s ability to excel in such an environment will require a strong organizational commitment to HRM.

As the concept of SCM is rather new, it emphasizes on cross-functional and inter-organisational relationships and participation of people across functions and across organizations concerned, which is an implicit
requirement to make SCM effective and efficient. Therefore the factors ‘Customer Focus’ and ‘Employee Involvement in SCM’ is combined and the construct named as Customer Orientation and Involvement of Employees is identified.

3.7.5 Strategic Purchasing

With the growing importance of SCM, purchasing has assumed an increasingly pivotal strategic role (Chen et al 2004), evolving from an obscure buying function into a strategic business partner (Ellram and Carr 1994). The increased emphasis on utilizing a strategic approach to purchasing /supply management involves expanding its core processes to include activities such as: supplier coordination, supplier development, supplier market research, cost analysis, sourcing strategy formulation, benchmarking and outsourcing decisions (Giunipero et al 2005).

One of the purchasing function’s basic objectives is to develop effective and reliable sources of supply (Dobler and Burt 1996 and Krause and Ellram 1997). Watts et al (1992) proposed that purchasing has the primary responsibility of linking suppliers’ capabilities with the internal requirements specified by corporate and manufacturing strategies. Without good suppliers and without superior purchasing, supply chains will not compete as effectively in the marketplace (Joyce 2006). Cousins et al (2006) through literature review defined four variables that would influence different purchasing configurations, namely: strategic purchasing, status of purchasing function, integration of purchasing function and skills of the purchasing function. The status of purchasing in the firm is related to the level of strategic purchasing because only purchasing functions viewed as strategic will be integrated in the firm’s strategic planning process Ammer (1989). Watts et al (1992) emphasized the importance of achieving congruence
between purchasing objectives and action plans, and manufacturing and business goals. Leenders et al (1994) concluded that the growing reliance on suppliers to provide goods and services formerly sourced internally is placing new demands on effective implementation of SCM and that the purchasing manager should become a manager of the supply chain, integrating the organization’s internal and external operation, rather than keeping them separate. Narasimhan and Das (2001) referred to purchasing integration as an alignment of strategic purchasing and goals with that of the firm and that it can be an important competitive advantage in the international marketplace (Hult et al 2000). Strategic purchasing is considered critical to fostering and facilitating close interactions with a limited number of suppliers, thus making effective use of the firm’s supply base (Cousins 1999). Wynstra et al (1999) attributed the increase in the involvement of purchasing in product development to, firstly, the increasing awareness of the purchasing function’s possible contribution to the firm’s strategic position and secondly, the growing importance of innovation and product development in creating competitive advantage. Mol (2003) suggested through literature review that purchasing is indeed a strategic activity and empirically demonstrated that purchasing and supply management contribute to sustainable competitive advantage.

Purchasing knowledge and skills are required for purchasing to effectively perform as a strategic function (Rajagopal and Bernard 1993). Strategic level purchasing functions are expected to have knowledge of their external supplier environment and knowledge of the firm’s strategic goal. Purchasing function should have the ability to gain access to information concerning material availability, material costs and substitute materials is a valuable resource to the product planning process and the use of information technology speeds up the purchasing ability to provide information for strategic decision making (Carr and Smeltzer 1997). The objective of supply
management is to minimize the total acquisition cost while meeting the availability, response time and quality requirements stipulated in the customer service policy and the inventory master plan (Frazelle 2004). The author suggested that the logistics of supply should include, developing and maintaining a Supplier Service Policy (SSP) and defined SSP as a set of guidelines for choosing suppliers, monitoring supplier performance and designing inbound logistics programs.

Supplier integration focuses on aligning with all the critical suppliers in a company’s supply chain. The potential outcome of supplier integration is a new level of competition in which supply chains compete with other supply chains. Supplier integration represents a change in philosophy, vision and culture (Morgan and Monczka 1996). The supplier integration is recognized by the presence of (1) supplier relationships (2) vendor managed inventory, (3) forecast sharing, etc (Frazelle 2004). Narasimhan and Das (2001) suggested through their findings that external purchasing initiatives (such as supply base leveraging, buyer–supplier relationship development and supplier performance evaluation) might not be sufficient to elevate purchasing into a strategic function. These practices should be accompanied by internally focused purchasing initiatives that enable purchasing to become a member of the business planning process and leverage its supply base investments for competitive advantage.

Chen et al (2004) investigated the extent to which strategic purchasing fosters supply management capabilities, consisting of long-term orientation, limited number of suppliers and communication. They conclude that these capabilities contribute to enhancing customer responsiveness and financial performance for the buying firm showing that not only can purchasing contribute directly to the firm’s bottom line but also it is a vitally important strategic partner in fostering supply management capabilities.
Giunipero et al (2006) conducted a qualitative study on the impact of the changes in the purchasing /supply management and their findings indicated that supply management professionals would assume a more strategic role in the future. Kocabasoglu and Suresh (2006) concluded from their study that strategic sourcing consists of: elevation of the purchasing function from the traditional transaction-processing mode to one with a more strategic role; effective cross functional coordination of purchasing with other functions of the firm; and information sharing with and development of key suppliers.

### 3.7.6 Trading Partner Management

*Trading Partners* refers to any external organization that plays an integral and critical role in the enterprise and whose business fortune depends all or in part on the success of the enterprise. This includes the customers, suppliers, contract manufacturers, subassembly plants, distribution centers, wholesalers, retailers, carriers, freight forwarders and so on. These relationships can be characterized by long-term relationships with a reduced number of suppliers, selection of suppliers based on quality, supplier quality certification, visits to suppliers plants, supplier reward and recognition of quality improvements, supplier training, intensive communications and information sharing with suppliers, and supplier involvement in the buyer’s new product development (NPD) process (Rodriguez and Lorente 2004). In today's competitive business climate, buying firms increasingly rely on their suppliers to deliver technologically advanced, defect-free products (Krause and Ellram 1997). Stjemstrom and Bengtsson (2004) suggested removal of hindrances, namely, demands for price reduction, vagueness regarding the customer’s expectations, unequal relations due to different degrees of dependence and restricted opportunities to collaborate with the customer’s competitors, to improve supplier contributions and mutual learning.
SCM integrates suppliers, manufacturers and distribution centers to get the right products to the right place at the right time and in the right condition (Christopher and Towill 2001). The quality management literature has long emphasized the importance of collaborative buyer-supplier relationships in a TQM system (e.g., Ahire et al 1996, Flynn et al 1994, Saraph et al 1989 and Joseph et al 1999). Buyer-supplier dyadic relationship has been highly touted to be of crucial importance to the strategic management of supply chains (Anderson et al 1994). Since deregulation of the freight transportation industries, buying logistics services has become similar to the purchase of other types of industrial services (Menon et al 1998). Chan and Qi (2003) noted that to survive under increased pressures, more and more enterprises are striving to develop long-term strategic partnerships with a few competent suppliers and collaborate with them in product development, inventory control and non-core process outsourcing. Li et al (2005) considered long term relationship; supply base reduction, joint problem solving, involvement of supplier in decision-making and NPD and supplier certification under ‘Strategic supplier partnership’. ‘Information Sharing’ and ‘Information Quality’ were the other factors related to trading partner management. Krause and Ellram (1997) noted the following critical elements related to supplier development, namely: Effective two-way multi-functional communication, Top management involvement, Cross-functional buying firm teams, Price versus the total cost of ownership, Long-term perspective, Large percentage of suppliers' annual sales, Supplier evaluation and Supplier recognition. Chen and Paulraj (2004b) used supplier base reduction, long-term relationship, communication, cross-functional teams and supplier involvement to measure buyer-supplier relationships. Reed and Walsh (2003) stated that the organization is only as good as its supply base. Chen et al (2004) and Paulraj and Chen (2005) noted supply management as a multidimensional construct and suggested researchers to consider additional constructs, namely: Supplier selection, Supplier certification, Supplier Integration and Trust, in future work.
3.7.6.1 Selection

In an era of global sourcing, a firm's success often hinges on the most appropriate selection of its suppliers (Petroni and Braglia 2000). Effectively selecting and evaluating suppliers and managing their involvement in the supply chain are thought to be capabilities that enable manufacturers to achieve the four dimensions of customer satisfaction, namely: competitive pricing, product quality, product variety and delivery service (Narasimhan and Jayaram 1998). Tracey and Tan (2001) confirm through their research that higher levels of customer satisfaction (i.e. competitive pricing, product quality, product variety and delivery service) and firm performance result from selecting and evaluating suppliers based on their ability to provide quality components and subassemblies, reliable delivery and product performance. Petersen et al (2005) emphasized the criticality of the supplier selection decision in NPD process, considering not only the capabilities of the supplier, but also the culture of the supplier, which will have an impact on the buying firm’s ability to interact with the supplier effectively. van Hoek and Chapman (2007) offered practical insights and experiences to enhancing NPD impact through leveraging supply chain capabilities. The authors suggested three particular steps that can be taken, namely: improving basic alignment; improving supply chain readiness; and leveraging supply chain capabilities.

Menon et al (1998) identified seven factors for choosing transportation services, namely: Speed and Reliability, Inventories, Freight rates, Market responsiveness, Company policy, customer influence and External market influences. Their study indicated that capability requirements such as management creativity and financial stability of the logistics service provider, in addition to their performance, were very important for the customers. Trustworthiness, integrity, commitment and characteristics that
imply ‘fair dealing’ are also considered with importance in selecting the supplier (Anderson and Narus, 1990). Specifically, suppliers who are unwilling to share information on cost, quality and production can be screened out, because willingness to share information is viewed as a signal of trustworthiness of the supplier (Dyer 1997 in Dyer and Chu 2000). Kannan and Tan (2006) concluded from their review of literature on supplier selection that while price, quality, delivery reliability and service are the most important criteria used to screen potential suppliers, the specific criteria used and their relative importance depends on the type and circumstances of the purchase. Moreover, while there is a tendency to focus on measurable criteria, subjective criteria such as technical capability, flexibility and the willingness of a supplier to work in a collaborative manner, can be important in certain buying circumstances, for example, in the context of cooperative relationships.

