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**The Social-Psychological Processes of Supply Chain Learning:**

**A Dyadic Perspective**

A thesis

submitted in fulfillment

of the requirements for the degree

of

**Doctor of Philosophy**

at

**The University of Waikato**

by

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*Te Whare Wānanga o Waikato*

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## **Abstract**

Today's dynamic and complex supply chain contexts require supply chain actors to continuously learn. Hence, this research explores the fundamentals of effective supply chain learning, which presents in the extant literature as an opaque black box. The study explores the socio-psychological dynamics of learning capability and learning processes of a dyadic supply chain, arguing that they depend on certain enabling characteristics. The study also contributes to a comprehensive theory of supply chain learning by establishing the nature of the linkages between the elements of supply chain learning, thereby bridging the various gaps between micro-and macro-perspectives. By highlighting the significance of the enabling factors, it also theorizes the dynamics of supply chain learning. Also, the relationship between enabling characteristics and the individual, individual-group, group-organizational, and organizational levels of supply chain learning is shown to be strongest when certain contextual factors are present.

In analyzing the phenomena, the study uses a constructivist paradigm and an interpretative philosophical base. It also adopts organizational learning theory and a relational view as fundamental theoretical perspectives. A multiple case study methodology is used when collecting the data.

This research makes valuable original contributions in the field of supply chain learning. The theoretical contributions extend organizational learning theories to the dyadic supply chain context by developing a more comprehensive and practical perspective of 'supply chain learning' that also demonstrates the crucial role of certain enabling characteristics. This research also develops a framework of the dynamics of supply chain learning at the dyadic level from the perspectives of the supplier and the manufacturing firm. This study will help decision makers to better

understand how to manage their supply chain dynamics and enhance their learning processes and capabilities.

Using a multilevel lens to study the supply chain learning phenomenon, the framework presented in this study opens the way for understanding the critical role of value creation and behavioral enabling characteristics in supply chain learning. Overall, the study emphasizes the importance of applying behavioral approaches in future explorations of supply chain learning phenomena. However, further theoretical development is required, both to enhance the validity and reliability of the findings and ultimately to provide a successful and sustainable theory of supply chain learning.

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## Glossary of Terms

This section offers succinct definitions for the core concepts appearing in this document.

**Absorptive capacity:** Early studies of the learning capacity of an organization generally use absorptive capacity theory (Schildt, Keil, & Maula, 2012; Cohen & Levinthal, 1990). Absorptive capacity is “an ability of a firm to recognize the value of new, external information, assimilate it and apply it for commercial ends” (Cohen & Levinthal, 1990, p. 128).

**Achievement needs:** From the motivation theory perspective, achievement needs are needed to excel in relation to set standards (Robbins & Judge, 2013).

**Analyzing:** Analysis can break down communication into its constituent parts revealing the relationships among them (Krathwohl, 2002). Analysis capability can take different forms such as distinguish, differentiate, appraise, calculate, compare, contrast, organize, manage, or prepare (Krathwohl, 2002).

**Application:** Articulation of resource mobilization in implementing new knowledge is identified as ‘application’ (Noblet et al., 2011). Coltman et al. (2009) argue the critical role of the process of supply chain contracts to the success of supply chain application.

**Arranged interactions:** The management information systems literature identifies human interactions as a major factor for failures in the development and implementation of such systems (Laudon & Laudon, 2006). Furthermore, alignment of goals of individuals to supply chain goals is crucial for supply chain interactions that focus on implementation (Zouaghi & Laghouag, 2012).

**Assimilation:** Assimilation refers to the firm's processes that allow it to analyze, process, interpret, and understand the information obtained from external sources (Zahra & George, 2007; Szulanski, 1996).

**Challenging established practices:** The early literature argued that the starting point of challenging established practices was identifying knowledge sources relevant to a solution (Carlile, 2003).

**Co-creating knowledge power:** Co-creating knowledge is involvement of at least two actors and integration of knowledge (Skarzauskaite, 2013).

**Constructing:** From the learning perspective, constructing refers to constructing new meaning through learning activities (Biggs & Tang, 2007). The theory of constructive alignment argues that constructing new meaning should correspond to intended learning outcomes (Biggs & Tang, 2007).

**Contextual factors:** Mowday and Sutton (1993) identify the influence of individuals on organization contexts; and organizational context is argued to be a consequence of individual behavior (Argote, 2011; Mowday & Sutton, 1993). Studies into organizational learning argue that the cognitions and actions of individual members influence the organization context (Argote, 2011; March, 1991). The review of the literature indicates that the active context of the organization consists of basic elements of organizations, members, and tools that interact with the organization's tasks (Argote & Miron-Spektor, 2011).

**Conversations:** Interpretation occurs in terms of cognitive maps, conversations and dialogues (Crossan et al., 1999). Early researchers identify conversation as a discussion between two or more people (Patterson et al., 2012). Free flow of relevant information is recognized as core to successful conversations (Patterson et al., 2012). Conversations are simultaneously referred to as dialogues and discussions (Patterson et al., 2012). Thus, early literature emphasized the value of the quality of the

conversations in a supply chain context to identify critical factors (Boland & Tenkasi, 1995).

**Coordination:** Coordination is linking different parts of an organization to accomplish a collective set of tasks (Karl, 2007). The theory of coordination by Malone and Crowston (2006) recognizes coordination as the act of managing interdependencies between activities.

**Core competency:** Core competencies are identified as collections of learning in the organization, more linked with products and business units (Prahalad & Hamel, 1990).

**Co-specialized knowledge power:** Co-specialized knowledge is the creation of irreversible new knowledge that is unique to a specific supply chain context (Heiman & Nickerson, 2004; Peterson, 2009). Early researchers argue that two entities with knowledge assets specific to mutual transaction increase dependence and the problem of opportunism between supply chain partners (Sridharan & Akroyd, 2011).

**Diverse knowledge power:** Diverse knowledge as different knowledge bases (Buckley et al., 2009).

**Dyadic supply chain:** A dyadic supply chain refers to two firms working together to create value (Londe & Masters, 1994).

**Dynamic capability:** Teece, Pisano, and Shuen (1997) refer to dynamic capability as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to rapidly changing environments” (p. 516). Capabilities can be acquired through internal as well as external means (Helfat et al., 2007). The review of the literature indicates that despite dynamic capabilities being inherent in individuals, dynamic capabilities arise from learning (Teece, 2016).

**Empowerment:** The process of giving power to people. Delegating freedom of thinking to people enhances ability to respond to the dynamic



business environmental changes in supply chains in a knowledge based economy (Saremi, 2015).

**Engagement needs:** From a motivation perspective, job engagement is identified as the employee's investment, in terms of physical, cognitive and emotional energies, into job performance (Robbins & Judge, 2013).

**Exploitation:** Exploitation capability refers to the mobilization of the organizational resources to create new systems, which improves core competencies of the specific dyad partner (Zahra & George, 2002).

**Helping behavior:** Interdependent roles require helping behavior, which leads to employee cooperation and ultimately enriches overall performance (Van Dyne & Le Pine, 1998). The review of the literature indicates that employees involved in helping behavior are satisfied with their organization (Van Dyne & Le Pine, 1998). Smith et al. (2012) identify helping behavior as self-reported helping behavior. Higher levels of organizational support to employees lead to positive attitudes and behaviors of employees towards the organization, and enhance employee performance and helping behavior (Eisenberger, Fasolo & Davis-LaMastro, 1990). In addition, altruistic helping behaviors are found to be related to collective goals, collective identity and collective interest (Campbell et al., 2016).

**Images:** Early researchers argue that images can take a diagrammatic form (Benedek & Nyiri, 2014). A fundamental way of representing diagrammatic forms is the objects of knowledge and instruments through which those objects are generated and explored (Benedek & Nyiri, 2014). The role that diagrammatic forms play in thinking is considered as an especially critical aspect in intuition (Benedek & Nyiri, 2014). "How people think" is considered as the basis of human agency (Rousseau, 2012). Free will is identified as how the brain talks to itself over expectations and opportunities (Rousseau, 2012).

**Innovation:** An idea, practice or object that is considered as new to an individual or a unit (Rodgers, 1995).

**Innovative focus:** Effort on the innovation process. It consists of all the decisions, activities and their impacts from recognition of a need or problem, research and development (Rodgers, 1995).

**Institutionalization:** Institutionalization indicates the process of implementing individual and group level learning to the organizational level (Crossan et al., 1999). System changes and investments are frequent features of the institutionalization process (Crossan et al., 1999).

**Integration:** Integration is the process of developing shared understandings among individuals and taking coordinated actions. It requires mutual adjustments (Crossan et al., 1999).

**Interpersonal interactions:** Individuals' behavior patterns in supply chain learning (Hotho et al., 2012). These are more related with scale or extent of interaction related to specific supply chain activities (Hotho et al., 2012). In a supply chain learning context, interpersonal interactions can be categorized into diversity (scope) and extent (scale) of interactions. Diversity (scope) of interactions relates more to breadth of interpersonal interactions; while extent (scale) of interactions relates to depth of interpersonal interaction to specific supply chain activities (Hotho et al., 2012).

**Interpretation:** Interpretation refers to the explanation process using words and/or actions, of an idea to oneself and to others (Crossan et al., 1999).

**Intrinsic motivation:** Motivation as thinking patterns or drives that stimulate an individual's behavior (Achakl & Yolles, 2013). Intrinsic motivators operate based on curiosity of the individual (Robbins & Judge, 2013; Osterloh & Frey, 2000).

**Intuition:** Crossan et al. (1999) identify intuiting as the preconscious recognition of patterns or possibilities.

**Knowledge access:** Hult et al. (2006) identify knowledge access as the extent to which knowledge is easily available and obtainable within the

chain. In the literature, knowledge access capability comprises speed of access, motivation to share, and transparency; although not discussed is the speed of response in accessing knowledge (Grant & Baden-Fuller, 2004).

**Knowledge power:** Knowledge power is the influencee's faith that the influencer has some superior knowledge (Raven, 2008). Specialized, diverse, co-creating and co-specialized knowledge embed the ability to influence learning or the process of knowledge creation (Raven, 2008; Buckley et al., 2009; Skarzauskaite, 2013; Peterson, 2009).

**Micro-foundations:** The early literature frequently calls for micro-foundations of a specific phenomenon, though there is little consensus of what constitutes a micro-foundation (Barney & Felin, 2013). Early research also identifies the importance of beginning with fundamental levels to understand the individual roles in organizational learning (Felin & Foss, 2005). Thus, it is recommended to explore the individual's nature, choices, abilities, propensities, heterogeneity, purposes, expectations and motivations (Barney & Felin, 2013; Felin & Foss, 2005). The concept of a stopping point for a micro-level of analysis argues that "what causes" individuals and their interactions as important to develop strong theories (Barney & Felin, 2013). What causes can be genes and brains, but it is important to focus on practical and day-to-day activities of individuals in organizational contexts (Barney & Felin, 2013).

**Mutual adjustments:** Mutual adjustment refers to the ways in which two or more individuals accommodate, adapt to, and potentially struggle with, one another to develop practices (Ram & Edwards, 2003).

**Mutual benefit:** Mutual cost and benefit of the relationship (Mortensen, Freytag, & Arlbjorn, 2008).

**Naturally occurring interactions:** It is easy for each supply chain member to follow a course of self-interest (Fawcett et al., 2006). Naturally occurring interactions are more related with scale or extent of interaction related to specific supply chain activities (Hotho et al., 2012).

**Need for knowledge:** Rusly (2014) has identified that beliefs about the need to seek new knowledge enhance professionals' readiness to acquire knowledge.

**Organizational learning:** Organizational learning is defined by several authors as a continuous, cyclical process that reflects changes in cognition and behavior of individuals at different levels through acquisition, assimilation, transformation and adoption of knowledge stocks (Bontis et al., 2002; Crossan & Berdrow, 2003; Crossan et al., 1999; Huber, 1991).

**Participation in decision-making:** Participation in decision-making involves active participation of employees in making decisions through giving and receiving information and sharing experiences (Prisca, 2011).

**Perception:** From an organizational behavior perspective, perception is identified as a process by which individuals organize and interpret sensors, impressions to give meaning to aspects (Robbins & Judge, 2013).

**Prior experience in related field:** May be task, non-task/interpersonal, within and outside the organization and supply chain. Prior practice in similar aspects (Argote & Miron-Spektor, 2011).

**Prior experience in unrelated field:** May be task, non-task/interpersonal, within and outside the organization and supply chain. Prior practice in dissimilar aspects (Argote & Miron-Spektor, 2011).

**Prior experience:** Prior practice (Kolb et al., 1999). The experiential learning theory perspective argues learning as being a process of knowledge creation through transformation of experience (Argote & Miron-Spektor 2011; Kolb et al., 1999).

**Recognition:** The need for status and attention (Robbins & Judge, 2013) and the natural need by humans to be recognized (Grawe et al., 2015). Individuals who are recognized and praised and not always criticized and sanctioned can develop self-conscious personhood in a team (Krijnen, 2014).

**Reframing:** Frames can be identified as scripts and scenarios to guide action in specific circumstances (Bolman, 2014). Changing frames can change how things appear, the application process and how others see them (Bolman, 2014). The early literature argues that analysis often depends on the frames in use; images can be strong in one frame but subject to change in a different frame (Mabin & Davies, 1995). The end result is creation of a richer picture that recognizes implicit frames in use that shape the driving forces behind decision-making (Mabin & Davies, 1995).

**Relational view:** Relational view elaborates on how organizations can achieve relational rents through a supply chain relationship (Dyer & Singh, 1998). Because a “firm’s critical resources may span firm boundaries and embed in inter-firm resources and routines” (Dyer & Singh, 1998, p. 660), a relational rent (defined as a “supernormal profit jointly generated in an exchange relationship”) is one that cannot be generated by either firm in isolation, or one that can only be created through the joint idiosyncratic contributions of the alliance partners (p. 662).

**Relative absorptive capacity:** Capabilities in supply chain learning are studied through the theory of relative absorptive capacity. The ability of a supply chain partnership to value, assimilate, and exploit knowledge (Lane & Lubatkin, 1998).

**Self-development opportunities:** Firms need to plan career opportunities for knowledge workers in a manner that satisfies individual as well as organizational strategies (Kelly et al., 2011). Employee training and career planning are critical factors for creating self-development opportunities (Agic, 2012). The early literature found that employee training has a positive relationship with supply chain performance (Gowen & Tallon, 2003).

**Self-efficacy:** The self-efficacy theory of motivation argues that self-efficacy is the individual’s belief of capability to perform a task (Robbins & Judge, 2013).

**Social-psychological processes of learning:** Behavioral dynamics largely constructed through socio-psychological processes (Manuj et al., 2014). Organizational learning is argued to be a socially constructed phenomena consisting of psychological and social processes. Psychological processes are more related to an individual mind, whereas social processes are more related with interactions related to a group of individuals (Crossan et al., 1999).

**Specialized knowledge power:** Specialized knowledge as a deep focus area (Kelly et al., 2011).

**Speed of response:** The knowledge access perspective discusses the speed of accessing knowledge, although discussion is lacking on the speed of response in accessing knowledge (Grant & Baden-Fuller, 2004). The dynamic capability perspective argues that firms need to configure internal and external competencies for rapidly changing environments (Teece et al., 1997). The concept of customer response speed is a dynamic capability that enhances supply chain performance (Chiang et al., 2015). Customer response speed is critical as customer needs are continuously evolving (Chiang et al., 2015).

**Supply chain investments:** This refers to investments in diverse aspects of the organization when embedding new learning (Crossan et al., 1999). The early literature mostly focused on physical investment and information technology in a supply chain context (Cannon & Perreault, 1999).

**Supply chain learning:** The study defines supply chain learning as a continuous and cyclical interaction among socio-psychological learning processes and dynamic learning capabilities; a reflection of the changes in cognition and behavior of supply chain actors at different levels, enhanced by behavioral enabling characteristics.

**Supply chain:** A supply chain can be defined as two or more firms working together to achieve long term understanding to create value (Londe & Masters, 1994).

**Synthesis:** Bloom's taxonomy theory argues synthesis as being the production of a plan or proposed set of operations and also as a derivation of a set of abstract relations (Krathwohl, 2002). Krathwohl (2002) also describes synthesis as putting elements together to form a novel and coherent whole or make an original contribution; thus, it necessarily involves generating and producing new value. In addition, synthesis is more related with conceptual knowledge (Krathwohl, 2002). Synthesis involves higher mental processing (Akinci & Sadler-Smith, 2012).

**System changes:** System changes are important changes that occur in organizations due to the institutionalization process (Crossan et al., 1999).

**Transformative capability:** Transformative capability refers to the re-codification of new knowledge for the existing system (Zahra & George, 2002). It can also be argued as being the firm's capability to develop and refine routines that link existing knowledge with newly acquired and assimilated knowledge; further transformation can be achieved through adding or deleting knowledge, or interpreting the same knowledge in different ways (Zahra & George, 2002).

**Trust in competence:** The literature urges researchers to focus on the capability perspective of trust (Arnulf & Dreyer, 2005). Competence and goodwill are considered to be components of trust in professional relationships (Blomqvist & Stahle, 2000). Competence trust consists of technical capabilities, skills and knowhow (Blomqvist, 1997).

**Value creation:** Christopher and Ryals (2014) identify use of customer insight to identify opportunities to create customer value. There has not been much focus on new value creation from a learning capability perspective (Jin et al., 2013; Skarzauskaite, 2013).

# Chapter 1: Introduction

## 1.1 Background to the research

In today's highly competitive business environment, supply chain relationships are necessarily becoming more sophisticated (Schorsch et al., 2017; Daugherty, 2011; Harrison & Van Hoek, 2008; Ballou & Srivastava, 2007). Every business, irrespective of its size and profit motivation, creates learning relationships with other supply chain members to achieve a sustainable competitive advantage (Yang, Fia, & Xu, 2019; Bessant et al., 2013; Foss & Nielsen, 2012). Nevertheless, studies have shown that failure or near failure of these joint efforts are frequent (Bohme, 2009; Fawcett et al., 2008; Anderson, & Jap, 2005; Beth et al., 2003; Larsson et al., 1998). Day (1995) indicates that 70 percent of supply chain relationships fail through not meeting partner expectations (Schorsch et al., 2017; Sweeney, 2013; Bessant et al., 2003; Araujo, Dubois, & Gadde, 1999).

The focus of this thesis is the dyadic supply chain, which is referring to two firms working together to create value, via simultaneous interactions of capabilities and processes. Traditionally, supply chain learning capabilities have been studied through the lens of relative absorptive capacity theory, which Lane and Lubatkin (1998) define as the ability of a supply chain partnership to value, assimilate, and exploit knowledge. Hence, the relative absorptive capacity describes a supply chain partner's capacity to value, assimilate, transform, and exploit learning from the other firms. These four learning capabilities (i.e., value, assimilate, transform, and exploit) are underpinned by learning processes (Lane, Koka & Pathak, 2006).

A synthesis of literature into supply chain learning and organizational learning processes indicates that learning processes consist of intuition, interpretation, integration and institutionalization which are the essence of Crossan's 4-I model (Tam & Gray, 2016). The acceptance of Crossan's 4-I framework was reflected through the award of the prestigious "Academy of Management Review Decade



award in 2009”, in recognition of the most cited article during that decade (Crossan, Maurer & White, 2011). Learning can be identified as the process of creating knowledge (Crossan & Berdrow, 2003), and learning processes essentially consist of social-psychological processes (Crossan et al., 1999). The application of organizational learning theory to supply chain learning is considered to be in its infancy (Yang et al., 2019; Thakkar, Kanda, & Deshmukh, 2011; Pappu & Mundy, 2002; Sun & Childerhouse, 2009).

The earliest authors in the field frequently called for the study of micro-foundations of specific phenomena, although there is little consensus of what they meant by ‘micro-foundations’ (Barney & Felin, 2013). Researchers highlighted the importance of understanding the fundamental levels, meaning the individual roles in organizational learning (Felin & Foss, 2005). Although absorptive capacity at an organizational level is considered to be a dynamic capability (Razaei-Zadeh & Darwish, 2016; Zahra & George, 2002), there is inadequate research that applies this perspective to supply chain learning at the individual, group, and organizational levels (Golgeci & Arslan, 2014). Further, the extant literature does not present behavioral dynamics of the absorptive capacity in a supply-chain context (Martinkenaite & Breunig, 2016), and there is a need for a more relevant concept of dyadic supply chain learning capabilities and processes.

Hence, this thesis attempts to develop a comprehensive theory of supply chain learning by exploring the dynamics of the various elements of supply chain learning capabilities and processes. This study uses organizational learning theory and the relational view for this purpose. Nonetheless, this thesis does not present supply chain learning as a new concept.

This research also considers the antecedents of supply chain learning. Much research has been conducted on the antecedents of supply chain learning between partners (Yang et al., 2019; Manuj et al., 2013; Cheung et al., 2010; Speckman et al., 2002; Bessant, 2004; Bessant et al., 2003). A review of the literature identifies similarities and differences of supply chain dyads that trigger relative absorptive capacity (Razaei-Zadeh & Darwish, 2016; Cheung et al., 2010). However, this thesis contends that perspectives which take into account absolute or relative

similarities/differences may not be relevant in today's complex and dynamic supply chain contexts. In other words, there is a need to explore whether similarities/differences, other characteristics, or a combination of contributing factors affect supply chain learning.

## **1.2 Significance of the research and research questions**

In today's highly dynamic business environment, many organizations are creating interdependencies with supply chain partners to augment capabilities and competencies (Grawe, Daugherty & Ralston, 2015; Ketchen, Wowak & Craighead, 2014; Galaskiewicz, 2011; Christopher & Juttner, 2000; Borgatti & Li, 2009). The availability of advanced technological knowledge and the rising cost of research and development are also causing them to specialize in order to gain a competitive advantage (Egbetokun & Savin, 2015). In short, rapid changes in the business landscape are creating a fertile environment for inter-firm learning and innovation (Zobel, 2017; Egbetokun & Savin, 2015; Christopher & Ryals, 2014) in which organizations transfer resources, money, information, and knowledge between supply chain partners (Childerhouse & Towill, 2011; Fawcett, Mangan, & McCarter, 2008; Mentzer et al., 2001).

Silverstre (2015) identifies supply chain learning as creating joint technological, business, innovations that enhance sustainable performance. Some scholars claim that organizational learning is the only sustainable competitive advantage (Dyer & Singh, 1998; Sweeney, 2013; Schorsch et al., 2017; Senge, 1990). Thus, while a variety of reasons encourage supply chain relationships; "supply chain learning" can be considered as an important reason (Bessant, Kaplinsky, & Lamming, 2003; Hamel, 1991; Larsson, Bengtsson, Henriksson, & Sparks, 1998). However, understanding of supply chain learning mechanisms remains elusive due to ignorance of the behavioral aspects that drive the phenomenon (Schorsch et al., 2017; Sweeney, 2013; Manuj, Omar, & Pohlen, 2014; Bachrach & Bendoly, 2011; Fawcett et al., 2008; Mentzer, 2004).

Fundamentally, supply chain learning relies on behavioral aspects of the supply chain (Schorsch et al., 2017; Dyer & Singh, 1998; Pfeffer & Salancik, 1978). Such behavioral dynamics are largely constructed through socio-psychological processes (Manuj et al., 2014). Organizational learning is also argued to be a socially constructed phenomenon. Therefore, it consists of social-psychological processes involving the human mind and interactions related to groups of individuals (Crossan, Lane, & White, 1999).

The early literature into absorptive capacity and relative absorptive capacity theories adopted an efficiency-based perspective with a major interest focusing on economic theories and knowledge-based view (Zhu, Krikke, & Caniels, 2018). It was later discovered that the importance of a proper system to utilize acquired and accessed knowledge is needed to respond to new opportunities (Castro & Neira, 2005). Therefore, there is a crucial need to extend supply chain learning capabilities that address the above need. In order to address the above research gap, this study extends socio-psychological theories on supply chain learning to address the effectiveness of supply chain learning, by extending relational view and organizational learning theory.

Although the structural elements as facilitators are discussed extensively in supply chain learning literature (Yan & Nair, 2016), the role of enabling characteristics in supply chain learning has so far received scant attention. In addition, in today's complex supply chain learning context requires exploring behavioral facilitators of supply chain learning (Yang et al., 2019). The research thereby extends the literature into the context of supply chain learning by addressing behavioral enabling characteristics within the supply chain context, which drastically changes the literature focus on structural elements as the facilitators of supply chain learning.

Early literature frequently calls for micro-foundations of a specific phenomenon, though there is a little consensus as to what micro-foundations are (Barney & Felin, 2013). Moreover, early research identifies the importance of beginning with fundamental levels, which is to understand individual roles in organizational learning (Felin & Foss, 2005). Thus, it is recommended to explore an individual's

nature, choices, abilities, propensities, heterogeneity, purposes, expectations, and motivations (Barney & Felin, 2013; Felin & Foss, 2005). Therefore, this study attempts to draw insights from emerging areas of research in socio-psychological theories of supply chain learning. This research makes a substantial contribution to supply chain learning literature by way of applying socio-psychological theories at multi-levels within the supply chain context.

Against this background, the literature review suggests the prevalence of the following research problem and research gaps in the domains of organizational learning and supply chain relationships, which is expressed as:

**How do the social-psychological processes of organizational learning explain the phenomena of supply chain learning?**

The corresponding research questions are:

- What are the dynamics of elements of supply chain learning?
- What are the linkages among the elements of supply chain learning?
- What are the enabling characteristics of supply chain learning?
- How do these enabling characteristics affect supply chain learning?

In a journey of exploration through the field of supply chain learning, this study begins by setting out a model derived from the literature review, as indicated in Figure 1.1.

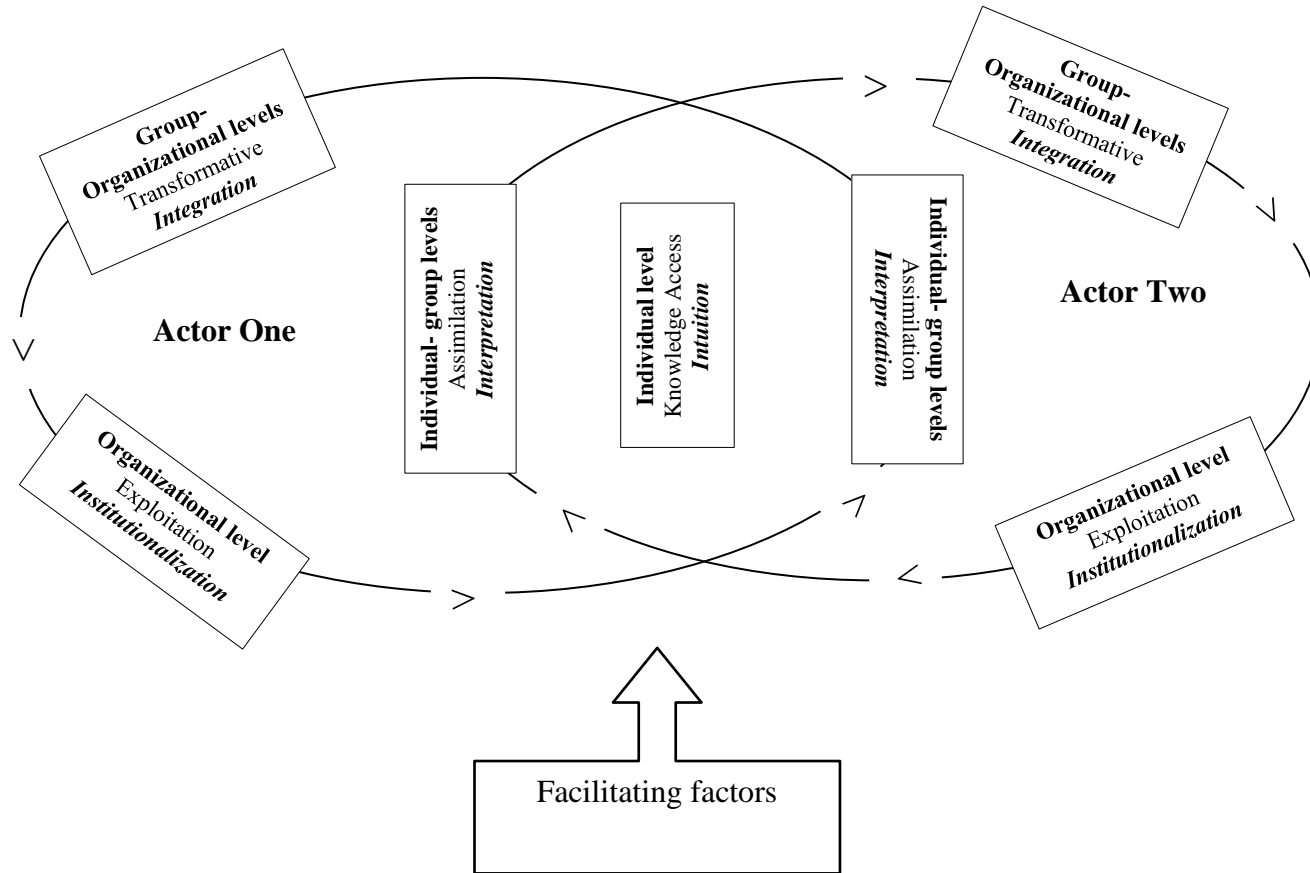


Figure 1.1: Model derived from the literature

### 1.3 Conceptual model of the study

The outcome of this study contributes to addressing a gap in the literature concerning the main domains of organizational learning and supply chain relationships. The final conceptual model which was derived from the research is indicated in Figure 1.2.

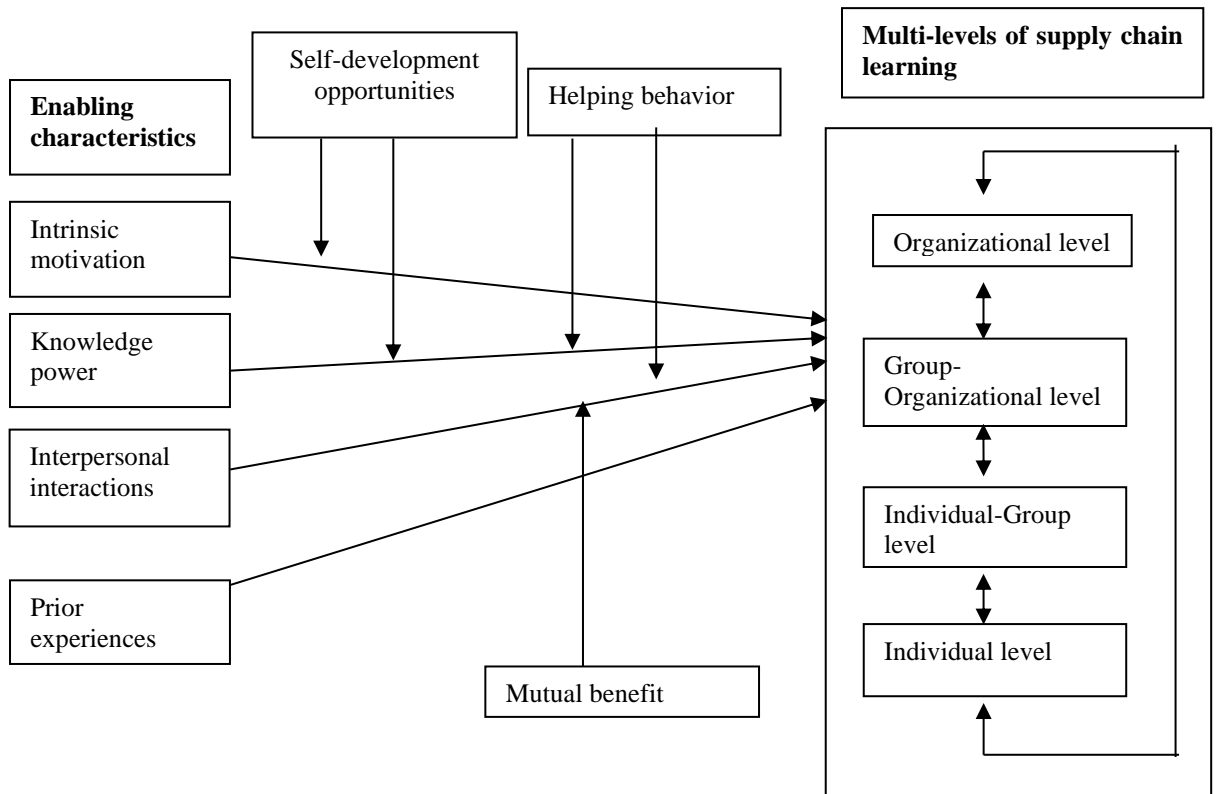


Figure 1.2: Conceptual model derived from the study

The conceptual model of this thesis advances the knowledge of the dynamics of elements of supply chain learning at multi-learning levels and describes the enabling characteristics that enhance supply chain learning. The present thesis identifies an intrinsic motivation, knowledge power, prior experiences, and interpersonal interactions as critical enabling characteristics in today's supply chain context. Intrinsic motivators operate based on the curiosity of the individual (Robbins & Judge, 2013; Osterloh & Frey, 2000); the power or influence is embedded in types of knowledge and the nature of prior experiences (i.e. in related

and unrelated fields) and their effects on supply chain learning. Similarly, this study attempts to study the dynamics of interpersonal interactions (i.e. trust in competence, participation, naturally occurring, and arranged interactions in dyadic supply chain learning).

