CHAPTER 3: THEORETICAL FRAMEWORK:
MODEL DEVELOPMENT AND HYPOTHESIS FORMULATION

The value of adopting and applying theories from other disciplines has long been recognized by SCM and logistics researchers (Frankel et al., 2008; Rich and Hines, 1997). Ketchen and Hult (2007) highlighted the potential of organization theories in offering provocative and helpful insight into the field of supply chain management. They advocated the need to understand supply chain management phenomena using various theoretical perspective like resource based view, knowledge based view, strategic choice theory, agency theory, social capital theory, institutional theory, transaction cost theory and system theories, to name a few.

Specific theories addressing the reason why organizations should have a highly integrated supply chain include transaction cost theory (Coase, 1937; Williamson, 1975), resource based view (Barney, 1991; Wernerfelt, 1984) and knowledge based view (Grant, 1996; Kogut and Zander, 1992).

Based on the theoretical framework, a research model and research hypotheses are presented in this chapter.

3.1 Theories in Support Of Supply Chain Integration

Resource Based View (RBV): The Resource based view of a firm considers firms to be bundles of distinct resources (Wernerfelt, 1984) and suggests that firms can generate rent or competitive advantage by developing unique resources and capabilities (Barney, 1991; Day, 1994). These resources can be either firm’s internal resources like in-house knowledge of technology, machinery, efficient procedures, capital, employment of skilled personnel (Wernerfelt, 1984) or external resources available to firm through its network (Gulati, 1999; Zaheer and Bell, 2005).
Supply chain integration helps in achieving superior performance through the development of relevant capabilities such as responsiveness, flexibility, cost leadership and supply chain efficiency (Clark and Lee, 2000; Barrat, 2004; Chen et al., 2009). These capabilities have been widely acknowledged as sources of competitive advantage (Daniel et al., 2000; Morash et al., 1996; Olavarrieta et al., 1997; Christopher, 1992). Thus, RBV theory is relevant to supply chain integration because of the involvement of both internal and external resources.

**Knowledge Based View (KBV):** The importance of knowledge as a source of competitive advantage has been emphasized by several researchers (Kogut and Zanders, 1992; 1989; Miller and Shamsie, 1996; Grant 1996, 1996a). Grant (1996) articulated the theoretical foundations for the knowledge based view, both as a theory of organization (Grant, 1996) and as a theory of strategy (Grant, 1996a). Drawing upon KBV, Kogut and Zander (1992) stated that “organizations are social communities in which individual and social expertise is transformed into economically useful products and services by the application of a set of higher order organizing principles.” These principles define how relationships among individuals, within and between groups and among organizations, are structured (Rosenzweig et al., 2003). The high level of SCI acts as an integrative mechanism by which knowledge is transferred within and between organizations (Grant 1996; Schroeder et al., 2002; Parker and Anderson, 2002). The formation of cross functional teams which is the often cited practice for fostering horizontal or intra-firm linkage (Bishop, 1999; Cohen and Bailey, 1997, Parker, 1994) helps in knowledge transfer among people and between different departments of the organization. The use of highly integrated information technology helps in knowledge transfer among supply chain partners by increasing the volume and speed of information flows and enhancing the communication (Burgess, 1998; Holland et al., 1992; Vickery et al., 2003). Hence, from this one can conclude
that when a high level of supply chain integration is achieved, the firm exists as a community within which functional expertise can be communicated and combined to create knowledge (Grant 1996; Kogut and Zanders, 1992).