### 3.7.6.2 Supply base reduction

One of the most strategic areas of responsibility in the purchasing and supply function in organizations is supply base management (Ogden 2006), which the author defined as the process of and activities associated with reducing the number of suppliers than an organization utilizes. The traditional practice of firms contracting with multiple suppliers, even for the same material or component, was based on the premise that (1) competition is the basis of the economic system, (2) purchasing must not become source dependent and (3) multiple sourcing is a risk-reducing technique (Newman 1989 and Shin et al 2000). Simultaneous with the growth in out-sourcing has been a move towards rationalization of the supplier base. (Christopher and Juttner 2000). Reduction of the supplier base is a unique characteristic of contemporary buyer supplier relationships (Newman 1988 and Helper 1991), because the administrative or transaction costs associated with managing a
large number of vendors often outweigh the benefits (Dyer 2000 and Chen and Paulraj 2004a). Thus, buying firms are moving beyond traditional adversarial relationships to cooperative, mutually beneficial relationships, which view suppliers as virtual extension of their firm (Tan et al 1998a, Monczka and Trent 1991 and Krause 1999). The relational competency perspective suggests that having close ties with a limited number of suppliers and increasing investments in relationship-specific assets ultimately fosters greater trust, dependability and cooperation among supply-chain partners (Chen et al 2004). To better manage their supply bases, many firms have dropped redundant suppliers and consolidated volumes with their most competent and trustworthy suppliers (Tully 1995 and Tan et al 1998a). Ogden (2006) identified and analysed six critical success factors associated with supply base management, namely: good information system, cross-functional teams, choosing the right supplier, good project communication, establishing win-win relationships and key management support.

3.7.6.3 Trust and commitment

SCM is built on a foundation of trust and commitment (Lee and Billington (1992). Collaborative relationships require trust and commitment for long-term cooperation along with a willingness to share risks (Sahay and Maini 2002 and Sahay 2003). Trust refers to a firms’ expectation that their partners will act to benefit their (firms’) interests regardless of their ability to monitor such behavior. The outcome of trust is the “firm’s belief that a partner’s company will perform actions that will result in positive outcomes for the firm as well as not take unexpected actions that result in negative outcomes” (Anderson and Narus 1990). A high level of inter-organizational trust is found to be related to enhanced supplier performance, lowered costs of negotiation and reduced conflict (Zaheer et al 1998). Sahay (2003) reviewed previous definitions of trust and proposed a working explanation as “trust is
an expectancy of positive (or non negative) outcomes that one can receive based in an expected action of another party in an interaction characterized by uncertainty”. The lack of trust among trading partners often creates a condition where every transaction has to be scrutinized and verified, thereby increasing the transaction costs to an unacceptably high level, productivity is lost and efficiency and effectiveness, cornerstones of supply chain goals, will be compromised (Kwon and Suh 2004). Effective supply chain planning based on shared information and trust between and among partners is an essential element for successful supply chain implementation (Kwon and Suh 2005). Trust exists when one party has confidence in an exchange partner’s reliability and integrity (Morgan and Hunt 1994). Issues of trust and risk can be significantly more important in supply chain relationships, because supply chain relationships often involve a higher degree of interdependency between companies (LaLonde 2002). Releasing and sharing information is a challenging task, which requires a high degree of trust among and between the supply chain partners (Handfield 2002, Kwon and Suh 2005 and Lippert and Forman 2006). Handfield and Bechtel (2002) suggested that trust is the central feature of buyer-supplier relationships and pointed out that Trust can contribute significantly to the long-term stability of an organization. Trust is one’s belief that one’s supply chain partner will act in a consistent manner and do what he/she promises (Sahay 2003). While trust comes in various forms such as ‘cognitive trust’ and ‘calculative trust’, it is the calculative trust that can have a significant impact on buyer-supplier relationships and, consequently, supply chain performance (Chen and Paulraj 2004a).

Morgan and Hunt (1994) defined commitment as “an exchange partner believing that an ongoing relationship with another is so important as to warrant maximum efforts at maintaining it; that is, the committed party believes the relationship endures indefinitely” and commitment is central to all the relational exchanges between the firm and its various patterns. Any
enduring business transactions among supply chain partners require commitment by two parties in order to achieve their common supply chain goals. Without commitment, business relationship and subsequent transactions become fragile and vulnerable. Accordingly, enduring commitment is a basic requirement for successful supply chain implementation (Kwon and Suh 2005). Commitment implies that the trading partners are willing to devote energy to sustaining this relationship (Dion et al 1992). Commitment plays a significant role in inter-firm relationships. The nature of commitment in inter-organizational, intra-organizational and interpersonal relationships is stability and sacrifice (Anderson and Weitz 1992). (Grieco 1989 and Chen and Paulraj 2004a) depicted supplier certification as buyer-supplier partnership, involving higher levels of trust and communication. (Baiman et al 1998 and Chen and Paulraj 2004a) described certified suppliers as a vendor who, after extensive investigation of its manufacturing operations, production capabilities, personnel and technology, is certified to provide materials and components without routine testing of each receipt. Gibson et al (1995), extending supplier certification to logistics function, illustrated the utilization of supplier certification to certify carriers and its benefits. The ultimate goal of supplier certification is quality at the source and to reduce inventory, non-conformance, communication errors, duplicate testing, receiving inspection, deliver to point of use, cycle time and the ability to shift focus from process input to output (Tan 2001).

3.7.6.4 Cross-functional teams

Managing long-term relationships with customers using cross-functional teams is becoming a common practice in supply chain (Smith and Barclay 1993 and Narus and Anderson 1995). Cross-functional teams have been identified as important contributors to the success of such efforts as supplier selection, product design (Burt 1989), just-in-time manufacturing,
cost reduction, total quality initiatives and improved communications (Ellram and Pearson 1993) and most of all improved communication (Chen and Paulraj 2004a). The concept of “team” has been shaped to fit many circumstances ranging from temporary to permanent, single function to multi-function, routine to non-routine and co-located to virtual. (Larson and Gobeli 1987 and Rangarajan et al 2004) argued that cross-functional teams positively impact the motivation, job satisfaction and commitment of team members. According to Carr and Pearson (1999) suppliers are critical team members assisting with initial product design suggestions, technology and resource contributions and quality assurance considerations. Saad and Patel (2006) noted from their study on Indian Automotive sector that strong boundaries within and between organizations are significantly impeding the development of cross-functional teams, communication needed for a greater trust, participation, empowerment and continuous improvement.

3.7.6.5 Trading partner involvement

Studies on SCM emphasized the importance of a long-term strategic relationship between a manufacturing firm and its suppliers (Choi and Hartley 1996). Research suggests that managing supplier involvement well can lead to better supplier performance, improved manufacturing and product and process advancement and in turn enhance customer satisfaction and firm performance (Shin et al 2000). A major reason for integrating suppliers into NPD is to access more and/or better information earlier in the development process by leveraging the supplier’s expertise (Petersen et al 2005). Many firms increasingly realize that supplier involvement in NPD can be beneficial with regard to the costs and quality of new products and the costs and time associated with their development. The involvement may range from giving minor design suggestions to being responsible for the complete development, design and engineering of a specific part or sub-assembly.
Manufacturing costs can likely be reduced, product quality maximized and new products’ brought to market at a much faster rate if purchasing brings key suppliers into the product design and development at the earliest stage of the process (Joyce 2006).

3.7.6.6 Communication

Effective two-way communication is demonstrated throughout the literature as essential to successful supplier relationship (Krause 1999). Communication can be defined broadly as the formal, as well as the informal sharing of meaningful and timely information between firms (Anderson and Narus 1990). Effective inter-organisational communication could be characterized as frequent, genuine and involving personal contacts between buying and selling personnel (Krause and Ellram 1997). In order to jointly find solutions to material problems and design issues, buyers and suppliers must commit a greater amount of information and be willing to share sensitive design information (Carr and Pearson 1999). When communication occurs among design, engineering, quality control and other function between the buyer and supplier firms, in addition to the purchasing-sales interface, the supplier’s quality performance is superior to that experienced when only the buying firm’s purchasing department and supplier’s sales department acts as the interfirm information conduit (Carter and Miller 1989). Effective implementation of SCM rests on the twin pillars of trust and communication (Grieco 1989 and Chen and Paulraj 2004a), and procurement and logistics professionals must be equipped with the necessary expertise in the critical functions of their own enterprise and fully understand how it affects the entire value chain (Tan 2001). A major precursor to trust is communication, which can be defined as the formal, as well as informal sharing of meaningful and timely information between the channel members (Ballou et al 2000).
LaLonde (1998) considered sharing of information as one of five building blocks that characterize a solid supply chain relationship. Timely communication fosters trust by assisting in resolving disputes and aligning perceptions and expectations about the benefits of cooperation. Chopra and Meindl (2001) divide the information necessary to achieve a global scope corresponding to the different stages of the supply chain as (a) supplier information (b) manufacturing information (c) distribution and retailing information and (d) demand information. While the information sharing is important, the significance of its impact on SCM depends on what information is shared, when and how it is shared, and with whom (Chizzo 1998, Li et al 2005 and Holmberg 2000). Information sharing refers to the extent to which critical and proprietary information is communicated to one’s supply chain partner (Monczka et al 1998). Shared information can vary from strategic to tactical in nature and information about logistics activities to general market and customer information (Mentzer et al 2000). Jarrel 1998 and Li et al (2005) noted that sharing information within the entire supply chain can create flexibility, but this requires accurate and timely information. Information quality includes such aspects as the accuracy, timeliness, adequacy and credibility of information exchanged (Monczka et al 1998). Quick, frequent, and accurate information transfer among members of the supply chain can counteract the distortion of information (known as the bullwhip effect) as it passes up the supply chain from the end customer (Metters 1997 and Wisner and Tan 2000). Christopher and Ackerson (2004) concluded from their study that that the supply chain is able to remain successful because of the strong and frequent unidirectional communication existing between the manufacturer and the supplier and between the manufacturer and the distributor even while communication weakens and disappears at either end of the supply chain.
3.7.6.7 Long-term relationships

Collaborative relationships require trust and commitment for long-term cooperation along with a willingness to share risks (Sahay and Maini 2002 and Sahay 2003). Through close relationships supply chain partners are willing to (1) share risks and reward and (2) maintain relationship over a long period of time (Landeros and Monczka 1989, Cooper and Ellram 1993, Stuart 1993). Effective SCM is made up of a series of partnerships and, thus, SCM requires partners to build and maintain long-term relationships (Cooper et al 1997, Ellram and Cooper 1990). Cooper et al (1997) argued that the time horizon of the relationships extends beyond the life of the contract and at the same time, the number of partners should be small to facilitate increased cooperation. De Toni and Nassimbeni (1999) found that a long-term perspective between the buyer and suppliers have a positive impact on a firm’s supplier performance. A strategic partnership emphasizes direct, long-term association and encourages mutual planning and problem solving efforts (Gunasekaran et al 2001). Choi and Hartley (1996) emphasized the importance of a long-term strategic relationship between a manufacturing firm and its suppliers Through a long-term relationship, the supplier will become part of a well-managed chain and will have a lasting effect on the competitiveness of the entire supply chain (Choi and Hartley 1996, Kotabe et al 2003). A partner committed to the relationship will cooperate with another because of a desire to make the relationship work (Ballou et al 2000). Mason-Jones and Towill (1997) suggested that successful information enriched supply chains must view their information as a strategic asset and ensure that it flows with minimum delay and minimum distortion. Handfield (2002) and Kwon and Suh (2005) noted that releasing and sharing information is a challenging task, which requires a high degree of trust among and between the supply chain partners.
3.7.7 Information Technology

Information Technology (IT) is the key enabler to supply chain. In today’s competitive environment, the use of IT is a necessity for the survival of companies (Sahay et al 2003, Upendram et al 2004), and has the effect of reducing levels of complexity (Power 2005). Technology is likely to support more sophisticated functions and types of data exchanged for those organizations that nurture higher levels of social relations with dyads (Bernardes and Fensterseifer 2004).