This model is the first attempt to study the social-psychological aspects of supply chain learning capabilities and processes. Secondly, this model is the first to investigate enabling characteristics that enhance supply chain learning.

#### **1.4 Original contribution to knowledge**

In terms of theoretical contributions to the field, this research extends organizational learning theories to the dyadic supply chain context (Crossan & Berdrow, 2003; Huber, 1991; Simon, 1991; Adler, & Clark, 1991; Senge, 1990), thus developing a more comprehensive and practical theory of the social-psychological processes that inform supply chain learning. In particular, one of the main contributions of this thesis is exploring the behavioral dynamics of absorptive capacity at the dyadic supply chain level. The thesis also addresses the means by which supply chain learning interactions contribute to the emergence of absorptive capacities at the dyadic supply chain level, thereby addressing current theoretical gaps (Borgatti & Cross, 2003; Lewin et al., 2011). The thesis also attempts to develop a framework of the dynamics of supply chain learning at the dyadic level from the supplier's and the manufacturing firm's perspectives, which is also absent in the literature (Knoppen, Saenz, & Johnston, 2011; Barnes, Naude, & Michell, 2007).

This research could potentially enrich our understanding of the role of behavioral dynamics of absorptive capacity and socio-psychological processes at the dyadic supply chain level that links the elements of supply chain learning. Further, structural facilitators are well researched and understood, but there are surprisingly little behavioral facilitators (Yan & Nair, 2016). This research carries the potential of enriching the understanding of the role of enabling characteristics, such as intrinsic motivation, knowledge power, prior experiences, and interpersonal interactions on supply chain learning.

In recognizing the critical role of behavioral factors in supply chain learning, this research uses organizational learning theory to study the interplay of behavioral aspects in supply chain relationships.

In terms of practical contribution, the results of this thesis will help decision-makers to understand better how to manage supply chain dynamics and enhance learning processes. This study is also the first research on the social-psychological processes of supply chain learning at the dyadic level in a Sri Lankan setting.

## **1.5 Research methodology**

This thesis uses a constructivist paradigm and an interpretative philosophical base; applying organizational learning theory and a relational view as fundamental theoretical perspectives. A multiple case study methodology is employed in collecting data and a constructivist grounded theory employed in analyzing the data.

## **1.6 Structure of the thesis**

The thesis consists of six chapters. This chapter (Chapter 1) gives a holistic picture of the background to the thesis. It describes the importance of the research and outlines the research questions, methodology, and the thesis outline.

Chapter 2 focuses on synthesizing the literature on the respective research phenomena. The first part of the review describes theoretical bases. It then focuses on elements of supply chain learning, including the linkages, and enabling characteristics of supply chain learning. These concepts address the absorptive capacity theory and social-psychological processes of supply chain learning, providing a multi-level view, and describing linkages among the elements of supply chain learning and the context of supply chain learning. The synthesized model derived from the literature is presented. And also, the chapter identifies gaps in the literature, states the research problem and research questions.



Chapter 3 discusses the research methodology adopted for the study. It considers the main building blocks of theory development, basic elements of the research process, the methodology, research methods, and associated considerations concerned with the saturation of the study, code development over data analysis, and qualitative data analysis, using NVivo 12 PLUS.

Chapter 4 presents the findings and a related discussion of supply chain learning at the individual, individual-group, group-organization, and organization levels.

Chapter 5 describes the cross-case analysis and discussion related to the enabling characteristics of supply chain learning and their impacts on the learning elements.

Chapter 6 presents the conclusions and limitations of the study and identifies future research opportunities. It elaborates on the theoretical contribution, practical implications, and future research directions.

## **Chapter 2: Literature review**

### **2.1 Introduction**

The purpose of this chapter is to provide an in-depth discussion of the theory behind the social-psychological processes of supply chain learning. This is necessary because, today, many organizations are creating interdependencies with their supply chain partners in order to augment their capabilities and competencies (Grawe et al., 2015; Ketchen et al., 2014; Galaskiewicz, 2011; Christopher & Juttner, 2000; Borgatti & Li, 2009). Despite the early literature focusing on diverse categorizations, multi-level aspects, and adopting a holistic view, the dynamics of learning capabilities and processes have still not been thoroughly explored (Yang, Fia, & Xu, 2019). Additionally, today's dynamic supply chain context calls for exploration of the behavioral aspects of specific contexts rather than similarities and differences between contexts. In the journey of exploring the dynamics of supply chain learning and behavioral oriented facilitators, this study builds on the relational view and on organizational learning theory.

The review of the literature for this thesis was conducted using the manual method, NVivo 12 PLUS, and VOS Viewer software (Web of Science database). Software analysis of literature review utilizes artificial intelligence capabilities of respective software in pattern recognition. Software analysis methods provide the opportunity to get detailed analysis, varying scientific parameters within a shorter period. In addition, co-citation analysis and bibliographic coupling for each of the themes, sub-themes of the thesis were conducted using VOS viewer software. These analyses have the option to change scientific parameters and generate different analysis results. These were used in generating insights for the literature review section, and an example has been illustrated in Appendix 5 and Appendix 6. Future researchers can replicate these findings by adopting the same parameters of the analysis, as indicated in Appendix 7.

The overall argument of the thesis is based on the synthesis based on human intelligence. This study uses computer-aided analytic approaches to triangulate human intelligence as well as finding novel patterns. However, both advantages and

disadvantages of computer-aided analytical techniques can be considered; a few disadvantages, such as a lack of consistency, and difficulty in integrating ideas in certain situations can be highlighted.

## **2.2 Towards a social-psychological theory of supply chain learning**

The theoretical and empirical boundaries of supply chain learning constructs are still unclear and highly subjective, which has hindered the consistency of theoretical development of the supply chain learning field (Yang et al., 2019; Podsakoff et al., 2016; Flint, Larsson, & Gammelgaard, 2008). This thesis uses the relational view and the social-psychological perspective of organizational learning theory to enrich the dimensions of the supply chain learning construct to address this critical gap.

Social-psychology is identified as the nature and causes of human social behavior (DeLamater, 2006), whereas few researchers argue that “social psychology is the scientific study of the causes and consequences of people’s thoughts, feelings, and actions regarding themselves and other people” (Greenberg, Schmader, Arndt, & Landau, 2015, p. 2). Social-psychologists address individuals (motivations and cognition) and groups (individual interactions) (DeCremer, Van Dick, & Murnighan, 2011).

The roots of social-psychology theories are nurtured by multiple theoretical perspectives. Early researchers argue that human behavior is a result of instincts (Greenberg et al., 2015). Sigmund Freud’s psychoanalytic theory discusses unconscious desires and their impact on human behavior (Greenberg et al., 2015). Later behaviorists argued that human behavior is shaped by experience (Greenberg, 2015). The emergence of social psychology was influenced by the main argument that human behavior is determined by both instinct and experience (Greenberg et al., 2015). Further, the roots of social-psychology underscore symbolic interactionist theory and social exchange theory (DeLamater, 2006). For instance, symbolic interaction theory argues that interaction is symbolic; a person develops meaning within interaction itself (DeLamater, 2006). The evolutions of the above theoretical traditions are embedded in the supply chain learning field.

Supply chain learning theories have incorporated cognitive psychological theories and social-psychological theories to enrich the field. Cognitive psychological theories of particular relevance to supply chain learning include information acquisition, information processing, prior knowledge (Lane & Lubatkin, 1998; Huber, 1991). Social-psychological theories of particular relevance to supply chain learning are knowledge access, social-interactions, and prior experience (Hotho, Becker-Ritterspach, & Saka-Helmhout, 2012). Most of the previous studies on supply chain learning have utilized cognitive psychological theories, while the theoretical and empirical evidence suggests the need for social-psychological theories to address effective supply chain learning theory.

Earlier literature discussed the depth and breadth of the supply chain learning construct using three dimensions: the unit of analysis/learner, including individual, group, organizational and supply chain (Knoppen et al., 2010; Knight, 2002); the context of learning where learning takes place might affect the learning (Larsson et al., 1998); finally, the content of learning, whether learning results in changes to cognition or behavior (Knight, 2002). However, the linkage between learning processes and learning capability has not been addressed adequately in supply chain learning literature (Yang et al., 2019). Thus, this study proposes a broad theory of the social-psychological processes of supply chain learning requires a linkage between the learner, learning content, the behavioral context of learning, dynamism, the linkage between capabilities and processes. Most of the organizational learning and supply chain learning theories have not addressed these dimensions adequately, as indicated in Table 2.1. The next sections of the literature review articulate an argument for the social-psychological theory of supply chain learning.

Table 2.1: Attributes for social-psychological perspective of supply chain learning

Key Attributes (A1 to A5)	A1: Learner (Individual, group, organizational and dyads)	A2: Content of learning (Cognitive and behavioral changes)	A3: The context of learning (Behavioral factors)	A4: Supply chain learning as a dynamic capability	A5: Linkage between learning processes and learning capabilities
Organizational learning theories					
Huber (1991)	Yes	Yes	Not considered	Not considered	Not considered
Simon (1991)	No group and organizational level	Yes	Not considered	Not considered	Not considered
Crossan et al (1999)	Yes	Yes	Organizational level	Not considered	Not considered
Senge (2006)	No organizational level	Yes	Organizational level	Not considered	Not considered
Sun & Anderson (2010)	Yes	Yes	Organizational level	Not considered	Yes (Organizational level)
Supply chain learning theories					
Lane & Lubatkin (1998)	Individual and Organizational level	No	Yes	Not considered	Not considered
Larsson et al (1998)	Group, Organizational, dyad, network	No	Organizational, Inter-Organizational learning, Dyads	Not considered	Not considered
Knight (2002)	Yes	Yes	Inter-Organizational learning, Dyads	Not considered	Not considered
Selnes & Sallis (2003)	Dyad	Yes	Dyadic level	Not considered	Not considered
Flint et al (2008)	Individual, Group, Organizational, dyad	Yes	Not considered	Not considered	Not considered
Knoppen et al (2010)	Dyad	No	Not considered	Not considered	Not considered
Gong et al (2018)	Inter-organizational	Yes	Not considered	Not considered	Not considered
Li et al (2018)	Organizational	Yes	Not considered	Not considered	Not considered
Yang et al (2019)	Triadic	No	Not considered	Not considered	Not considered
This thesis (Dyadic supply chain context)	Individual, group, organizational, dyads	Yes	Enabling characteristics	Yes	Yes

The next sections discuss the theoretical foundations of supply chain learning within the dyadic supply chain context.

### **2.3 Theoretical foundations**

It is still somewhat difficult to determine which theories should be used to explain diverse problems arising in the supply chain field (Ellram & Cooper, 2014; Chicksand, Watson, Walker, Radnor, & Johnston, 2012), hence a multiple lens approach to theory building bridges the silos within and between the disciplines (Matthews, Power, Touboulic, & Marques, 2016; Zacharia, Sanders, & Fugate, 2014; Okhuysen & Bonardi, 2011; Halldorsson, Kotzab, Mikkola, & Skjott-Larsen, 2007).

It is evident that phenomena may also be viewed from a variety of perspectives (Engestrom, Kerosuo, Engestrom, & Kerosuo, 2007; Harland et al., 2006; Carlile & Christensen, 2004). The present thesis utilizes the dual lenses of organizational learning theory and the relational view as the main theoretical bases for the study (Crossan et al., 1999; Dyer & Singh, 1998; Lane & Lubatkin, 1998; Pavlov, 1927).

When combining theoretical lenses there are two main dimensions to consider. The first one concerns the conceptual distance that may exist between the phenomenon and that of the lens's original conception (Okhuysen & Bonardi, 2011). The second dimension is the degree of compatibility between the underlying assumptions of the multiple lenses (Okhuysen & Bonardi, 2011). Compatibility refers to similar or dissimilar individual decision-making processes, organizational mechanisms or other properties in development of their explanations (Okhuysen & Bonardi, 2011). Accordingly, in this research the conceptual similarities of the lenses of the study include a behavioral focus and relational rents as important means to achieve competitive advantages. Compatibility of the study lenses also includes the behavioral priority; existence of multi-level processes; and interdependencies.

A review of literature indicates that supply chain relationships have been studied mainly from the perspectives of transaction cost economics (Zhu et al., 2018), resource-based theory (Ojha, Shockley, & Acharya, 2016; Ngai, Chau, & Chan, 2011) and knowledge-based theory (Zhu et al., 2018; Willis, Genchev, & Chen, 2016), and less frequently from the organizational learning theory, relational view

and dynamic capability theory. The sections to follow reviews knowledge-based theories, resource-based theories, and transaction cost economic theories. Thereafter, this study addresses theoretical gaps, and the study shows that the most appropriate theories to consider are organizational learning theory, dynamic capability theory, relational view, and extends these into the supply chain relationships domain.

### **2.3.1 Knowledge based view**

Today's knowledge-based economy consider knowledge as the most significant resource of achieving competitive advantage (Grant, 1996). The knowledge-based view has contributed to the development of learning theory (Zhu et al., 2018; Willis et al., 2016). The knowledge-based view model the types of knowledge, characteristics of the source, and receipts of knowledge, characteristics of context (Szulanski, 1996).

The knowledge-based theory has focused on the positivistic perspective of research methodology while it seeks to explain significant and valuable insights into the outcome of learning (Zhu et al., 2018; Willis et al., 2016). For instance, Willis et al. (2016) argue that firms with a higher level of supply chain learning challenge existing organizational processes and restructure in better ways that ensure flexibility and performance. Further, Zhu et al. (2018) found out that supply chain learning mediates the relationship between supply chain integration and focal firm performance.

Despite the progress observed during the last three decades, the role of knowledge-based view into supply chain learning processes and capabilities field remains in an embryonic stage. The basis of this research is not the outcome of learning, but instead, the process of creation of knowledge termed as supply chain learning.

### **2.3.2 Resource-based theory**

Neo-classical economic theory has contributed to the resource-based theory (Barney, 2001). The resource-based theory assumes that resources and capabilities

may be heterogeneously distributed across firms (Barney, 2001, p. 644). It includes assets, capabilities, organizational processes, firm attributes, information, and knowledge as firms' resources (Barney, 2001, p. 101). Furthermore, the resource-based theory addresses structural aspects of supply chain learning in creating valuable, rare, and costly to imitative resources in supply chains and necessarily gives a macro-level perspective (Ojha et al., 2016; Ngai et al., 2011).

The resource-based theory offers promising theoretical foundations to explain the structural aspects and consequences of supply chain learning. However, there is only a miniscule amount of literature that applies resource-based theory in supply chain learning research (Ojha et al., 2016; Ngai et al., 2011). These researches address the structural orientation of supply chain learning. For example, Ojha et al. (2016) identify supply chain learning as a resource characterized by key learning routines such as team orientation, system orientation, learning orientation, and memory orientation, which enhances entrepreneurial emphasis and innovativeness. In addition, Ngai et al. (2011) address the consequences of supply chain learning by exploring the relationship between supply chain competence and supply chain agility on firm performance.

The resource-based theory addresses the macro-level perspective of supply chain learning. In contrast, the complex nature of supply chain interactions is generally attributed to the process of learning, while the process of unique joint resource creation is not addressed. Therefore, this research examines the role of supply chain learning capabilities and processes that create a unique supply chain value.

### **2.3.3 Economic perspective**

Since learning results in a reduction in time and cost in production, the economic perspective of learning becomes increasingly important. In this respect, the economic perspective identifies that learning occurs due to cumulative production (Bell, Whitwell, & Lukas, 2002). Findings from these studies highlight that accumulated experience gain tacit knowledge and lead to a reduction in cost (Bell et al., 2002). The absorptive capacity theory is based on the economic perspective (Cohen & Levinthal, 1990). Economic perspective argues that prior related



knowledge and diversity of background as facilitators of absorptive capacity (Cohen & Levinthal, 1990). Further, research and development expenditure is considered as an antecedent of absorptive capacity (Cohen & Levinthal, 1990). Interestingly, these theories are more interested in the cognitive and structural aspects that enable learning. Research into the economic perspective of supply chain learning mostly uses the positivist paradigm (Cohen & Levinthal, 1990). For instance, relative absorptive capacity theory using the positivist paradigm argues that similarity of the partner's basic knowledge, research communities, lower management formalization, research centralization, and compensation practices as factors positively related to inter-organizational learning (Lane, 1996). Lane (1996) recognizes the role of the individual in developing the individual level of learning capabilities. Most of these learning contexts involve technical and scientific learning (focus on research and development context). Thus, the economic perspective addresses the macro-level perspective of supply chain learning. Little effort has focused on understanding learner and learning context interactions in supply chains.

Even though several theoretical perspectives address the facilitators and consequences of supply chain learning at the macro-level, enhancing the supply chain learning processes is still an under-examined field. Little effort has been extended to understand the supply chain learning processes and its dynamics. Later, researchers argue that the behavioral perspective of organizational learning as an appropriate approach to handle the complexity of supply chain learning (Schorsch et al., 2017). Therefore, this study demonstrates that relational characteristics enhance learning in the dyadic context. This research uses multiple theoretical perspectives of relational view, organizational learning, and dynamic capability perspective to achieve the purpose.

#### **2.3.4 Relational view**

In essence, a relational view elaborates on how organizations can achieve relational rents through a supply chain relationship (Dyer & Singh, 1998). Because a “firm’s

critical resources may span firm boundaries and may be embedded in inter-firm resources and routines” (Dyer & Singh, 1998, p. 660), a relational rent (defined as a “supernormal profit jointly generated in an exchange relationship”) is one that cannot be generated by either firm in isolation, or one that can only be created through the joint idiosyncratic contributions of the alliance partners (p. 662).

A large body of research into relational view has explored the relation specific assets and effective governance in supply chains (Cheng, Chen & Huang, 2014). However, few studies have utilized the relational view to exploring supply chain learning processes and capabilities (Borgatti & Cross, 2003). Existing studies mainly focus on information sharing, knowledge exchange, supplier integration trust, supply chain performance (He, Sun, Ni, & Ng, 2017; Cheng et al., 2014). For example, early studies found out that knowledge exchange and information technology integration foster the level of dyadic supply chain integration (Chen, Preston, & Xia, 2013). Further, the relational view theory has demonstrated a facet of interactions that enrich supply chain relationships (Dyer & Singh, 1998). Application of the relational view on information seeking and learning highlights the learning characteristics of knowledge-seeking by an individual (Borgatti & Cross, 2003). Dyer & Hatch (2006) applied resource-based theory and network theory principles in studying network knowledge sharing and identified the existence of resources and capabilities that are relation specific and are not easily transferable to the other networks.

Relational rents are generated through interactions among supply chain partners. Supply chain interactions are necessarily uncertain, and it encourages a variety of interdependencies (Chen et al., 2013). Findings from these studies emphasize the need for having positive interactions that reduce access barriers and future interactions (Borgatti & Cross, 2003). Therefore, higher interdependencies increase the need for behavioural factors that enable the supply chains. This study proposes behavioural factors enrich supply chain learning capabilities and processes that help to cope up with supply chain uncertainty.

The relational view also considers dynamic capabilities, routines and processes as central components in generating relational rents (Galaskiewicz, 2011; Dyer &

Singh, 1998). Researchers identify dynamic capabilities variously as abilities, capacities, processes or routines (Barreto, 2010). Some researchers have identified dynamic capabilities as specific and identifiable processes (Eisenhardt & Martin, 2000). Values and capabilities are rarely created within one company (Kazadi, Lievens, & Mahr, 2016); rather, they are co-created among supply chain actors (Dyer & Singh, 1998).

There are a variety of similarities and differences between dynamic capabilities, routines and processes. In terms of similarities, each concept exists at the level of the individual, the team and the organization (Salvato & Rerup, 2011). On the other hand, aggregates of one aspect lead to higher level phenomena - in other words capabilities are comprised of a collection of processes (Salvato & Rerup, 2011). Lane et al. (2006) describe how absorptive capacity capabilities are achieved through different learning processes and other researchers identify dynamic capability as learned and stable patterns of collective processes (Zollo & Winter, 2002).

### **2.3.5 Dynamic capability perspective**

Learning itself is identified as a dynamic capability (Golgeci & Arslan, 2014; Meinschmidt, Foerstl, & Kirchoff, 2016; Mellat-Parast, 2013; Wilkens, Menzel, & Pawlowsky, 2004), thus it can be argued that there is a sequential presence of capabilities and processes. Dynamic capabilities are fundamental to competitive advantage (Teece, Pisano, & Sheun, 1997). According to Forman (2004), it is clear that, in a twenty-first century economy, 80 percent of the market value of an organization is determined by intangible factors such as intellectual and human capital. Cash and tangible assets have become outdated (Forman, 2004). In today's dynamic business environment, organizations enter into relationships in order to combine capabilities to create synergies (Skarmeas, Zeriti, & Baltas, 2016; Jacobides & Winter, 2005). A capability is an ability to perform a particular task or activity, which can be divided into operational and dynamic capabilities (Helfat et al., 2007). Operational capabilities enable present practices; similarly, dynamic

capabilities enable adaptation to change (Helfat et al., 2007). Teece et al. (1997) refer to dynamic capability as “the firm’s ability to integrate, build, and reconfigure internal and external competencies to rapidly changing environments” (p. 516). Capabilities can be acquired through internal as well as external means (Helfat et al., 2007). The present study focuses on learning capabilities acquired through external means, their generation and implementation.

Dynamic capabilities are assumed to be embedded in supply chain capabilities and processes (Dyer & Singh, 1998). They change according to the needs of the context (Teece, Peteraf, & Leih, 2016). Learning is identified as continuously changing dynamic capability (Winter, 2003), hence supply chains need to continuously learn to meet the requirements of the context. Early researchers use the concept of dynamic capabilities to uncover the nature and requirements for successful organizational learning (Swift & Hang, 2008).

Supply chain learning capability as a dynamic capability operates within multiple levels of the organization (Golgeci & Arslan, 2014; Pittz & Intindola, 2015; Dosi, Nelson, & Winter, 2000). Specific capabilities are mostly multi-dimensional (Flynn & Flynn, 2004). This thesis argues that supply chain learning capability as a specific capability consists of multiple levels, and leads to the creation of other capabilities of the organization. Some research considers organizational capabilities as an aggregate phenomenon (Nelson & Winter, 1982) which comprises heterogeneous elements (Salvato & Rerup, 2010).

Dynamic capabilities are comprised of systematic processes for strategic decision making, resource allocation and knowledge creation routines (Peng, Schroeder & Shah, 2008; Eisenhardt & Martin, 2000; Pentland & Rueter, 1994). Ad hoc problem solving leads to dynamic capabilities (Winter, 2003). Supply chains involve many ad hoc decisions (Sodhi, Son, & Tang, 2012), and complex supply chain relationships consist of ad hoc decision making rather than repetitive decision making.

Furthermore, Teece (2016, p. 210) recognizes organizational dynamic capability as a resource that can be enriched to produce a desirable outcome. In this regard, Teece

et al. (1997) identify core competencies as crucial components in a theory of dynamic capability, defining core competencies as a firm's fundamental business and arguing that generally core competencies are derived by looking across a range of firms. The next few sections explain the use of dynamic capability theory to understand the underpinnings of supply chain learning capabilities.

Researchers into absorptive capacity theory argue that absorptive capacity as a set of organizational routines and processes by which firms acquire, assimilate, transform, and exploit knowledge (Zahra & George, 2002). Zahra & George (2002) also identify absorptive capacity as a dynamic organizational capability. Although this view has succeeded in setting the tone for dynamic learning capability; it has failed to address the supply chain context, in which existing research has not studied whether learning capability at the supply chain context creates new value (Golgeci & Arslan, 2014; Castro & Neira, 2005).

Extant research into firm acquisition emphasizes that firms do not create value through acquisitions, but it creates customer value through effective utilization and integration of capabilities (Castro & Neira, 2005). For instance, extant research has proven that the transfer of technological capabilities is motivated by face to face communication, frequency of visits, meetings of supply chain employees (Castro & Neira, 2005). Most of the literature into absorptive capacity and relative absorptive capacity focus on the acquisition of knowledge by entering into supply chain relationships (Rezaei-Zadeh & Darwish, 2016). Nonetheless, that does not guarantee value creation within joint partners to adapt to the environment. Less attention is paid to behavioral dynamics of utilizing acquired knowledge to create competitive advantages. Dynamics of value creation is a critical gap in the literature; therefore, this thesis extends knowledge acquisition capability to address the ability to sensing new opportunities and adapting to the business environment. Therefore, this thesis provides valuable insights into managing acquired knowledge by enhancing the individual level of learning capability in a supply chain context.

An individual can use innate abilities and life experiences in sensing new opportunities (Beck et al., 2013). A few pieces of research have focused on how inner human facets influence on the creation of value in sensing new future

opportunities (Beck et al., 2013). A review of the above theories shows that there is a lesser number of studies that address the relational facilitators of individual learning. Therefore, this study proposes enabling characteristics that enhance dynamic learning capability at a supply chain context.

One aspect of the relational view is the theory of relative absorptive capacity (Dyer & Singh, 1998). Relative absorptive capacity can be considered to be a dynamic capability (Knoppen et al., 2011). Early researchers applied absorptive capacity to dyadic supply chains, referring to it as relative absorptive capacity (Lane & Lubatkin, 1998). In the sections to follow, absorptive capacity and relative absorptive capacity are discussed.

### **2.3.6 Introduction to absorptive capacity theory**

Absorptive capacity, taken in the context of dyadic supply chains, represents relative absorptive capacity theory, since current literature definitions of absorptive capacity imply that a firm has the equal ability to learn from other supply chain partners (Cohen & Levinthal, 1990).

The early literature identifies absorptive capacity theory as a basis to develop relative absorptive capacity theory; which is the learning capability at dyadic supply chain level (Schildt, Keil, & Maula, 2012; Cohen & Levinthal, 1990). The review of the literature indicates that absorptive capacity theory mostly considers learning capability as a firm-level capability that builds unique capabilities (Cohen & Levinthal, 1990). Later, extensions into relative absorptive capacity shed light on the study of absorptive capacity in a supply chain context. Absorptive capacity is “an ability of a firm to recognize the value of new, external information, assimilate it and apply it for commercial ends” (Cohen & Levinthal, 1990, p. 128). Table 2. 2 indicates the dimensions of absorptive capacity as obtained from a review of the literature.

The ability to recognize the value of new knowledge refers to the use of related prior knowledge and insights and perceive the value of new knowledge (Kumi &

Sabherwal, 2018). Assimilation capability refers to the ability to understand new knowledge and analyze and interpret new information obtained from external sources (Omidvar, 2013). Assimilation capability focuses on context-specific meaning generation. Transformative capability refers to a firm's ability to develop and refine routines that facilitate combining existing knowledge with assimilated new knowledge (Zahra & George, 2002, p. 190). Exploitation capability refers to the application of new knowledge (Zahra & George, 2002, p. 190).

Various researchers have modeled the components of absorptive capacity, although there remains little consensus. For example, Zahra and George (2002) categorized acquisition and assimilation as potential absorptive capacity, and transformation and exploitation as realized absorptive capacity. Todorova and Durisin (2007) identify recognition of value, acquisition, assimilation, transformation and exploitation as components of absorptive capacity. Recognition of value refers to seeing and understanding the potential value of new information with prior knowledge via cognitive structures.

Absorptive capacity research spans multiple levels of analysis, macro-level research, multiple applications, and is applied in multiple fields (Kumi & Sabherwal, 2018). For example, absorptive capacity has an impact on exchange behaviors in online communities of practices (Kumi & Sabherwal, 2018). Further, recent researchers have begun to explore absorptive capacity generation paths. For instance, researchers identify specific organizational routines and processes that contribute to enhancing absorptive capacity (Lewin, Massini, & Peeters, 2008). Further, prior literature mostly applies the absorptive capacity concept to study inter-organizational learning (Dobrzykowski et al., 2015). This inherent diversity of applications leads to conceptual ambiguity of "what absorptive capacity is." Therefore, it is necessary to explore the socio-psychological dynamics to generate new insights.

Table 2.2: Analysis of elements of absorptive capacity

Level of context	Elements	Defining characteristics	Authors
Individual level	Ability to recognize new external information Recognition capacity	Prior investments, risk tolerance, prior knowledge, senior management support, training, experience with the Research & Development department, motivation for collecting knowledge, speed of knowledge Recognition capacity	Zobel (2017); Ojo & Raman (2015); Omidvar (2013); Todorova & Durisin (2007); Lane et al. (2006); Zahra & George (2002); Szulanski (1996); Cohen & Levinthal (1990); Cohen & Levinthal (1989)
	Acquisition	Knowledge Acquisition, absorb external knowledge, recognition and understanding of new knowledge, appreciation of its value, external sources background, nature of external knowledge, type of new knowledge, interrelationships, actor's motivations, common or shared language, familiarity with organizational problems, ability to detect opportunities	Ambulkar et al. (2016); Noblet, Simon, & Parent (2011); Todorova & Durisin (2007); Zahra & George (2002); Szulanski (1996); Mowery & Oxley (1995); Cohen & Levinthal (1990); Cohen & Levinthal (1989)
Individual-group level	Assimilation	Knowledge dissemination, absorption, understanding, formalization, routinization, coordination capacity, personal turn over, number of research communities, management support	Ambulkar et al. (2016); Ojo & Raman (2015); Omidvar (2013); Noblet, Simon, & Parent (2011); Todorova & Durisin (2007); Lane et al. (2006); Zahra & George (2002); Szulanski (1996); Cohen & Levinthal (1990)
Group-organizational level	Transformative	Internalization, conversion, recodification, challenging established practices, adaptability, combination, additions, removals, choice, maintenance, reactivation and synthesis to ongoing technology development efforts	Noblet, Simon, & Parent (2011); Todorova & Durisin (2007); Zahra & George (2002); Szulanski (1996); Garud & Nayyar (1994)
Organizational level	Exploitation	Apply, use, knowledge usage, implementation, mobilization of resources, core competencies, achievement of organizational goals, Ability to utilize	Ambulkar et al. (2016); Ojo & Raman (2015); Omidvar (2013); Noblet, Simon, & Parent (2011); Todorova & Durisin (2007); Lane et al. (2006); Zahra & George (2002); Szulanski (1996); Cohen & Levinthal (1990)



### **2.3.7 Relative absorptive capacity theory**

Relative absorptive capacity as a dynamic capability comprises the dynamic capabilities of recognition of value, acquisition, assimilation, transformation, and exploitation of knowledge between dyadic supply chains (Knoppen et al., 2011). Capacity to understand and value external knowledge is posited as understanding external knowledge (Lane & Lubatkin, 1998; Lane, Salk & Lyles, 2001). Change in new knowledge and combining new knowledge with the existing structures is posited as assimilation capacity and use of new knowledge for commercial use is posited as the exploitation capacity of the relative absorptive capacity (Lane & Lubatkin, 1998; Lane et al., 2001).

Lane and Lubatkin (1998, p. 461) define relative absorptive capacity as “the ability of a supply chain partnership to value, assimilate, and exploit knowledge”. Here, capacity to understand and absorb external knowledge is posited as recognition of value of new external knowledge (Lane & Lubatkin, 1998, p. 464; Lane, Salk & Lyles, 2001). Change in new knowledge and combining new knowledge with existing structures is posited as the assimilation capacity of relative absorptive capacity, and the use of new knowledge for commercial use is posited as the exploitation capacity of relative absorptive capacity (Lane & Lubatkin, 1998, p. 465; Lane et al., 2001). Table 2.3 indicates the dimensions of relative absorptive capacity as derived from the literature. Table 2.3 shows that most relative absorptive capacity theories use the same dimensions as absorptive capacity theory (Lane & Lubatkin, 1998; Lane et al., 2001; Lewin et al., 2011; Saenz, Revilla, & Knoppen, 2014).

Relative absorptive capacity research spans multiple levels of analysis, macro-level research, and uses the information processing perspective (Dobrzykowski et al., 2015). For instance, a few researches focus on both partner perspectives towards absorptive capacity in innovations (Newey, 2000). In addition, addressing the macro level, relative absorptive capacity theory examines the impact of a firm's knowledge-sharing routines on knowledge sharing in a dyadic supply chain context.

In contrast, this thesis examines the unexplored micro aspects of the relative absorptive capacity theory.