**Transaction Cost Theory (TCT):** The Transaction cost theory was originally introduced by Coase (1937) in his classic article, “The Nature of the Firm”. It compares the cost associated with performance of a transaction within the firm and outside the firm (Geyskens et al., 2006). The choice of producing in-house or buying from outside should be made on the basis of cost involved in both the operations. While producing in house may incur higher production costs, buying from the market incurs higher transaction costs (Zhao et al., 2008). Extending the work of Coase (1937), Williamson (1975, 1985, 1991, 1993, 1996) proposed four types of transaction costs which are search cost, contracting cost, monitoring cost and enforcement cost. SCI helps in reducing all the four types of transaction costs (Zhao et al., 2008). SCI reduces search costs by establishing long term relationships with fewer suppliers, reduces contracting costs by reducing the costs of negotiation and writing contractual agreements and reduces enforcement cost by formulating collaborative strategies. Further, the long term close relationship with supply chain partners helps in preventing opportunism and hence reduces monitoring cost (Walker and Weber, 1984, 1987; Klein, Frazier and Roth 1990). Finally, firms with highly integrated supply chains also have the potential to lower the net costs of conducting business (Rosenzweig et al., 2003). Supply chain integration also presents an excellent opportunity to reduce production costs (Klein et al., 1990 and Walker and Weber, 1984, 1987) through economies of scale, improved asset utilization, substantial inventory savings and lead time reductions (Maloni and Benton, 2000). The coordination of internal business processes with different functional areas helps in lowering
production costs by reducing redundancies and improving efficiencies (Grant, 1991, Stank et al., 2001).

The above theories favor internal integration of functional areas within a firm and also external integration with upstream suppliers and downstream customers. Hence, this study explores different performance outcomes which a firm can achieve by integrating internally across different functional areas, and externally with its suppliers and customers. Further, the study explores how these performance outcomes will impact financial performance of the firm. Hence this study has two broad research objectives:

1) To examine the relationship between the dimensions of SCI (Supplier, customer and internal integration) on their immediate performance outcomes.

2) To examine the impact of immediate performance outcomes on the financial performance of the firm.

To achieve these research objectives, a research model has been developed and presented in Figure 3.1. The model postulates the relationship between supply chain integration, supply chain performance (SCP) and financial performance. Three dimensions of SCI are considered supplier integration, customer integration and internal integration. Three components of supply chain performance construct are considered which are- supplier related performance outcome, customer related performance outcome and manufacturing related performance outcome. The model postulates that the dimensions of SCI will influence each of the supply chain performance constructs which in turn will influence the financial performance of the firm. Further, the model also postulates that SCI will influence SCP and financial performance.
The following section presents the detailed descriptions of the constructs in the theoretical research framework.

3.2 Constructs in the Research Model

**Supply Chain Integration**: Supply chain integration refers to “the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes with the goal to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer at low cost and high speed” (Flynn et al., 2010).
The review of the literature on SCI shows that some authors have considered SCI as a unidimensional construct (Vickery et al., 2003; Rosenzweig, 2003) whereas others have considered it as two dimensional- internal and external integration (Stank et al., 2001; Zailani and Rajgopal, 2005; Pagell 2004; Stanley and Wisner, 2001) and multi dimensions- internal integration, customer integration, supplier integration, product-process integration and corporate strategy integration (Swink et al., 2007; Narasimhan and Kim, 2002; Gimenez and Ventura, 2005, Kannan et al., 2010).

For the current study, three dimensions of supply chain integration viz. supplier integration, customer integration and internal integration have been considered to enable the examination of different dimension of SCI on different performance construct. The consideration of three dimensions of SCI is inspired by Flynn et al. (2010) argument who stated that “the relationship of SCI to performance can only be fully examined when all three dimensions of SCI are considered together….the studies that aggregated supplier and customer integration in a single construct (external integration) may be drawing inaccurate conclusions (pp. 66, Flynn et al., 2010). Hence, three dimensions have been considered which are explained below:

**Supplier Integration:** Supplier integration refers to the degree to which a firm engages with its suppliers to structure their inter-organizational practices, procedures, strategies and behaviors into synchronized and manageable process in order to fulfill customer's requirements at lowest cost (Chen and Paulraj, 2004; Stank et al., 2001; Flynn et al. 2010 and Zhao et al., 2011). It involves strategic joint collaboration, information sharing, joint product development, strategic partnership and supplier relationship development, cross functional involvement and joint problem solving for managing cross-firm business processes (Das et al., 2006; Li et al., 2010; Zhao et al., 2011, Wong et al., 2011).
**Customer Integration:** Customer integration refers to the degree to which a firm collaborates with its customers to improve visibility and enable joint planning (Fisher et al., 1994; Wong et al., 2011). Customer integration provides manufacturer better understanding of market expectation and the opportunities and helps in being more responsive to customer needs and requirements (Swink et al., 2007).