The integration of the supply chain with IT is aimed at leveraging information tools to address business concerns such as flexibility and variety, quality, responsiveness and edging towards agility (Mohanty and Deshmukh 2004). SCM, based on the need for coordination between supply chain partners (Narasimhan and Jayaram (1998), Vakaria (2002) and Prahinski and Benton (2004)), has been particularly influenced by the growth and development of IT (Sanders 2005 and Chatzipanagioti et al 2007). A key aspect of SCM is the ability to makes strategic decisions quickly, based on accurate data, and this requires an efficient and effective information systems (Mentzer 2001b). Lai et al (2007), based on their study in China, indicated that efforts to improve IT systems could only be effective if the improvements in IT are properly aligned with a company’s overall strategy. Boyson and Corsi (2005) pointed out that suppliers gain access to OEMs’ statistical data bases, including past sales, current inventory levels, customer order forecasts, through secure extranet sites for promoting collaborative planning. Upendram et al (2004) pointed out that many Indian organizations are still in the rudimentary stages as far as IT is concerned and the average spending on IT in Indian auto companies is 0.3 to 0.5 % of the revenues compared to global averages of 3% to 4 %. Rahman (2004) found from their survey in India that the most popular use of IT was in transportation followed by order
processing, managing vendor relations, and purchasing/procurement and customer services. The advancement of IT has allowed firms that participate in SCM to share information across organizational boundaries, bringing about substantial increase in performance (Kwon et al 2007). Study by Kent and Mentzer (2003) found a strong and positive relationship between investment in IT and relationship commitment between channel partners. New technologies such as EDI and ECR enable customer related information to be sent directly to suppliers, distributors, and manufacturers who can use this information to respond instantaneously to changing inventory levels. This represents the beginning of a SCM revolution, which will capture and diffuse customer trends and preferences deep into supply chain member companies (Bechtel and Jayaram 1997). Best practice companies, for designing the appropriate network structure, are moving from the traditional rule of thumb to using optimization tools and techniques such as Linear and Integer programming in factoring different aspects of scale like economics to manufacturing, transportation costs, inventory carrying costs, etc (Upendram et al 2004). Mohanty and Deshmukh (2004) pointed out that the developments in IT have resulted in many possible alternative solutions for managing the supply chain effectively, and listed some of the major developments in IT, which are transforming the supply chains today, namely: Electronic data interchange (EDI), Internet /Extranet, Data mining/data warehousing/data marts, E-commerce, etc. Danese (2006) noted from literature that effective information sharing between supply chain partners enhances most supply chain initiatives, including vendor managed inventory (VMI), continuous replenishment program, collaborative forecasting and replenishment, and efficient customer response. Under a VMI agreement, it is the supplier who determines when stocks are to be replenished and what it the quantity rather than responding passively to order placed by the retailers (Chatzipanagioti et al 2007), thus reducing investments in stocks while simultaneously maintaining a high service level (Disney and Towill 2002), efficiency and
security of information sharing across the supply chain (Jones et al 2004), reduced storage, handling and distribution expenses, increased sales through reduced stock outs, and improved cash flow through increased inventory turns (Kakkainen 2003), by the usage of Radio Frequency Identification (RFID) technology in supply chain. While the IT helps to break the internal silos within an organization, it also assists the coordination of activities with the members of the supply chain and the customers (Brah and Lim 2006).

A key ingredient for success in managing a supply chain is fast, accurate information from a wide range of operating areas, including transportation, inventory, purchasing, customer services, production scheduling, order processing and vendor operations (Gunasekaran and Ngai 2004). The quality of information exchanged via linked information systems has a significant impact for all types of collaborative planning, and has a larger impact than the quality of information exchanged through traditional modes in every context of collaborative planning except for joint goal/target setting (Petersen et al 2005). Mohanty and Deshmukh (2004) defined Decision support systems (DSS) as an interactive computer-based system that utilizes data and models for facilitating decision makers in solving semi-structured and unstructured problems, and suggested that DSS is an extremely useful tool as a decision aid for managing the supply chain.

3.7.8 Supply Chain Design, Structure and Operations

The starting point in moving towards supply chain excellence is designing the supply chain to suit the customer and product being served (Upendram et al 2004). The supply chain is a complex network of facilities and organizations with different and conflicting objectives (Ballou 2004). Simchi-Levi et al (2000) and Mentzer (2001b) pointed out control of smooth material flow in the supply chain lies in the heart of the best SCM design, and
practices and reengineering of material flows can improve supply chain performance. Supply chain design is effectively determined during the product development stage when product, process and information systems decisions are specified and determined. This is so because the supply chain network consists of suppliers, warehouses, distribution centers, and retail outlets as well as raw materials, work-in-process inventory, and finished products that flow between the facilities (Petersen et al. 2005). Fine (2000) discussed supply chain design as a separate dimension besides product and process design. Selldin and Olhager (2007) also emphasized that before any measures are taken, the design of the supply chain has to be considered. Fisher (1997) suggested that mismatch between type of product and the type of chain is the root cause for supply chain problems. The author divided products into two categories: functional and innovative, and suggested that flexible supply chain is of value when dealing with innovative products, whereas a constant, continuous replenishment supply chain is of value with functional products. To function effectively, supply chains need sound structural design that must be adapted to the physical nature of the product it moves, along with the supply and demand characteristics of its marketplace (Hull 2005). Mentzer (2001b) pointed out that network design has five different aspects, namely: strategic, tactical, operational, spatial, and temporal. In this study “Supply Chain Design, Structure and Operations” is reviewed under the headings “Supply-Chain-Management Techniques” and “Supply-Chain-Management Supporting Tools” in the present study.

3.7.8.1 Supply chain management techniques

Supply chain performance is impacted by several factors beginning with the plant location decision. Locating fixed facilities throughout the supply chain network is an important decision problem that gives form, structure, and shape to the entire supply chain system. Location decisions
involve determining the number, location, and size of the facilities used. These facilities include such nodal points in the network as plants, ports, vendors, warehouses, retail outlets, and service centers—points in the supply network where goods temporarily stop on their way to the final customers (Ballou 2004 and Chopra and Meindl 2001). Bhatnagar and Sohal (2005) asserted that there is a significant relationship between qualitative plant location factors such as labour, infrastructure, business environment, political stability, proximity to markets, proximity to suppliers, key competitors’ location, supply chain uncertainty and broad manufacturing practices, and the operational competitiveness of supply chains as measured by quality, flexibility, inventory turnover and responsiveness. Cigolini et al (2004) introduced a set of SCM techniques. For example, “Design for SCM”, a technique that aims to improve upon the traditional manufacturing oriented methods of product design (e.g., design for manufacturing, assembly, cost, etc), and combines standardisation of parts and subassemblies, modular design, item variety postponement, etc., for decreasing variance in consumption of materials over time, and increases the responsiveness of the chain to varying demand. Upendram et al (2004) noted that the key element in supply chain design in Indian conditions is leveraging the tax laws and incentive structures available.

A strategy increasingly adopted by discrete manufacturers is developing *common architectures across products*, to simplify product design and compress development time and costs. Best practice organizations use outsourcing effectively to balance between cost/service level management and the strategic interests (e.g., Upendram et al (2004), which enable companies to focus on the critical success factors (Prahalad and Hamel 1990 and Kannan and Tan 2006). Outsourcing offers a new alternative to achieving competitive advantage by allowing firms to focus on producing the goods and services
comprising their core business (Gunasekaran and Ngai 2004). Outsourcing decisions that do not take into account the long-term implications tend to cost the supply chain more than it bargained for, in terms of total cost of ownership (Vanteddu et al 2006). The most important strategic reasons for shippers to outsource warehousing, transport or other logistics activities are: to reduce costs or amount of capital invested, to improve the service or quality improvement, the need for strategic flexibility, and a focus on core competencies (van Laarhoven et al 2000). In the face of a competitive global market, organizations have downsized, focused on core competencies, and attempted to achieve competitive advantage by more effectively managing purchasing activities and relationships with supplier (Farley 1997 and Wisner and Tan 2000).

Postponement is emerging as an important strategy in SCM. Delaying the final labeling, assembly or packaging until the last moment is known as the principle of postponement (Mohanty and Deshmukh 2004). The objective of postponement is to minimize the risk of carrying finished product inventory at various points in the supply chain by delaying product differentiation to the latest possible moment before customer purchase (Jharkharia and Shankar 2004). Li et al (2005) considered postponement as a separate construct in their study. Another strategy increasingly adopted by manufacturers is developing common platforms across different product lines, which is essentially developing common architecture across product structures, to simplify product design and compress development time and costs (Upendram et al 2004). The author suggested unbundling of activities to better leverage the company’s tangible and intangible assets that are underutilized. Cigolini et al (2004) pointed out that, organizations companies resort to “Retailing system design”, a technique, wherein organizations focus their product mix on a specific market segment or brand.
3.7.8.2 Supply chain management supporting tools

Cigolini et al (2004) suggested that OEMs should develop effective coordination tools such as a supply chain cost accounting system and vendor rating, to co-ordinate and better control a large number of suppliers. A supply chain cost accounting system allows managers to monitor the economic performance of each actor within the chain and of the chain as a whole. Existing cost accounting systems and cost management practices in industries do not adequately support the objectives of competitive manufacturing (Mohanty and Deshmukh 2004). When devising a logistics-oriented costing system, the primary goal is in identifying all the costs and trade-offs related to offering a specific service to a specific customer or targeted market (Christopher 1992 and Cigolini et al 2004). Mohanty and Deshmukh (2004) listed the benefits of using Activity Based Costing (ABC) and concluded that the ABC system helps an organisation to become an agile and responsive organisation. The author pointed out that sharing a supply chain accounting system between suppliers and customers is a necessary pre-condition for justifying investments in upstream stages whose benefits can be harvested only downstream. Ramos (2004) focused on the potential role that management accounting information can play in SCM and suggested that effective management accounting techniques can create considerable value for inter-organizational supply chains by a) providing timely and accurate information about the activities required for their success and b) providing information about the efficiency and quality of tasks performed and about the performance of managers and operating units.