Table 2.3: Analysis of elements of relative absorptive capacity

Level of context	Elements	Defining characteristics	Authors
Individual level	Ability to recognize, understand and value new external information	Ability to recognize, understand, value, prior investments, risk tolerance, prior knowledge, senior management support, training, experience with the research & development department, motivation for collecting knowledge, speed of knowledge	Saenz et al. (2014); Lewin et al. (2011); Lane et al. (2001); Lane & Lubatkin (1998)
	Knowledge acquisition	Absorb external knowledge, ability to recognize, mutual learning between parties	Ojo & Raman (2016); Newey & Verreyne (2011); Lui (2009)
	Knowledge access	Speed of accessing, intensity of effort and motivation to share, seeking external sources of information	Grant & Baden-Fuller (2004); Grant (1996); Ambulkar et al. (2016)
Individual-group level	Assimilation	Absorption, understanding, formalization, routinization, coordination capacity, personal turn over, number of research communities, management support	Saenz et al. (2014); Newey & Verreyne (2011); Lewin et al. (2011); Lane et al. (2001); Lane & Lubatkin (1998)
Group-organizational level	Transformative	Internalization, conversion, recodification, challenging established practices, adaptability, combination, additions, removals, frameworks, Adoption, acceptance	Lewin et al. (2011); Newey & Verreyne (2011); Ke et al. (2009); Hallen et al. (1991)
Organizational level	Exploitation	Apply, use, implementation, mobilization of resources, core competencies, achievement of organizational goals	Saenz et al. (2014); Newey & Verreyne (2011); Lewin et al. (2011); Lane et al. (2001); Lane & Lubatkin (1998)

Relative absorptive capacity theory explains the importance of the characteristics of supply chain partners in improving capabilities of supply chain learning (Lane & Lubatkin, 1998). Empirical research has identified the antecedents required at the individual, group and organizational levels for relative absorptive capacities to occur (Lane et al., 2001). It was found that similarity of partner's basic knowledge or prior knowledge of the supply chain partners, trust, social and human aspects are positively related to recognition of value and knowledge acquisition capacities of the supply chain partners (Lane, Salk, & Lyles, 2001; Lyles & Salk, 1996; Lane & Lubatkin, 1998). Trust between the dyadic supply chain partners facilitates mutual recognition and acquisition of new knowledge (Lane et al., 2001). Trust is important in developing mutual credibility and reliability (Kwon & Suh, 2005). Supply chain partners are better able to absorb new knowledge from each other in the case where both partners are familiar with the new knowledge (Lane et al., 2001). In contrast, some researchers found that recognition of the value of new external information and knowledge acquisition is not related to the similar knowledge bases of the supply chain partners (Nagati & Rebolledo, 2012; Sense & Clements, 2006). Furthermore, trust was found to be not related to the acquisition of new knowledge (Lane et al., 2001).

Researchers have highlighted that lower management formalization, research centralization, compensation practices, research communities, learning structures and processes were positively related to the assimilation and transformation capacities of supply chain partners (Lane & Lubatkin, 1998; Lane et al., 2001). Lane et al. (2001) further argue that familiarization with knowledge leads to a reduction in the need for the learning structures and processes. It was found that for knowledge processing systems, specialized systems had a non-significant impact on assimilation and transformation capacities (Lane et al., 2001; Lyles & Salk, 1996). In contrast, management support from a foreign parent was not found to support assimilation capacity (Lane et al., 2001). Incompatibility of the findings, from using the same sample after a three -year gap, indicates the impact of changes

in relationships. Thus, supply chain learning is dynamic, and changes over time (Inkpen & Crossan, 1995; Pfeffer & Salancik, 1978).

The dominant logic of the supply chain partners, their strategy and their training competence were all found to be positively related to the exploitation capacities of the supply chain partners (Lane & Lubatkin, 1998; Lane et al., 2001). Anomalies regarding the antecedents of relative absorptive capacities require researchers to focus on studying how individuals interact within the antecedents and the context of supply chain learning (Nagati & Rebolledo, 2012; Sun & Childerhouse, 2009; Sense & Clements, 2006).

As mentioned above, the relative absorptive capacity concept can be used to explain how dyadic supply chain partners achieve relational rents (Lane & Lubatkin, 1998). While relative absorptive capacity offers good insights into the factors that enhance supply chain learning, the behavioral element is largely ignored in the literature (Lewin et al., 2011). Relative absorptive capacity is considered to be a dynamic capability (Dyer & Singh, 1998), hence it is critical to understand which routines and processes associated with supply chain learning improve absorptive capacities between dyadic supply chain actors (Easterby-Smith & Prieto, 2008; Pentland & Feldman, 2005; Borgatti & Cross, 2003; Dyer & Singh, 1998). The next section provides a theoretical base to discuss the processes that underlie relative absorptive capacity.

### **2.3.8 Organizational learning theory**

The micro-perspective of learning focuses on individuals and their surrounding relationships in an organization (Shipton & Defillippi, 2011). The supply chain is a human-centric phenomenon (Myers, Griffith, Daugherty, & Lusch, 2004). Humans within the context of a supply chain learn and enrich the supply chain relationship through joint learning (Lambrechts et al., 2012; Jones & Macpherson, 2006; Senge, 2006; Borgatti & Cross, 2003; Inkpen & Crossan, 1995; Simon, 1991). Knight (2002) argues that, in a dyadic supply chain context, learning occurs at the individual-, group- and organizational-level. Hence, this study assumes that supply

chain learning happens between people and their interactions with systems and processes.

There are several dominant theories of organizational learning, which is defined by several authors as a continuous, cyclical process that reflects changes in cognition and behavior of individuals at different levels through acquisition, assimilation, transformation and adoption of knowledge stocks (Bontis, Crossan, & Hulland, 2002; Crossan & Berdrow, 2003; Crossan et al., 1999; Huber, 1991; Argyris, 1976).

Most of the organizational learning theories focus on the cognitive psychological perspective, without considering the socio-psychological perspective. A review of prior literature indicates that most of the research, focusing on cognitive change through information processing, are considered to be learning (Lee, Rittiner, & Szulanski, 2015; Huber, 1991). Huber (1991) identified a learning process as being comprised of knowledge acquisition, information distribution, information interpretation, and organizational memory. Huber (1991, p.90) defined knowledge acquisition as the process by which knowledge is obtained by an organization; information distribution as “the process by which information from different sources is shared and thereby leads to new information or understanding” (Huber, 1991, p. 90); and information interpretation as “the process by which distributed information is given one or more commonly understood interpretations” (Huber, 1991, p. 90).

Organizational memory is the means by which knowledge is stored for future use (Huber, 1991). Simon (1991) states that all learning happens in human heads; an organization can only learn via the learning of all its members and by ingesting new members. He further identifies the social components of individual learning in organizational learning and the importance of people's interactions in creating and implementing organizational learning (Simon, 1991).

Senge (1990, 2006) recognizes five disciplines of organizational learning that enrich the context of learning: personal mastery, mental models, team learning, shared thinking, and systems thinking. Personal mastery refers to individual proficiency; mental models refer to images that influence how an individual

understands the world; team learning refers to team work that re-frames individual mental models; shared thinking refers to building a shared vision of the future by teams; and systems thinking refers to how change can affect the whole system (Senge, 1990, 2006).

Crossan et al. (1999) developed a “4-I framework” which includes units of learning, contexts of learning, and content of learning. This recognizes intuition, interpretation, integration and institutionalization as social-psychological processes of organizational learning (Crossan et al., 1999). Intuiting refers to the recognition of patterns, while interpretation refers to explaining insights, ideas to oneself, or others (Crossan et al., 1999, p. 525). Further, integration is the process of developing shared understanding, and institutionalization is identified as a process of ensuring routinized activities occur (Crossan et al., 1999, p. 525). Using the organization as the unit of analysis, the authors state that learning processes include cognitive and behavioral changes in a strategic renewal context (Crossan et al., 1999). Other researchers have applied the organizational learning principles of Huber (1991), Simon (1991) and Senge (1990, 2006) in organizational and supply chain contexts (Tam & Gray, 2016; Jones & Macpherson, 2006). In addition, Argote and Miron-Speckter (2011) articulate organizational learning processes as creating, retaining and transferring knowledge and these sub-processes are related with each other.

Neither the Huber (1991) and Senge (1990, 2006) models address the transfer of learning between the individual, group and organizational levels nor do they address all of the dimensions of organizational learning (Crossan et al., 1995). Although Simon (1991) identifies the dominant role of individuals and their interactions in organizational learning, he does not provide an integrative framework of organizational learning because the levels of learning and transfer of learning are not included (Di Milia & Birdi, 2010; Crossan et al., 1995; Easterby-Smith, Crossan, & Nicolini, 2000). Because the Crossan et al. (1999) 4-I framework integrates all of the dimensions of organizational learning, it offers a more comprehensive model of organizational learning by including feedforward and

feedback learning processes. This research uses the Crossan et al. (1999) 4-I framework within the supply chain context.

Early studies mostly focus on one level of learning at a time so that, due to their complexity, the interactions of learning units are ignored (Boateng, 2011). It is often argued that the most suitable approach for identifying the interactions of the various units is through a qualitative case study. The context of learning is referred to as a learning supply chain (Gibson, Kerr, & Fisher, 2016; Peterson, 2002). However, the impact of supply chain characteristics on supply chain learning has received little attention in the literature. Mostly researchers focus on a few selected characteristics of the supply chain and their impact on learning (Razaei-Zadeh & Darwish, 2016). Also, because the vast majority of the organizational learning literature focuses on information processing as the basic point of learning (Huber, 1991), this ignores the critical role of humans within supply chain learning (Debrulle, Maes, & Sels, 2014).

Prior researchers emphasize the need for understanding the relationship between dynamic capability and organizational learning by exploring socio-technological dynamics, to enhance a greater understanding of organizational learning construct (Argote, 2011). Although the majority of extant literature focuses on the cognitive psychological perspective of supply chain learning, the socio-psychological perspective of supply chain learning has been neglected by the supply chain learning community. The next section distinguishes organizational learning and dyadic supply chain learning.

#### **2.4 Terminology of organizational learning and interorganizational learning**

Organizational learning refers to learning that occurs within the boundaries of the individual organization (Theodorakopoulos, Ram, Shah, & Boyal, 2005). In contrast, inter-organizational learning refers to learning that occurs beyond the boundaries of individual organizations (Theodorakopoulos et al., 2005). Review of literature indicates that inter-organizational learning construct has been addressed using a variety of terms, including inter-partner learning (Dussauge, Garrette, &



Mitchell, 2002), alliance learning (Inkpen & Tsang, 2007), inter-organizational learning (Knoppen et al., 2010), relational learning (Selnes & Sallis, 2003), supply chain learning (Gong, Jia, Brown, & Koh, 2018) and network learning (Phelps, Heidl, & Wadhwa, 2012). These constructs possess overlapping aspects; however, this research focuses on the supply chain learning construct, i.e., learning that occurs between two supply chain partners. In terms of the learner and learning context, dyadic supply chain learning can be considered as a subset of inter-organizational learning. Supply chains involve more specific joint learning activities to create joint products and services. Nonetheless, inter-organizational learning activities can be specific or general (e.g., Government knowledge sharing session on the country's tax system).

Review of the literature indicates that existing supply chain learning definitions mostly focus on four aspects – i.e., a link to another construct such as innovation, processes, consequence, relational properties. Most of these studies focus on macro-level aspects and uses the positivist paradigm in theory building. Firstly, Flint et al. (2008) argue that multiple supply chain partners developing, sharing, and interactions relate to supply chain issues, product problems, and innovation. Secondly, Bessant et al. (2003) identify supply chain learning as behavioral learning in an inter-organizational context that consists of three phases, namely set up, operating, and sustaining phase. Thirdly, as a consequence, for example, Silverstre (2015) identifies supply chain learning to create joint technological, business, innovations that enhance sustainable performance. Fourthly, relationship learning as a joint activity in which the two parties strive to create more value together, focusing on relation-specific behaviors (Selnes & Sallis, 2003). Above mentioned research literature focuses mostly on "why" supply chains enter into joint learning relationships and "what" constitutes supply chain learning; i.e., the focus is confined to the formation of supply chain learning. Nonetheless, the present thesis argues that ensuring ongoing supply chain learning activities needs much attention than forming them.

Further, organizational learning and supply chain learning is not isomorphic across levels (Knight, 2002). Organizational learning is a descriptive process begins with

the individual and feed forwards to the organizational level (Crossan et al., 1999). The fundamental theories of individual learning, group learning, organizational learning, supply chain learning, and network learning are different (Knight, 2002). For instance, experiential learning theory explains individual learning, and cognitive learning theory explains organizational learning (Cohen & Levinthal, 1990).

The present study argues that lower levels of learning theories advance higher levels of learning. For instance, individual learning theories advance organizational learning theory as organizations consist of groups of individuals. However, with the evolution of time, a distinction between individual learning and organizational learning emerges (Kim, 1993). Similarly, with the evolution of time, a distinction between organizational learning and supply chain learning emerge.

This thesis argues that the above quantitative findings offer only limited exploration of micro-level learning behaviors that influence complex ongoing supply chain context. Thus, the present study aims at extending the understandings of socio-psychological processes of supply chain learning to address this gap. Therefore, aligning with the original contribution of this thesis, supply chain learning is defined as a continuous and cyclical interaction among socio-psychological learning processes and dynamic learning capabilities; a reflection of the changes in cognition and behavior of supply chain actors at different levels, enhanced by behavioral enabling characteristics.

Therefore, the next section focuses on developing an argument for supply chain elements as a critical aspect of developing the social-psychological processes of supply chain learning.

## **2.5 Supply chain learning elements: A social-psychological perspective**

Although the literature recognizes the capability and processes of supply chain learning (Minbaeva, Pedersen, Bjorkman, Fey, & Park, 2014; Lambrechts et al., 2012; Dutta, 2012), there is a limited focus as to “how” to ensure the ongoing supply chain learning activities. Hence, the following sections address this deficiency.

Extant literature argues difficulties encountered in putting supply chain learning into practice, is a consequence of lack of focus and understanding of the human and behavioral components (Sweeney, 2013, p. 73), while human and behavioral components consists of social-psychological aspects (Schorsch et al., 2017). Therefore, this study explores the socio-psychological dynamics of learning capability in the supply chain context, which remains a critical gap in the literature.

### **2.5.1 Review of social-psychological dynamics of learning capability**

The relative absorptive capacity concept has been developed in a setting where one partner acquires the knowledge of another partner (Pittz & Intindola, 2015). Researchers have extended knowledge acquisition capability to knowledge access, and knowledge accessing theory of strategic alliances has created a distinction between knowledge acquisition and knowledge access (Grant & Baden-Fuller, 2004). Further, the literature assumes that the goal of supply learning is to acquire knowledge; consequently, the outcome may be the competition for learning, which destabilizes the relationship and supply chain partner becoming a competitor in the future (Grant & Baden-Fuller, 2004). Similarly, Hamel (1991) has identified learning the intents of a supply chain partner, such as collaborative versus competitive or internalization of partner skills versus mere knowledge access, and argues that the learning intention decides the stability and longevity of supply chain learning.

This thesis argues that the strategic long-term supply chain relationships should have the intention to access the new information of the other supply chain partners, and should integrate new knowledge to joint-learning activities. Then, it ensures that specific supply chain partners are accessing and co-creating new knowledge, while also maintaining specialties within the organizations. In addition, this thesis argues that supply chain partners should focus on continuous value creation activities, which enhance long term supply chain relationships. Similarly, this study argues that today's dynamic business environment requires not only accessing of knowledge but the creation of future value.

Fast changing technology cycles and complex supply chain environments require quick responses to customer needs (Christopher & Ryals, 2014; Lambrechts et al., 2012; Ayers, 2001). Thus, the early literature identifies the value of focusing on customer value creation when responding to changes in an effective manner (Christopher & Ryals, 2014). Supply chain learning capability based on creation of future value plays a critical role in the present business context (Lambrechts et al., 2012). This study argues the importance of joint value-creation-based-learning-capability to manage today's supply chain complexities. In addition, the role of supply chain employees has dramatically changed due to a new focus on learning (Kiessling, Harvey, & Akdeniz, 2014). In short, this study proposes that it is important to consider certain key characteristics of supply chain learning and so it proposes corresponding learning capabilities that fulfill the key characteristics. Further, this study explores the social-psychological dynamics of learning capability in a supply-chain context, which is a critical gap in the literature.

As mentioned above, in general, the literature shows that the firm's absorptive capacity involves learning from any outside parties, while the concept of relative absorptive capacity argues for learning from a specific supply chain partner (Cohen & Levinthal, 1990; Lane & Lubatkin, 1998). The practice-based approach to absorptive capacity argues that meaning is contextualized, situated and focused on developing identity (Omidvar, 2013). As such, the literature emphasizes the importance of the context of the supply chain (Opengart, 2015). Further, the socio-psychological dynamics of learning capability at supply chain context will address the key characteristics of supply chain learning (as indicated in the next few sections) in today's business context, which is found to be a critical gap in the existing literature.

The key characteristics of supply chain learning and the corresponding learning capabilities are spread across multi-levels, as indicated in Table 2.4. Previous studies mostly focus on the explicit part of the individual level of learning, in terms of recognition of value and valuing new external information (Opengart, 2015). In contrast, today's dynamic supply chain context requires deliberate pattern identification to create new value to customers (Lambrechts et al., 2012; Preiss &

Murray, 2005). In addition, dynamic supply chains require decision making at the individual level, where the literature indicates that all supply chain actors need to be flexible in responding to change (Feng, Zhang, Feng, & Cui, 2013). Thus, real value growth comes from tacit and situated new ideas of individuals (Kiessling et al., 2014; Feng et al., 2013; Preiss & Murray, 2005).

This study stresses the importance of lifelong learning of the supply chain actors that facilitate synthesis (Opengart, 2015; Feng et al., 2013; Autry, Skinner, & Lamb, 2008; Preiss & Murray, 2005; Novicevic, Buckley, & Harvey, 2000). Early researchers identify formal learning, non-formal learning and informal learning as components of life-long learning (Hyde & Phillipson, 2015). Life-long learning takes place in anything from everyday activities (Hyde & Phillipson, 2015) and leads to life satisfaction and self-efficacy (Hyde & Phillipson, 2015). Life satisfaction and self-efficacy lead to creativity (Hyde & Phillipson, 2015). From an individual-group level perspective, supply chain actors are necessarily diverse in their thinking (Frankel, Mollenkopf, Russo, Coleman, & Dapiran, 2016; Lambrechts et al., 2012). Non-availability of a framework to help manage the diversity at the boundary level is an aspect of dynamic supply chains (Lambrechts et al., 2012). In such a context, this study argues the importance of proper understanding and analytical methods that consider the diversity of supply chain actors. From a group-organizational level viewpoint, the supply chains face a complex conversion process (Opengart, 2015); hence this study suggests a focus on a proper reframing of the change process. In a similar way, the dyadic partners focus on long term core competency building through successful new implementations to the market, in order to meet the dynamic environmental changes (Frankel et al., 2016; Opengart, 2015; Lambrechts et al., 2012; DeWitt, Giunipero, & Melton, 2006). Thus, this study also argues the need to focus on improvements at the organizational level.

Table 2.4:Key insights of supply chain learning and suggested learning capabilities

Levels of learning	Key features of supply chain learning	Defining characteristics of key features	Proposed learning capabilities
Individual	Life-long learning, individual learning Opengart (2015); Lambrechts et al. (2012); Bootz (2010); Autry, Skinner, & Lamb (2008); Taylor (2008); Preiss & Murray (2005); Novicevic et al. (2000)	Innovations Opengart (2015); Preiss & Murray (2005); Bessant, Caffyn & Gallagher (2001), creativity Christopher & Ryals (2014), empowerment Lambrechts et al. (2012), value generation Lambrechts et al. (2012); Preiss & Murray (2005)	Value creation, knowledge access (Focused on future value creation)
Individual-group	Diverse supply chain actors Lambrechts et al. (2012),  Diverse scenarios Frankel et al. (2016); Opengart (2015); Petersen & Autry (2014),  Less defined language Lambrechts et al. (2012)	Understanding and analyzing Lambrechts et al. (2012)	Assimilation (Focused on proper understanding and analyzing)
Group-organizational	Complex conversions (Opengart, 2015; Lambrechts et al., 2012),  High interdependency Lambrechts et al. (2012)	Challenging status quo, reframing Opengart (2015); Lambrechts et al. (2012)	Transformative (Focused on reframing and interdependencies)
Organizational	Long term focus Frankel et al. (2016); Lambrechts et al. (2012); Salam (2011); Preiss & Murray (2005)	Improvements Lambrechts et al. (2012)	Exploitation (Focused on improvements)

It is in a dyadic level concept that it is proposed that absorptive capacities at dyadic supply chain context result from the underlying processes of supply chain learning.

### **2.5.2 Review of social-psychological processes of supply chain learning**

This study examines how learning at the dyad flows forwards and institutionalizes. Dyadic supply chain learning has unique dynamics not seen in an organization (Gong et al., 2018; Tam & Gray, 2016). This study examines the social-psychological processes of supply chain learning to explore these dynamics. Therefore, this study extends organizational learning theory to identify behavioral aspects of supply chain learning.

To date, few studies focus on the processes of supply chain learning and there is a need to develop an integrative framework of behavioral aspects of dyadic supply chain learning (Gong, Jia, Brown, & Koh, 2018; Tam & Gray, 2016; Silvestre, 2015; Lambrechts, Taillieu, Grieten & Poisquet, 2012; Thakkar, Kanda & Deshmukh, 2011; Jones & MacPherson, 2006; Bessant et al., 2003). One exception is the study by Bessant et al. (2003), which developed a three-stage model of supply chain learning leading to innovation. The preliminary 'set up stage' provides focus and shared motivation between supply chain partners and involves recognition of patterns using personal experiences. The 'operation stage' involves agreement on shared goals and targets to be developed for new operating processes and new ways of working, to arrive at a shared understanding (Bessant et al., 2003). The 'sustaining stage' deals with management processes that emphasize the need for continuous learning, such as measurements and benchmarking that are necessary when implementing changes in organizational and supply chain levels (Bessant et al., 2003).

However, the literature remains silent on the stages of development of social-psychological processes of supply chain learning at the individual, the group and the organizational level in a supply chain context. One of the few studies that has applied the 4-I framework by Crossan et al. (1999) to supply chain learning is by Jones and Macpherson (2006), which identified the crucial role played by external organizations in helping to institutionalize knowledge within small and medium scale enterprises and the important role of owner managers in accessing external knowledge. Jones and Macpherson (2006) also identified 'intertwining' as the process of 'inter-organizational learning' and 'customer requirements, supplier suggestions, after sales service, regulatory environment and knowledge providers'

as inputs and outcomes of learning at the intertwining level. The study identified that critical incidents lead to new knowledge acquisition, owner/manager recognition of the need to access new external knowledge, and decisions to create internal systems and structures that institutionalize new knowledge (Jones & Macpherson, 2006). Conversely, the 4-I model did not address the context of supply chain learning that facilitates or hinders the transfer of learning from one level to another, or how it links to learning capability development (Crossan et al., 2011). By extending Crossan's 4-I model into the small- and medium-sized enterprises context, Tam and Gray (2016) found dominant learning levels at each stage of the life cycle. Hence, the individual level of learning was found to be more important at the inception stage; the group level of learning more important at the high growth stage; and, the organizational level of learning more important at both the high growth and maturity stages. The inter-organizational level is favored in all life-cycle stages due to the benefits it can bring (Tam & Gray, 2016). Manuj et al. (2014) defined 'fostering', 'deploying' and 'adjusting' as inter-organizational learning processes. Here, fostering consists of variations in learning behavior across firms, whereas deploying and adjusting involves the processes of changing inter-organizational systems (Manuj et al., 2014). Knight and Pye (2005) defined 'developing meaning', 'developing commitment' and 'developing method' as network learning processes. Developing commitment and developing method represents processes which occur within the respective organizations (Knight & Pye, 2005).

The early literature focuses on macro-level processes of supply chain learning. Mostly, one context level or a single aspect is discussed and multi-level interactions are not considered (Yang et al., 2019). Moreover, as most of these studies are empirical, it is evident that different researchers use "a learning process in one level" under different levels as is reflected in Table 2.5. For instance, early researchers classify the experimenting process under intuition, interpretation and institutionalization. As a consequence, there is no consensus on the elements of supply chain learning processes. In consideration of these anomalies, this study extends organizational learning theory to the supply chain context to address the processes of supply chain learning.



Table 2.5: Analysis of elements of processes of learning

Level of context	Elements	Defining characteristics and authors
Individual level	Intuition	Intuition - Mazutis & Slawinski (2008); Vera & Crossan (2004), intuition and interpretation - Tam & Gray (2016), intuiting and attending - Jones & Macpherson (2006), Experience - Booth & Beeby (2000), experimenting – Holmqvist (2004), fostering - Manuj et al. (2014), developing meaning - Knight & Pye (2005), creativity – Gardner (2011), expert pattern recognition, matching; mental simulation, spreading activation, incubation, insight, empathic perception, judgment - Gore & Sadler-Smith, (2011), exploration – Holmqvist (2003), managerial cognition - Manral (2011)
Individual-group level	Interpretation	Interpretation - Tam & Gray (2016); Mazutis & Slawinski (2008); Vera & Crossan (2004), interpreting and experimenting - Jones & Macpherson (2006), reflection - Booth & Beeby (2000), processing, joint experimenting - Holmqvist (2003), deploying - Manuj et al. (2014), developing commitment - Knight & Pye (2005)
Group-organizational level	Integration	Integration - Tam & Gray (2016); Mazutis & Slawinski (2008); Jones & Macpherson (2006); Vera & Crossan (2004), concept - Booth & Beeby (2000), interpreting, joint acting - Holmqvist (2003), deploying - Manuj et al. (2014), developing commitment Knight & Pye (2005)
Organizational level	Institutionalization	Institutionalization - Mazutis & Slawinski (2008); Vera & Crossan (2004), institutionalization and intertwining - Tam & Gray (2016); Jones & Macpherson (2006), experiment - Booth & Beeby (2000), taking action, acting - Holmqvist (2003), adjusting - Manuj et al. (2014), developing method -Knight & Pye (2005)

## **2.6 Linking multi-level processes of supply chain learning**

The relationship between learning capability and learning processes is not made clear in the literature (Brusset, 2016; Song, 2015; Sun & Anderson, 2010), although prior research identifies the possibility of integrating organizational learning and absorptive capacity constructs at an organizational level (Sun & Anderson, 2010; Lane et al., 2006). Lane et al. (2006) articulate a theoretical model indicating that the learning processes of a firm underlie its absorptive capacities. Their model recognizes that exploratory learning processes underlie recognition and understanding of new external knowledge capabilities; transformational learning processes underlie the assimilation of external knowledge capability; and exploitative learning processes underlie the application of external knowledge. Another theoretical model created by Sun and Anderson (2010) identifies that the recognition of value and acquisition capacity is related to the socio-psychological processes of intuition that operate at the individual level. The assimilation capacity is related to the socio-psychological processes of interpretation that operates at the individual-group level (Sun & Anderson, 2010). Transformative capacity is related to the socio-psychological processes of integration that operate at the group-organizational levels and exploitation capacity is related to the social-psychological processes of institutionalization that operate at the organizational level (Sun & Anderson, 2010). Sun and Anderson (2010) suggest that the dimensions of absorptive capacity are generated by specific social-psychological learning processes in the organizational context. Nonetheless, the relationship between learning capabilities and the learning processes is absent in supply chain literature.

From a dynamic capability perspective, supply chain learning capability should be able to adapt to changes in the supply chain environment. Hence, this thesis argues that neither the knowledge acquisition concept nor the recognition of value of new

information concept adequately address the ability to adapt to the changes in the supply chain environment; in particular, because the ability to adapt to environmental change requires new value creation which suggests the creation of new value as learning capability at the individual (learning) level. Hence, the present study extends the argument that intuition leads to the acquisition of knowledge, knowledge access while proposing the creation of value using acquired and accessed knowledge. Thereby, the model of the present study extends Sun and Anderson (2010) theory into supply chain context, by proposing value creation as a learning capability at the individual level in supply chain learning.

In this thesis, the development of linkages among the absorptive capacities in supply chain context and socio-psychological processes of supply chain learning bridges the current gaps existing in the micro-macro divide in the supply chain learning literature. The thesis attempts to apply organizational learning theory at the dyadic supply chain level and to contribute to possibilities of linking social-psychological processes of supply chain learning and absorptive capacities in the supply chain context. Furthermore, this thesis uses the concept of dynamic capabilities underlying the learning processes as the basis of integrating the capabilities and processes. Organizational learning is considered as being a source of dynamic capability (Whitaker, Mithas, & Krishnan, 2010; Zollo & Winter, 2002) and dynamic capabilities comprise patterned organizational behavior rather than idiosyncratic behaviors (Helfat et al., 2007). Aligning with the early literature, this study argues that multiple levels of supply chain learning occur at the individual, group, and organizational levels. In addition, that absorptive capacities have separate and complementary roles, which implicitly indicate the multilevel existence of the absorptive capacities (Noblet et al., 2011; Zahra & George, 2002). Hence, supply chain learning is a phenomenon essentially operating at multiple levels so that there is a need to focus on a multilevel perspective in order to develop a theory with more relevance (Foss & Nielsen, 2012; Inkpen & Crossan, 1995).

From this synthesis of the literature, this thesis argues that the intuition process at the boundary spanning level operates at the individual level; it underlies knowledge access capabilities at the dyadic supply chain level. In addition, the interpretation process operates at the individual and group levels, underlying assimilation capabilities at the dyadic supply chain level. The integration process operates at the group and organizational levels, underlying transformative capabilities at the dyadic supply chain level. The institutionalization process operates at the organizational level, underlying exploitation capabilities at the dyadic supply chain level.

Therefore, the model derived from the literature develops linkages between supply chain learning capabilities and processes as indicated in Figure 2.1 (p. 70).

### **2.6.1 Social-psychological theory of supply chain learning elements: A multi-level perspective**

As organizations are multi-level systems of relationships (Feldman, Pentland, D'Adderio, & Lazaric, 2016; Hitt, Beamish, Jackson, & Mathieu, 2007), the multi-level perspective is potentially rich in theoretical and practical contributions (Foss & Nielsen, 2012). Isomorphism is the degree to which the constituent components of a phenomenon and the relationships among the components are similar across levels of analysis (House, Rousseau, & Thomas-Hunt, 1995, p. 87). Organizations do tend to be isomorphic across levels of analysis so that constructs mean the same thing across the different levels (Rousseau, 1985). The next sections articulate the multi-levels of supply chain learning from the insights in the literature. The sections review the absorptive capacity capability at each level (e.g., knowledge access at the individual level) and the associated social-psychological process (e.g., intuition at the individual level).

### **2.6.1.1 Individual level of supply chain learning**

The proposed model of this study identifies that the individual level of supply chain learning comprises the knowledge access and intuition process.

From a psychological perspective, an individual's learning is given priority, and there are several dominant theories based and focusing on individual learning (Rezaei-Zadeh & Darwish, 2016; Cohen & Levinthal 1990). Much later, researchers have incorporated principles of individual learning to develop theories into organizational and supply chain learning (Tam & Gray, 2016; Knight, 2002). Similarly, the present study argues that the individual level of learning concentrates more on cognitive aspects, proposing the need to explore it from a behavioral perspective.

**Knowledge access.** From an absorptive capacity perspective, the early literature argues that the individual level of supply chain learning is mostly focused on knowledge acquisition (Rezaei-Zadeh & Darwish, 2016). The relationship between knowledge acquiring supply chain partners is limited to acquiring new knowledge and being a competitor in the future; it is mostly within existing knowledge bases (Song, 2015). In addition, knowledge acquiring supply chain relationships are of short duration; therefore, those relationships are transaction oriented. It was found that knowledge acquisition leads to increase in efficiency (Grant, 1996). However, it is not focused on effectiveness in terms of continuous value creation that substantially enhances the existing knowledge bases. Long term supply chain relationships mostly focus on sustainable relationships that engage in continuous value creation; therefore, those relationships are strategic and relationship oriented in nature. Recently, researchers have identified that recognition of (knowledge) value is also a capability at the individual learning level (Omidvar, 2013). Nonaka (1994) argues that organizations which operate in dynamic business environments

must create knowledge, in addition to processing it. Thereafter, the researchers have identified that knowledge access as a capability at the individual learning level (Grant & Barden-Fuller, 2004).

The knowledge access concept comprises aspects of learning, and supplier learning and development (Grant & Barden-Fuller, 2004). Knowledge access is defined as accessing a partner's stock of knowledge to exploit complementarities, but with the attendant intention to maintain specialized knowledge (Grant & Baden-Fuller, 2004). Uncertainty about the future substantially increases the value of knowledge access alliances (Grant & Baden-Fuller, 2004) and creates a context for continuous new value creation. The manager who has the ability to seek external sources of information is prepared to manage disruptions in the supply chain (Ambulkar et al., 2016). Knowledge accessing supply chain relationships are predicted as being long term ones (Grant & Baden-Fuller, 2004). In contrast to the knowledge access concept, the protective capacity of a firm is the ability to protect its vital information (Andersen, 2015). However, in today's dynamic supply chain context, knowledge is continuously changing so that protection of knowledge adds less value to an industry, rather sharing of knowledge plays a critical role.

In the early literature, some researchers argued that knowledge access is the combining of knowledge resources from supply chain partners to develop new products (Buckley & Carter, 2004). This literature is mostly silent on the subject of sharing new innovations with other supply chain actors (Hansen & Rasmussen, 2013). Nowadays, few researchers would argue that knowledge access involves complementary and supplementary knowledge access (Buckley, Glaister, Klijn, & Tan, 2009). Complementary access refers to access to similar specialized knowledge of both parties concerning the same product (Buckley et al., 2009), whereas supplementary access includes different specialized knowledge between supply chain partners (Buckley et al., 2009). However, the literature remains silent

on the need for knowledge access and speed of response, which are both critical for success in today's dynamic supply chain contexts.