**Internal Integration:** Internal integration refers to the degree to which a manufacturer structures its own organizational strategies, processes and practices into collaborative synchronized processes in order to meet customers’ requirement at lowest cost (Kahn and Mentzer, 1996, Zhao et al., 2011; Flynn et al., 2010). Internal integration emphasizes that different departments in an organization should integrate their activities rather than acting as functional “silos.” It involves integration of information systems across the different departments to share information as well as the formation of cross functional teams that work together on new product development, process improvement and other activities.

**Supplier Related Performance Outcome (SRPO):** Suppliers play a prominent role in the performance of an organization. Poor product quality and late delivery of raw materials coming from suppliers can add significant cost to buyers in terms of inspection, rework and returns etc. Thus, supplier quality, delivery, flexibility and cost performance are the intermediate outcomes of the implementation of an appropriate supply chain strategy (Chen and Paulraj, 2004). Hence, for the purpose of this study SRPO is considered as consisting of specific performance benefits that can be achieved with a high level of integration with suppliers. The indicators used to measure supplier related performance include faster delivery time, high quality of raw materials, low cost of raw material, low procurement lead time, reduced inventory cost, high responsiveness of suppliers, reliable delivery of product and components.
Customer Related Performance Outcome (CRPO): For the purpose of this study CRPO is considered as consisting of specific performances that can be achieved through a high level of integrated with customers. The indicators used to measure customer related performance are on time delivery of products to customers, high level of customer service, high customer satisfaction, high responsiveness to customer requests, quick response to changes in market demand, lower inventory of finished goods, short lead times for fulfilling customers order and accurate determination of customer’s expectations.

Manufacturing Related Performance Outcome (MRPO): For the purpose of this study MRPO is considered as consisting of specific performances that can be achieved through internal integration. The indicators used to measure manufacturing related performance include reduced manufacturing cost, reduced manufacturing lead time, enhanced product quality, short new production lead time, high order fill rate, low work in progress inventory, high flexibility in production volume and product mix, on time fulfillment of customer orders.

Financial Performance: Financial performance measures reflect the assessment of a firm by factors outside of the firm’s boundary (Chen and Paulraj, 2004). Commonly used measure of the financial performance of a firm include return on investment, return on assets, present value of the firm, market share, and profitability. For the purpose of this study financial performance is measured using three indicators suggested by Vickery et al. (2003) which are pre tax return on assets, return on investment and return on sales.

3.3 HYPOTHESES

To assess the mediating role of immediate performance outcomes on the relationship between supply chain integration constructs and financial performance, the theoretical framework has
been elaborated with the eight hypotheses illustrated below. The following section presents the theoretical support of each hypothesis.

**Relationship between supplier integration and performance**

Past researchers observed that integration between manufacturers and suppliers positively influences different performance outcomes. Their observations are summarized below:

The development of strong strategic partnerships with suppliers helps in facilitating their understanding and anticipation of the manufacturer’s needs, in order to better meet its changing requirements (Flynn et al., 2010). The exchange of information between suppliers and manufacturers about processes, products, schedules and capabilities helps manufacturers in developing their production plan and in producing goods on time, thus, leading to improved delivery performance. The information sharing among supply partners provides several logistics benefits (Zhao et al., 2002; Lee et al., 2000) and also agility and flexibility (Swafford et al., 2008). Supplier integration helps in reducing production costs, administrative costs and logistics costs (Handfield et al., 1999, Gimenez and Ventura, 2005, Devraj et al., 2007) and hence reduces the cost of running the system (Coase, 1937). The integration with suppliers promotes cooperation, coordination and joint problem solving routines (Narasimhan and Jayaram, 1998) that reduces waste and redundancy of efforts in managing supply chain activities across partner firms (Swink et al., 2007). Integration with suppliers and customers helps in improving time based performance such as product development time, procurement lead time (Droge et al., 2004; Rosenzweig et al., 2003). The involvement of suppliers in early stage of product development facilitates quicker product development and introduction time (Droge et al., 2004). The supplier integration is important to deliver superior value to customers (Ragatz et al., 2002).
The close coordination with suppliers is important for reducing delivery lead time and reducing buffer inventories (Handfield, 1993). Supplier integration has become critical to the success of companies because it helps in significant improvement in terms of delivering quality, shorter cycle time and reduces cost and production lead time (Shin et al., 2000; Ragatz et al., 2002). On the basis of the above observation, the following hypothesis is framed:

\[ H1a: \text{Supplier integration is positively related to supplier related performance outcome.} \]