Leading companies, for designing the appropriate network structure, are moving from the traditional rule of thumb to using optimization tools and techniques such as linear and integer programming in factoring different aspects of scale like economics to manufacturing, transportation
costs, inventory carrying costs, etc., (Upendram et al 2004). A key to SCM effectiveness is an underlying common database, which stores information that can be used by any SCM member (Bechtel and Jayaram 1997). Haan et al (2007) found from their survey on small and medium enterprises in Poland that when statistical and mathematical models were used, customers’ orders and materials and spare parts requirements were forecasted mostly with the use of models being part of a data base being a part of the company’s information system. The authors asserted that the main components of managerial environment important for the excellence of logistics management in SMEs are

- IT and available systems supporting decision making and enabling joint access to data bases and all kinds of information.
- Organisation of logistics and supply chain management and proper structures for decision making and responsibility in that area.

Cigolini et al (2004) suggested that supply-chain performance metrics as one of the coordination tools used by companies in order to support the implementation of supply chain techniques. A supply chain performance metrics system consists of a set of parameters that can fully describe the logistic and manufacturing performance of both the whole supply system, as perceived by end customers, and of each actor of the chain, as perceived by downstream players.

3.7.9 Supply Chain Integration

Integration is one of the important concepts in SCM. The definition of SCM developed by Global Supply Chain Forum (GSCF) is that SCM is the
integration of key business processes from end user through original suppliers that provides products, services and information that add value for customers and other stakeholders (Lambert and Cooper 2000). Both in theoretical and empirical contributions, it is shown that integrative practices improve supply chain performance (Van Donk and van der Vaart 2004). The importance of supply chain integration is stressed in a number of theoretical contributions (e.g., Bechtel and Jayaram 1997 and Tan 2001) and has been approached in the literature from different perspectives. Since the early 1990s, there has been a growing understanding that SCM should be built around the integration of trading partners (Barratt and Oliveira 2001). For example, supply chain integration has been conceptualized at multiple levels: functional, internal and external, encompassing customer, manufacturing, distribution and purchasing issues (Stevens 1990 and Narasimhan and Das 2001). Narasimhan and Das (2001) distinguished between customer integration, information integration, logistics and distribution integration and supplier integration. De Toni and Nassimbeni (1999) classified supply chain integration mechanisms into design links, quality links and logistic links. Romano (2003) identified four streams of literature focusing on functional integration, logistic integration, information integration and process integration.

The successful implementation of SCM requires integrating internal functions of a firm and effectively linking them with the external operations of its partner firms in the supply chain (Holmberg 2000), and the integration can be accomplished through cross-functional teams, in-plant supplier personnel, and third party service providers (Cooper et al 1997). The basis of integration can be characterized by cooperation, collaboration, information sharing, trust, partnerships, shared technology and a fundamental shift away from managing individual functional processes, to managing integrated chain of processes Akkermans et al (1999). According to Morash et al (1996),
logistics capabilities (i.e., the capabilities of demand and supply chain management) are boundary-spanning interfaces of logistics with other functional areas, so that logistics must work closely together with production and marketing to plan, coordinate, and integrate their cross-functional activities. Collaborative interdepartmental integration involves a predominantly informal process based on trust, mutual respect and information sharing, the joint ownership of decision, and collective responsibility for outcomes (Mentzer 2001b). Cagliano et al (2006) concluded that the adoption of internal integration practices influences external integration, thus confirming the need for a coherent approach in order to succeed in this direction. Successful SCM involves horizontal cross-functional integration both across and within firms (Burgess and Singh 2006). van Hoek and Mitchell (2005) noted that, in practice, companies are not even sufficiently integrated internally while the talk about external integration is going on. Mouritsen et al (2007) questioned the conventional wisdom of integration that -more the integration and transparency in the supply chain the better. The authors argued that integration is a complex phenomenon, and suggested that the extent of integration in the supply chain is influenced by issues such as power relation between participants in the supply chain and the degree of outsourcing. The potential outcome of supplier integration is a new level of competition in which supply chains compete with other supply chains. Leading-edge companies realised that by transferring costs either upstream or downstream, they are actually not increasing their competitiveness, since all costs ultimately make their way to consumers. Hence, SCM tasks firms to co-operate with the common goal to increase the overall channel sales and profitability, rather than competing for a bigger share of a fixed profit (Cigolini et al 2004).

As suggested in the literature, integration in the supply chain is characterized by both internal integration and external integration. In the
present study internal integration manifests in factors, namely, *Information Technology*, *Manufacturing Management*, *Customer orientation and involvement of Employees*, *Strategic Purchasing*, and *Supply chain design, structure and operations*. External integration is identified separately and reviewed under the factor “*External Logistics Integration*”.

### 3.7.9.1 External logistics integration

Council of Logistics Management (1998) defined Logistics as: *that part of the supply chain process that plans, implements, and controls the efficient flow and storage of goods, services and related information from the point of origin to the point of consumption in order to meet customer requirements*. Considering the need for integrated business processes in SCM, TQM enablers could play a major role in promoting effective integration of suppliers and customers along the value chain (Gunasekaran 2003). Romano (2003) developed a conceptual framework and emphasized three closely interrelated elements, namely (1) the drivers, (2) co-ordination mechanisms and (3) integration mechanisms, in order to understand how logistics processes can be designed and successfully managed across a supply network. To be fully effective in today’s competitive environment, firms must expand their integrated behavior to incorporate customers and suppliers (Bowersox and Closs 1996 and Ross et al 2003). By expanding logistics beyond the existing company structure to involve suppliers and vendors, parties involved in the logistics process obtain benefits such as asset productivity, operational effectiveness, and cost efficiencies in addition to logistical capabilities (Langley and Holcomb 1992 and Mentzer 2001b). Samaranayake (2005) suggested that effective management of supply chain requires integration of information and material flow through supply chain partners from source to user and proposed a conceptual framework for SCM that integrates various
components (materials, resources, activities) involved in a business process across a number of partners in the supply chain. The features of the framework included the integration of individual components, elimination of various interfacing steps between partners, representation of relationships (component precedence, parent-component, and component-component), and functionality for planning and execution of components at the structural level. Paulraj and Chen (2007) found from their study that external logistics integration is of strategic importance as it can have a significant impact on the agility performance of both the supplier and buyer firms. Further the results indicated that the impact of strategic buyer-supplier relationships and information technology on external logistics integration improves the integration of their logistics activities through superior relational and technological initiatives.

Sethi (2004) pointed out that transport-infrastructure inadequacies erode India’s competitiveness and affect supply performance and listed a few constraints encountered, namely: high transaction cost, low productivity, complex procedures, delays at check points and in transit, multiple points of interaction, and lack of integration between different partners in supply chain. The rise in standardisation of goods has permitted the introduction of inter-modal transportation system, such that containerized goods can travel by rail, truck or sea (Parola and Sciomachen 2005). Frazelle (2004) suggested the process of systematic analysis of item and order activity in the supply chain, known as logistics activity profiling process, which is designed to quickly identify the root causes of material and information flow problems, to pinpoint major opportunities for process improvements, and to provide an objective basis for project-team decision making.
3.7.10 Manufacturing Management

The function at the core of most companies is manufacturing, which has an important role in helping companies become strategically flexible. The goal of strategy becomes strategic flexibility, and the job of manufacturing is to provide that capability (Mentzer 2001b). Miller and Roth (1994) described two core elements, namely, the task and pattern of manufacturing choices that are essential for the definition of a manufacturing strategy. Supply chain production systems have a strategic role to play in many companies because the selection of the appropriate production system can directly affect the strategic capability of the firm (Mentzer 2001b). The study by Swink et al (2005) indicated that manufacturing practices are mostly effective only when high levels of integration in strategy complement them. The authors concluded that strategy integration serves as a basis for improved cost efficiency and new product flexibility, which in turn lead to better performance in the marketplace.

The distinction between stable functional products competing on price and volatile fashion or innovative products dependent on fast response is now widely accepted (Fisher 1997, Feitzinger and Lee 1997). The terms lean and agile supply have emerged to reflect this distinction and various generic hybrids have been defined to clarify means and ways of, at least partially, satisfying the conflicting requirements of low cost and fast response (Mason-Jones et al 2000, Christopher and Towill 2000). A supply chain with flexible and agile players will be better positioned to adapt to the changes more readily (Agarwal et al 2006). Lean manufacturing is an integrated set of activities designated to archive high volume production using minimal inventory of raw materials, work in progress and finished goods. The aim of lean thinking is to remove muda, or waste, in the production process (Rubesch et al 2005). The findings of Cagliano et al (2006) indicated that adoption of
the lean production model has a strong influence on the integration of both information and physical flows along the supply chain. Lean thinking is one approach that is seeing increased interest in India (Baker 2002 and Dhandapani et al 2004). Sahay et al (2003) found that only 14% of companies in their survey operated a make-to-order strategy in India while Chandra and Sastry (1998) found that the average manufacturing lead-time was 39.5 days, with an annual stock turn of just 6.6 days. In a constantly changing global competitive environment, an organization’s supply chain agility directly impacts its ability to produce, and deliver innovative products to their customers in a timely and cost effective manner. From a customer’s view, supply chain agility can be attributed to providing new products quickly and frequently based on the strength of the synergies between the procurement / sourcing, manufacturing, and distribution/logistics processes (Swafford et al 2005). Li et al (2005) considered internal lean practices as a separate construct in their study. Manufacturing flexibility, which has received a lot of attention, enables the manufacturing system to be responsive to changes in demand, product design, process technology, material supply, etc Swafford et al (2005). By making QM an integral element of the supply chain, companies can avoid being simply reactive to the requirements of their supply chain customers and can strive to meet their demands more proactively (Love et al 2003).

For supply chain production to work, it is important that companies develop close partnerships using shared information streams to forecast, produce, ship and assemble in a true just-in-time scheme. Companies can have a supply chain focus by ensuring engineering change orders are sent out not only to their suppliers but to their supplier’s vendors as well (McKeefry 1998 and Mentzer 2001b). Investigations have shown the impact of increased demand visibility and its impact on supply chain performance. Thron et al (2006) noted from literature that lack of unflawed demand information as the
major cause of inefficiencies and delays within production and delivery scheduling. Numerous investigations (e.g., Lambert and Cooper 2000, Lau and Lee 2000, Lin et al 2002) concluded that increasing demand visibility i.e., to share information in between all echelons of a supply chain should remarkably diminish these inefficiencies and thus lead to smoother production, lower inventories, less delayed deliveries and lower service level gaps. (Lee et al (2004) pointed out the distortion of demand information implies that the manufacturer who only observes its immediate order data will be misled by the amplified demand patterns, and this has serious cost implications. Huang et al (2003), through a literature review, suggested that six categories of production information i.e., product, process, resource, inventory, order and planning, are encountered in the analysis of information sharing.