**Intuition.** Intuition refers to the subconscious recognition of patterns (Crossan & Berdrow, 2003). Whilst difficult to articulate (Harteis & Billett, 2013), it involves psychological learning processes (Manral, 2011; Crossan et al., 1999). Intuition is a specific feature of expertise and is a result of processing of the mind (Sinclair, 2010; Gobet & Chassy, 2009) and is also referred to as a 'gut feeling' or a 'hunch' (Hensman & Sadler-Smith, 2011). Early research argues that intuition occurs within individuals depending on personal experiences, images and metaphors (Crossan et al., 1999). Some researchers consider that intuition consists of expert intuition, pattern recognition from past learning, and entrepreneurial intuition, making novel connections (Berends & Lammers, 2010). Others have identified intuition as also being a rapid response to developing situations, making it difficult to give reasoned justification for intuitive decisions (Eraut, 2007). Some researchers argue that intuition leads to creativity and that experts have better mastery in terms of pattern recognition, similarity recognition, common-sense understanding and skilled know-how (Gallate & Keen, 2011). In the supply chain context, pattern recognition is performed by boundary spanning individuals (Agnihotri, Rapp, & Gabler, 2014). The interfaces of the dyad are said to be exploratory (Stader, Rajwani, & Kavaba, 2013). The new patterns identified by boundary spanning individuals would be lost, if not reflected upon by themselves, or transferred to another individual (Agnihotri et al., 2014).

Intuition is said to happen within the human mind, and none of the technological developments to date are able to completely replace the human mind (Gobet, 2017; Sala & Gobet, 2017; Min, 2010; Dreyfus, 1986). Neither logical information systems nor advanced artificial intelligence systems are reliably capable of making

any provision for uncertainty, imprecision and exceptions to rules (Gobet, 2017; Sala & Gobet, 2017; Min, 2010; Dreyfus, 1986). Conventional mathematical models are incapable of reflecting incompleteness, imprecision and unreliability of environments of real world decisions (Gobet, 2017; Sala & Gobet, 2017; Min, 2010; Dreyfus, 1986). Hence, some authors claim that machines will never come close to the human mind that performs cognitive tasks requiring intuition and holistic thinking (Gobet, 2017; Sala & Gobet, 2017; Min, 2010; Dreyfus, 1986). Therefore, human intuition is useful in real world decision making (Gobet, 2017; Sala & Gobet, 2017; Hortovanyi & Ferincz, 2015; Min, 2010; Dreyfus, 1986).

Intuition is considered to be effective human performance at a demanding task, with components related to expertise, which in turn is a function of education and takes a long term perspective (Harteis & Billett, 2013). For example, a five-stage model by Dreyfus (1986) describes the acquisition of human expertise as a progression through the stages of novice, advanced beginner, competent, proficient and expert in his/her journey from a novice to an expert. Psychological theories similarly discuss cognitive aspects of intuition (Harteis & Billett, 2013).

As indicated earlier, the new intuitive ideas identified by individuals would be lost, if not reflected upon by themselves, or transferred to another individual (Agnihotri et al., 2014). Therefore, next section synthesis of individual-group level of supply chain learning.

### **2.6.1.2 Individual-group level of supply chain learning**

The individual-group level of supply chain learning comprises assimilation capability plus an interpretation process.



**Assimilation capability.** Little research effort has been focused on assimilation capability, which may be due to the dynamic nature of the assimilation process. The early literature identified assimilation as the firm's processes that allow it to analyze, process, interpret, and understand the information obtained from external sources (Zahra & George, 2002; Szulanski, 1996). Researchers have identified routinization, coordination capacity, personnel turnover, number of patents pending, number of research and/or practice communities, and management as variables of assimilation capability (Noblet et al., 2011). Interpretation, understanding and formulation are identified as the indicators of assimilation capacity (Noblet et al., 2011).

As mentioned in the above analysis, previous studies on assimilation capability discuss functions of dealing with external information (Zahra & George, 2002). Less attention has been paid into the process of meaning generation, the human interactions of the process, and how it develops over the next stages. Meaning generation is contextual in new knowledge, especially in developing innovations. Hence, further work is required to identify factors that influence assimilation under the above circumstances. The present study proposes the application of socio-psychological aspects of assimilating new knowledge.

**Interpretation.** Interpretation refers to the process of explaining an idea to oneself or to others, using words and/or actions (Crossan et al., 1999). It is the conscious element of individual learning (Crossan & Berdrow, 2003) and may present in terms of cognitive maps, conversations and dialogs (Crossan et al., 1999). New pattern recognition is converted into a cognitive map by self-reflecting or communicating with another supply chain actor. Interpretations are a continuous process and it is difficult to find a boundary (Issacs, 1993). Some researchers argue that interpretation results in the engagement of collective sense-making activities within

groups (Berends & Lammers, 2010). Here, coordination of stakeholders through dialogues is needed to reach a shared decision, which leads to the integration process (Issacs, 1993).

The mode of claiming, showing, and arguing creates an interpretation of the mental maps (Gibson, 2006). Such interpretation happens in a supply chain context through conversations, by adopting its particular language and constructing new cognitive maps (Edwards, Day, Arthur, & Bell, 2006; Lawrence, Mauws, Dyck, & Kleysen, 2005). Interpretation also happens in formal planning meetings and informal organizations, via information sharing forums, board meetings, management meetings and task-force teams (Selnes & Sallis, 2003). In the same way, interpretation occurs in optimal decision making, planning and development discussions, internal benchmarking and best practice sharing (Chen & Wang, 2005). Electronic communications, written documents, weekly and monthly meetings, benchmarking and symbols also provide a forum for interpretation (Dibella, Nevis & Gould, 1996).

According to the above analysis, previous studies on the interpretation process discuss conversations and dialogs. While an individual's perception influences a meaning generation, the interpreting sensors of individuals that give a different meaning compared to objective reality are not clearly delineated in the literature. Thus, the current study aims to extend the understanding of the perception and depth of conversations of supply chain learning.

### **2.6.1.3 Group-organizational level of supply chain learning**

The group-organizational level of supply chain learning comprises transformative capability and an integration process. Most of the new insights have been unable to reach maximum utilization due to the non-availability of proper transformative and

integration mechanisms (Razaei-Zadeh & Darwish, 2016). In this regard, managing diversity, the multiplicity of views, unplanned change, and complex interdependencies of supply chain context related to product and process innovations necessarily require proper transformation and integration to realize supply chain initiations.

**Transformative capability.** The literature on absorptive capacity and relative absorptive capacity discusses the transformation process. Early researchers address conversion capability using constructs of transformative capability as well as transformation capability (Razaei-Zadeh & Darwish, 2016; Garud & Nayya, 1994). Nonetheless, a review of the literature indicates that these two concepts are not mutually exclusive. Transformative capability refers to the re-codification of new knowledge for the existing system (Zahra & George, 2002). Moreover, early researchers argue that a firm's capability to develop and refine routines linking existing knowledge with newly acquired and assimilated knowledge; further transformation can be achieved through adding or deleting knowledge or interpreting the same knowledge in different ways (Zahra & George, 2002). Internalization and conversion are identified as the defining characteristics of transformative capability. Early literature identifies development of new products, diversification, routines for knowledge creation and numbers of new ideas as variables of transformation capability (Noblet et al., 2011). Re-codification, challenging established thinking or practices and adaptability are identified as indicators of the transformation process (Noblet et al., 2011).

As established in the above analysis, the focus of the previous studies on transformative capability has been on conversion as a function. A very little effort and focus have been directed at the challenge of constructing new meaning and making outcome-based changes. Further, as supply chains involve power

imbalances, the present study proposes the importance of understanding mental frames and reframing in the current contexts.

**Integration.** The literature on supply chain structures, supply chain integration, and Crossan's 4-I framework considers the integration process. This process refers to changes in the individual's understanding of actions (Crossan & Berdrow, 2003), which involves developing shared understanding, mutual adjustments and interactive systems (Becker-Ritterspach, 2006; Crossan et al., 1999). Integration is related to coherent and collective actions and it mostly occurs in conversation and shared practices (Lawrence et al., 2005). Some researchers argue that the integration of a new idea into a group is best achieved by the use of force, based on formal authority (Lawrence et al., 2005). A review of the early literature indicates that collective actions involve groups of specific organizational contexts.

As stated in the above analysis, previous studies on the integration process have had their main focus on systems and collective actions. Since supply chain integration involves social interactions, interpersonal adaptation, and struggles towards change, inter-subjective guessing becomes highly important. In this respect, mutual adjustments among supply chain actors play a crucial role.

Further, the present study proposes that supply chain learning involves complex tasks and activities, in which managing interdependencies, sequencing of activities, and accomplishing a collective set of tasks share equal significance.

Therefore, the present study addresses the significant gaps in research on behavioral elements of transformative capability and integration process, which is necessary for successfully commercializing the new innovations in a supply-chain context.

#### **2.6.1.4 Organizational level of supply chain learning**

The organizational level of supply chain learning comprises exploitation capability and an institutionalization process. Supply chain learning can be considered a critical aspect of achieving supernormal profits in today's dynamic business environments (Silverstre, 2015). Nonetheless, most of the new ideas are not commercialized due to the lack of proper implementation mechanisms within supply chain contexts (Schorsch et al., 2017; Sweeney, 2013). In this regard, the existing elements of exploitation capability and institutionalization process are inadequate to address the dynamism of the implementation process.

**Exploitation.** The literature on supply chain implementation, absorptive capacity, relative absorptive capacity, supply chain quality management all discusses exploitation capability (Noblet et al., 2011). Exploitation capability refers to the mobilization of organizational resources to create new systems which improve core competencies of the dyad partner (Zahra & George, 2002) and results in achieving organizational goals. Both use and implementation are identified as the defining characteristics of exploitation, whereas, mobilization of resources and core competencies are identified as indicators of exploitation capability (Noblet et al., 2011). The quantity of filed patents, and of new products and protection systems are identified as the variables of exploitation capability (Noblet et al., 2011). Early researchers argue that people within organizations are more focused on exploitative learning (Stader et al., 2013).

As mentioned in the above analysis, previous studies on exploitation capability focus mostly on the operational aspects of implementation, such as resource allocation. Realizing the complexity of resource allocation among systems requires extending knowledge of supply chain improvements, supply chain contract generation, and the maintenance process.

**Institutionalization.** Institutionalization refers to the process of implementing individual and group learning at the organizational level (Crossan et al., 1999). It comprises the application of new initiatives or implementations of new shared meanings. The knowledge exploitation literature assumes that organizations are a collection of individuals and that learning is institutionalized to the routines, systems, rules and procedures of an organization (Crossan & Berdrow, 2003). Some researchers argue that institutionalized learning is included in physical artifacts, such as documents, rules, procedures and systems of the dyad partners (Selnes & Sallis, 2003). Hence, the cyclical process of supply chain learning is articulated as indicated in Figure 2.1 (p.70).

As mentioned in the above analysis, the main focus of the previous studies on the institutionalization process is rules, regulations, procedures, and physical investments. However, these quantitative findings offer a limited explanation about the role of human capital, information technology, how to minimize revisiting forces and maximizing driving forces, which are crucial in managing today's complex supply chain learning.

Therefore, the present research focuses on the exploitation capability and institutionalization process, addressing the behavioral dynamics of today's supply chain context.

According to the above analysis, a considerable gap in the literature regarding the dynamics of elements of intuition, interpretation, integration, and institutionalization concepts at the dyadic supply chain level is observed. Hence, the present study intends to extend the understanding of the behavioral dynamics of supply chain learning processes.

Early literature indicates that learning capabilities and learning processes are affected by contextual factors of learning (Rezaei-Zadeh & Darwish, 2016; Jansen, Van den Bosch, & Volberda, 2005). Those contextual factors can be identified as facilitators of supply chain learning.

## **2.7 Facilitating factors of supply chain learning**

The early literature mostly focuses on exploring the absorptive capacity concept, with only scant attention paid to the facilitating factors (Rezaei-Zadeh & Darwish, 2016; Jansen, Van den Bosch, & Volberda, 2005). Knowledge transfer between multinational corporations is a complex phenomenon (Song, 2014). Properties of knowledge, knowledge transfer mechanisms and interactions among the mechanisms, properties of business units, the relationships between the units, and the operating context are all identified as determinants of knowledge transfer (Song, 2014; Sillince & Shipton, 2013; Prahalad & Bettis, 1986).

Most often the absolute effects of facilitators are taken into consideration and the relative or comparative effect not studied at length (Andersen, 2015; Sezen, 2008). The factors affecting supply chain learning also lack consistent definition, making it inevitable that researchers frequently arrive at contrasting viewpoints, which can affect the validity of the findings. This creates the need to explore factors from new theoretical perspectives. A model of supply chain learning as derived from the literature is indicated in Figure 2.1 (p.70).

The literature has identified similarities and differences between the supply chain actors that facilitate supply chain learning (Sadovnikova, Pujari, & Mikhailitchenko, 2016; Andersen, 2015; Khachlouf, Quelin, & Soparnot, 2014; Grant, 1988); for example, organizational familiarity with a problem found to facilitate alliance learning (Lane & Lubatkin, 1998). Similarities between dyad

partner compensation practices and organizational structures are positively associated with supply chain learning (Krammer, 2016; Lane & Lubatkin, 1998). Similarities between supply chain partners enhance the repetitiveness not the innovation itself (Marabelli & Newell, 2014). In addition, the review of the literature indicates that experience leads to capabilities and resources (Chang, Chen, & Lin, 2014; Barney, 2001; Barney, 1991). Familiarity and similarity are mostly related to experience and experience provides a route to learning through reflection. Hence, it is important to study the role of experience in the development of aspects of supply chain learning.

Supply chain relationship compatibility is the degree to which two partners share a set of norms or values that constitute an inter-organizational culture, common goals, objectives, business philosophies, and management styles for achieving strategic alignment (Cheung, Myers, & Mentzer, 2010, p. 476; Saenz et al., 2014). Cheung et al. (2010) highlight how the literature offers contradictory evidence regarding the impact of organizational compatibility on supply chain success. However, the review of the literature indicates that supply chain partner differences can enhance supply chain learning (Krammer, 2016; Haunschild & Sullivan, 2002). For example, Lane, Salk, and Lyles (2001) argue that the cultural incompatibility and the diversity of work settings often create innovative ideas and insights, leading to reflection and self-critique, which leads to better choice-making (Flood & Romm, 1996; Ingram & Baum, 1997). The differences enrich synergy and several researchers indicate that individual differences are relatively unimportant when predicting the ability to become an expert in a particular domain (Krammer, 2016; Goodyear, 1997).

The early literature mostly focuses on the cognitive facilitators of supply chain learning (Lane & Lubatkin, 1998). However, ‘learning to learn’ is even more important in today’s dynamic environment than is prior knowledge, which is in line



with earlier research that showed prior knowledge was not detected in breakthrough findings of scientists (Gallate & Keen, 2011). Prior knowledge tends to limit choices (Gallate & Keen, 2011) and in the supply chain context, critical knowledge involves not only technical knowledge but awareness of where useful complementary knowledge resides, inside and outside the organization. In addition, the review of the literature indicates that recognition of the value of knowledge depends on the organization's boundary spanners, who can legitimately hold alternative perspectives rather than utilizing prior knowledge (Omidvar, 2013). Within dynamic supply chain contexts, decisions about complex futures are made, which make prior knowledge less relevant in the intuition process. In contrast, having some relevant basic knowledge and specialization is important because prior related knowledge both increases the speed of learning and affects the quality of communication of new knowledge (Markus, 2001). Moreover, while diversity of knowledge affects innovation (Hotho, 2012), it increases the risk of 'good' ideas being incompatible with prior accumulated knowledge, potentially hindering the organizational progress. An 'inverted-U' relationship was found between the relatedness of knowledge between firms and the usefulness of the resource absorbed (Palich, Cardinal, & Miller, 2000). In other words, the greater the firm's exposure to diverse and complementary external knowledge, the greater will be the opportunity to enhance absorptive capacity (Zahra & George, 2002).

The literature indicates that early studies were conducted in one-way or two-way learning contexts (Lane & Lubatkin, 1998). Studies of dyads also focused on patterns of routine learning rather than on the complex, changing, non-routine activities that characterize supply chain activities, such as how to ensure survival in a dynamic business environment.

Relative absorptive capacity has been studied in technical settings (Yao, Yang, Fisher, Ma, & Fang, 2013). However, most supply chain relationships involve non-

technical settings and relationships, thereby favoring managerial skills over technical skills (Bisogni, 2008) as it can be argued that managerial skills are more related to behavioral aspects, while technical skills are more related with hard/logical aspects. Friedman (2001) argues that studying organizational context and conditions of organizational learning hinders the critical contribution of the individual human being's role. In today's hyper competitive business environment knowledge rapidly becomes obsolete so that high-quality human capital is critical for success (Liebeskind, 1996). All this contributes to the question of whether similarities and differences of dyad partners enhance learning capability in today's supply chain context (Isaksson, Simeth & Seifert, 2016; Krammer, 2016). Behavioral characteristics are fundamental components of supply chain relationships (Pfeffer & Salancik, 1978).

Hence, this study highlights the importance of a behavior-enabling characteristic concept in which supply chain organizations are necessarily different (Pfeffer & Salancik, 1978).

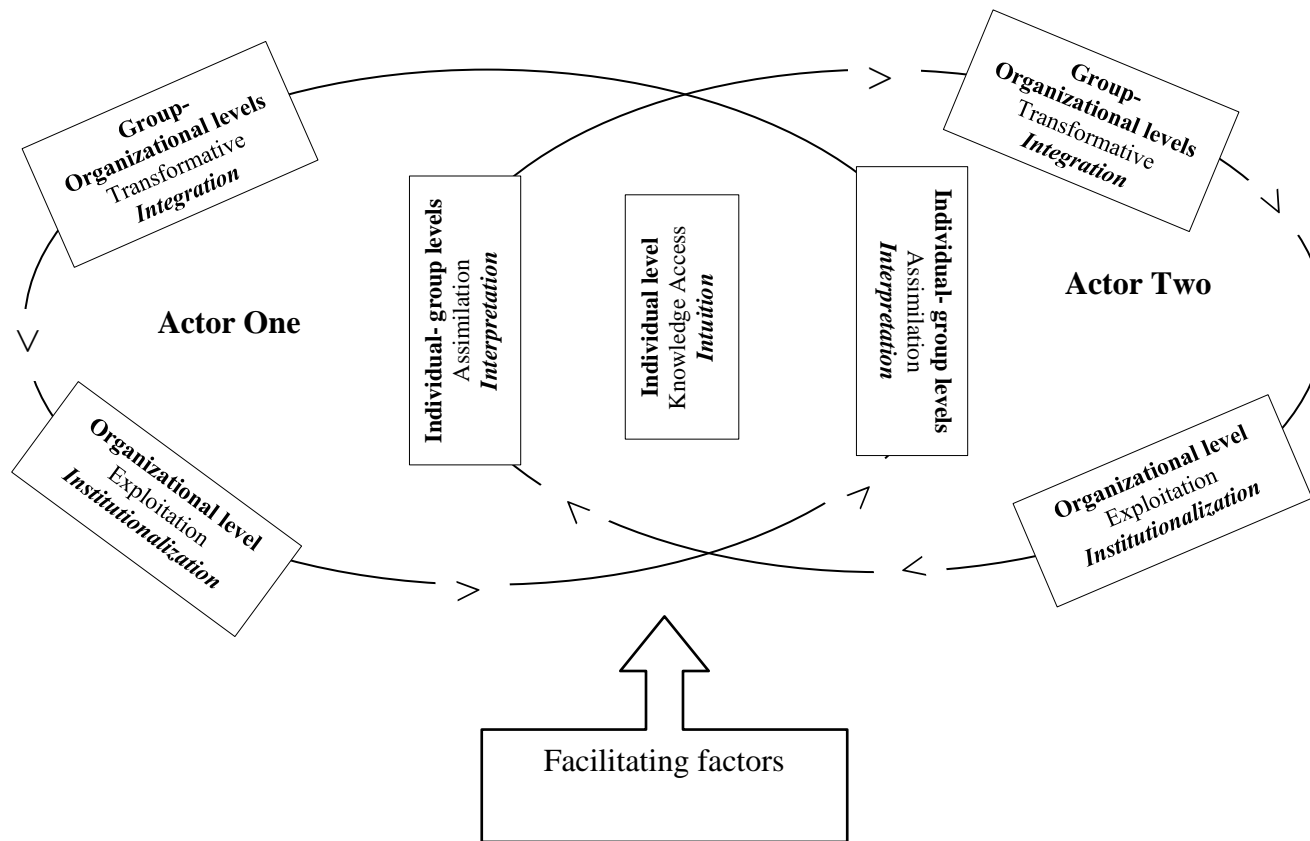


Figure 2.1: A model derived from literature

### **2.7.1 Enabling characteristics of supply chain learning**

The early literature argues that strong interdependence is a catalyst for knowledge sharing (He, Ghobadian, & Gallear, 2013). However, in today's supply chain context, being the largest or strongest in the industry is not as important as being prepared and capable of change (Celo, & Chacar, 2015; Pereira, Christopher, & Silva, 2014; Hearnshaw & Wilson, 2013). Cheung et al. (2010) state that attention needs to be given more to the behavioral issues than to similarities and differences between supply chain partners in the dyad. Thus, for today's dynamic business environment, the present study argues the over-riding importance of enabling characteristics which enrich absorptive capacity at the dyadic supply chain level.

Hyland, Soosay, & Sloan (2003) recognize that implementation and application of certain 'levers' enable or influence human behavior, and these factors have substantial influence on a firm's attitude toward transferring knowledge. Here enablement is more related to capabilities since it implies to make able, give power, means, competence or ability (Faisal, 2010, p. 512). Faisal (2010) further considers an enabler to be a variable that enables (provides ability to) selected aspects of a supply chain. Hence, in this study enable refers to the ability to "make able" supply chain learning.

Synthesis of the literature indicates that there are some dominant behavioral aspects that impact supply chain learning capabilities and processes (Ke, Liu, Wei, Gu, & Chen, 2009; Mackintosh, 1975). This thesis proposes those factors to be intrinsic motivation, knowledge-power, interpersonal interactions, and prior experiences, as shown in the next few paragraphs.

A few researchers have identified motivation, transparency and receptivity as being main impacting factors of supply chain learning (Larsson et al., 1998; Hamel, 1991). The literature review indicates that in a dyadic supply chain learning context the transparency dimension relates to behavior and the receptivity dimension relates to capability (Larsson et al., 1998; Hamel, 1991). The motivation of partners is considered to be one major determinant of supply chain learning (Hamel, 1991). Research based on a positivistic approach has identified that motivation leads to transparency and receptivity (Chen, Hung, & Tseng, 2010), thereby emphasizing the critical role played by motivation in supply chain learning.

From the absorptive capacity perspective, motivation is mostly studied in strategic alliances (Hamel, 1991), and is referred to as intent in a supply chain study context. Partner intent is considered to be one aspect of anxiety over asymmetric inter-organizational learning (Hamel, 1991). Nonaka (1994) identifies intent as the first enabling condition of knowledge creation. However, the literature is silent on the specific aspects of motivation which affect supply chain learning and how they affect learning at multiple levels.

Prior researchers define motivation as thinking patterns, or drive, stimulating an individual's behavior (Achakl & Yolles, 2013). The literature describes many motivational theories (Luthans & Ottemann, 1973) which can be categorized into either intrinsic or extrinsic motivation (Robbins & Judge, 2013). Intrinsic motivators operate based on the curiosity of the individual (Robbins & Judge, 2013; Osterloh & Frey, 2000), whereas extrinsic motivators operate based on the influence of other people acting in the environment (Achakul & Yolles, 2013; Robbins & Judge, 2013). Hence, intrinsic motivation is related to psychological and sociological components (Robbins & Judge, 2013). In today's business environment, intrinsic motivation plays a vital role (Remedios & Boreham, 2004).

Early researchers found that the characteristics of creative individuals are mostly innate, so that highly creative people are often characterized as having high levels of intrinsic motivation (Amabile, 1996). Few researchers would argue that intellectual abilities are less relevant for intuition than a person's interest and drive (Gallate & Keen, 2011), hence consideration of the relevant intrinsic motivators of the supply chain actors is important. For example, prior literature indicates that positive moods are related to more creativity than negative moods (Gallate & Keen, 2011). Thus, this study attempts to assess the role of intrinsic motivation in dyadic supply chain learning.

Power is a fundamental aspect of any supply chain relationship (He et al., 2013), since supply chain actors are dependent on each other (Hansen & Rasmussen, 2013) and dependency creates power imbalances (Touboulic, Chicksand, & Walker, 2014; Hansen & Rasmussen, 2013). From a resource dependency theory point of view, power can be described (Pfeffer & Salancik, 1978) as a resource that is exercised over others in a supply chain context (Marabelli & Newell, 2014). Early researchers categorize power as expert power, referent power, rewards power, legitimate power and coercive power (Raven, 2008), and model knowledge based on type and quality (De Jong & Ferguson-Hessler, 1996). However, it is critical to explore the dominant aspects of power that influence today's knowledge-based economy (Lee & Song, 2015; Flynn, Gruenfeld, Molm, & Polzer, 2012; Mason, Casey, & Betts, 2010; Huzzard, 2004; Fletcher, 1992).

Synthesis of the literature highlights the critical role played by 'knowledge power' on supply chain learning rather than traditional categories of power (Foss, 2007; Dyer & Nobeoka, 2000; Foss, 1996). This is referring to the power or influence that is embedded in knowledge. Hence, it can be argued that expert power is a part of knowledge power. Thus, this study attempts to study the role of knowledge power

in dyadic supply chain learning. Although others have argued that production of goods and services requires application of many types of knowledge (Inkpen & Dinur, 1998; Kogut & Zander, 1992), the influence of different facets of knowledge power on the various levels of supply chain learning is not studied (Matheus, Saunders, & Chakraborty, 2016).

The importance of interpersonal interactions research makes it applicable in the supply chain learning field, where an individual's behavior pattern is considered to involve interpersonal interactions (Granovetter, 1973). Research into knowledge transfer with multinational enterprises has explored the impact of supply chain actor interactions during knowledge transfer between internal units (Hotho, Becker-Ritterspach, & Saka-Helmhout, 2012; Noorderhaven & Harzing, 2009). This identifies the supply chain actor interaction patterns as the extent of social interactions (scale of the interactions) and the diversity of employee interactions (scope of employee interactions). Hotho et al. (2012) also categorize the diversity of the interactions (i.e., the scope or breadth) into two areas which include supply chain actor interactions across hierarchical levels, and the involvement of actors in interactions. The extent of the interactions (scale or depth) is also characterized into two areas: cross-hierarchical and cross-functional; either day-to-day interactions or (temporary) project based.

Early researchers highlighted the importance of human behavior in organizational learning (Armstrong & Lengnick-Hall, 2013; Mahapatra, Narasimhan, & Barbieri, 2010; Defee, 2007), in which communities of interactions play a critical role in the further development of ideas (Nonaka, 1994). Communities of practice consist of employees with a common purpose, relevance and socialization in a joint learning activity (Kerno & Mace, 2010). Communities of practice theory argue that significant learning and innovation has taken place in informal communities of

practice (Brown & Duguid, 1991). Although it has been identified that interpersonal interactions are an important factor of supply chain learning (Khachlouf, Quelin, & Soparnot, 2014; Hotho et al., 2012), little research is evident on the role of interpersonal interactions in supply chain learning (Armstrong & Lengnick-Hall, 2013). Thus, this study attempts to study the role of interpersonal interactions in dyadic supply chain learning.

In today's business environment, prior experience plays a vital role (Ganesan, 1994). Similar to experiential learning theory, which argues that learning is a process of knowledge creation through transformation of experience (Argote & Miron-Spektor, 2011; Kolb, Boyatzis, & Mainemelis, 2001), organizational learning has been found to be a consequence of prior experience (Gino, Argote, Miron-Spektor, & Todorova, 2010). Prior research argues that human knowledge begins with experience (Kant, 1929). The early literature argues that the most fundamental dimension of experience is whether it is acquired directly from the specific organizational unit, or indirectly from other units (Levitt & March, 1988). Well-known experiential learning theories argue that knowledge is created through experiences (Kolb et al., 2001), where prior experience is identified as prior practice (Kolb et al., 2001).

Learning from experience consists of re-evaluation of relevant work experience via reflection (Knipfer, Kump, Wessel, & Cress, 2013). Hence, some researchers propose cumulative learning through reflection by individuals and groups as organizational learning (Knipfer et al., 2013). Further, it is shown that relationships with other organizations enrich experiences (Argote & Miron-Spektor, 2011). In addition, the organizational learning literature has identified the importance of prior experiences of employees in absorptive capacity (Cohen & Levinthal, 1990). Theories of strategic management, organizational learning, internal organizational



evolution and evolutionary economics have identified the critical role played by organizational routines in valuing prior experience and inducing cognitive and behavioral changes (Cyert & March, 1963).

Although the value of prior experience to supply chain learning has been demonstrated (Lane & Lubatkin, 1998), there is comparatively little research into the prior experience of supply chain actors and supply chain learning (Ganesan, 1994). From an organizational learning perspective, the relative importance of different types of experience is argued to vary across levels of analysis (Argote & Miron-Speckter, 2011) and early researchers categorized prior experience into direct tasks, indirect tasks and learning-by-doing (Gino et al., 2010; Argote & Todorova, 2007; Argote & Ingram, 2000). The literature has not examined the nature of prior experiences (i.e. in related and unrelated fields) and their effects on supply chain learning, hence this study attempts to study aspects of prior experience and their role in dyadic supply chain learning.

Rezaei-Zadeh and Darwish (2016) highlight how the multi-dimensional nature of specific antecedents and their impact on multi-dimensional absorptive capacity is not well studied. Hence, this study argues the importance of studying the multi-dimensional nature of enabling characteristics on supply chain learning in today's supply chain context.

Prior research argues that the active organizational context consists of basic elements of organizations, members, and tools that interact with the organization's tasks (Argote & Miron-Spektor, 2011). Organizational learning studies argue that the cognitions and actions of individual actors influence the organizational context (Argote, 2011; March, 1991; Dutton & Dukerich, 1991), so that organizational context is a consequence of such behavior (Mowday & Sutton, 1993). Thus, this study explores the contextual factors of supply chain learning.

Finally, this thesis defines supply chain learning as a continuous and cyclical interaction among socio-psychological learning processes and dynamic learning capabilities; a reflection of the changes in cognition and behavior of supply chain actors at different levels, enhanced by behavioral enabling characteristics.

The next section describes the research gaps, in order to describe the boundary for the thesis, the research problem selected, and the main research questions for the study.

## **2.8 Research gaps**

This study applies organizational learning theory to supply chain relationships, which is a relatively under-researched area and perspective (Manuj et al., 2014). In particular, research that extends the theoretical foundations of the subject is imperative since, evidently, theory generation about supply chain learning is in a nascent stage (Manuj et al., 2014) and most studies have used a positivistic approach (Halldorsson et al., 2015; Ellinger, Ellinger, & Keller, 2002; Ortenblad, 2002).

## **2.9 Research problem and research questions**

Based on the review of literature, the overarching research problem of this study is:

**How do the social-psychological processes of organizational learning explain the phenomena of supply chain learning?**

This study also seeks to address research questions that are linked to the overarching research question. These are elaborated in the sections to follow:

### **2.9.1 Research gaps regarding elements of supply chain learning**

A review of the literature indicates that learning capabilities underlie learning processes (Lane, Koka, & Pathak, 2006). Relative absorptive capacity and the “4-I framework” are leading supply chain learning concepts that address supply chain learning capabilities and processes (Lane & Lubatkin, 1998; Crossan et al., 1999).

The absorptive capacity concept has been extended to the dyadic supply chain context and named relative absorptive capacity (Lane & Lubatkin, 1998). The relative absorptive capacity concept argues the similarity of dyad partners and its impact (Lane & Lubatkin, 1998). However, later researchers criticized the dimensions of relative absorptive capacity for their lack of applicability to long-term supply chain relationships (Nagati & Rebolledo, 2012).

Currently, the literature argues the need to explore the social-psychological dynamics of elements for the individual level of absorptive capacity in the supply chain context (Grant & Baden-Fuller, 2004). Assimilation and transformation capabilities are somewhat fluid concepts in the literature, as it is difficult to define start and end points (Rezaei-Zadeh & Darwish, 2016). The social-psychological aspect of the exploitation capability, which is the realization of the supply chain learning, also requires further study (Rezaei-Zadeh & Darwish, 2016).

Supply chain learning studies tend to adopt a one supply chain partner perspective (Ambrose, Marshall, & Lynch, 2010). However, because suppliers and buyers will have different perceptions of the dimensions of a supply chain (Ambrose et al., 2010), this study incorporates both supply chain partners in an effort to describe a valid theory.