**Relationship between customer integration and performance**

Past researchers observed that integration between manufacturers and customers positively influences different performance outcomes. Their observations are summarized below:

The close relationship between manufacturers and customers helps in improving the accuracy of demand information which helps in reducing the product design and production planning time for manufacturers. The tight integration with customers reduces inventory obsolescence and also costs (Flynn et al., 2010). Customer integration helps manufacturers in becoming more responsive to the needs of customers, create greater value and detect demand changes more quickly. Customer integration has been found to impact customer satisfaction, both directly (Homburg and Stock, 2004) and indirectly through its relationship to product innovation performance and product quality performance (Koufteros et al., 2005). The manufacturers who integrate with customers can reduce inventories and decrease delivery times and become more flexible to customer demands, hence, making the supply chain more efficient (Barrat, 2004; Clark and Lee, 2000). On the basis of the above observation, the following hypothesis is framed:

\[ H1b: \text{Customer integration is positively related to customer related performance outcome} \]
Relationship between internal integration and performance

The importance of internal integration has been widely highlighted in SCI literature. Internal integration has been found to have a positive impact on operational performance of the firm including logistics performance (Germain and Iyer, 2006; Stank et al., 2001) and process efficiency (Saeed et al., 2005). It has also been found to have a positive impact on time based performance constructs such as “time-to-market”, “time-to-product” and also achieving high customer responsiveness (Droge et al., 2004). Internal integration has been found to have a positive impact on business performance of firms (Flynn et al., 2010). On the basis of the above observation, the following hypothesis is framed:

H1c: Internal integration is positively related to manufacturing related performance outcome

Relationship between SRPO and firm performance, CRPO and firm performance, MRPO and firm performance

Many studies investigating the relationship between SCI and financial performance have shown that SCI does not directly impact financial performance of the firm, showing that there are some immediate performance outcomes of SCI (Resenzweig et al., 2003; Vickery et al., 2003). Droge et al. (2004) mentioned in their study that managers view quality, cost and inventory improvement as immediate performance outcomes of either types of integration which can further affect financial performance of firm. Hence, we argue that immediate performance outcomes of individual dimension of SCI will have positive impact on financial performance of firm. Therefore, the following hypotheses are framed.

H2a: SRPO is positively related to financial performance
**H2b:** CRPO is positively related to financial performance

**H2c:** MRPO is positively related to financial performance

**Relationship between supply chain integration and supply chain performance.**

Many studies related to supply chain integration have shown that supply chain integration has a positive impact on supply chain performance. Frohlich et al. (2001) found that the higher level of supplier and customer integration have the strongest association with performance improvement including cost, time, delivery dependability, and speed of product development. A high degree of supply chain integration helps manufacturers in reducing delivery time and inventory cost which can make the supply chain more efficient (Clark and Lee, 2000; Barrat, 2004). Vickery et al. found significant positive relationship between e-integration and business and operational performance of the firm. Hence the following hypothesis is framed.

**H3:** Supply chain integration is positively related to supply chain performance

**Relationship between supply chain integration and financial performance**

Companies adopt strategies with the motive of enhancing the profitability of their firms. Chen and Paulraj (2004a) argued that financial performance is an important measure of supply chain performance. Supply chain integration is also expected to improve the financial performance of firms. As mentioned in the literature review, the impact of SCI on firm performance has been studied. Some of the authors found a direct relationship between supply chain integration and financial performance of the firms (Tan et al., 1999; Carr and Pearson, 1999; Frohlichet al., 2001; Droge et al., 2004) while others have argued that this relationship is mediated by some competitive capabilities such as manufacturing capabilities or customer services capabilities.
(Vickery et al., 2003; Rosenzweig, 2003). Several studies have shown that supplier integration helps in improving overall performance of the supply chain and achieving competitive advantage (Carr & Pearson, 1999; Germain and Droge, 1998; Tan et al. 1998). Hence the following hypothesis is framed.

**H4: The positive relationship between SCI and financial performance is mediated through immediate performance outcomes.**

Chapter Four presents the research methodology used to test these hypotheses.