3.7.11 Returns Management

Reverse logistics management is growing increasingly important as companies change the way they do business (Handfield et al 1997). The application of environmental management principles to the supply chain has emerged as a new way to address the sustainability challenge and includes activities such as reverse logistics, product recovery and remanufacturing (Vachon and Klassen 2006). Industries have started to realize that the reverse logistics can be used to gain competitive advantage. More and more firms now realize that the reverse logistics is a business process by itself and needs core competency to successfully manage it. Growing green concerns and advancement of reverse logistics concepts and practices make it all the more relevant. According to Srivastava and Srivastava (2006), economic, regulatory and consumer pressure drive product returns worldwide, which has also gained momentum because of fierce global competitiveness, heightened customer expectations, pressures on profitability and superior supply chain
performance. Economic, environmental or legislative reasons have also increased the relevance of reverse logistics in the present-day scenario (Ravi and Shankar 2005), to minimize threat of government regulation and to improve the corporate image of the companies (Carter and Ellram 1998), and also for altruistic reasons (e.g., Nike) (Roy 2003).

The council of Logistics Management defined reverse supply chain as the process of planning, implementing and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal (Roy 2003; Rogers and Tibben-Lembke 1998 and Ravi et al 2005). It is a process whereby supply chains can become more environmental friendly through recycling, reusing and reducing the amount of materials used (Carter and Ellram 1998). Tibben-Lembke and Rogers (2002) classified reverse logistics networks into several categories depending on the source of the reverse flow, namely: catalog/e-commerce customer returns; retail customer returns; retailer returns; and manufacturer returns to a supplier. Fleischmann (2001) and French and La Forge (2006) discussed five categories of reverse flows, including external returns as end of use returns, commercial returns and warranty returns and internal returns as production scrap and by-products. Kocabasoglu et al. (2007) investigated the factors influencing Reverse Supply Chain investments for building sustainable operations and supply chains.

Marien (1998) and French and La Forge (2006) discussed reverse logistics in the paint industry. The author mentioned multiple sources of “reverse flows” with varying cost implications from different points in the supply chain, and included returns, recalls, refusals, reworks, recyclables, rejects, re-processed overruns, remakes, residues, reorders, resale and returnable shipping containers. Ravi and Shankar (2005) expressed
apprehensions about the ultimate fate of the various brands of automotive products manufactured and distributed in India when these products complete their life cycle. The various functions executed throughout the reverse logistics activities include gate-keeping, compacting disposition cycle times, remanufacturing and refurbishment, asset recovery, negotiation, outsourcing, finance management and customer service (Roy 2003). Thus, the reverse logistics focuses on managing flows of material, information and relationships for value addition as well as for the proper disposal of products (Ravi et al 2005). Some of the barriers for implementing reverse logistics programs are lack of systems, management inattention, financial resources, personnel resources, lesser importance of reverse logistics relative to other issues and company policies (Rogers and Tibben-Lembke 1998 and Ravi and Shankar (2005).

Society in general and particularly the Indian context, is still price sensitive and to a little extent quality sensitive (quality for a given price) but not environment sensitive in its buying and promotion behavior. Lack of incentives/disincentives from regulatory authorities and lack of pressure from prospective customers and consumers on the manufacturers/service providers is inhibiting these initiatives in India. Therefore, Reverse Logistics has not received the desired attention and is generally carried out by the unorganized sector for some recyclable materials such as paper and aluminum (Srivastava and Srivastava 2006). Roy (2003) concluded that in addition to cost reduction, reverse supply chain helps in understanding why products are returned. This would enable companies to arrive at the root cause of returns, resulting in better engineering, manufacturing or distribution. Companies that have been most successful with their reverse supply chains are those that closely coordinate them with their forward supply chains.
3.7.12 Benchmarking of Supply Chain Activities

Benchmarking and performance evaluations are components of modern management practices and part of TQM (Tan et al 1999). Global Supply Chain Forum (GSFM) proposed Benchmarking of all operations against competitors and implementation of best practices throughout the enterprise as one of the activities at the tactical level, in their SCM model (http://en.wikipedia.org/wiki/Supply_chain_management).

Benchmarking is a process of continuously measuring and comparing an organisation’s business processes against business process adopted by leaders anywhere in the world to gain information, which will help the organisation take action to improve its performance (Mohanty and Deshmukh 2004). Some authors (e.g., Evans and Lindsay 2002 and Gowen III and Tallon 2003) stated competitive benchmarking and continuous improvement teams as some of the leading edge practices that could enhance the competitive advantage in SCM. Min and Joo (2006) used financial benchmarking to enhance productivity and price leverages of third party logistics companies. Carr and Smeltzer (1999) pointed out that purchasing managers have started to use benchmarking as a way to identify and understand what practices are necessary to reach world-class standards. Mohanty and Deshmukh (2004) classified the various processes to be benchmarked as core, support and administrative processes. Based on existing literature Wisner and Lewis (1997) classified benchmarking as one of the quality improvement elements in transportation. Gunasekaran et al (2004) listed innovation and benchmarking as one of the critical factors in logistics operations. Anderson et al (1998) investigated the influence of quality management components on logistics performance operational results and customer satisfaction. They found that constructs related to preparing (i.e. Training) and enabling (i.e. Benchmarking and Information) employees to do
their jobs were found to influence operational results. The inclusion of benchmarking in Malcolm Balridge National quality Award manifests its widespread use and its importance to quality management (Hackman and Wageman 1995).

3.8 THEORETICAL ELUCIDATION OF SCM CONSTRUCTS: PERSPECTIVE OF TRADING PARTNERS

As mentioned earlier, in this study, the term trading partners represents entities that include the customers, suppliers, contract manufacturers, subassembly plants, distribution centers, wholesalers, retailers, carriers, freight forwarders and so on. The points expressed, in this paragraph, by various authors in favour of the supplier is extended to the other entities as well, namely, LSPs and Retailers, as it is strongly believed that handling services of logistics and retailing is similar to other types of industrial services.

The supply chain is traditionally viewed from the perspective of the supply chain leader who is usually the strongest member of the supply chain (Rota et al 2002). One argument for the need to focus on the supplier perspective is that suppliers usually are engaged in several dynamic supply chains, where they are expected to involve and contribute to various customers in different settings (Stjernstrom and Bengtsson 2004). Suppliers have a significant direct impact on cost, quality, technology, speed and responsiveness of buyer firms, and strategic outsourcing is considered as a source of great advantage (Paulraj and Chen 2005). Taking the suppliers perspective, Kalwani and Narayandas (1995) reported that when a firm engages in a long-term relationship with its customers, the firm can reduce demand uncertainty, improve its servicing of customer needs, and lower inventory holding and monitoring costs. The success of a supply chain
depends on the effectiveness of partner firms in carrying out mutually beneficial activities, i.e., meeting customer requirements at minimal cost (Lai et al 2002). Any focal organization represents a set of activities and resources that has to be integrated in an efficient manner despite the fact that it takes part in several supply chains (Hakansson and Persson 2004). A sustaining supplier-manufacturer relationship cannot be possible without tangible benefits accrued to both partners (e.g., Monczka et al 1993, Iyer and Bergen 1997 and Kim 2000). An important implication is that unless there is revenue increases outside of the supply chain itself, any efficiency gains within the supply chain cannot be sustainable since they are traded off between the chain participants (Kim 2000). Strategic supply management initiatives of a buyer firm specifically focus on the strategic coordination and management of its supply partners. Fostering and sustaining a win-win relationship with the suppliers and other supply chain partners is a challenging task (Paulraj and Chen 2005). Any focal organization represents a set of activities and resources that has to be integrated in an efficient manner despite the fact that it takes part in several supply chains (Hakansson and Persson 2004). The above arguments strengthen the need to focus on the perspective of the trading partners and therefore various points are elucidated from the perspective of the trading partners, namely, Supplier (tier 1 and tier 2 material suppliers), LSP and Retailer.

Various authors have stressed on the aspects of integration, collaboration and cooperation between the major entities of the supply chain. For example, Min and Mentzer (2004) identified that the concept of SCM includes: agreed vision and goals, information sharing, risk and reward sharing, cooperation, process integration, long-term relationship and the agreed supply chain leadership. SCM makes firms to co-operate with the common goal to increase the overall channel sales and profitability, rather than competing for a bigger share of a fixed profit (Cigolini et al 2004).
Spekman et al (1994) suggested that partners should also share a common vision of the future, which is an important ingredient to building relationship commitment (Hult et al 2000). Unsuccessful outsourcing relationships have been generally attributed to unclear goals and unrealistic expectations, internal sabotage by managers at the firm engaging in outsourcing and flaws in contractual agreement linking the parties involved (Boyson et al 1999). These arguments strengthen the premise of the present study that certain critical factors, namely, (a) Top Management Commitment, (b) Customer Orientation and Involvement of Employees, (c) Information Technology, (d) Returns Management and (e) Benchmarking of Supply Chain Activities, are all adaptable and applicable to cover the aspects of SCM from the perspective of the trading partners (i.e., Supplier, LSP and Retailer) as well, and that theoretical elucidations made under the above factors from the perspective of the OEM (section 3.7) hold good for the other entities as well. However, the perspective changes with the entity.

One of the constructs of SCM from the trading partner’s perspective is Supply Chain Orientation (SCO). By SCO, it is meant in this study, that the trading partner (i.e., Supplier, LSP and Retailer) takes effort in orienting his/her activities related to the supply chain towards the OEM. Effective supply chain management in the new competition suggests seeking close, long-term working relationships with one or two partners (both suppliers and customers) who depend on one another for much of their business; developing interactive relationships with partners who share information freely, work together when trying to solve common problems when designing new products, who jointly plan for the future, and who make their success interdependent (Spekman et al 1998). Christopher and Towill (2001) noted that SCM integrates suppliers, manufacturers and distribution centers to get the right products to the right place, at the right time, and in the right condition. Traits such as coordination, collaboration, commitment,
communication, trust, flexibility and dependence, are widely considered to be central to meaningful relationships (Kannan and Tan 2006). Through their commitment, trading partners throughout the supply chain become integrated into their major customers’ processes and more tied to their overarching goals (Spekman et al 1998). The suppliers’ ability to deliver customized products with short delivery times and high due-date observance is becoming increasingly dependent on its ability to use information that is shared by their customers in order to anticipate their own raw material requirements. Therefore, supplier’s managers are convinced that the only way to maintain and improve their customer service is to increase collaboration with their customers (Rota et al 2002). Developing strategies to decrease the risk faced by the retailer is becoming more and more critical in a supply chain, especially in the global marketplace where firm-to-firm competition is being replaced by supply-chain-to-supply-chain competition (Lee et al 2000). As per Walter et al (2003), the level of commitment, trust and cooperation of its members determines the ultimate success or failure of a supply chain alliance. The above views expressed by researchers strengthen the consideration of the construct Supply Chain Orientation in the present study.