Scant research has focused on the processes of supply chain learning in a supply chain context (Manuj et al., 2014). However, according to Tam and Gray (2016), early research discussed insights, experience, images, metaphors, and organizational memory under the aspect of intuition. Researchers also identified language, cognitive maps, conversations, dialogs, and knowledge sharing as aspects of the interpretation process (Tam & Gray, 2016; Spinelli, 2005). They identified shared understanding and interactive systems as aspects of the integration process (Tam & Gray, 2016), and routines, rules and regulations as aspects of the institutionalization process (Tam & Gray, 2016; Noblet et al., 2011). Despite this, there is no consensus on the variety of components of supply chain learning.

The applicability of Crossan's 4-I processes model in the supply chain context is not theoretically proven despite some empirical studies, such as that by Jones and Macpherson (2006). Most of the studies use one supply chain partner perspective while ignoring the supply chain partners' perspective. Again, this study incorporates both supply chain partners in an effort to describe valid theory.

The literature review reveals that there is no consensus on the dimensions of absorptive capacity and learning processes in supply chain context (Tam & Gray, 2016; Noblet et al., 2011). Mostly, the early literature focuses on cognitive aspects of absorptive capacity (Hollan, 2008; Cohen & Levinthal, 1990), which is problematic in the supply chain context. Therefore, this study aims to explore the social-psychological dynamics of the absorptive capacity and learning processes for today's dynamic supply chain context.

Accordingly, the following research question is posed:

- **What are the dynamics of elements of supply chain learning?**

### **2.9.2 Research gaps regarding linkages among the elements of supply chain learning**

Most studies investigate supply chain learning capabilities and processes separately (Rezaei-Zadeh & Darwish, 2016; Newey & Verreynne, 2011). However, the literature on routines and dynamic capabilities presents linkages between capabilities and processes in organizations (Salvato & Rerup, 2011). This opens up the possibility of linking supply chain learning capabilities and processes. There is a dearth of research focusing on the generation paths of supply chain learning capabilities and processes (Martinkenaite & Breunig, 2016). Linkages of macro- and micro-processes of supply chain learning are not explored to any great extent (Hollan, 2008). Early exploratory work on this subject examines the cyclical process of supply chain learning capabilities and processes. In addition, this study attempts to study linkages among micro- and macro-elements of supply chain learning.

Organizational learning at multiple levels is explored (Sun & Anderson, 2010); nonetheless, the multi-level supply chain learning phenomenon is not much studied empirically. A complete theory of supply chain learning must address its multi-level aspects. Consequently, this study attempts to link the micro- and macro-aspects of supply chain learning.

Accordingly, the following research question is posed:

- **What are the linkages among elements of supply chain learning?**

### **2.9.3 Research gaps regarding the enabling characteristics that affect supply chain learning and its impact**

The early literature on enabling characteristics focuses on the similarities that enrich supply chain learning capabilities, and such similarities were studied in a directive supply chain learning context (Lane & Lubatkin, 1998). Researchers posited the impact of different knowledge bases on supply chain learning capabilities (Lane & Lubatkin, 1998). Initial research investigated the contextual factors of learning, knowledge sharing, and knowledge transfer, focusing on similarities and differences via a largely positivistic approach (Razaei-Zadeh & Darwish, 2016). As a result, most of the studies focus on only one or a few aspects, and their impact on supply chain learning. However, later research revealed contradictory positions regarding these factors (Razaei-Zadeh & Darwish, 2016), giving conflicting signals to future researchers and calling into doubt the validity of supply chain learning theories. Few studies have focused on how one factor affects supply chain learning at multi-levels (Razaei-Zadeh & Darwish, 2016).

Despite resource dependency theory highlighting the behavioral aspects of supply chain learning (Peffer & Salancik, 1978), little research has actually focused on identifying the behavioral factors that enrich supply chain learning (Esper, Bradley, Thomas & Thornton, 2015; Esper, 2003). Therefore, there is a gap in the literature distinguishing the behavioral elements of supply chain learning. Therefore, this thesis proposes the enabling characteristics include behavioral characteristics of supply chain actors (i.e., individual, group, and organizational). The present thesis identifies an intrinsic motivation, knowledge power, prior experiences, and interpersonal interactions as critical enabling characteristics in today's supply chain context. Accordingly, the following research questions are posed:

- **What are the enabling characteristics of supply chain learning?**

- **How do these enabling characteristics affect supply chain learning?**

## **2.10 Chapter summary**

Overall, this chapter has reviewed appropriate theoretical perspectives in the extant literature and demonstrates the importance of exploring the social-psychological aspects of supply chain learning. It has discussed the rationale of theory building at the dyadic supply chain level; exploration of social-psychological dynamics of capabilities and processes of supply chain learning; linking of multi-level processes, and the cyclical processes of supply chain learning. The enabling characteristics of supply chain partners in supply chain learning are described. Thus, this literature review chapter contributes to the thesis by critically reviewing the literature regarding:

- absorptive and relative absorptive capacity theory: it identifies the need for exploring social-psychological dynamics of elements of absorptive capacity at the dyadic supply chain level;
- organizational learning theory: it identifies the need for exploring social-psychological dynamics of elements of supply chain learning;
- multi-level theories of supply chain learning: it identifies a strong need to build theories covering multiple levels;
- the actors of supply chain learning: it strongly identifies a need to select the most suitable supply chain actor to address theories of supply chain learning, which enhance the validity of theories;
- the relational view and inter-organizational learning: it identifies a need to recognize and model facilitators of supply chain learning;

- the relational view and inter-organizational learning: it identifies the need to model the types of supply chain learning to increase the reliability of the theories; and
- the role of enabling characteristics on supply chain learning: it identifies intrinsic motivation, knowledge power, prior experiences and interpersonal interactions as critical enabling characteristics in today's supply chain context.
- It identifies intrinsic motivators that operate based on the curiosity of the individual (Robbins & Judge, 2013; Osterloh & Frey, 2000); then, the power or influence that is embedded in types of knowledge. Moreover, the nature of prior experiences (i.e., in related and unrelated fields) and their effects on supply chain learning will be identified. Similarly, this study attempts to study the dynamics of interpersonal interactions (i.e., trust in competence, participation, naturally occurring, and arranged interactions in dyadic supply chain learning).

In addition, this chapter has elaborated on the gaps in the literature to provide justification for the research problem and research questions. This marks a milestone for the thesis exploration. As such, the research problem of the study is:

- How do the social-psychological processes of organizational learning explain the phenomena of supply chain learning?



In summary, the research questions of this study are:

- What are the dynamics of elements of supply chain learning?
- What are the linkages among the elements of supply chain learning?
- What are the enabling characteristics of supply chain learning?
- How do these enabling characteristics affect supply chain learning?

The next chapter discusses the study methodology.

## **Chapter 3: Research methodology**

### **3.1 Introduction**

This chapter describes and justifies the research methodology for the study. First, it considers the main building blocks of theory development and the basic elements of the research process. Then, the appropriate methodology and research methods are chosen for the study.

### **3.2 Theoretical contribution: The building blocks of theory development**

There are three main building blocks of theory development: what, how and why (Whetten, 1989). The What factors (variables, constructs and concepts) logically explain a social phenomenon (Whetten, 1989). The two dimensions of the What factor are comprehensiveness, which implies that all the relevant factors are included in theory, and parsimony, which implies that some factors are left out as they add little value to an understanding of phenomena (Whetten, 1989). This study pinpoints the behavioral factors as being important to developing a comprehensive theory of supply chain learning in today's dynamic business contexts. These are absorptive capacity in supply chain context, processes, and enabling characteristics.

The How aspect explains the relationship between the factors (Whetten, 1989), and the current study analyzes the impact of enabling characteristics on supply chain learning.

The Why aspect reveals the underlying psychological, economic, or social dynamics that justify the selection of factors in the proposed causal relationships

(Whetten, 1989). Against this context, the current study provides explanations for the causal relationships identified.

Research findings should result in interesting insights into the phenomenon under investigation, achieved via a deep understanding of the knowledge domain or from meaningful personal experiences (Rindova, 2011). Also, the original idea becomes a basis for theoretical contribution when the researchers'/authors' envision its role and place in current research (Rindova, 2011). Originality and utility are crucial in determining theoretical contribution (Corley & Gioia, 2011).

### **3.2.1 Multi-level theory building**

Multi-level theories bridge the micro-macro divide of the domain of interest (Barney & Felin, 2013; Klein, Tosi, & Cannella, 1999), and the research conclusions offer deeper understanding of the particular subject (Barney & Felin, 2013; Klein et al., 1999). Multi-level research explores the individual characteristics that enrich organization-level characteristics (Klein et al., 1999). Klein et al. (1999) reiterate the importance of using construct levels in accordance with formal groupings of context (e.g. individuals or organizations), while also arguing that these levels change over time (e.g. an individual's attitude changes). They also discuss the importance of within-unit agreement and disagreement in multi-level theory building – for instance, the level of construct as a unit and aggregation of individual data regarding the construct to unit levels. The conceptual and quantitative analysis of the determinants, as well as the nature and consequences of within unit agreement and disagreement are important (Klein et al., 1999). Most research concurs on the importance of exploring the role of individual actions in increasing organizational constructs, and dismissal of

organizational level constructs being the result of individual acts and attitudes. In addition, they identify the importance of isomorphic models, which posit that the relationship between two or more variables at one level of analysis can be replicated at another (Klein et al., 1999).

Multi-level theory building identifies new focus areas for future inquiry (Barney & Felin, 2013; Baudry & Chassagnon, 2010; Klein et al., 1999). For instance, most of the multi-level theories focus only on two levels: individual and organizational (Klein et al., 1999). However, the review of the literature indicates that broadening the levels to groups and dyads adds value to theories (Klein et al., 1999).

### **3.3 Basic elements of the research process**

There are five critical decisions concerning a piece of research: the ontological stance, the epistemological stance, theoretical perspective, research methodology, and methods (Fabian, 2000; Crotty, 1998). These five decisions necessarily need to be bound by a common thread related to the study, in order to create a new piece of work, an addition to the existing collective enterprise of scholarship on which future researchers can rely (Fabian, 2000). The following section discusses the ontology, the epistemology, theoretical perspective, research methodology, and methods appropriate to this research.

Figure 3.1 shows the summary of linkages of ontological stance, epistemological stance, theoretical perspective, research methodology, and research methods for the study and its consistency.

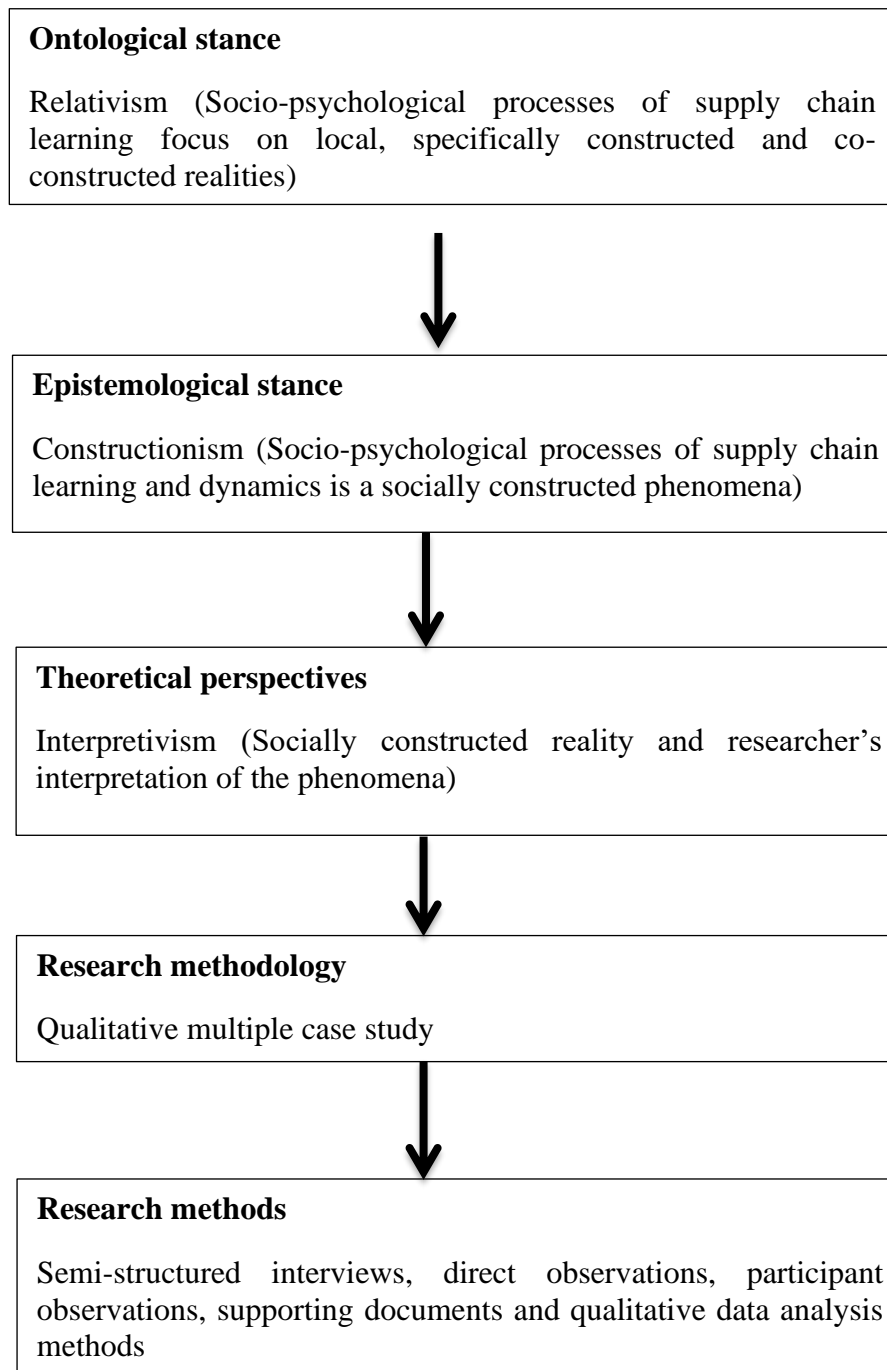


Figure 3.1: Summary of linkages of ontological stance, epistemological stance, theoretical perspective, methodology and methods

### **3.3.1 Ontological stance**

Ontology is concerning the study of being. It is concerned with, “what is” with the nature of existence (Crotty, 1998, p.10). There are five ontological stances; naive realism, critical realism, historical realism, relativism, and participative reality (Guba & Lincoln, 2005). Naive realism holds "real" reality, but it is apprehensible (Guba & Lincoln, 2005, p.195). The concerns of historical realism are "virtual reality shaped by social, political, cultural, economic, ethnic and gender values crystallized overtime" (Guba & Lincoln, 2005, p.195). Participative reality holds subjective-objective reality, co-created by the mind, and given cosmos" (Guba & Lincoln, 2005, p.195). Critical realism is an ontological stance that assumes reality exists but is only imperfectly apprehensible (Guba & Lincoln, 2018). Enabling characteristics of the study is a socially constructed reality. It may not be real, as argued by critical realists. There are several differences between constructionist and critical realist perspectives. Positioned as an alternative to positivism and constructivism, critical realism emphasizes the reality as distinct from social conceptions, while focusing on social transformation; particularly towards more equity and justice.

This research initiative explores the social-psychological processes and dynamics of supply chain learning. Therefore, the ontological stance of the study is relativism (Guba & Lincoln, 2005). Relativism focuses on local, specifically constructed, and co-constructed realities. Socio-psychological processes of supply chain learning focus on local, specifically constructed, and co-constructed realities.

### **3.3.2 Epistemological stance**

Epistemology concerns the ways of understanding and explaining, the way we know what we know (Crotty, 1998). It considers approaches to understanding and explaining society and the human world, or what (or what should be) regarded as acceptable knowledge in a discipline (Bryman & Bell, 2007).

Research endeavor is informed by four possible paradigmatic worldviews: objectivism, constructionism, participatory, and pragmatism (Crotty, 1998; Plano Clark & Creswell, 2011). Objectivism holds that meaningful reality exists apart from any consciousness, for researchers to discover the truth (Crotty, 1998). Constructionism holds that meaning comes into existence as a result of human engagement with realities in the world; there is no meaning without a mind in construction of meaning (Crotty, 1998). This results in the belief of the ability of different people to construct different meanings in relation to the same phenomena (Crotty, 1998). The participatory stance contends that findings are negotiated with the participants, through the active collaboration of participants and researchers, and bring changes to the participants (Plano Clark & Creswell, 2011). Pragmatism is associated with mixed methods of research; focusing on the consequences of research, it accepts singular and multiple realities, practicality, and the use of quantitative and qualitative methodologies (Plano Clark & Creswell, 2011; Creswell & Clark, 2007). A mixed methods research study involves the use of multiple worldviews (Creswell & Plano Clark, 2007).

This research initiative explores the social-psychological processes and dynamics of supply chain learning. The meaning of the phenomena of interest to the research does not exist in the world for the researcher to discover but is constructed in context through the activity of human minds. Knowledge to fill the research gaps

of this study is not available as objects in reality. Thus, meaning or concepts need to be created using the actors in the supply chain context.

This study is investigating the processes of supply chain learning, which are complex and multiple phenomena. The associated processes of supply chain learning are more complex to measure using standard mathematical formulae. However, the opinion of the participants, gained through experiences in living in the social context, is most valid in investigating the supply chain learning processes. Hence, the researcher relies on the socially constructed views of respondents in the dyadic organizations of the supply chain, then reconstructs that knowledge (Bryman & Bell, 2007; Creswell, 2007; Denzin & Lincoln, 2005; Morgan & Smircich, 1980). The most suitable epistemological system for this study is judged to be constructionism. In this worldview, individuals seek understanding of the world in which they live and work, developing subjective meanings of their experiences in regard to certain objectives and things; consequently, meanings are varied and multiple (Creswell, 2007).

### **3.3.3 Theoretical perspective**

The theoretical perspective of the social sciences examines the nature of social entities or how one views the world (Bryman & Bell, 2007; Crotty, 1998). The central point of orientation is the question of whether social entities should be considered as objective entities that have a reality external to the social actors, or social constructions built up from the perceptions and actions of social actors (Bryman & Bell, 2007, p. 22).

The three philosophical bases of a research study are positivism, interpretivism, and critical realism (Cavana, Delahaye, & Sekeran, 2001; Saunders, Lewis, &



Thornhill, 2003). Positivism relies on natural sciences. It assumes observable social reality, universal laws that can be used to predict human behavior, and the researcher's independence, neither affecting nor being affected by the object of research (Cavana et al., 2001; Saunders et al., 2003). A positivist approach employs deductive reasoning (Cavana et al., 2001; Saunders et al., 2003) through experiments, questionnaires, and secondary data. Data analysis occurs through quantitative methods; research quality is gauged using internal, and external validity, and reliability (Cavana et al., 2001; Saunders et al., 2003).

In contrast, the critical researcher tries to peel back the surface illusions of the material world to empower people and to change their world (Cavana et al., 2001; Saunders et al., 2003). Field research and historical analysis are favored methodologies (Cavana et al., 2001; Saunders et al., 2003).

The interpretivist researcher recognizes the complexity of the world; its unique nature and dynamism that would result in difficulty arriving at universal rules. Instead, the focus is on socially constructed reality as understood by an individual or group (Cavana et al., 2001; Saunders et al., 2003). The researcher “discover(s) the details of the situation to understand the reality behind them” (Saunders et al., 2003, p. 85).

In this study, the researcher attempts to interpret the meaning that is socially constructed by the people working in a specific context, without changing the situation of the participants. Thus, the most appropriate philosophical base is judged to be interpretivism.

### **3.4 Research methodology**

The research methodology explains the research strategy or plan of action of the study (Crotty, 1998). Narratives, phenomenology, grounded theory, ethnography, and case studies are frequently used methodologies in qualitative research (Manuj, & Pohlen, 2012; Creswell, 2007). Case studies originated in the human and social sciences (ibid.).

Complex problems and processes which describe the phenomena of interest can be best addressed using a qualitative study (Bacharach, 1989; Creswell, 1994; Plano Clark & Creswell, 2011). A case study methodology is appropriate when a “question is being asked about a contemporary set of events over which the investigator has little or no control” (Yin, 1994, p. 9). This study focuses on the case study approach as methodology. It aims to build theory which offers another reason in favor of case study (Yin, 2009). Case studies also provide a forum to combine qualitative and quantitative data (Eisenhardt & Graebner, 2007; Stuart, McCutcheon, Handfield, McLachlin, & Samson, 2002; Eisenhardt, 1989; Yin, 1994). Case study research is also compatible with studying a process where a group of individuals participate (Creswell, 2007). This research study is concerned with a contemporary phenomenon that is based on the social construction of meaning. It has investigated a process with the involvement of the group of individuals, indicating that the case study methodology was the most suitable approach.

A case study research design is a framework that links the data to be collected, conclusions, and research questions of the study (Stuart, McCutcheon, Handfield, McLachlin, & Samson, 2002; Yin, 1994, 2009). The research design includes considerations of the type of design; and methods to increase construct validity,

external validity and reliability for an exploratory case study (Fawcett et al, 2014; Yin, 1994).

### **3.4.1 Research rigor**

The researcher uses internal validity, external validity, internal reliability and external reliability to measure qualitative studies (Bryman & Bell, 2010). Concepts of respondent validation and triangulation are also important aspects in qualitative research.

#### **3.4.1.1 Validity**

In broad terms, validity refers to whether findings reflect what they appear to be about (Saunders, Lewis, & Thornhill, 2009, p. 157). Qualitative researchers should be able to support their interpretations from text or other data, also paving the way for other researchers to perceive the rationale of the theory (Auerbach & Silverstein, 2003). Theory then becomes validated, even though there might be other ways to interpret the data (Auerbach & Silverstein, 2003). In other words, there is no one right way to interpret the concerns in qualitative research (Auerbach & Silverstein, 2003). Trustworthiness and authenticity constitute ways to evaluate qualitative research (Guba & Lincoln, 1994).

Respondent validation. Respondent validation refers to the researcher giving an account of the findings to the research participants, which ensures the compatibility of the researcher's findings with the participants' perspectives and experiences (Bryman & Bell, 2011).

Internal validity refers to the correspondence between a researcher's observations and theoretical ideas (Bryman & Bell, 2011). Hence, in the later discussion section, this study elaborates on a review of empirical findings with the literature to ensure the integration of findings with theoretical facts in the field. External validity refers to the degree to which findings can be generalized in different contexts (Bryman & Bell, 2011). External validity is ensured through replication of the findings of the first case study to other case studies.

#### **3.4.1.2 Reliability**

In broad terms, reliability refers to extent to which data collection techniques or analysis yield consistent findings (Saunders et al., 2009, p. 156; Easterby-Smith, Thorpe, & Jackson, 2012). External reliability refers to the degree to which the study can be replicated in other supply chains (Bryman & Bell, 2011). This study uses multiple case studies to observe the replication logic of the study. Internal reliability refers to whether more than one respondent of the research agrees with the ideas (Bryman & Bell, 2011). Reliability can be achieved through a case study protocol and a case study database (Yin, 1994), and this study uses multiple interviewees to collect the data into constructs.

#### **3.4.1.3 Triangulation**

Triangulation refers to the use of more than two methods or sources of data in studying social concepts (Bryman & Bell, 2011). Triangulation may involve the use of multiple observers, theoretical perspectives, sources of data, and methodologies, but is largely focused on the last two (Denzin, 1970). This study uses multiple

interviews with the same respondents, and observations and secondary data analysis to ensure the validity of constructs.

The researcher's personal capabilities and passions are important in conducting a qualitative research study (Fendt & Sachs, 2008). The researcher will use her capacities and experiences as a mentor and educator when collecting and analyzing the data.

### **3.4.2 Unit of analysis**

The unit of analysis can be an individual, an event, an entity, or a less defined unit (Yin, 1994). The object of this study, supply chain learning, is a social phenomenon (Bessant, Kaplinsky, & Morris, 2003). The complex nature of the phenomenon and the research problem require a sound decision regarding the unit of analysis for data collection.

Each unit of analysis may require a specific research design and data collection strategy (Yin, 1994). Early literature identifies individual beliefs, preferences and interests as a fruitful starting point to build theories of social structures (Barney & Felin, 2013). Thus, individuals and their interactions can be argued as micro-foundations of social theories (Breite & Koskinen, 2014; Barney & Felin, 2013; Hodgson, 2012; Williams, 2012). Barney and Felin (2013) identify the importance of the individual and specifically their unique nature, interactions and collective effects in theory building. Supply chain learning takes place in individuals operating at different levels of the organization (Borgatti & Cross, 2003; Inkpen & Crossan, 1995; Jones & Macpherson, 2006; Simon, 1991). Since this study examines how the social-psychological processes of organizational learning explain

the phenomenon of supply chain learning, individuals become the basic unit of analysis. This study employs multiple units of analysis:

- Focal Actor (boundary spanner) – External actor (inter-firm) social-psychological processes
- Focal Actor – Internal (intra-firm) Actors social-psychological processes
- Focal Actor and External Actor and Internal Actors (inter and intra) interactions with systems and processes

Embedded (multiple units of analysis) and multiple case design strategies are made use of in conducting case studies; informed by the logic of replication (Yin, 1994, 2009). It is important to note that the study uses an interpretivist approach as a base in determining the social-psychological processes of supply chain learning as social constructions that are shaped by the researcher.

Even though it is difficult to identify a boundary for levels of learning, some researchers who use Crossan's 4-I framework utilize characteristics of each level of learning to categorize learning practices to separate levels. For instance, training is provided to individuals as a learning activity at an individual level (Tam & Gray, 2016). Therefore, aligned with previous studies, initially this study uses characteristics of levels of learning as indicated in Table 3.1 when categorizes empirical data into levels of learning. Additionally, this study uses each interviewee's view in categorizing learning practices and activities into levels of learning. It uses theoretical triangulation by applying multiple theoretical perspectives (absorptive capacity, relative absorptive capacity and organizational learning) when categorizing empirical data to each level of analysis. It also uses perspectives of literature related to each learning capability and processes these when categorizing empirical data to codes.

Table 3.1: Characteristics of units of learning

Levels of learning	Content of learning
Individual	Change in cognition of an individual
Individual-group	Change in cognition and/or behavior of individual-group level
Group-organizational	Change in cognition and/or behavior of group-organizational level
Organizational	Change in cognition and/or behavior of organizational level

### 3.4.3 Sampling strategy of the study

Exploratory research uses non-probability sampling and most of the research uses one or more number of sampling techniques at different stages (Saunders et al., 2009; Creswell, 2007). Purposive samples enable the researcher to use subjective judgments to select cases that would best answer research questions and fulfil research problems (Saunders et al., 2009; Creswell, 2007). Moreover, findings from initial case studies that direct the researcher how to extend sample to subsequent cases (Saunders et al., 2009). This qualitative study uses the purposive sampling strategy at different levels of the study (Creswell, 2007; Plano Clark & Creswell, 2011). A qualitative researcher can “sample at site level, event, process and participant levels and a good plan for a qualitative study includes one or more of these levels” (Creswell, 2007, p. 126).

Creswell (2007) has identified criterion sampling, snowball sampling and maximum variation sampling as sub-types of purposive sampling. Criterion sampling is concerned to ensure that all cases meet some particular criterion, which is useful for research quality assurance (Creswell, 2007). Snowball sampling is

generally used when it is difficult to identify the most suitable members to collect data from; therefore, the researcher must contact respondents and ask them to select the most suitable ones (Saunders et al., 2009). Maximum variation sampling collects data from diverse cases or participants and identifies important common patterns (Creswell, 2007). The research strategies used in this study are criterion sampling for the selection of four focal organizations; snowball sampling for the selection of the most suitable supply chain partner for the study; and maximum variation sampling for the selection of the participants. The study uses a heterogeneous sample of companies to ensure wider applicability of the findings.

The interpretivist, multiple, embedded case study poses the question, How do the social-psychological processes of organizational learning explain the phenomena of supply chain learning? in four supply chain dyads in a Sri Lankan context. To date there has been no research on the social-psychological processes of supply chain learning in selected industries within a Sri Lankan context. Scholars concur that between four and ten cases are sufficient to develop theory concerning a phenomenon that is relatively little understood (Bourgeois & Eisenhardt, 1988; Eisenhardt, 1989). Several criteria were used to select focal case study organizations. Criterion sampling was used to select the focal organizations. The four focal organizations selected operate within the main industrial sectors that contribute to the Sri Lankan economy. The focal organizations are large-scale organizations that are well recognized in the industry and have established procedures. They normally use legal contracts with their suppliers, who generally have less power.

Prior literature indicates that close relationships can only be formed between two to three actors (Min, Mentzer, & Ladd, 2007). Min et al. (2007) argue that working closely with every partner in a supply chain is not feasible; hence, firms need to



select the most capable or critical partners to create value. Hence, the context of this study is limited to the social-psychological processes of supply chain learning that involve a single selected (supply chain) partner. The dyad partners are involved in a number of bilateral learning activities with the selected suppliers. Both organizations have entered into a dyadic relationship due to the lack of complementary resources within their own organization. Long term close relationships are a key factor for deep supply chain learning, hence, this study studies close dyadic supply chain learning relationships.

In choosing snowball sampling to select the most suitable supplier to the organizations (Creswell, 2007), a dyad comprising one manufacturer and one supplier was selected from each supply chain, resulting in four such dyads for the study. Initially, the researcher contacted key informants of the focal manufacturing firm to ask them to select the most suitable supply chain partner (with whom the focal organization has learning activities). Then a sample of participants for the study at both the inter- and intra-organizational levels was identified.

The researcher used maximum variation sampling (Creswell, 2007; Plano Clark & Creswell, 2011) to select participants experiencing the social-psychological processes of supply chain learning. In this method, the researcher selects diverse individuals with different perspectives on the central phenomenon of interest (Plano Clark & Creswell, 2011). For instance, initial data was collected from diverse actors in terms of hierarchy of organization, age, experience in the dyadic relationship and diverse academic backgrounds. Then, depending on the views of initial interviewees, further interviewees were selected. This provided an opportunity to explore a diversity of views of the constructs under study. The number of participants interviewed and the relevant participants were decided at the initial data collection stage (Plano Clark & Creswell, 2011).

#### **3.4.4 Boundary for supply chain learning research**

A review of the early literature indicates that little research has been conducted to identify the most suitable unit of supply chain analysis (Hart, Gilstrap, & Bolino, 2016; Barabasi & Albert 1999; Crossan, Lane, White, & Djurfeldt, 1993) so that there is no consensus on “what constitutes the most suitable unit of analysis” in supply chain learning research. Use of a variety of factors (Knight, 2002) can act as a major barrier in interpreting and evaluating the validity of research findings. Therefore, this study attempts to theorize the most suitable unit of analysis for supply chain learning.

#### **3.4.5 Supply chain dyad**

A supply chain can be defined as two or more firms working together to achieve long term understandings to create value (Londe & Masters, 1994). Although supply chain research is moving towards considering a network of organizations (Borgatti & Li, 2009; Lambert & Cooper, 2000), fundamental theories in the field use the dyad as the unit of analysis (Lane & Lubatkin, 1998).

Prior researchers argue that, although the two supply chain actors of the dyad have separate relationships with stakeholders (Ritter, Wilkinson, & Johnston, 2004), those stakeholders are not linked to one another (Braziotis, Bourlakis, Rogers, & Tannock, 2013). Choi and Wu (2009) state that the dyad is also the base of a supply chain network in which the two dyadic supply chain actors are linked to one another (Braziotis et al., 2013).

According to Fawcett and Magnan (2002) over 95 percent of supply chain integration efforts are focused on working with first-tier suppliers; 47 percent

attempt to create seamless processes within their organization; 34 percent establish supply chain management in purchasing and focus on interactions with first-tier suppliers; and 11 percent establish supply chain management in marketing and focus on integrating key customers. According to Fawcett and Magnan (2002), only 8 percent of companies systematically integrated first-tier customers and suppliers. Interestingly, the authors also describe how collaboration from supplier's supplier to customer's customer is a future vision not yet achieved.

Effective, close relationships can only occur between two, or a maximum of three, actors (Adenso-Diaz, Mena, Garcia-Carbajal, & Liechty, 2012; Galaskiewicz, 2011; Baer, 2010; Borgatti & Li, 2009; Dyer & Singh, 1998). This idea is the focus of the present study; for long term strategic supply chain relationships can only be initiated by one or a few members (London & Sessa, 2006).

This study uses the dyadic perspective with the aim of addressing the salient aspects of supply chain learning in an in-depth manner. Being the smallest unit of a supply chain, the fundamental theories of supply chains lie with the dyad as the unit of study. Therefore, this research also uses the dyadic supply chain context for data collection and the supply chain actors as a core unit of study. The sections that follow discuss the specific research context within the dyadic supply chain.

#### **3.4.6 Research context**

As noted above, four dyadic supply chains were selected from manufacturing industries in Sri Lanka, with one dyad from each supply chain selected for data collection. The dyad members comprise a manufacturing firm and a supplier, as indicated in Figure 3.2.