3.8.1 Critical Dimensions of SCM: Perspective of Suppliers

In this section the perspective of the tier 1 and tier 2 suppliers (vendors who supply materials to the OEM) are addressed. As indicated in Table 3.1, most of the factors that cover the aspects of SCM from the perspective of OEM would also cover from the perspective of the Supplier as well. However, as it is conceived in this study that OEM, in principle, is the one who plans, designs, implements and maintains the supply chain, the factors, namely, Environmental Uncertainty, Supply Chain Design, Structure and Operations, etc., are not considered from the suppliers’ perspective. Other factors (for e.g., Strategic Purchasing, Trading Partner Management under
OEM) have been scaled down to reduce the complexity of the instrument developed from the perspective of the Supplier. The critical factors that cover the aspects of SCM from the Supplier’s perspective are:

- Top Management Commitment
- Customer Orientation and Involvement of Employees
- Information Technology
- Manufacturing Management
- Returns Management
- Benchmarking of Supply Chain Activities
- Supply Management
- Supply Chain Orientation

### 3.8.2 Critical Dimensions of SCM: Perspective of LSPs

Since the deregulation of the freight transportation industries, buying logistics services has become similar to the purchase of other types of industrial services (Menon et al 1998). As competition becomes more and more intense in many sectors, many enterprises are considering the option of logistics outsourcing in order to streamline the value chain (Franceschini et al 2003). During the last decade, third party logistics (TPL) has played an important part in the manifestation of “inter-organizational” issues within logistics and SCM (Halldorsson and Skjøtt-Larsen 2006). The use of LSPs has become popular and logistics is said to be the last frontier for reducing costs. A growing awareness that competitive advantage comes from the delivery process as much as from the product has been instrumental in upgrading logistics from its traditional backroom function to a strategic
boardroom function (Razzaque and Sheng 1998, and Mentzer et al 2001a). In today’s SCM practices, a successful strategy depends increasingly on the performance of TPL service providers, as they play a key integrative role linking the different supply chain elements more effectively (Evangelista and Sweeney 2006). TPL is commonly known as an arrangement in which a service provider provides logistics services such as transportation and warehousing, to the manufacturers production goods (Chung et al (2005). Nilsson (2006) concluded from their study that LSPs are facing huge complexities as companies are becoming more multifaceted themselves in their relationships with suppliers and customers, and in view of the increased turbulence facing almost all industries.

The term “Logistics Service Providers” is used as a synonym throughout this paper for carriers, warehouse operators, third-party logistics service providers, and any other type of logistics service intermediates such as forwarders or information processing service providers. As a part of the supply chain, LSPs help their clients’ products reach the market before the demand for them lapses. LSPs function as intermediaries in bringing about the organized and logical flow of goods in the supply chains of their client firms. (Lai and Cheng 2004). The new and expanded role for logistics will place high priority on both inter-firm and intra-firm integration of logistics activities (Stock et al 2000 and Gunasekaran and Ngai 2004). Sobrero and Roberts (2002) and Stjernstrom and Bengtsson (2004) distinguished between short-term expectations of the supplier, pertaining to time, costs and quality level, and expectations with a longer time perspective, which concern learning in the relationship. Nilsson (2006) found from their research that further development of the logistics discipline, and thus of importance for logistics management, is the identification of understanding and sense-making of concepts, techniques and models in logistics. Halldorsson and Skjøtt-Larsen (2006) noted that the arrangement between the buyer (shipper/ consignee) and
service provider is formalized into a contractual relationship aiming to reduce the risk of failure involved in the relationships.

To enable client firms to manage multiple relationships across their supply chains, it is highly desirable for LSPs to possess the service capability to meet the needs of customers for a variety of logistics services (Lai and Cheng 2004). Customer needs and expectations are becoming more and more unstable, dynamic and demanding, difficult to identify and at the same time, customers have many choices, frequently similar in terms of quality and price (Fassoula 2006). Earlier, logistics used to have a supportive role to primary functions such as marketing and manufacturing, but it has now expanded to cover warehousing and transportation activities, purchasing, distribution, inventory management, packaging, manufacturing and even customer service (Bowersox and Closs 1996 and Chapman et al 2003), and other functions such as order management, customer services, management of returns (Gunasekaran et al 2004), information related services and value added services (Lai and Cheng 2004). Late configuration, performed in the distribution channel, is termed value added logistics. Ballou (2004) noted four types of form late configuration in warehouses, namely, labeling, packing, assembly and manufacturing and the fifth being time. Nilsson (2006) grouped the various logistics processes and activities into four uncertainty dimensions, namely: customer demands and expectations; internal processes; human factors; and general trends.

Warehouse operation is an important part of logistics where products (raw material, parts, goods-in-process, finished goods) are stored at and between point of origin and point of consumption. Two other major operations of warehousing are: material movement and information transfer (Lambert et al 1998). According to Faber et al (2002), the complexity of a warehouse operation has a large impact on the performance of the warehouse.
The author argued that warehouse complexity refers to: (1) the number and variety of items to be handled and (2) the amount of daily work to be done; and as per de Koster and Warffemius (2005), the number, nature and variety of processes necessary to fulfill the needs and demands of customers and suppliers constitute the warehouse complexity.

Transport is one of the major activities within logistics, where the creation of time and place utility is performed (Coyle et al 1996 and Stefansson 2006). The supply chain of a transport logistics firm involves shippers at the input side and consignees at the output side. The goal is to satisfy the needs of different parties both upstream and downstream in the chain for greater effectiveness and efficiency than its competitors (Lai and Cheng 2003 and Lai et al 2004). Quality within the transportation industry encompasses a number of dimensions, depending upon the perspective. Shippers tend to view quality primarily in terms of the level of service provided and transportation cost, while transportation companies view quality from a much broader perspective including the areas of customer service, administration, maintenance, storage, and information; finally, government tends to view transportation quality from a safety, economic, and consumer welfare perspective (Wisner and Lewis 1997).

Chiu (1995) and Gunasekaran and Ngai (2004) identified the critical success factors in effective logistics management that included: good planning in a logistics system, a well-designed distribution system, the prudent selection of allied companies, close relationships with trading partners, good logistics investment analysis, the elimination of communication barriers to logistics management, the commitment of top management, and continuous improvement in logistics. Lummus and Vokurka (1999) argued that successful supply chains would develop customized logistics networks tailored to each customer segment. With IT, companies can
develop an understanding of their clients’ activities, such as manufacturing, or marketing, that previously would have been infeasible due to the workload involved in manually collecting and analyzing large quantities of data (Lewis and Talalayevsky 2000). Power and Simon (2004) noted that through a combined use of product numbering, bar-coding and EDI, organizations have the available means to enable specific SCM practices such as quick response, cross-docking, use of advance shipment notification and vendor management of inventories.

Mentzer et al (2001a), based on their study on logistics service quality, presented an empirical support for the following nine logistics service quality constructs, namely, personal contact quality; order release quantities; information quality; ordering procedures; order accuracy; order condition; order quality; order discrepancy handling and timeliness. Gunasekaran et al (2004) listed the critical success factors in logistics operations that include: (1) Strategic alliances with large clients and local TPL providers across the world, (2) Web-based information systems, Networking and Relationship Management, (3) Key Performance Indicators for logistics management control, (4) Customer Relationship Management, (5) Joint ventures, (6) Innovation and (7) Benchmarking. Sahay and Mohan (2006) conducted a survey to determine the extent of usage of third party logistics practices in India and to establish the impact of usage of TPL services on business results. Some of the issues they focused on are: (1) importance of various logistics activities to organizations, (2) extent of usage of services offered by TPL service providers for carrying out specific logistics activities, (3) the benefits of using third party logistics services on specific business objectives, (4) the overall satisfaction with third party logistics service providers and (5) the future plans of current users of third party logistics services.
Based on the above discussions, the constructs identified to cover the aspects of SCM from the perspective of the Logistics Service Providers are:

- Top Management Commitment
- Customer Orientation And Involvement Of Employees
- Integration Of Supply Chain Logistics
  - Freight Forwarding
  - Distribution/ Warehousing
  - Transportation
- Information Technology
- Returns Management
- Benchmarking Of Supply Chain Activities
- Logistics Design
- Supply Chain Orientation

3.8.3 Critical Dimensions of SCM: Perspective of Retailers

Effective SCM places its emphasis on the consumer and issues that bring the most benefit to the end-user (Wilson 1996). Retailers are at the end of the supply chain. They are involved in timely delivery of goods and services to consumers at competitive and affordable prices. Being closest to the consumer, retailers and distributors have vast knowledge of what sells, and what does not. Retailers offer choice, immediacy, different price points and an ambience that influences consumption (Desbarats 1999). A key benefit of effective SCM is its ability to help retailers better manage their assets, most
notably their investments in accounts receivable, inventories, and physical infrastructure (Brown et al 2005).

SCM is seen as one element of efficient consumer response, which takes as its starting point how best to serve the consumer (Wilson 1996). Retailers are faced with many issues, namely, customer satisfaction, ability to acquire the right products, product presentation, traffic building, layout, locations, and keeping pace with technology, as they attempt to be successful (http://www.knowthis.com/tutorials/ principles-of-marketing/ retailing/2.htm, accessed on January 27, 2008). Retaining customers is becoming increasingly important for retailers as customer loyalty can provide the organization with a valuable and sustainable competitive advantage (Dixon et al 2005). In recent years, with the growing power of retailers, the vertical channel interactions have gained importance. Retailers impact manufacturers profit in two ways, namely: a) directly through negotiating lower wholesale prices and higher trade allowances and b) indirectly by affecting the intensity of price competition among manufacturers (Draganska and Klapper 2007).

Retail store’s location could determine its success or failure since the size of it’s ‘‘catchments’’ is related to its accessibility (Vandell and Carter 1993). The location-specific character of each store is made operational by variables on the stores’ service area about competition, degree of urbanization, the number of commuters and socio-demographic data of the inhabitants (Verhetsel 2005). From the retailer perspective, service is usually assessed by product availability (Waller et al 1999). Sustained improvement on on-shelf availability requires retailers and suppliers to work together to improve in-store out of stocks (Corsten and Gruen 2003).