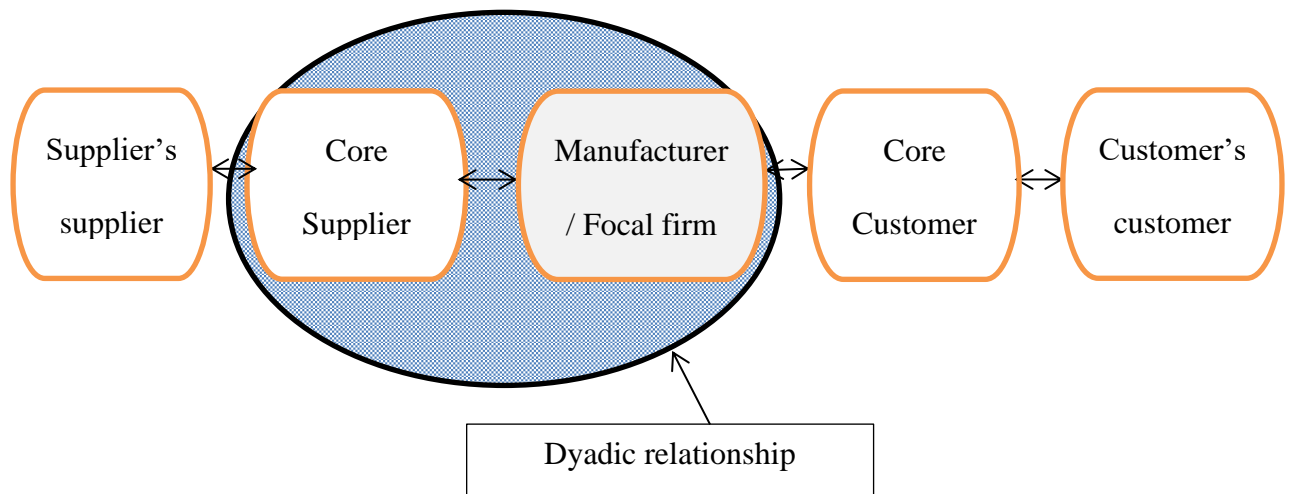


Figure 3.2: Research context

#### 3.4.6.1 Brief description of the four dyads

To maintain the confidentiality of the four dyads studied, fictional names are used. Dyad A-B comprises a soft-drink manufacturer, “A,” and its supplier, “B,” who supplies gas. Organization A is the Sri Lankan arm of a global soft drink giant, and is one of the top local organizations. It has 450 employees and produces more than eight million units of soft drinks per annum. In addition, it has a countrywide network of over 100 distributors. Organization "A" is involved in an extended supply chain practices, from manufacturing to reverse logistics. The organization mainly focuses on developing new products, to keep up with the fierce competition in the market. The organization uses several sales strategies based on the market, geography, and profile of customers. As the demand for the product is uncertain, the manufacturer has allowed the supplier to identify demand uncertainties. The manufacturer and supplier use sophisticated technological processes for manufacturing. Therefore, small players won't be entering the market, as it requires

a high cost of investment. The supplier organization B, is also a major organization and a leading gas producer in Sri Lanka; it produces a wide variety of medical and commercial gas, with many years' expertise and a customer base of well-known organizations. It employs 210 persons and has the widest network of depots and dealers throughout the country, plus a large fleet of tankers. The dyadic learning relationship started in 2010, and the supply chain relationship continues as a renewing contract.

Dyad C-D consists of a tobacco manufacturer, “C,” and a packaging product manufacturer, “D”. Organization C is a manufacturer, marketer, and exporter of cigarettes of well-known international brands, with 360 employees, a large number of retailers, farmers, and distributors. Organization “C” values open-mindedness, encourages creativity, constantly challenges the status quo, and operates a cross-functional organization structure. Organization C constantly changes the package of tobacco products. Further, Organization C possesses one of the best human resource management structures, of which the main focuses are, inter alia, on employee development in Sri Lanka. The supply chain of organization C consists of more than 20,000 retailers, 10,000 small farmers, and 30 distributors. The supply chain is managed using a highly advanced process management system. The organization actively engages in sustainable business practices and acts as a leading organization that brings the new sustainable business practice to Sri Lanka. The supplier organization D, is one of South Asia’s most respected providers of printing and packaging solutions. It has a high technological equipment base in printing. This entity works with a wide variety of industries, including many high-profile clients. Both organizations believe in developing partnerships with their customers via renewing contracts. Supplier D is a privately-owned company existing for more than 40 years in the Sri Lankan market, with a customer base in five continents. Supply chain partnerships are considered a fundamental way of running a business.

The organization is committed to building trustworthy long-term successful relationships with its supply chain partners. They continuously collaborate with supply chain partners to develop innovative packaging products, services, and delivery services in a sustainable manner. Company D has a reputation in providing packaging solutions to world-renowned Sri Lankan tea manufacturers. The core values of managing employees are dependent on continuous developments in innovative solutions and commitment to operate in a sustainable manner.

Dyad E-F consists of “E,” the manufacturer of fast-moving consumer items, and the packaging product manufacturer, “F.” Organization E is a global player, with more than 350 brands spanning more than ten categories. Organization E covers entire Sri Lanka in terms of its customer base. They are ranked as the number one employer of choice for several years. The company has ambitious growth plans supported by state of the art technological advances, considerable focus on research, development, and sustainable business strategies. The company has moved into a new state of the art factory to cover the increasing customer base all over the country. The company values partnering growth with supply chain partners and long-term commitments. The supplier, Organization F, is a leading plastic packaging manufacturer for consumer goods, has highly advanced technological equipment for plastic products, and enjoys a customer base consisting of some of Sri Lanka’s leading organizations. The dyadic relationship continues as a renewing contract. Organization F is one of the most innovative packaging manufacturers in Sri Lanka. A visionary Sri Lankan businessman started the organization F a few decades back. Presently, having state of the art manufacturing facilities, the organization thrives on creating innovative packaging solutions to supply chain partners.

Finally, dyad G-H consists of a soft-drink manufacturer, “G,” and a manufacturer of plastic crates, “H.” Organization G designs, produces, and markets products, creating maximum value for customers. Organization G is a leading soft drink manufacturer in Sri Lanka, which is infusing world-class best practices, innovation, automated factories, and state of the art technologies. The organization, as a responsible corporation that upholds ethics, values, and thrives towards innovating new products to capture and maintain a leading position in the market. The organization is engaged in introducing comprehensive reverse logistics practices and sustainable business practices in day to day activities. Its supplier, Organization H, makes plastic crates for the soft drinks industry and boasts specialized knowledge of the task. Organization G is one of the most innovative and preferred plastic crate manufacturers that thrive on introducing new products. The organization takes new initiatives in bringing sustainable practices to the plastic crate industry.

Overall, the eight chosen Sri Lankan organizations are leaders in their respective industries; quality focused as well as conscious of their brand image. The four manufacturers are producers of internationally recognized products and act as the Sri Lankan arm of highly recognized multinational brands. The four material suppliers are considered as strategic suppliers. All eight organizations have a culture of innovation that makes them market leaders. Organizational culture is the underlying beliefs and assumptions, and reflected in activities and practices, and can be considered as a contextual factor of supply chain learning. Collaboration, capabilities, and innovation are considered core values. The manufacturing organizations specialize in their respective products and brands, while the suppliers are also specialists in their own fields.

The researcher has utilized the Organizational Culture Assessment Instrument (OCAI) to measure the culture of innovation (Cameron & Quinn, 2011). The study has utilized six dimensions, namely, dominant characteristics, organizational leadership, management of employees, organizational glue, strategic emphases, and criteria of success (Cameron & Quinn, 2011). These criteria were assessed using an in-depth discussion with the key contact person of all eight organizations.

In all of the cases studied, the supplier and manufacturer relationship is a strategic one. Most significantly, there is supplier-driven innovation. Hence, the suppliers are at liberty and motivated to develop new suggestions, ideas, and values. Therefore, all four manufacturing organizations take advantage of external sources of innovations that are initiated by their suppliers. Supplier innovation behavior reflects long term innovation intentions (Henke & Zhang 2010). Supplier driven innovations indicate supplier commitment to the relationship that goes beyond explicit cost and benefits (Henke & Zhang 2010). It will increase switching costs for suppliers and customers, and, further, it creates more dependencies (Henke & Zhang 2010). Thus, supplier driven innovations provide a context for the supply chain learning processes to occur.

Since there are other competitors in the market, the demand for the product is uncertain, and the manufacturer has given the supplier ample opportunity to identify demand uncertainties. Highly technological processes are used for manufacturing; therefore, small players are prevented from entering the market by the high cost of investment. Manual and automatic quality checking takes place, which assures via multiple reconfirmations (i.e., reconfirming the design and implementation of new initiatives through several methods). Consequently, indispensable are high-quality raw materials in addition to a specialized, safe, and healthy factory environment.



The manufacturers have high-cost production systems. The supply chain employees are specialists in one field, and have general knowledge in all relevant activities.

#### **3.4.6.2 Brief description of the joint learning activities**

Selnes & Sallis (2003, p. 81) identify “joint learning activities and supply chain learning as interlinked concepts”. Selnes & Sallis (2003, p. 81) conceptualize “relationship learning as a joint activity in which two parties strive to create more value together than they would create individually or with other partners”. Several studies consider joint learning as a joint activity between the supplier and the customer executed by facilitating information exchange, developing common learning arenas and uploading behavior accordingly (Selnes & Sallis, 2003; Huikkola, Ylimaki, & Kohtamaki, 2013). Thus, this thesis argues that joint learning activities provide a forum for supply chain learning process to occur.

The joint learning activities of the selected dyads include system, process, and product improvements; testing mechanisms; commitment-based training; long-term projects; life-long learning; sharing future plans; innovative forums; cross-functional teams for innovation; virtual structures; a culture of self-learning; joint investments; access to databases; and discussions. System and process improvements take place by identifying problems (and sub-problems); root cause analysis; process-driven problem solving; and analysis based on models. Product improvements consist of research to substitute raw materials; price innovations; sharing product ideas with competitors; adding new elements to raw materials; increasing the product purity level; and research with global experts and reputable laboratories.

Testing mechanisms include online testing, batch testing, total productive maintenance, dyad partners testing the same product by different mechanisms; new quality certifications; and environmental quality testing. Commitment-based training consists of assurances of job security; career improvement targets; freedom to suggest training programs; knowledge sharing with international corporate universities; and access to research laboratories and experts in the respective manufacturing fields.

The organizations shared plans concerning individual career paths, demand, investment (and investment specification), future expansion, future demand increases, and future commitments. From the participant's perspective, employee suggestion schemes, joint product improvement schemes, joint process improvement schemes, and links with experts and technologically advanced foreign laboratories were innovative forums. These innovative forums consist of related parties in the cross functional activities. The study found that lifelong learning, or learning in every moment in life of supply chain actors, enhances commitment to continuous learning.

The long-term nature of projects involves investments, creating linkage between dyad partners. The investments are mostly conducted with joint ownership. Ultimately, the accumulated organizational memory develops a unique expertise base: the dyad partners have access to field databases more than 100 years old. This strong knowledge base, developed over time, prevents reinvention of the wheel.

Data was collected between August 2013 and July 2016. All of the interviewees are supply chain actors related to joint learning activities. Observations were made and secondary data collection collected using the research protocols developed.

This research involves the participation of human subjects. An application for ethics was approved by Waikato Management School Ethics Committee (Please refer to Appendices 1, 2, 3 & 4 for the ethics application details).

### **3.5 Research methods**

The research method is the technique(s) or procedure(s) used to gather and analyze data related to the research questions of the study (Crotty, 1998). Case study data collection may comprise single or multiple sources (Yin, 1994). It may include documents, archival records, interviews, direct observations, participant observations, and physical artifacts (Yin, 1994).

This research study is cross-sectional (George & Jones, 2000). The science of supply chain management activities deals with a complex context using multi-disciplinary perspectives (Kotzab & Westhaus, 2005). Therefore, multiple data collection methods were used for the study.

#### **3.5.1 Data collection methods**

Research should have multiple sources of evidence to ensure quality data collection (Yin, 1994; Montgomery & Duck, 1993). Data was collected from primary and secondary sources. A study may make use of semi-structured interviews, direct and participant observations, and supporting documents, each with its own strengths and weaknesses. This ensures triangulation of the study (Yin, 2009).

Semi-structured interviews, of which the questions derived from several methods, were the main method of data collection. Insights were taken from early literature

at the initial level, were then adjusted according to the insights of the supervisory panel and industry experts. In addition, semi-structured interviews combine features of unstructured and structured interviews, which, as a result, give flexibility in developing theory through a consistent contribution of new insights.

### 3.5.1.1 Interview summary

The interview summaries of the four dyads are indicated in Tables 3.2 to 3.5. The interviewees were supply chain actors related to joint learning activities.

Table 3.2: Interview summary of Dyad A-B

	Position of interviewees in supply chain context	Time duration
Organization A	Manufacturing manager	0.75 hours
	Procurement manager	2 hours
	Engineering manager	0.75 hours
	Supply chain manager	1 hour
	Quality assurance manager (Key contact person)	2.5 hours
	Team leader - Quality assurance	1 hour
	Human Resources Executive 1	1 hour
	Stores assistant 1	0.75 hours
	Assistant manager systems	0.75 hours
	Human resources executive 2	1 hour
	Stores assistant 2	1 hour
	Organization B	Quality assurance senior manager (Key contact person)
Head of operations and supply		1 hour
Quality assurance assistant		1.75 hours
Administrative manager		0.75 hours
Marketing manager		0.75 hours
Head of quality assurance		1.25 hours
Total number of hours		20.25 hours

Table 3.3: Interview summary of Dyad C-D

	Position of interviewees in supply chain context	Time duration
Organization C	Quality assurance manager	1 hour
	Assistant sourcing manager	1 hour
	Stores executive	0.75 hours
	Procurement manager (Key contact person)	1 hour
	Procurement executive	1 hour
	Brand manager	0.75 hours
	Procurement assistant	1 hour
Organization D	Chief executive officer	1.5 hours
	Production employee 1	0.5 hours
	Production employee 2	0.5 hours
	Factory executive	3 hours
	Operations manager	1 hour
	Software design manager	0.75 hours
	Quality Assurance	1.25 hours
	Factory manager (Key contact person)	3.5 hours
	Production employee 3	0.5 hours
	Production employee 4	0.5 hours
	Production employee 5	0.5 hours
	Production employee 6	0.5 hours
	Production employee 7	0.75 hours
	Production employee 8	0.5 hours
Production employee 9	0.75 hours	
	Total number of hours	22.5 hours

Table 3.4: Interview summary of Dyad E-F

Organization E	Position of interviewers in supply chain context	Time duration
	Procurement manager (Key contact person)	1 hour
	Project manager	2.25 hours
	Marketing manager	0.5 hours
	Information technology manager	1 hour
	Packaging development manager	2 hour
Organization F	Packaging manager (Key contact person)	2.5 hours
	Sales manager	1.5 hours
	Total number of hours	10.75 hours

Table 3.5: Interview summary of Dyad G-H

Organization G	Position of interviewees in supply chain context	Time duration
	Purchasing assistant	1 hour
	Reverse logistics assistant	0.5 hours
	Logistics manager (Key contact person)	3 hours
	Procurement manager	1.25 hours
Organization H	Special project manager (Key contact person)	2 hour
	Sales manager	1 hour
	Total number of hours	9.75 hours

### 3.5.1.2 Summary of main secondary data sources and observations

The researcher has collected relevant secondary documents and observations of the joint learning activities of all four dyads until the model was saturated. The behavior patterns and interactions of employees of both organizations were observed without disturbing their normal behaviors. Table 3.6 and Table 3.7 provides a summary of the main secondary data sources and observations.

Table 3.6: Summary of main secondary data (Dyad A-B & Dyad C-D)

Dyad	Secondary data sources	Observations
Dyad A-B	Annual reports, raw material descriptions, process flow charts, feasibility studies, process charts, process parameters, monthly dash boards records, 5 “s” system records, supplier guidance principles, terms and conditions of purchases, technological reports, related brochures and other related documents.	Observation of factory premises, layout of the factory, production process and joint learning activities. For instance, the process of unloading of raw materials.
Dyad C-D	Annual reports, corporate social responsibility reports, raw material descriptions, process flow charts, feasibility studies, process charts, process parameters, documentation process of procurement, supplier guidance principles, terms and conditions of purchases, designs, changes to design, design change evolution, extensive review of the packaging technology used, products range, special packages, materials of packages, quality assurance records, color combinations, other related brochures and other related documents.	Observation of factory premises, quality assurance premises, stores, layout of the factory, operation process of package printing, production process related to joint learning activities were conducted during data collection and analysis process.



Table 3.7: Summary of main secondary data (Dyad E-F & Dyad G-H)

Dyad	Secondary data sources	Observations
Dyad E-F	Annual reports, sustainability reports, product design drawings, category portfolios, description to global brands, regional brands, local brands, raw material descriptions, process flow charts, feasibility studies, process charts, process parameters, evaluation records, 5 “s” system records, supplier guidance principles, terms and conditions of purchases, brochures related to joint learning activities.	Observation of factory premises, layout of the factory, use of 5 “s” system, meeting facilities, the behavior of employees in meetings, innovative office layout, lunch rooms and production process related joint learning activities.
Dyad G-H	Annual reports, raw material descriptions, recycling process, the management information systems, operation of the management information system, lay out of the warehouses and stores, process flow charts, feasibility studies, process charts, process parameters, monthly performance records, supplier guidance principles, terms and conditions of purchases, product range brochures with design specifications and other related documents.	Observation of factory premises, recycling process, the nature of the product handling, recycling data, the data management process of the warehouse, layout of the factory, layout of the office and production process related to joint learning activities. For instance, observation in to the construction process of new factory expansions.

The next section elaborates the data collection procedure of the study.

### **3.5.2 Data collection procedure**

The researcher interviewed the key informants of the two supply chain partners, and the interview list grows as further information was given by informants. An interview with each participant took around 60-90 minutes. At the same time, the required learning processes and documents for reference were identified. Site and participant observations were conducted appropriately. The researcher used ethically approved interview and observational protocols to collect data and take notes while interviewing. Hence, a recorder was used with the interviewee's permission only. The researcher took field notes of observations. In addition, the data gathered through interviews in the form of notes and tape recordings were kept in a locked cupboard, of which the only key is in the researcher's possession. The researcher used a password-protected personal laptop computer to store soft copies of data.

### **3.5.3 Data analysis methods**

Analyzing case study evidence is a difficult task since the techniques remain undefined. Nevertheless, it is necessary to have a general strategy of analysis from the beginning (Yin, 1994). For this study, the data analysis process essentially consists of a spiral: managing data, reading, describing, classifying, interpreting, representing, and visualizing (Creswell, 2007). In practice, this means filing and organizing; reflecting and writing notes, context, codes, themes, and causal maps; pattern recognition; and developing a framework of supply chain learning and its dynamics (Creswell, 2007).

### **3.5.4 Describing, classifying and interpreting data**

The study used the constructivist grounded theory thematic for data analysis.

#### **3.5.4.1 Thematic analysis**

According to Braun and Clarke (2006), “a theme captures something important about the data in relation to the research question and represents some level of patterned responses or meaning within the data set” (p. 82). Thematic analysis is a method “for identifying, analyzing and reporting patterns (themes) within data” (Braun & Clarke, 2006, p.79). It is prevalent in many fields but there is no clear agreement on the method (Braun & Clarke, 2006). Thematic analysis is not embedded in any pre-existing theoretical framework, thus, opening the door to the use of various theories (Braun & Clarke, 2006).

Saturation was initially seen as the best standard to measure value addition in building qualitative theories, but it has multiple meanings and limited transparency (O’Reilly & Parker, 2012). Instead, researchers now hold that the feasibility of qualitative research is related to sampling adequacy, which provides depth and maximum opportunity for transferability of the findings (O’Reilly & Parker, 2012). Sampling in qualitative research depends more on information richness than the number of participants (Kuzel, 1992). There are no accepted guidelines or tests for estimating the sample size to reach saturation (Guest, Bunce, & Johnson, 2006).

#### **3.5.4.2 Constructivist grounded theory thematic analysis**

The data analysis used the grounded theory thematic analysis technique to code the data. Intensity and maximum variation sampling were used to select a broad range of phenomena under study. In this qualitative study, incidents and events related to the phenomenon are subject to the constant comparative method – exploring difference and similarities across incidents within the data and providing guidelines for further data collection.

Open coding is conducted based on the following queries: What is happening in the data? What is the basic socio-psychological problem? What accounts for it? What patterns are occurring here? Open coding categories are expanded in terms of their given properties and dimensions. A concept goes through four stages: emerging excitement, the validity challenge, tidying up with typologies and constructs collapse (Hirsch & Levin, 1999). The study assumed that supply chain actors' feelings about the joint learning activities must be related to supply chain actors' feelings gained from engaging in joint learning activities.

After identifying codes, axial coding was conducted, which relates categories to other categories. Codes were categorized depending on causal conditions, strategies, contextual conditions, and consequences. The categories were used to identify the context (structure) and the process of the phenomenon before selective coding takes place, the process by which categories were related to the core categories. Finally, categories were integrated and developed into a theory.

The empirical data analysis was mainly conducted using NVivo 12 PLUS software.

### **3.6 Qualitative data analysis using NVivo 12 PLUS software**

All the interviews were transcribed using a standard transcription format. The interviewer and interviewee bias were tackled through a strategy of recording the interviews. Interviewees were guaranteed the confidentiality of their responses to minimize the possibility of socially desirable responses hiding the truth.

The data gathered from semi-structured interviews, observations, and secondary data sources was analyzed using NVivo 12 PLUS software, which enables a wide variety of coding; management of data and ideas, including queries; visualizations of, and reports derived from data. This software platform provides ample opportunity to analyze audio, video and documents (Siccama & Penna, 2008). NVivo 12 PLUS software further allows thematic analysis, data retrieval, in addition to separate and combined analysis of each code, theme, and abstract concept. NVivo 12 PLUS allows auto coding or manual coding of qualitative data. Auto coding is mostly used for structured interviews with the same questions where the answers can be analyzed automatically. Manual coding is mostly used in semi-structured or unstructured questionnaires where the answers are different. This thesis utilized a manual coding method. It is frequently used to explore a new research area.

This study investigated the social-psychological processes of supply chain learning and its dynamics via semi-structured questionnaires with a wide variety of answers. Therefore, the most suitable approach was manual coding. The codes were combined as themes in NVivo 12 PLUS, and the themes as abstract concepts. NVivo 12 PLUS enables the researcher to dynamically rotate codes, themes, and abstract concepts for full saturation of the dataset (QSR international, 2017). The NVivo 12 PLUS platform also facilitates a variety of classification mechanisms of the sources and nodes (QSR international, 2017). In analyzing data, NVivo 12

PLUS permits the creation of a dynamic model, different types of charts, cluster analysis, and tree maps (QSR international, 2017). NVivo 12 PLUS enables the qualitative researcher to analyze data in numerous different ways, as indicated in the following section, which is not supported by the manual qualitative data analysis (QSR international, 2017).

### **3.6.1 Representing and visualizing data using NVivo 12 PLUS software**

The next few sections indicate the main steps of interview data analysis using NVivo 12 PLUS software.

#### **3.6.1.1 Attributes, values, classifications and creating initial nodes**

Initially, interview transcripts were imported into the project. Then, reading through transcripts allowed the researcher to get initial views about the data set. All participants were addressed using position titles to adhere to confidentiality. Thereafter, attributes, values, classifications of interview transcripts are created in NVivo. Attributes are characteristics of a data set (e.g., age, experience, type of innovation) that use to categorize data sources. NVivo facilitates to create any number of attributes, for documents or nodes that lead to identifying patterns of data. Each attribute has any number of values, as indicated in Figure 3.3. The case classifications option of NVivo 12 PLUS allows classifying attributes and values to explore patterns, as indicated in Figure 3.4. The researcher used the above insights in creating initial codes.

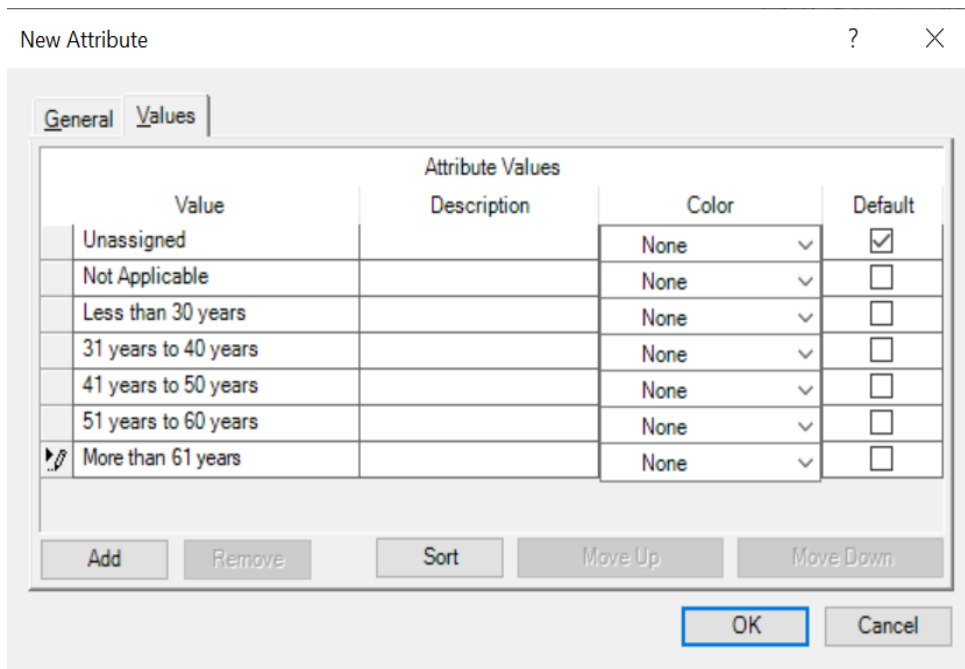


Figure 3.3: Attributes and values

The 'Demographics' window displays a table with the following data:

	A : Age
1 : Assistant sourcing manager-C	31 years to 40 years
2 : Engineering manager-A	31 years to 40 years
3 : Human resources assistant-A	31 years to 40 years
4 : Human resources executive-A	41 years to 50 years
5 : Information technology manager-E	41 years to 50 years
6 : Logistics manager-G	41 years to 50 years
7 : Manufacturing manager-A	31 years to 40 years
8 : Marketing manager-E	41 years to 50 years
9 : Operations and supplier manager-B	41 years to 50 years
10 : Packaging manager-E	41 years to 50 years
11 : Procurement executive-C	31 years to 40 years

Figure 3.4: Classifications

**Text mining queries.** This includes word frequency query, word cloud, and treemaps.

**Word Frequency query.** Word frequency query option lists the most frequently occurring words or concepts in single, multiple, selected, or all sources (QSR international, 2017). These results were used in identifying potential themes in the analysis.

**Word Cloud.** Word cloud option shows up to 100 words in varying font sizes. In fact, larger font sizes corresponded to frequently occurring words, as indicated in Figure 3.5 (QSR international, 2017). These results were used in identifying potential themes in the analysis.



Figure 3.5: Word cloud



**Treemaps for queries.** Treemaps display up to 100 words as a series of rectangles. Larger rectangles are frequently occurring words, as indicated in Figure 3.6 (QSR international, 2017). These results were used in identifying potential themes in the analysis.



Figure 3.6: Tree maps for queries

**Open coding.** Open coding was conducted using the "Nodes" function of NVivo. Open coding involved recognizing initial patterns of data. The researcher continues to open at this stage, and also, continue the thought process by comparing data with data as well as data with codes (Charmaz, 2006). All coded data were linked to the respective codes in NVivo 12 PLUS, as indicated in Figure 3.11. Further, NVivo links all coded references and/or sources, as shown in Figure 3.7.

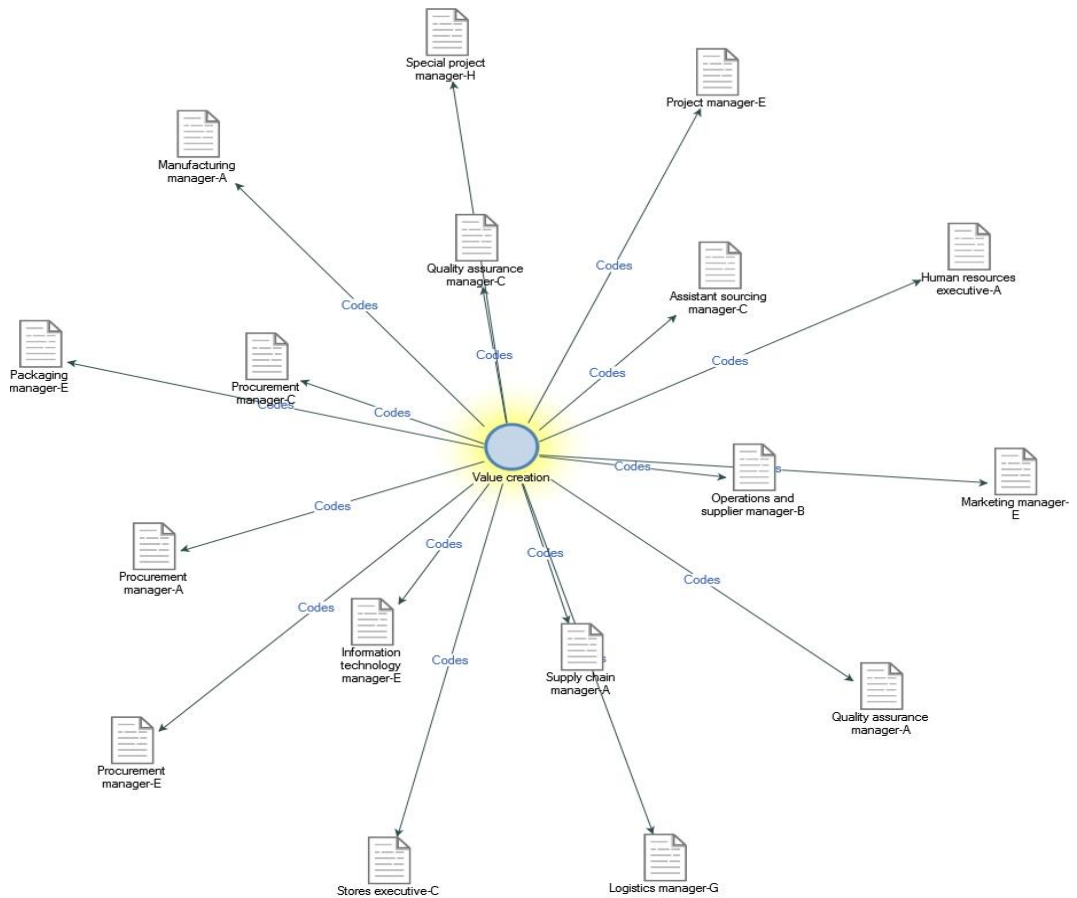


Figure 3.7: Data links with codes

The next section addresses the analysis stage of data using NVivo 12 PLUS.

### 3.6.1.2 Analysis stage of NVivo 12 PLUS

Analysis stage of NVivo 12 PLUS was developed using theory-building queries, running queries, matrix coding queries, framework matrixes, cross-case queries, and comparison diagrams of codes and interviewee transcripts.

**Theory building queries.** Various queries were generated, and data were analyzed in a variety of ways. Running queries allowed the researcher to explore more complex aspects of nodes. Matrix coding query facilitates a variety of cross-tabulations of pairs of items, and the output is displayed in excel sheets, as indicated in Table 3.8 (Bazeley & Jackson, 2013). The researcher used these cross tables to compare and contrast subgroups in the database. These insights were used to move, merge, and rename initial codes. Then, the results were used in developing a hierarchical structure of the nodes or parent and child codes, as indicated in Figure 3.11. Queries showed that initial hunches appear in data. Queries option enabled the researcher to explore interactions among themes, sources, and data.

Table 3.8: Matrix coding query

	Use of external experts	Use of internal experts
Problem identification	30	25
Needs identificaiton	45	33

**Framework matrixes.** Framework matrixes consist of comparing nodes, i.e., cases in rows and nodes in columns, as indicated in Table 3.9 (Bazeley & Jackson, 2013). Framework matrixes not only allow identification of common patterns across dyads but also identify individual cases that are contradictory to the trend (Bazeley & Jackson, 2013).

Table 3.9: Framework matrix

Cases	Innovative focus	Intuition	Need identification
Designing	Exploring new energy for gas production (Non-petroleum)	Experimenting with new components of gas that reduce cost and increase the taste	Plastic waste problem: designing the new recycling process to convert waste plastic packages into plastic pallets
Substantial innovations		Factory expansion to another area	Research into tobacco manufacturing
External experts	Contacting non-petroleum and sustainable gas production experts		
Internal experts		The new factory layout design	Exploring customer trends

### Comparison diagrams between codes and interviewee transcripts

A large number of comparison diagrams were run, as indicated in Figure 3.8, in conducting cross-case analysis and comparison of data and sources.

The researcher used the above insights in creating initial codes. The software has the ability to directly move into the linked data sources, matrixes, and classifications related to causal relationships. Using these insights researcher has developed an excel file identifying patterns across four cases.

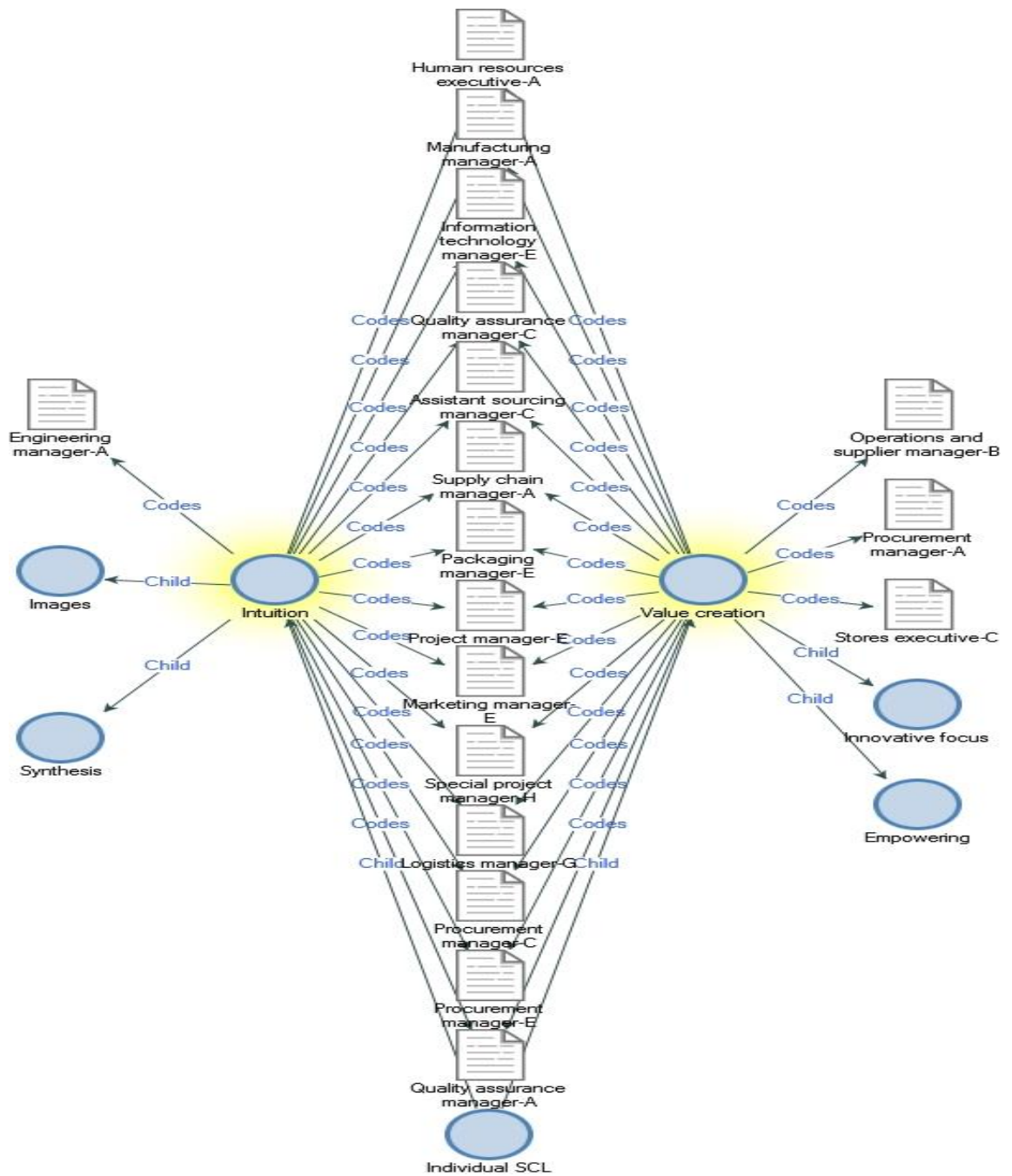


Figure 3.8: Comparison diagram between codes and interview transcript

The next section addresses the theory-building stage of data using NVivo 12 PLUS.

### 3.6.1.3 Theory building stage using NVivo 12 PLUS

Theory building stage involved reliability and validity testing, cluster analysis using Jaccard's coefficient, merging nodes into hierarchies, single case analysis, and cross-case analysis, followed by the final developments of models and relationships.

**Reliability and validity using NVivo 12 Plus.** The visuals of the main themes show the percentage of contribution from participants to codes (QSR international, 2017). For example, matrix coding queries produce a template, as indicated in Figure 3.9, and it shows that a number of participants collectively commented on the selected theme. In addition, Figure 3.9 showed the triangulation of ideas by various participants.

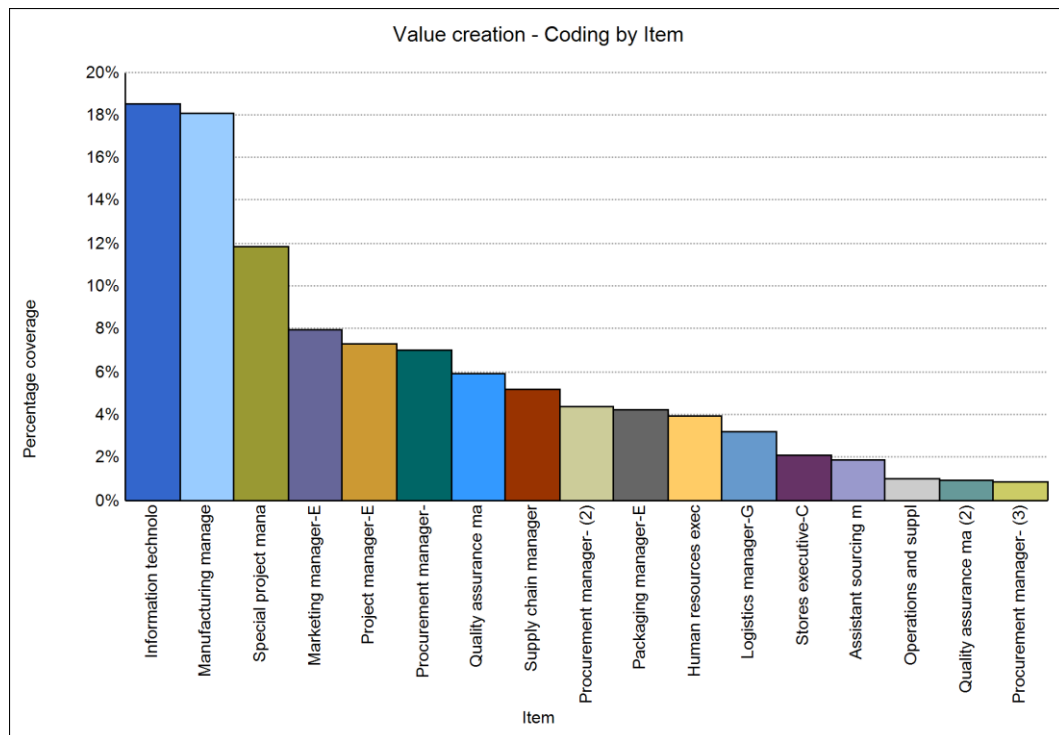


Figure 3.9: Triangulation of insights

### Cluster analysis using Jaccard's coefficient of two nodes

This study used cluster analysis using Jaccard's coefficient of two nodes in developing a higher level of clarity of words in codes in developing higher-order themes of theories.

The resulting numeric coefficient provided a helpful guide concerning the similarity in the content of coded references in both nodes. The following Table 3.10 and Figure 3.10, illustrate Jaccard's coefficient modeling on the nodes of "supply chain contract execution" and "initial expectation" recognized as a coefficient of 0.12. That indicates both selected nodes contained coded references that related to the higher-order theme of the "supply chain contract process". Further, it was possible to return to the original transcripts and reflect on the significant findings and the meaning. This process could continue as a cycle until achieving a higher level of clarity of words. This allowed the extrapolation of an overall summary of the findings.

Table 3.10: Jaccard's coefficient for nodes

Code A	Code B	Jaccard's coefficient
Nodes\\O SCL\\Exploitation capability\\Supply chain contract process\\Supply chain contract execution	Nodes\\O SCL\\Exploitation capability\\Supply chain contract process\\Initial expectation	0.126801

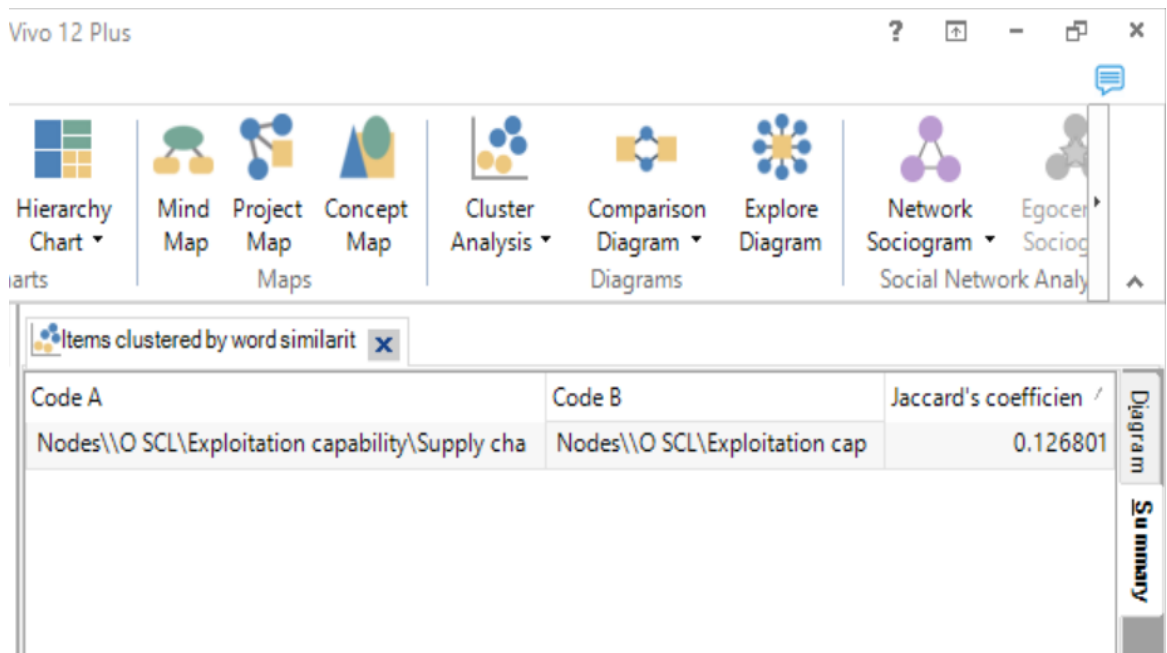


Figure 3.10: Jaccard coefficient for codes NVivo 12 PLUS

**Merging nodes into hierarchies.** Axial coding relates "categories to subcategories, specifies the properties and dimensions of a category, and reassembles the data researcher has fractured during initial coding to give coherence to emerging analysis" (Charmaz, 2006, p. 60). The researcher used a large number of NVivo analysis sheets to identify the diversity of situations, actions, and interactions of the data (Strauss & Corbin, 2008). These insights were used to develop reasons to link themes, subthemes, and parent-child node displays in NVivo, as indicated in Figure 3.11.



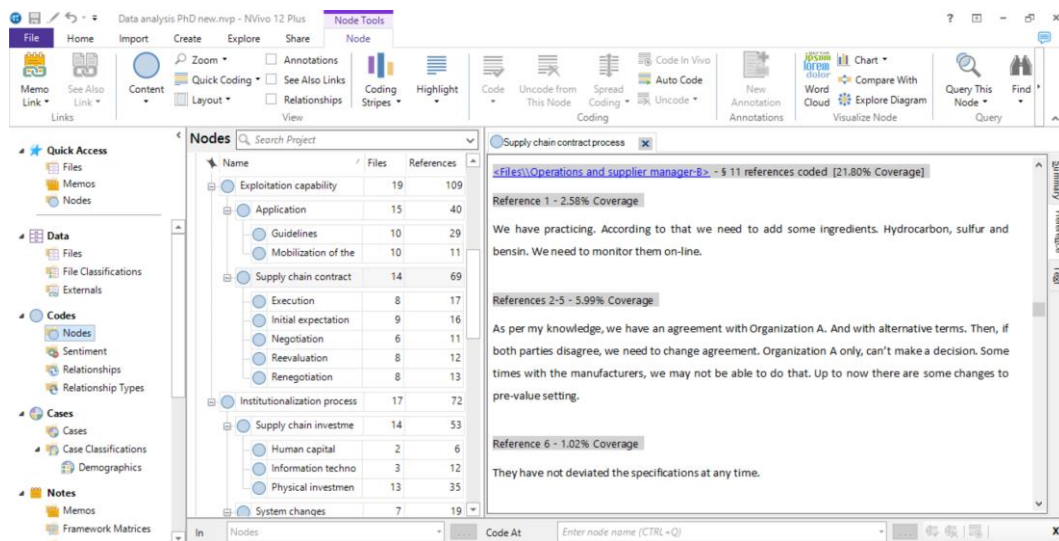


Figure 3.11: Code structure

**Single case analysis and cross-case analysis.** The researcher has developed initial coding for four dyads separately. Recurring themes, odd discrepancies, or significant concepts are identified for each separate dyad (Bazeley & Jackson, 2013).

Then, the cross-case analysis compares and contrasts insights of one dyad with other dyads, using the results of theory building matrix queries and framework matrixes (Bazeley & Jackson, 2013). Theory building matrix queries allow to compare cases on specific factors, refine, add additional dimensions (Bazeley & Jackson, 2013).

**Models and relationships.** Core themes were selected in the selective coding stage, and a storyline was articulated that resulted in theory generation (Charmaz, 2006). NVivo 12 PLUS data analysis produced patterns in various ways. A collection of

patterns is a causal model, i.e., an empirically grounded network of concepts with causal connections, which helps in theory building (Charmaz, 2006). The researcher used NVivo analysis results to articulate the theory of the study.

The purified data were used in causal mapping or model building while using multiple heuristics methods in building causal relationships. Results of matrix queries and framework matrixes have been used in developing causal relationships of cross-case analysis. A causal relationship with high frequencies was added to the thesis. Further, the initial causal relationships were refined using a variety of methods such as applying continual “why and how” analysis and contacting interviewees and key contact persons to get their rule of thumb. In addition, the researcher refined causal relationships by incorporating supervisory panel comments at various stages of theory development.

Models were created using "Mind Map", "Project Map" & "Concept Map" options of NVivo 12 PLUS. The researcher has created and stored a large number of models, continuously update, link, and delete data to models. The layering of sub-models to the main model was conducted in the development of the theory. Further, the researcher linked the results of analysis tools such as single case and cross-case queries to models. For example, the data was linked to causal maps, as indicated in Figure 3.12. Further, the software can directly move into the linked data sources related to causal relationships.

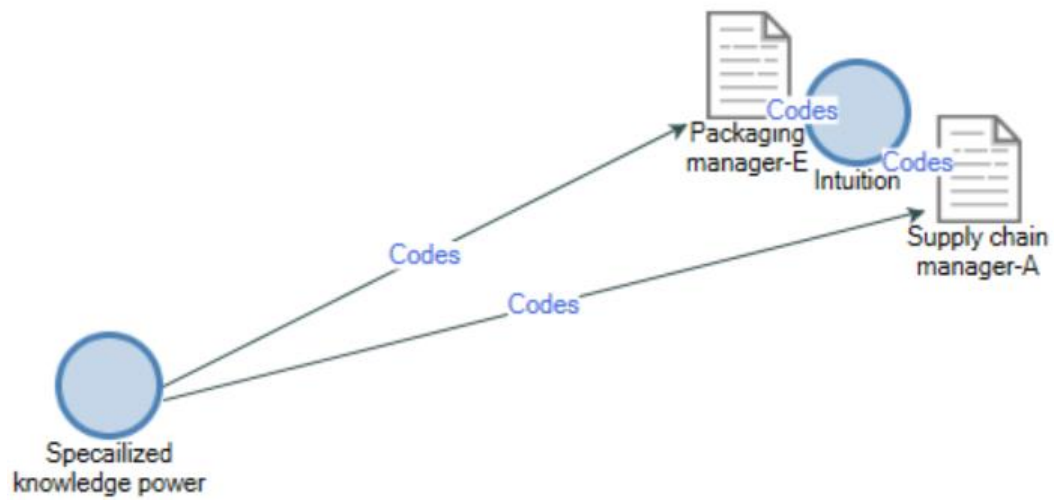


Figure 3.12: Causal model related to individual level of supply chain learning

The next section addresses the sample size and saturation of the study.

### 3.7 Sample size and saturation of the study

As mentioned above, a minimum sample size for non-probabilistic sampling is not available (Guest et al., 2006), and there is little research on the number of interviews needed for qualitative research. A general norm holds that 15 is the smallest acceptable sample size for qualitative research (Bertaux, 1981; Guest et al., 2006). Most qualitative researchers concur that more than 20 interviews add little ‘new’ data to a model (Green & Thorogood, 2013). In general, qualitative research samples need not be greater than 60 participants (Charmaz, 2006; Creswell, 2007).

The guiding principle of sample size in qualitative case study research is the concept of saturation, or no new information or themes arising from new data (Mason, 2010; Guest et al., 2012; Morse, 1995).

### **3.8 Code development over data analysis**

Code definitions are developed using a standard method (MacQueen, McLellan, Kay, & Milstein, 1998) that has five elements: brief definition of the code according to the analyst's memory; full definition; based on data when to use the code; based on data when not to use code; and example sections of the data that best describe code (MacQueen et al., 1998).

Coding is an iterative process (Sekaran & Bougie, 2010), in which data is repeatedly explored to increase understanding of what it represents (Skearan & Bougie, 2010). Initially, the researcher needs to select the coding unit, which may be words, sentences, paragraphs, or themes (Sekaran & Bougie, 2010). Code development can take both inductive and deductive forms (Sekaran & Bougie, 2010).

The analysis of code development is a method to identify saturation in the study (Guest et al., 2006). A further thematic analysis was conducted to identify how many interviews were needed to achieve a reliable model. The analysis of cumulative code development over four dyads is indicated in Figure 3.13. The majority of the codes (90%) were derived from analysis of the first seventeen interviews with the first (A-B) dyad. Few new codes were generated from twenty two interviews with the second (C-D) dyad, resulting in a total of 96 percent of codes being identified. The third (E-F) and fourth (G-H) dyads did not result in major changes to the theme definitions, although the seven interviews of the E-F dyad provided the balance of the 100 percent code generation since the six

interviews of the G-H dyad did not result in new code generation. This indicated that the model is saturated. According to consensus theory (Romney, Batchelder, & Weller, 1986), the study derived a socially constructed world, distinct from the real world.

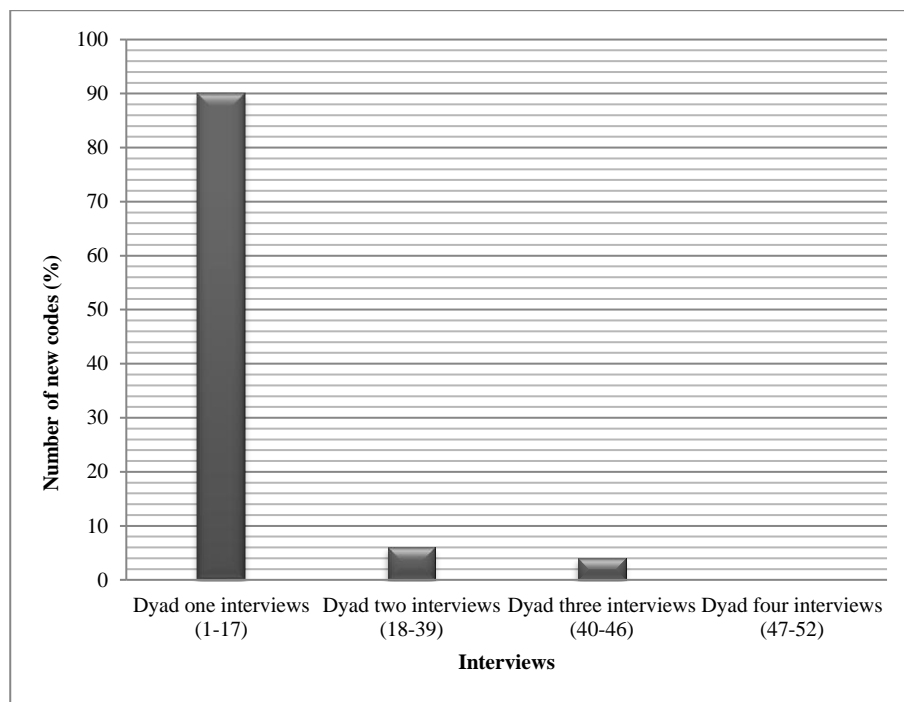


Figure 3.13: Code creation over data analysis

### 3.9 Code definition changes over data analysis

The analysis of code definition changes helps to analyze the degree of saturation of a qualitative study (Guest et al., 2006). Definition changes include adding and deducting features to the codes conducted throughout data analysis. Saturation depends on the investigators' proclamation and evaluation of the adequacy and

comprehensiveness of the results (Morse, 1995). It is not the quantity of data in a category but the richness derived from detailed description that is considered theoretically important to the saturation process (Morse, 1995).

Data reduction is used throughout the analysis process to sharpen, sort, focus, discard, and organize data (Mills & Huberman, 1994). The researcher used multiple methods such as reviewing literature, discussions with interviewees, supervisory panel advice and cluster analysis to decide which data chunks to be coded and which to be pulled out and which evolving story to be told (Mills & Huberman, 1994). Further, the researcher obtained the assistance of selected interviewees to code a few transcripts and conducted discussions to rectify inter-coder differences, which improve the reliability of the findings.

For example, the initial data analysis stage identifies self-esteem as a concept that consists of “self-confidence” and “recognition”. However, the iterative process of data analysis finetunes and finally ends up with intrinsic motivation as a concept, and self-efficacy, recognition, engagement, and achievement needs as sub-themes.

### **3.10 Analysis of secondary data**

The researcher has analyzed secondary data using NVivo 12 PLUS software. Appendix 8 illustrates the analysis of the selected secondary data using NVivo 12 PLUS software. Most of the methods used in interview data analysis have been utilized for secondary data analysis as well. Initially, secondary data were imported into the NVivo project. Then, reading through secondary data allowed the researcher to acquire initial views about the data set. Thereafter, attributes, values, and classifications of secondary data are created in NVivo. The researcher used theory-building queries, queries, matrix coding queries, framework matrixes, cross-

case queries, and comparison diagrams. Although, it is difficult to add comprehensive analysis sheets to the thesis, secondary data analysis enriched the insights gained through the data collected in the interview. These findings are used to triangulate the thematic analysis findings.

### **3.11 Chapter summary**

This chapter has comprehensively elaborated on the scientific base of the study. It consists of five basic elements of the research process: ontology, epistemology of the study, theoretical perspectives, methodology, and research methods. In addition, qualitative data analysis using NVivo 12 PLUS is discussed. Ultimately, this chapter elaborates the most appropriate approach to exploring the research gaps identified in the social-psychological processes of supply chain learning. The key insights of the chapter are outlined in the following sections.

- Relativism is the most suitable ontological stance as it focuses on local, specifically constructed and co-constructed realities.
- Constructionism is the most suitable epistemological stance as it involves developing subjective meanings of experiences of certain objectives and things. The meanings are many and varied.
- Interpretivism is the most suitable theoretical perspective for the research gaps as it considers socially constructed reality and the researcher's interpretation of the phenomena.
- The theoretical contribution in terms of three main building blocks of theory development addresses what, how and why. It identifies that multi-level theories bridge the micro-macro divide of the domain of interest.

- The qualitative multiple case study is identified as the most suited research methodology.
- The use of external reliability, internal reliability, internal validity, and external validity to measure the strength of the theory of the study is identified.
- Semi-structured interviews, direct observations, participant observations, supporting documents and qualitative data analysis methods are used as most appropriate research methods.
- Multiple units of analysis are used and it is recognized that each unit of analysis may require a specific research design and data collection strategy.
- This qualitative study uses the purposive sampling strategy at different levels of the study.
- The data analysis uses thematic analysis, application of constructivist grounded theory thematic for data analysis, and secondary data analysis.
- Data is represented and visualized with single case study analysis and multiple case study analysis.
- The concept of saturation is used in reaching the optimum level of theory building

The next sections of the thesis elaborate on the findings of the case studies and add new insights to the theory of supply chain learning.



## **Chapter 4: Findings and Discussion - Elements of supply chain learning and it's linkages: A multi-level perspective**

### **4.1 Introduction**

This chapter addresses the findings and discussion of the study related to the elements of supply chain learning. Findings and discussion that relate to the following research questions are presented:

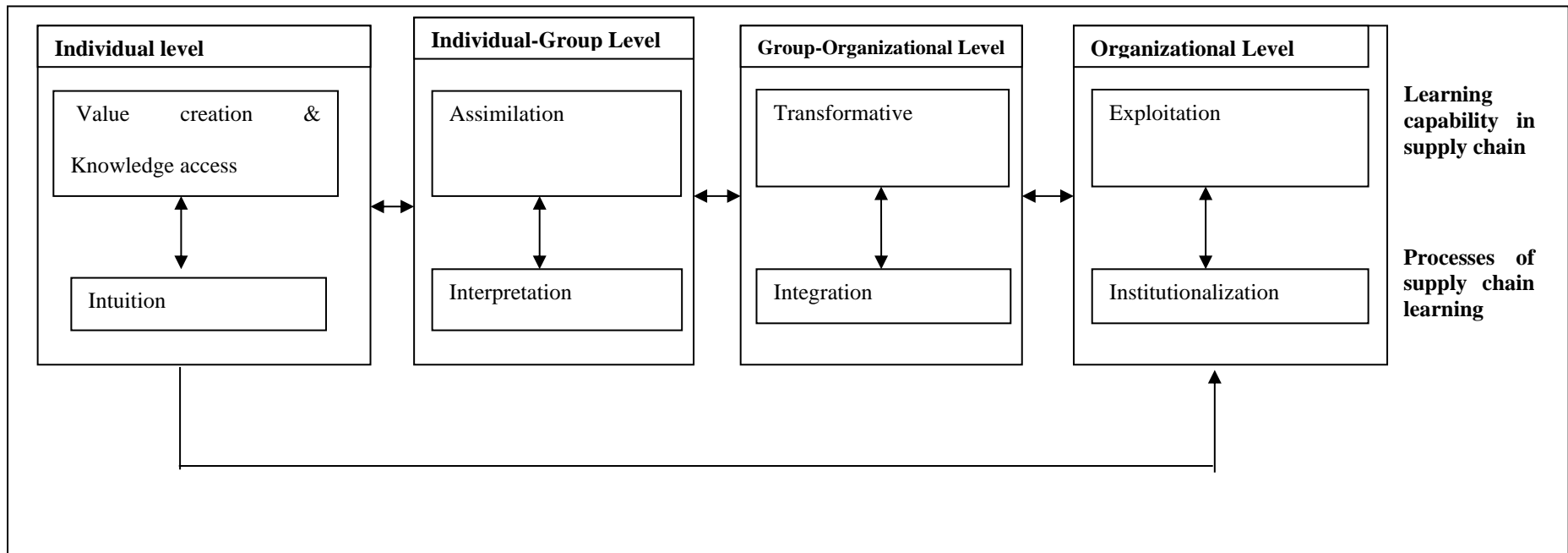
- What are the dynamics of the elements of supply chain learning?
- What are the linkages among the elements of supply chain learning?

Elements of supply chain learning consist of capabilities and processes. Here, learning capabilities are referred to as "learning capabilities in the supply chain" and learning processes, as "social-psychological processes."

The chapter begins with discussion of the learning elements at the individual, individual-group, group-organizational and organizational levels. Then, the findings of the cross-case analysis are presented. The findings underscore the crucial role of interdependencies, diversity, sequential-steps and uniqueness as embedded features to learning capabilities and processes. Finally, the chapter articulates the conceptual model and contributions of the study.

## **4.2 Findings of elements of supply chain learning: A multi-level perspective**

This section explores the dynamics of learning capabilities in the supply chain and the associated processes of supply chain learning. These findings identify the nature of the elements of learning processes and learning capabilities in the supply chain at the individual, individual-group, group-organizational, and organizational levels (as indicated in Figure 4.1). In line with the literature, the cross-case study findings validate that supply chain learning is a cyclical process.



Source: Liyanage (2017a)

Figure 4.1: Elements of supply chain learning

The key abstract concepts, learning elements, and sub-elements, derived from the data for learning capabilities in the supply chain (LCSC) and processes (P), are indicated in Table 4.1. In developing theory, this study extends the content of the existing literature into behavioral elements of learning capabilities in supply chain and learning processes, by introducing the following themes and sub-themes. For instance, a review of the early literature indicates the recognition of value as an element of the individual level of relative absorptive capacity (Lane & Lubatkin, 1998). Therefore, this study extends existing literature by introducing value creation as the element of the individual level of absorptive capacity in supply chain context. Further, early literature recognizes images, metaphors as elements of intuition. Therefore, this study extends existing literature by introducing the value of visualization (images) with a holistic view (synthesis) as the element of intuition in supply chain context.

Table 4.1: Insights for multi-level absorptive capacities and processes

Abstract concepts	Themes - Learning capabilities in the supply chain (LCSC) or processes (P)	Sub themes
Individual level of supply chain learning	LCSC: Value creation	Innovative focus
		Empowerment
	LCSC: Knowledge access	Need for knowledge
		Speed of response
	P: Intuition	Images
	Synthesis	
Individual-Group level of supply chain learning	LCSC: Assimilation	Understanding
		Analyzing
	P: Interpretation	Conversations
		Perception
Group-Organizational level of supply chain learning	LCSC: Transformative	Challenging established practices
		Reframing
	P: Integration	Coordination
		Mutual adjustments
Organizational level of supply chain learning	LCSC: Exploitation	Improvements
		Application
	P: Institutionalization	System changes
		Supply chain investments

The next section discusses the dynamics of elements of the individual level of supply chain learning.

#### 4.2.1 Learning elements at the individual level of supply chain learning

The learning activities and processes related to an individual human mind take place within this category. Analysis of the data demonstrates how this initiation process that leads to learning at the other levels. Value creation and knowledge access were identified as the main themes for absorptive capacity in the supply chain. Similarly,

intuition was found to be the main theme for the social-psychological processes of learning at the individual level. These three elements are now discussed.

#### **4.2.1.1 Individual level of learning capabilities: Value creation.**

Understanding the future values that a dyad partner will require; value creation is critical at the individual level of supply chain learning. Findings from the cross-case analysis highlight the importance of several mechanisms in value creation. For instance, the C-D dyad, as a well-established supply chain practice, has in place extensive exploration mechanisms. These mechanisms are not limited to rigorous researching of existing products and processes, but extend to identification of gaps and future opportunities. Furthermore, due to the inherently complex nature of supply chain needs, products, and processes, the findings indicate that various mechanisms exist that focus on generating and capturing value. Cross-case analysis findings indicate that value creation is encouraged via an innovative focus and empowerment.

***Innovative focus.*** The empirical data indicates that innovation consists of all the decisions related to recognition of a future need, and the creation of a model to satisfy that need. By having an innovative focus, all four dyads studied are capable of sustaining a competitive edge. Findings reveal that the diverse nature of products and processes call for a variety of innovative efforts, such as individual effort on problem identification, need identification, research and development. The cross-case analysis indicates that C-D dyad employees are eager to seek out problems and identify needs related to product and process improvements. For instance, individuals are committed to articulating novel directions for handling plastic waste disposal, thereby increasing value to the dyad. The possibility of value also

accumulating to broader stakeholder groups outside of the dyad partners also fosters acceptance of innovative ideas. This process can be illustrated by comments made by a middle level executive:

The Production Manager investigated the problem of plastic waste disposal and related cost. He designed a new recycling process to convert waste plastic packages to plastic pallets. It reduces waste disposal costs. Of course, it adds value to us as well as to the environment. (Stores executive-C)

The findings also reveal that different needs lead to diverse innovations. For instance, the A-B and C-D dyads have needs that will substantially change supply chain operation activities and so requiring highly qualified external experts is a necessarily long-term process. On the other hand, the C-D dyad also needs to make substantial changes to its supply chain activities to fit with some unique requirements of its local context, thereby relying on local expertise in the needs identification and research and development processes. A senior manager illustrates the use of external expertise in a substantial process change involving gas production:

We have identified that our present gas production methods create environmental pollution. With the help of the parent company, which is located in a developed country, and its expert base for researching petroleum and sustainable gas production, I now have contacts with one of the highly recognized professors in this area. He is an expert and has links with the parent company. If we move, we can support our supplier to move into sustainable gas production. That will be a milestone in our partner relationship strategy. (Supply chain manager-A)

The A-B dyad operates within an environment where a continuous improvement culture prevails. Here, it can be observed that new innovations lead to the identification of further needs, leading to a chain of new needs identification. For example, and as reported by a quality assurance manager:

We have moved into online testing of some raw materials. However, I am planning to introduce appropriate online testing for several other materials. It requires a lot of commitments from both parties. Of course, our supplier is giving us its fullest cooperation. As an initial step, I am preparing a plan that includes the parameters of the measurement systems and the needs of both organizations. (Quality assurance manager-A)

A positive supplier relationship leads to further needs identification and prominence of a relationship that strengthens the innovative focus. The following quote exemplifies this finding. It describes how the managers of a manufacturing organization were willing to allow their suppliers' employees to spend regular time and effort on innovative package design for promotional campaigns:

This is an innovative packaging which they have brought to our attention. So we are going ahead with this innovation very shortly. Because they are interested in our business they continue to strive to develop different initiatives. We gave them visibility of our future. They are producing this one as a sample. We say this is a good product to us. That's how it goes. (Procurement manager-C)

The study also revealed that organization E's needs identification is influenced by its global business changes. This is because the organizational identity of organization E is strengthened by being a local arm of a highly respected fast-



moving consumer goods organization, which creates (advantage) gaps in the market:

Yes, it is a need created by the market... It is a global need. If you go back about 10 years, we were using very cheap, dry offset technology. There was no need for high tech printing technology. Then, slowly the competition appeared. We also think either our organization started that or competitor started that. It is a market need. Competition. Maintain the edge. Because our organization believes that we are creating gaps in the market. I mean if you need to succeed in the market, you need to really create the positive gaps. Then other companies need to bridge those gaps. (Information technology manager-E)

Comparatively speaking, the influence of global business changes on needs identification is less apparent for the C-D and G-H dyads. G-H dyad participants noted that research and development efforts always tend toward finding ways of identifying contexts in which to model the future needs of the dyad. Supply chain actors are self-motivated to create future needs. The supply chain actors focus on enhancing product design through research. For instance, one aspect of change to product design involved incorporating recyclability. The participants emphasized that they were paying attention to the most up-to-date knowledge to avoid reinventing the wheel. However, a lack of progress with sustainable recycling initiatives in Sri Lanka required that experienced professionals with a deep interest in the field were required to initiate in the field. As explained by a senior manager:

Recycling is an immature area in Sri Lanka. However, there is a great deal of potential in this area for us. We have just moved to recyclable designs. It is about the future and future image creation. I am interested in sustainable recycling. (Special project manager-H)

In short, identification and research and development efforts are critical aspects of an innovative focus capability.