The creation of a pleasant environment for shopping has become a competitive retailing strategy to enhance consumer experience in the store and
to attract consumers to the retail setting (Frasquet et al 2002). Store atmosphere refers to the environment that is brought about by a coordinated visual display of merchandise and the ease of mobility with in the store (e.g., Lee 1998 and Thang and Tan 2003). Atmospherics is the area that has received the most attention and can be described as relating to factors in the store environment that can be designed or manipulated in order to create certain emotional and behavioral responses in the consumer (Kotler 1973 and Backstrom and Johansson 2006). Atmospherics are composed of both tangible elements (the building, carpeting, fixtures and point-of-purchase decorations) and intangible elements (colors, music, temperature, scents) that comprise service experiences (Hoffman and Turley 2002). Knowledge of the ‘atmospherics’ that enhance positive feelings among shoppers can assist managers in their efforts to develop appropriate marketing strategies that create and maintain positive shopping experiences (D’Astous 2000). Stores endowed with good facilities are more likely to secure a favorable consumer perception. Facilities refer to the provision of infrastructures in the stores that enhance the comfort of shopping (Nevin and Houston 1980 and Thang and Tan 2003). Verhetsel (2005) investigated the impact of neighborhood characteristics on the relative attractiveness of product categories within a store, with special attention for the differences between hypermarkets and supermarkets. Magi and Julander (1996) considered assortment, store ambience, personnel interaction and personnel promptness for measuring service quality in a retail environment and found a strong link between service quality, customer satisfaction and customer loyalty.

A chief attraction of a retail store centers on its merchandising. Grewal et al (2003) found from their study that when customers’ wait expectations are negative, their evaluations of the store’s atmosphere are lower, and they suggested ways to enhance wait expectations by: (1) having sufficient sales and customer service employees on the sales floor;
(2) investing in technology such as efficient checkout equipment and kiosks to provide customer information; and (3) enhancing store atmospherics through visual communications (signs and graphics), lighting, colours, music and scents. Merchandising systems impact top-line revenues and need to be configured, customized and managed effectively for the retailer to improve its top line. To achieve this, retailers need to effectively mine large amounts of data and leverage this data to carry out effective forecasting, assortment planning, and collaboration with its suppliers so that promotions and other merchandising activities are effective and efficient (http://www.syntelinc.com/uploadedFiles/Syntel_RetailComplexity.pdf, accessed on January 30, 2008).

Retail pricing is one of the most difficult issues facing retailers. Retail price promotions, such as coupons, deal intensity rewards, bonus packs, and multipacks, involve a complex combination of pricing, promotion, and packaging issues (Grewal and Levy 2007). Retailers are constantly engaged in promotional efforts that include “incentives” such as sales and discounts, to attract shoppers to their stores. A well-managed promotional strategy attracts consumers to the store (arousal) and builds a value-for money mindset in them (pleasure) (Thang and Tan 2003). A strong merchandise mix provides consumers with a wider choice of products and services and enhances the ability of the stores to fulfill their needs and wants (e.g., Hanson 1980 and Thang and Tan 2003). The post-transaction service offered by the store builds credibility and influences the favorable perception of the consumers (Lindquist 1974 and Thang and Tan 2003). Examples of such services include delivery of merchandise to consumers’ homes, installation, offer of merchandise warranties and exchanges or refunds for defects (Thang and Tan 2003).
Logistics constitutes a key success factor for retailers. Efficient logistics systems save costs, which can, in turn, be passed on to the customer. Subsequently, this has a positive influence on customer satisfaction and loyalty (Schramm-Klein and Morschett 2006). Reverse logistics is an important issue that is to be handled by the retailer. While logistics activities involve material flow forward through the supply chain, reverse logistics addresses the return flows from the user and encompasses the re-processing into a usable product (Fleischmann et al 1997).

The basic enabler for effective supply chain management is information sharing among the business partners, which has been supported by advances in information technology (Archer 2006). With the increase in globalization of retailers both in terms of their points-of-sale, as well as their points-of-supply, the information technology spend in the retail sector has increased considerably and plays an increasingly important role in managing the complexity of retail operations (http://www.syntelinc.com/uploadedFiles/Syntel_Retailcomplexity. pdf, accessed on January 30, 2008). Angeles (2005) suggested that RFID technology was an important driver of business processes associated with supply chain sectors that included retail distribution (goods received, checking, put away, replenishment, shipping, and order taking) and transportation (product and asset tracking). The study by de Moerloose et al (2005) on implementation of information kiosks in the retail store identified various advantages to customers and retailers. For example customers had online access to product information that is updated on a regular basis, yet at the same time they could approach employees for advice or they could try the product offline. On the other hand retailers could improve service through personalizing customer information or attending to customer suggestions and complaints. Reed et al (2004) investigated the impact of the introduction of a computer assisted selling process (CASP) on
customer’s perceptions of the overall buying process for buying a car. Their findings indicated the CASP was well received by the customers.

Based on the above discussions, the constructs identified to cover the aspects of SCM from the perspective of the Retailers are:

- Top Management Commitment
- Materials Management
- Information Technology
- Store Management
- Returns Management
- Benchmarking of Supply Chain Activities
- Customer Orientation and Involvement of Employees
- Supply Chain Orientation

### 3.9 MEASURES OF PERFORMANCE

An important component in supply chain design and analysis is the establishment of appropriate performance measures. A performance measure, or a set of performance measures, is used to determine the efficiency and/or effectiveness of an existing system, or to compare competing alternative systems (Beamon 1998). Traditional performance measures such as profitability are less relevant for measuring supply chain performance because they tend to have an "individual focus" and fail to consider chain-wide areas for performance improvement (Lai et al 2002), and an effective method is lacking (Chan and Qi 2002). Simatupang and Sridharan (2002) made the criticism that individual supply chain members attempt to optimize their own
performance metric at the expense of overall system performance. The implementation of SCM requires that the internal perspective of performance measures be expanded to embrace a partnership perspective and avoid a self-focused attitude in management’s approach (Holmberg 2000). Gunasekaran et al (2005) recognized the need to identify critical success factors and suggested that organisations should develop measures and metrics that assess performance in key areas, and use those measures to plan and control operations to improve organizational performance and, thus, competitiveness. The author suggested that performance measurement is critical to the success of any for-profit organization as it creates understanding, molds behavior and improves competitiveness.

Some of the benefits of SCM, which are predominantly discussed in the literature, include lower inventory levels (e.g., Stank et al 1999, Quinn 2000), better responsiveness and lower throughput time (Stank et al 1999). Bechtel and Jayaram (1997) advocated the use of integrated measures, in addition to non-integrated measures, that motivate firms to consider chain-wide performance, rather than their own individual performance measures. Neely et al (1995) segregated performance measures into quality, time flexibility and cost that would be useful tool in system analysis. Sahay et al (2003) observed that Order fulfillment was the second most important supply chain issue in Indian companies, and companies were paying maximum time and attention to improve it. Beamon (1999) developed a performance evaluation framework for manufacturing supply chains, where Resources, Output and Flexibility are considered necessary components for supply chain performance. The challenge for firms to achieve a competitive edge is to manage supply chain performance (SCP) for advantages in cost and service differentiation (Lai and Cheng 2003). The supply chain performance measurement system must measure each of the three types (resource measures (R), output measures (O), and flexibility measures (F)), as each type is vital to the overall performance success of the supply chain (Beamon 1999). The author categorized performance measures into qualitative and quantitative groups involving customer satisfaction and customer responsiveness, flexibility and supplier performance.

Gunasekaran et al (2001) proposed a framework for measuring the performance of supply chains in which the metrics were classified into strategic, tactical and operational levels. Measures were further divided into financial and non-financial categories. The emphasis was on performance measures dealing with suppliers, delivery performance, customer service, inventory and logistics costs in a supply chain. Li et al (2005) noted two performance measures from review, namely: delivery reliability, defined as
the ability of an organization to provide products on time and time to market, defined as capability of an organization to introduce new products faster than the competitors.

Time based performance measure, among others, has recently received substantial attention in SCM. For example, researchers have considered different aspects of timebased performance relative to various stages of the overall value delivery cycle and have proposed several measures to evaluate them (Jayaram et al 1999). Vickery et al (1999) stated that supply chain flexibility should be examined from an integrative, customer oriented perspective, and defined five flexibilities including: Product flexibility, Volume flexibility, New product flexibility, Distribution flexibility, and Responsiveness flexibility. SCM entails measuring the performance of the entire supply chain rather than just the performance of the individual supply chain partners. After all, the essence of SCM implies that it is the combined performance of integrated supply chain that is of paramount importance (Chen and Paulraj 2004a). Kaplan and Norton (1992) recorded inadequacies in the traditional performance measures and suggested a Balanced Scorecard (BSC), a new tool for implementing business strategy distinguished four different types of performance metrics, namely: customers, internal processes, innovation and finance. The balanced scorecard included financial measures that told the results of actions already taken. The BSC complemented the financial measures with operational measures on customer satisfaction, internal processes, and the organization’s innovation and improvement activities. Bhagwat and Sharma (2007) also developed a BSC for SCM that measured and evaluated day-to-day business operations from four perspectives, namely: finance, customer, internal business process, and learning and growth. Table 3.2 gives the consolidated list of measures of performance from each of the four entity’s perspective, considered in this study.
Table 3.2 Consolidated list of measures of performance

<table>
<thead>
<tr>
<th>ENTITY</th>
<th>Measures of Performance from the Entity’s perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEM</td>
<td>Financial Performance</td>
</tr>
<tr>
<td></td>
<td>Trading Partner Performance</td>
</tr>
<tr>
<td></td>
<td>Business Performance</td>
</tr>
<tr>
<td></td>
<td>Customer Related Performance</td>
</tr>
<tr>
<td>SUPPLIER</td>
<td>Financial Performance</td>
</tr>
<tr>
<td></td>
<td>Business Performance</td>
</tr>
<tr>
<td></td>
<td>Customer Related Performance</td>
</tr>
<tr>
<td>LSP</td>
<td>Financial Performance</td>
</tr>
<tr>
<td></td>
<td>Business Performance</td>
</tr>
<tr>
<td>RETAILER</td>
<td>Financial Performance</td>
</tr>
<tr>
<td></td>
<td>Business Performance</td>
</tr>
</tbody>
</table>

3.10 A GENERALISED CONCEPTUAL FRAMEWORK

From the discussions covered under the various subsections in this chapter, it is clear that the proposed constructs with respect to the OEM’s Perspective and the factors under the trading partners (Supplier, LSP, and Retailer) of the supply chain are critical to the establishment of a SCM system. These critical dimensions have different functions to perform in a SCM environment. The constructs identified to cover the various aspects of SCM from the four entities of the supply chain are presented below, in the form of a model (Figure 3.1), conceiving a relationship between the factors of SCM of the entity and the entity’s measures of performance, under a moderated environment. It is visualized in this study that the presence of a moderator(s) enhances the relationship between the various constructs of SCM from each entity’s perspective and the respective entity’s measures of
performance. The constructs of Trading Partner Management have been perceived to act as moderators from the perspective of OEM and the construct SCO from the perspective of the trading partners. The arguments made by various authors from the perspective of OEM under section 3.7.6 qualify the consideration of the constructs of Trading Partner Management as the moderator from the perspective of OEM. This perception is also strengthened by the arguments made by authors in the section 3.10.1. Similarly, from the perspective of the trading partners, the arguments made by various authors under section 3.8 for SCO qualify the consideration of SCO as the moderator.

### 3.10.1 Conceptual Framework: Perspective of OEM

From the perspective of OEM, the model (Figure 3.2) describes the SCM paradigm under uncertainty i.e., the level of uncertainty in which the supply chain would be operating. In this study, it is hypothesized that the level of various uncertainties (namely, Trading Partner, Customer, and Technology and Infrastructure) would be at the level at which the OEM perceives it. The level of uncertainty would not be captured from the perception of the trading partners. In the model, the box on the left hand side
indicates the factors (Independent variables) of SCM and the box on the right side contains the measures of performance (Dependent) variables, from the perspective of the OEM. The third box houses the moderator(s).

![Supply Chain Management Paradigm Under Uncertainty](image_url)

**Figure 3.2 Conceptual Framework: Perspective of OEM**

Various authors have earlier stressed the need for engaging in better trading partner management by the OEM, which would improve the performance of the OEM as well as the supply chain. For example, Forker (1997) suggested that the quality of an OEM’s final product can only be as good as the quality of the inputs they receive from suppliers, and OEMs rely on suppliers to achieve major reductions in product cost (Afuah 2003). SCM integrates suppliers, manufacturers and distribution centers to get the right products to the right place at the right time, and in the right condition.
(Christopher and Towill 2001). Krause and Ellram (1997) noted that in the context of competitive business climate, buying firms increasingly rely on their suppliers to deliver technologically advanced, defect-free products. Reed and Walsh (2003) stated that the organization is only as good as its supply base. Chan and Qi (2003) noted that to survive under increased pressures, more and more enterprises are striving to develop long-term strategic partnerships, with a few competent suppliers and collaborate with them in product development, inventory control, and non-core process outsourcing. Chen and Paulraj (2004b) used supplier base reduction, long-term relationship, communication, cross-functional teams and supplier involvement to measure buyer-supplier relationships. The authors showed that involving in trading partner management has a positive effect on buyer-supplier relationships and performance. Chen et al (2004) noted supply management as a multidimensional construct, and suggested to researchers to consider additional constructs, namely: Supplier selection; Supplier certification; Supplier Integration; and Trust, in future work. The above discussions strengthen the argument that the presence of the constructs of trading partner management (namely, Selection, Trust and Commitment, Cross Functional Teams, and Long Term Relationship) has a significant and moderating effect on the relationship between the constructs of SCM and the measures of performance. Involving suppliers earlier in the development process decreases uncertainty on the supplier side and improves performance, while simultaneously increasing the quality of products and communication within the supply chain (Quesada et al 2006). Based on the above arguments it is hypothesized in the present study that the presence of moderators (factors of Trading Partner Management, namely: Selection, Trust and Commitment, etc) has a significant and positive interaction effect on the relationship between the independent variables of SCM as expressed in the model and the dependent variables, taken one at a time as well as when taken together.
3.10.2 Conceptual Framework: Perspective of Trading Partners

One of the aspects of SCM from the supply chain partners’ perspective is SCO. By SCO, it is meant in this study, that the supply chain partner (e.g., Supplier, LSP and Retailer) takes efforts in orienting his/her activities related to the supply chain towards the OEM. The arguments put forth earlier in section 3.8 for SCO, justifies its consideration as the moderator. Accordingly, the conceptual frameworks developed from the perspective of the Supplier, LSP, and Retailer is given in Figure 3.3, Figure 3.4 and Figure 3.5 respectively.

![Supply Chain Management Paradigm: Supplier's Perspective]

**Figure 3.3 Conceptual Framework: Perspective of Suppliers**
**Figure 3.4 Conceptual Framework: perspective of LSP**

**Supply Chain Management Paradigm**

**Logistics Service Provider’s Perspective**

**Constructs of SCM**
- Top Management Commitment
- Logistics Design
- Customer Orientation and Involvement of Employees
- Integration of Supply Chain Logistics
  - Freight Forwarding
  - Distribution/Warehousing
  - Transportation
- Information Technology
- Returns Management
- Benchmarking of Supply Chain Activities

**Measures of Performance**
- Financial Performance
- Business Performance

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**Figure 3.5 Conceptual framework: Perspective of Retailers**

**Supply Chain Management Paradigm**

**Retailer’s Perspective**

**Constructs of SCM**
- Top Management Commitment
- Logistics Design
- Customer Orientation and Involvement of Employees
- Materials Management
- Information Technology
- Store Management
- Returns Management
- Benchmarking of Supply Chain Activities

**Measures of Performance**
- Financial Performance
- Business Performance
3.11 RESEARCH METHODOLOGY

The research gaps identified in this work have been addressed through a descriptive, conclusive, and single cross-sectional research design. The research is based on representative samples, and the data are subjected to quantitative analysis and therefore a conclusive research (Malhotra, 2004). The study is descriptive in nature as the perceptions of the respondents are collected about the level of implementation of SCM in their organizations. It is a single cross sectional study as only one sample of respondents is drawn from the target population, and information is obtained from this sample only once.

The availability of hard evidence based on a rigorous research methodology is mandatory for the development of reliable, valid and pragmatic diagnostic instruments, which researchers can use for their study. Practitioners, for the evolution and betterment of SCM programs, can effectively use such instruments and their findings. Questionnaire survey has been widely acknowledged as an efficient tool for assessing the perceptions of individual organizations on a particular subject.

In the absence of secondary data the validity of the instruments are achieved by measuring the perceptions and experiences of SCM practitioners from industries/organizations. The survey method adopted in this work has been through personal interview, snail mail and e-mail. The respondents were approached in their office and interviewed. Those respondents who were approached through mail have completed the questionnaire and returned the mail.

In order to empirically validate the SCM constructs identified from the perspective of the four entities, survey instruments have been developed.
To develop the instruments, scales adopted by some of the authors were noted. For example,

- Tan et al (2002) used a five point Likert scale with ‘1’ (Low) and ‘5’ (High) to study supply chain management and supplier evaluation practices.
- Chen and Paulraj (2004b) developed a scale based on a seven-point Likert scale with anchors ranging from strongly disagree (1) to strongly agree (7) in order to ensure high statistical variability among the survey responses. The indicators of performance measures were measured using seven point Likert scales with anchors ranging from ‘decreased significantly’ (1) to ‘increased significantly’ (7).
- Min and Mentzer (2004) developed a seven point Likert scale with each item anchored by 1 (strongly disagree) and 7 (strongly agree).
- Tracey et al (2004) used a five point Likert scale with 1 (Strongly Disagree), 2 (Inclined to disagree), 3 (Neither Agree or Disagree), 4 (Inclined to Agree) and 5 (Strongly Agree), with a N/A (Not Relevant/ Don’t Know) response also available for each item.
- Theodorakioglou et al (2006) used a five point likert scale with ‘1’ being very low and ‘5’ being very high. The authors added ‘0’ (Not at all) to the scale in order to prevent occurrence of the central tendency error.
- Hsu et al (2007) developed a five point Likert scale to develop a survey instrument to test the supplier selection construct.
In the present study, the instruments have been developed based on an exhaustive review of the literature (prescriptive, conceptual, empirical and practitioner). The SCM elements (or items) were initially presented to a panel of experts from both academia and practitioners in India. Based on the suggestions of the experts, modifications (in terms of removal of redundant items, and in the wordings of the items) have been appropriately done. A 5-point Likert scale (with 1 indicating very-low and 5 indicating very-high) has been adopted and an option of “Not-Applicable” (NA) has been provided. With respect to the dependent variable (performance), respondents were asked to indicate the increase in performance over the past 3 years. The indicators of performance measures were measured using five point Likert scales with anchors ranging from “Very Low” (1) to “Very High” (5). The mean value of 3 was considered for analysis for those cases in which the respondents had indicated NA as their response to the items in the questionnaire. The questionnaires have been provided with options to collect demographic details as well as the adoption of various tools and techniques, by the respondent organizations, related to SCM. The instruments have been developed to specifically address the SCM issues in the manufacturing sectors in India. All the instruments have been developed during 2005-2006 and the data collection has been carried out from June 2006 to March 2007.

Four questionnaires have been designed from the perspective of the four major entities (OEM, Supplier, LSP, and Retailer) of the supply chain, which have been administered to the respective entities. For the OEM’s questionnaire, the respondents have been practicing managers in Original Equipment Manufacturing companies in various sectors, namely Automobile, Engineering, Pharma, Petroleum, Fast Moving Consumer Goods, etc. Similarly, the respondents of Supplier’s questionnaire have been Tier-1 and Tier-2 suppliers of OEMs, the respondents of Logistics questionnaire have been LSPs who are involved in providing service to the above-mentioned
sectors, and the respondents of Retailer questionnaire have been retailers of the products manufactured by the above-mentioned sectors. The complete instruments developed from the perspective of the four entities, namely OEM, Supplier, LSP and Retailer are presented in Appendix 1 through Appendix 4 respectively.

For the questionnaire administered to the OEMs, there were 60 responses in total with the sample profile being Automobile companies (manufacturing 2 and 4 wheeled vehicles): 12, Heavy vehicles (manufacturing trucks): 8, Light Engineering companies (manufacturing storage equipments, tubes products, etc.): 11, Heavy Engineering (e.g., manufacturing earth moving equipments, heavy machinery, structures etc.): 12, Pharma and Chemical (manufacturing chemicals, fertilizers, drugs, etc): 11, Petroleum (manufacturing petro products): 4 and Computer hardware: 2.

For the questionnaire administered to the Supplier, 53 responses were received in total. A major percentage of the responses (49) have been from the organizations who have been supplying components and parts to manufacturers of two and four wheeled vehicles, heavy vehicles and earth moving equipments. The balance of 4 responses was received from organizations who have been supplying to general engineering industries.

For the questionnaire administered to the LSPs, 43 responses were received. The LSPs do not limit themselves to any particular sector and offer their logistics services to all types of companies. However, out of the 43 responses received, only 3 are offering services exclusively to the automobile sector. Others participate in all sectors.

A total of 50 responses have been received for the questionnaire administered to the Retailers. The sample profile of retailers being: two and
four wheeled vehicles 25, Heavy vehicles 15, Home appliances 4 and engineering components 6.

The data has been analysed with respect to all the objectives. Reliability analysis, regression analysis, and confirmatory factor analysis have been used in validating the scales developed to measure the level of implementation of SCM in their respective organizations.