***Empowerment.*** A core feature of supply chain learning at the individual level is the freedom to think of product and process improvements. Empowering individuals influences value creation capacity. However, the local and global nature of products and processes results in variations in levels of empowerment in the value creation process, so that empowerment mechanisms were found to differ across the four dyads. Despite the variety, which included empowering top management, suppliers, and manufacturers it was found that delegating to individual employees plays a dominant role at the individual level; resulting in the articulating of creative product and process designs.

The level of empowerment depends on product orientation. The locally oriented product ranges of organizations A, C, E and G have complete freedom to articulate changes. At the same time, A and C both have globally-oriented products, so limit the freedom to design to changes to global products.

In all four dyads, design creation ability varies depending on the specialized knowledge of the employees, so that freedom to design even locally oriented products is subject to employee capability. For instance, because of individual gas specialist's knowledge of gas combinations, the organizations have empowered selected individuals to effect design changes. This process is illustrated a senior manager:

Here, we have four gas specialists in soft drink gas combinations. We give full resources to conduct new gas combination experiments to each one of them. Each individual gas specialist involves in separate experimentation within our lab facilities. (Operations & supplier manager-B)

It is evident that delegating full freedom to think about new designs has led to substantial product changes. For instance, the supplier's factory executive of organization D is given full authority to create new promotional designs each year. It improves the self-confidence of respective employees to create further designs.

As a multinational, organization A's delegation of product design authority is limited due to its global product range, hence resulting in fewer internal design creations. One factory executive described an example of how the local nature of a product leads to delegating full freedom to think and its outcome:

I have to create the new design for promotional packages. I have full freedom to generate new designs. Last year, I designed a few packaging designs for promotional campaigns. The manufacturer has accepted the blue color package for the promotional campaign which was held in last year. We do not need to get permission from the parent company of the manufacturer for promotional package designs. I have full consent to design the package. (Factory executive-D)

The long term employer-employee relationships of all four dyads allow employees to identify each other's core strengths, capabilities, and potential. This allows management to empower the most appropriate individuals to the most suitable innovation activities. For instance, top management has recognized the packaging manager, who has been with the organization for around 10 years, and has empowered him to articulate a plan to change factory processes. In the words of the packaging manager:

I have a big task here. I have to decide steps that we need to consider in moving from old technology to new technology. All our machinery is tailor made to old technology. It is a problem that we face. There are many things

to plan to go ahead with changes. I am responsible to point out those things to management. I have articulated a plan. (Packaging manager-E)

It is evident that an employee's direct line manager is best placed to identify the core strengths, capabilities, and potentialities that can lead to empowering that employee. Direct line managers have continuous interactions with their subordinates, which allow them to properly assess their capabilities. For instance, in Organization B, quality assurance assistants report directly to the head of quality assurance. According to the head of quality assurance:

Actually, the senior quality assurance assistant and his junior assistant are the people who are doing the testing. They have been given authority to assess whether this is or is not okay. I can also check whether it has been done correctly. Check everything. And for good manufacturing practices and procedures, I have nominated the senior quality assurance assistant for that task. He has been given authority to give suggestions. (Head of quality assurance-B)

In contrast to the situation involving changes to global products, in all four of the dyads studied it is evident that there is much more freedom to make changes to production processes.

In the A-B, E-F and G-H dyads the majority of the learning processes are unique and internal employees are experts in specific processes. In such instances, a common approach is to empower these internal employees to make process design changes as they have the most expertise. For instance, the logistics manager in organization G is responsible for its unique recycling process, so top management has given him controlling power over the process. The following quote illustrates

this idea by showing how management has delegated unique processes to internal experts:

I have focused on improving the recycling process. It is an environmentally friendly and sustainable strategy. I am involved in looking at the possibilities for enhancement. We have the fullest cooperation of the top management in suggesting new ideas. (Logistics manager-G)

In contrast, in the C-D dyad the existence of common production processes for a range of products facilitates the use of delegated authority to external experts for process design changes.

#### **4.2.1.2 Individual level of supply chain absorptive capacity: Knowledge access**

In all the supply chains studied, individuals' knowledge deficiencies were found to play a critical role in deciding the need for knowledge and quick responses to the opportunities in the business environment.

*Need for knowledge.* With all four dyads being strategic supply chain relationships, the findings reveal that mostly the products and processes are unique to each dyad. This triggers the use of internal experts to identify knowledge deficiencies since the source of new knowledge is mostly available within the supply chain, making it easy to access specific and relevant knowledge:

Our parent company has a comprehensive way of evaluating a supplier; it considers financial strength, the entire supply chain process, linkages, information technology facilities and many other factors. Actually, our own procurement executive does not have that knowledge. So, what I did was arrange a session for her to see the value of that system and the importance

of creating an appropriate supplier evaluation system for our strategic supply chain partner. Now she is working on it. (Procurement manager-C)

However, in Organization A, globally-oriented products and their related common processes generally require external expertise to identify any knowledge deficiencies.

In organization C it was found that new employees lacked knowledge of printing techniques and processes. However, their willingness to learn and explore readily available knowledge within the chain made the process of knowledge access easy. According to one new employee:

I did not have that experience in printing in joining this company. What I did is I got it through supplier organization. Knowledge of how to do the printing. What sort of board sizes that are used. That is knowledge I got from the supplier organization. Frequent visits to the supplier, when we have an order running, I go and see how they do it. (Assistant sourcing manager-C)

Findings reveal that the value of new knowledge to the employee enhances knowledge access. Moreover, new knowledge availability from experts within the dyad helps in fulfilling the knowledge needs of employees and provides relevant, useful knowledge. Immediate benefit to the individual employee, in terms of addressing the tasks in hand, increases the value of new knowledge. For example, an engineering manager describes how capacity planning reports are important to help him fulfill future production plans:

Ah... capacity planning is conducted by the production planner. I can check with him. It comes under (my) planning. We are planning to install a new

line based on required time period. And on the initial volume and projected quality. (Engineering manager-A)

The E-F dyad operates in an industry where there is a high rate of technological change. Participants acknowledge the need to update technological expertise deficiencies related to their activities. This requires the use of external sources of knowledge regarding labeling technology. Willingness to acquire new knowledge is high as it involves addressing the knowledge deficiencies:

The supplier already has advanced systems for packaging. They only need slight improvements to reach our standards. However, we are not a static relationship. Therefore, further changes will definitely require new capacities and knowledgeable people. The product designers need to search for technical aspects of new labeling technology. (Procurement manager-E)

Similarly, the G-H dyad is in an expanding industry where managers need to focus on identifying new opportunities to gain profits. The findings indicate the importance of managers moving into new fields, such as recycling warehouses, as a profitable opportunity. Hence, management of the G-H dyad have focused on identifying gaps in the knowledge of individuals of their management team, who in turn are responsible for identifying knowledge deficiencies of their subordinates. The following remark by a senior manager indicates this point well:

Each manager is responsible to identify the new knowledge, skills, and attitudes needed to be cultivated within employees. I foresee the possibility of recycling crates. So, I personally search into recycling warehouses. Then, I identify the knowledge requirements that I should have as the logistics manager as well as what skills my warehouse assistant should have to face the future recycling challenges. (Logistics manager-G)

*Speed of response.* In addition to the need for knowledge at the individual level, speed is an important element. Fast response to change plays a critical role in a supply chain context. For example, supply chains with evolving customer needs require fast response and a deep appreciation of customer needs. The empirical findings indicate that, while speedy responses to operational activities are prevailing, high priority is also given to achieving a fast response to customer needs.

Early anticipation of needed changes to products enhances quick responses that satisfy customers. Familiarity with the product design processes is also a critical factor, and there is a need to track design change requirements of the customer; ideally in real time. For example, in the C-D dyad, frequent and ongoing design changes were observed. As described by one middle manager:

I am in the process of foreseeing the changes to the design. I have to track possible changes. Because there will be changes even after the early design is sent to production. (Factory executive -D)

In the G-H dyad, management focuses on internal expertise to anticipate product design changes. It is evident that those individuals who are involved in research to anticipate product designs are able to find a sequence of product design changes and quick responses when the real need arises. For instance, research into breakage points foresee vulnerable points and predicting time to failure, thereby becoming capable of finding a sequence of product design changes. This particular situation is depicted by the special project manager in the following quotation:

Research into breakage points has identified vulnerable points. The research actually gave amazing points to focus. Then, transferring these findings to the partners resulted in quick strategies for product handling in order to minimize breakages. (Special project manager-H).



Interestingly, innovations from the E-F dyad do not have other models to benchmark against; the novelty of the new product introductions requires rigorous trials to be made by internal employees.

The findings also highlight how a fast response to satisfying key customers is critical. For example, as was described by a supplier to a manufacturing company:

Our design engineer needed to somehow use a mould technology and the manufacturer organization only allowed 6 months of development time. So that's what we did. Output was to be 60 cases per hour. Initially, we were able to make only 45. I know that [the engineer] put his full effort to make it a reality. He came up with several prototypes. Only after 2-3 months rigorous trials were we were able to make 60. We trust his ability. We got the design within a shorter period of time. (Packaging manager-E).

It appears that achieving fast response to design changes can also depend on the strength of the relationship between the supply chain actors. For example, supplier B's long-time presence in its industry gives it the ability to respond to manufacturer needs quickly. Dyad E-F had a supply chain relationship lasting for several decades, which enabled a fast response to customer needs. Longer and stronger relationship means a better understanding of the manufacturer's need, and hence quicker and more contextual response is encouraged. The findings also indicate that long-term relationships and a diverse product range lead to further product introductions by internal experts. As one senior manager related:

Being in business for a long time, it gives some sort of confidence to us. In terms of reliability and they can supply for us. That's it. That is the only part for us. Because we know them for a long period. Because they do business for so many years. Therefore, we had a lot of subconscious confidence that

they can manage design changes in a timely manner. We trust their managers' technical expertise. (Supply chain manager-A)

#### **4.2.1.3 Individual level of learning process: Intuition**

The intuition of individuals was found to enhance value creation and knowledge access while adjusting to environmental changes to the supply chain context. Despite every supply chain partner being involved in the business of manufacturing, the broad nature of supply chain operations leads individuals to focus on different aspects of the intuition process.

Images and synthesis are identified as sub-themes of the intuition process. The main elements of intuition related to the contexts above are illustrated in the following description.

*Images.* At the individual level of learning, images are critical to stimulate value creation. Findings reveal the critical role of thinking in terms of visualizing models that shape the individual level of supply chain learning. In the C-D dyad, the managers need to visualize several aspects of the product. Hence, employees focus on step-by-step development of the components of products and processes. As remarked by the quality assurance manager:

In new product introductions, I have to develop possibilities for visual quality, physical quality, and machinability of materials. It requires step by step thinking. (Quality assurance manager-C)

Supply chain employees were able to find effective mechanisms for transferring detailed requirements. For instance, the C-D dyad's complicated art work design required visualization to organize the problems to be solved. As indicated in the

following quote, visualization of art work needs to consider requirements of both supply chain partners and printing issues. In short, the use of effective descriptive mechanisms, including diagrams, is essential for transferring detailed requirements. This is illustrated in the following quote by a middle manager:

In terms of dealing with the supplier organization. I would say, definitely, there would have been new technology. Looking at a very complicated art work... we might come across with... there are printing issues. In terms of price, it might not be feasible. I have learned a lot of knowledge in terms of pre-requisites and other complexities in terms of printing whenever we are coming across with new designs. (Procurement executive-C)

The findings indicate that the suppliers to organization D, which do not have a long-term relationship, have an incomplete knowledge of the processes related to products that cross supply chain entities and so cannot fully describe the real picture. Conversely, suppliers with a long term relationship with organization D were found to have a comprehensive knowledge; individuals could fully represent in drawings and descriptions all processes, including designing, packaging, mixing colors, painting, and framing. The following description captures how the employees of a core supplier are capable of representing the full description of the real world in strategies while another, short-term supplier, is not:

It has always been the case. See branding agency will look at the design and not in terms of getting the best quality paper. Not in terms of getting the quality ink. Not in terms of doing it in a bigger machine and getting it in-house early. The organization D has. He always comes up with suggestions. (Assistant sourcing manager-C)

**Synthesis:** At the individual level of learning, synthesis is also a critical element that stimulates value creation. This involves articulation of a plan that combines sets of aspects and identifies connections among those aspects. Synthesis is observed to be essential in the intuition process for two of the dyads studied.

Internal experts in the E-F dyad determine the components of products and processes to reconfigure, and mechanisms to put components together to enhance customer value. The findings indicate that product and process innovations are highly dependent on the conceptual thinking of top level managers in the E-F and G-H dyads. Putting elements together and developing a coherent whole requires experience of working into a particular field. One senior manager with many years of working experience described an example of synthesis:

Actually, there was not a major customer requirement to change into new package. But I saw that the present package is not so attractive on the supermarket shelves compared to our competitor products. I suggested that management should change our packaging and design to be more attractive. This involved consideration of many aspects such as parameters of the drawing, size of the pictures, materials to use, which technology to use and can our factory change into that technology. (Packaging manager-E)

The G-H dyad, which is operating within a changing industry sector, experiences uncertain directions in product and process improvements. In general, the soft drink industry is in the mature stage of the industry lifecycle. However, the selected organization moves ahead with product extension strategies, such as introducing relatively health-conscious soft drinks, moving into diverse market sectors, etc., which has resulted in a high-profit margin. Competition among industry players and technological changes related to product and processes make this a highly dynamic industrial sector. Further, the GH dyad has several products that are in

operation in different sectors of the industry. Therefore, the senior managers' many years of work experience are useful when developing and problem-solving new operations and deriving the relationships between them. An expert manager sees what needs to be done and how to achieve goals in a fast manner.

The following quote from a senior manager illustrates how non-logical responses and taking complex judgments are critical in a fast-changing supply chain environment:

My experiences in other areas have helped in doing a good job. Of course, it is also your common sense. How you look at things. And then, of course, save money and do different things. Actually, I have that mindset. What I see is a lot of people very scared to do new things. Because they are afraid of failure. We were not doing any hedging. Or anything as such. But then, after I came in, I have started hedging. You have to take a lot of effort to see whether the market is going. Still, you can be wrong. Because sudden things can happen. And then although you are looking at certain things... completely different something can come and hit you. So, we have taken the risk. And we have brought down cost tremendously. (Procurement manager-G)

However, top managers' non-logical, rapid decision-making in complex environment, which are critical in the fast changing environment of the supply chain, can sometimes fail. Thus, continuous tracking of external changes in the business sector and the self-confidence of top managers are critical.

## **4.2.2 Learning elements at the individual-group level of supply chain learning**

This section elaborates on the learning capabilities and processes at the individual-group level in the supply chain. Assimilation was identified as the main theme for absorptive capacity in the supply chain context. Similarly, an interpretation process is operating at the individual-group level of supply chain learning. These two elements are now discussed.

### **4.2.2.1 Individual-group level of supply chain absorptive capacity: Assimilation**

Due to the diverse nature of supply chain activities and the need to derive meaning and consider the diverse views of supply chain actors, learning capabilities at this level were found to be focused on understanding and analyzing.

*Understanding.* Findings indicate that all four dyads give particular attention to their oral, written and graphical communication and the value of determining the meaning of those messages. For instance, in the E-F dyad, participants expressed how each department classifies messages depending on the classifying mechanisms of the respective fields. The mechanisms of creating meaning are context-specific. Agreed upon criteria are then used to summarize refinements to the product innovations. The following illustrates this by showing how the marketing manager uses existing classification mechanisms before changing the size of a tub:

First, I discuss with my team about the size of the tub. Then, I discuss with marketing the potential customer reaction. Then, we have to discuss with the legal department about consumer laws. Then, from the factory guys, I

have to get confirmation that we can adjust our machines to create this larger size tub. Once we have agreed upon the criteria about the features of the tub, normally, I discuss with the suppliers' factory manager to refine the criteria of the product. (Marketing manager-E)

In organization B, teams of employees conducted a series of dialogs regarding a new era of gas production. Exploration of eco-friendly gas production processes leads to classifying functions of gas production into separate categories. Initial classifications lead to the identification of further classifications into world trends of each gas production function. The following illustrates this process by showing how the quality assurance manager and his team initially identify functions of the gas manufacturing process and then explore world trends for each gas manufacturing function. Discussions continue until final agreement is reached:

I and my team create a dialogue into new era of gas production. We explore eco-friendly gas production processes. For that, we create joint standards for each function. We scan information into world trends, most importantly, our parent company's data base. Still, this concept is in discussion stage. (Quality assurance senior manager-B)

Further, analysis of the technological reports of supplier's parent company validates the richness of data for the purpose of future innovations in the gas industry. These technical reports address rethinking existing energy sources. It involves technical details of moving into green energy sources.

In the G-H dyad, classification of ideas by both teams of supply chain actors leads to further needs identification. For instance, moving into plastic pallet manufacturing from the manufacturer's top management perspective considers profits in terms of transportation cost, quality, and on-time availability. And, it is

more beneficial for the manufacturer to purchase from the present supplier. In contrast, the supplier's top manager perspective on moving into plastic pallet manufacturing considers profits in terms of initial investment, quality, and cost of manufacturing - dissimilar classification of the cost-benefit analysis led to summarizing the plastic pallet manufacturing strategy as a non-feasible method for the supplier organization. The following quote from the special project manager illustrates this point well:

Recycling idea is accepted by both organizations as a sustainable strategy which would benefit both parties and environment. But, they suggest us moving into plastic pallet manufacturing as a supportive product for crates. We summarize standards for that product. But .... Anyway.....our criteria say.... 'Do not go ahead with this strategy as it is a loss for us.....' (Special project manager-H)

**Analyzing:** Findings indicate that the respective employees appraise specific aspects from their own perspective. Nonetheless, management obtains views from all its employees so as to organize the parts of the product into a coherent whole. The following quote shows how, in the G-H dyad, which is concerned with exploring significant product innovations, a series of team meetings is used to distinguish the most suitable shape of a crate that is less prone to damage:

We had a few team meetings regarding changes to the design of four corners of the crate. The present shape is prone to damage quickly. We reviewed several new shapes for stronger crate design. Our warehouse employees explain about the nature of crate damage from our end. Their warehouse employees explain about the nature of recycling crates. The factory manager of the supplier introduces us to evolving world trends. Well....with this basic understanding, our logistics manager informs me to get the views of



technical employees before deciding on the most suitable corner shapes.  
(Reverse logistics assistant-G)

In organization E, which is in a transition period, the relationship among the constituent parts of the innovation is unclear when each employee is not assigned a specific task in new product introduction. Hence, the organizing aspects of innovations are done by all related employees, which illustrates the unavailability of preexisting perspectives to organize, which leads to confusion. The following quote illustrates how unclear supply chain structures require everybody's opinion to organize new product introductions:

At that time, we didn't have the contract and everyone proposed their options. The manufacturing organization is in a transition period. If you ask a few people in the reporting structure, because of the transition, some may be confused. This was a supplier-driven innovation. Although they encourage supplier driven innovation, we haven't had the correct layout or process to carry out it with the development. (Project manager-E)

Organization C's management assigns its factory manager to handle supply chain learning activities in the C-D dyad so that organizing project activities is mostly the responsibility of the sole manager. The factory manager of "organization D", who is engaged in numerous coordination activities involving people and activities, is the key player of the C-D dyadic relationship. Moreover, although certain aspects of the pricing process are conducted by the finance department, as the C-D supply chain relationship is a special case, the factory manager involves conducting pricing, deciding which elements of pricing are to be considered, etc. The manager is responsible for the tangible cost and benefit analysis and intangible cost and benefit analysis. The following indicates how the availability of an exclusive manager leads to proper organization of operations:

I have worked here for 6 years. We deliver this brand mainly for our manufacturer. There are two sub-brands. We deliver around 12 million per month. The project is handled by me. The finance department will do costing. Though finance department does it, 90% of organizing is done by me. Pricing I do by myself. For their purchase orders, I am sending the pricing. (Factory manager-D)

#### **4.2.2.2 Individual-group level of learning process: Interpretation**

Case findings indicate that understanding and analyzing rely mostly on conversations and perception of the respective team members. Value adding conversations and perception play a vital role in the interpretation process of all four dyads. It was found that developing an interpretation is based on the perception of individuals. Findings of the cross-case analysis indicate that involvement of diverse supply chain actors results in gaps in perception. Nonetheless, long term interactions reduce gaps in the perception of team members.

***Perception.*** As expressed by employees in organization A (and organization E), the technical expertise of employees is given a critical place in constructing meaning in developing strategies. For instance, in Organization A, the engineering manager and his team perceive the applying lean concept in the production process mostly as a way of reducing costs. Thus, respective engineering teams analyze each process of the factory to identify opportunities to reduce costs. Notably, it was found that senior management's perception of interpretations is given the dominant place in providing meaning to aspects. The above scenario is depicted by referring to two top managers in the following quotations:

I believe in moving towards sustainable raw materials. It reduces the cost to us as well as to the environment. Thus, I am working with my team of employees towards optimizing cost and benefit in the supply chain. (Supply chain manager-A)

I and my team give more priority to reducing waste in factory processes. So, now we are doing step by step factory process analyses to identify areas to 'lean'. We believe that it can add value by way of reducing the cost of the production process. (Engineering manager-A)

Both organizations in the E-F dyad have recorded comparatively long years of relationship with supply chain partners, which results in long term employee relationships. Therefore, employees mention that gaps of perception regarding selected issues are relatively few, which leads to a quicker decision-making process.

We focus on long term supply chain relationships. I know that our supplier also has same logic in their head. That is why we can discuss most effective ways of reducing transportation costs by going ahead with several vertical integration strategies. It is still in the stage of discussion. We don't like to go ahead with short term strategies. It is not cost effective. (Procurement manager-E)

Conversely, in Organization D, where perceptual differences are recorded in a different department, this results in a lot of discussion for arriving at a decision. One senior manager reported that:

We had an issue with our outsourced transporter. They were not able to deliver goods on-time to our manufacturer premises. What I value most is we should satisfy our manufacturer - it is a strategic relationship. So, I

suggest searching for the backup transporters and allocating our own lorries to transport package to them. But my finance managers concern about is cost reduction. We had to have several meetings to prove my view to him.  
(Factory manager-D)

In all four dyads, different requirements are suggested by the supply chain partners, nonetheless, the perspectives of the dominant supply chain actors handling the specific task define the designs. For instance, in Organization G, the logistics manager breaks down the management information system into its component parts. Then, he conducts analysis to decide which parts should be given priority, and what parts should be added or removed, by considering the value added to the strategic goals. The following illustrates how the logistics manager's views dominate the handling of the management information system:

The supplier is highly focused on the new concept of 'recycling.' They ask us to add recycling related data as a separate section in our management information system. Actually, for us, the impact of recycling is lower. So, I am reluctant to add that data to our management information system. Presently, it is handled by the warehouse assistant. He is doing it very nicely. (Logistics manager-G)

**Conversations.** Conversations consist of subjective ideas, objective facts and groups of actors in all the firms studied. All four dyad partners maintain strong supply chain relationships and acknowledge the large time commitment needed for their discussions. Similarly, their long-term relationships add the ability to conduct deep conversations about the tasks, and all parties prioritize joint learning activities. Findings reveal that employees' pre-established relationships lower their initial reluctance to start conversations and the flow of meaning is made clearer in dialogues with group members, thus leading to meaningful conversations. More

effort is put into conversations that mostly concern people in a particular task. It was found that the dyad partners use different methods of communication.

In all four dyads studied, the findings show free flowing information among supply chain actors in informal discussions. Participants indicate that problem-solving is first approached using informal discussions when impressions of speakers can be made and thereby assumptions and certainties managed which would lead to free flow of information. One senior manager described an example of this style in the following quote:

Finally, it [problem solving] should be formal. But initially, it is informal. They have to inform it to us. We ask them to drop down the issues. And then we have to work together to resolve issues. Then we have to inform that to the business unit. (Supply chain manager -A)

In all four dyads studied, the mutual purpose or perception that another actor is working towards a common goal, interests or values in conversation is identified as a critical factor of successful conversation. When supply chain actors are working towards a common goal, findings indicate they are willing to listen and slow down. Such resolutions of contrasting views are what leads to the large effort put into conversations. The following quote from the logistics manager illustrates how both organizational members identify the need to change machine design as the common goal, and how successful conversations are held which lead to modified machines:

A couple of years back, both companies identified that we need to change the machine design. And then we knew that if there are any new suggestions now is the time to accommodate. So, that time we have done our part. And let's say based on that the modification is done. (Logistics manager-G)

Such processing of the facts leads to transforming existing supply chain activities, as discussed in the next section.

### **4.2.3 Learning elements at the group-organizational level of supply chain learning**

This section elaborates on the learning capabilities and processes at the group-organizational level in the supply chain that relate to conversion. Transformation was identified as the main theme for absorptive capacity in the supply chain context. Similarly, an integration process is operating at the group-organizational level of supply chain learning. These two elements are now discussed.

#### **4.2.3.1 Group-organizational level of supply chain absorptive capacity: Transformative capacity**

Challenging established practices and reframing play critical roles in transformative capability in all the dyads studied. Participants identified the critical role of deciding the outcome of the product or the process at the outset, then creating new meaning constructs focused on the intended outcome. Such transformation values the role of multiple angles to reframe meanings. Acceptance by all related teams of dyad partners facilitates reframing for the new system.

*Challenging established practices.* The major challenge when constructing new meaning is deciding the corresponding outcome for the product or process change.

It was evident that intended outcomes of the redesign of existing systems vary among the dyads studied. Organizations belonging to the A-B dyad have a relatively

new supply chain relationship. Staff employed by Organization A claim that the firm is supportive of drastic changes in the production process to increase integrity in production. For instance, staff is encouraged to decide the required outcome of the process with team members. The availability of technical knowledge from top managers and the respective departmental team drive decisions around the needed outcomes for processes. The following quote exemplified this idea by showing how management encourages the move into a total productive maintenance system:

We [the firm] have decided to move into a total productive maintenance system. That would reduce delays in manufacturing processes. Using this technique, we will focus on improving the integrity of the products and processes. (Manufacturing manager-A)

In the C-D dyad, being a well-established supply chain relationship, more focus is given to using internal expertise in a changeover of the process that involves designing outcomes and solutions. In contrast the G-H dyad, being in a growing industry sector, acknowledges the value of obtaining external expertise in designing outcomes and solutions. Being in the fast moving consumer goods industry, the E-F dyad values customer perception of prototype product changes.

Participants described how the starting point of constructing new meaning is identifying relevant knowledge sources related to a solution. There had been earlier instances when Organization E did not communicate the outcome of the new product introduction process to the supplier organization, resulting in new meaning construction that is misleading. Therefore, management now encourages continuous feedback when constructing new meaning for new product introduction processes.

A challenge was also observed in all four dyads when the outcome of the process or product is shared between multiple supply chain actors. The nature of the intended outcome is inseparable from creators, solution developers, and context:

Issues are basic sometimes. For example, let's say the lid for the tub is not fitting. So they would say this is the specification which you all gave. And we would say that you haven't done it properly. So, they would need to come together and understand what exactly we can do to sort it out. There were many issues like that. I mean those are concerns. Because these kinds of projects if you just let it go, it will not happen. So, there is a lot of back and forth idea transferring. A lot of taking feedbacks from several parties. So, therefore these issues are common. (Procurement manager-E)

Identifying the sequence of outcomes in a process change also appears to be a crucial element that motivates supply chain actors during the transformation process. Organization A demonstrated how various sources need to be considered when deriving new meaning to achieve intended outcomes. The following quote illustrates how the sequence of outcomes is identified:

The new concept of total productive maintenance requires several major changes in physical investments and human resources. First, we have focused on changing the old belt systems of the factory. It has a high maintenance cost. We use that for mixing our supplier's raw materials with other liquids in soft drink production. Of course, we have to train our employees to the new system. I predict that this change would reduce the majority of our maintenance cost. (Engineering manager-A)

In the E-F dyad, having complementary knowledge bases acknowledges that knowledge transference plays a leading role in creating new meaning within the



supplier organization team. For example, Organization E used regular customer surveys to discover the product packaging that is less appealing to its customers, meaning that this manufacturing organization has identified the nature of the required packaging. Within this context, dyadic partners need to decide which department and who to deal with in constructing new meaning to product changes. Moreover, as the supplier organization is an expert in packaging technology, it is easy for them to decide on the main aspects of the required solution that is important to achieve the required product changes. This process is illustrated by a senior manager:

Early on we had canned products. Customers need to use a cutter to open it. But now we have changed the lid with an easy opener. Tell you the truth; we have to struggle with many departments and with our supplier to make this dream a reality. First, our supplier needs to accept the design change. We show our customer survey analysis results to show the difficulties faced by our customers in opening a canned product. (Marketing manager-E)

The study participants highlighted the importance of recognizing the implicit frames or indirectly expressed assumptions in use before reframing system configurations. Also, due to the dynamism of the supply chain context, identifying implicit frames can be a complex task.

**Reframing.** Initially, recognition of critical internal and external forces driving the transformation process decides the success of manual to online system changes in the A-B dyad. Changing manual processes to online processes is identified as another critical method that could reframe management's objective of improving transparency. The following quote exemplified this idea by showing how the use of internal and external forces and their views regarding system changeover, make for a successful change effort:

When we introduced an online gas analyzer, by removing manual testing mechanisms of both organizations, our purchasing equipment specialists were concerned about the system configuration. That team analysed the suitability of transmitter, connecting unit, and valve. An expert from an Asian country helped us in the changeover process by adding a power supply board and user interface board. Suppliers from their end confirm the possibility of using the calibration tube in their labs. So.... Finally, it was a successful change over effort. (Quality assurance assistant-A)

The findings also indicate how examining the same situation from multiple perspectives fosters the reframing and that different individuals shape the activity in subsequent steps. Further understanding of the existing activity lies with the team of people engaged in the specific activity as they can effectively reframe the existing situation. One example:

There are several points of checking the accuracy of the raw material. When they load it onto vehicles at the supplier's premises and again when it comes to us. Before unloading, our store team test raw material components using our testing system to measure it. It signals that relevant changes are incorporated in the correct manner. (Stores assistant-A)

The incorporation of multiple points fosters sense making of the new frames. For instance, in the E-F dyad, having a large number of stock keeping units and linkages to sophisticated regional and multi-national organizations is critical to discussing new ideas with numerous teams and organizations about even regional and global levels. Participants comment that it is easy to regenerate options. The ideas are screened/approved through more than one supply chain actor, and consequently modified to fit the next step of technology development. In addition, experienced

supply chain leaders can change perspectives to mitigate failures of new frames. This is shown in the following quote from a project manager:

First, we discuss with them and identify diverse suggestions. However, before moving further, we always contact local and international experts in the context. (Project manager-E)

Looking at the same situation from multiple viewpoints is found to be the important factor in organizations in relatively novel industries. In the context of the G-H dyad, the supplier constructs new meaning for product and process improvements which is novel to the context. Because the existing (local) frames are not mature enough to address contextual issues, the frames of third party experts foster the reframing process. In the A-B dyad, a large number of parties and activities have been developed through years of supply chain relationship. Thus, understanding the implicit frame requires management to consider each lens to foster successful product and process improvements. In the respondent's words:

Product design issues are discussed with our supply chain partners and third party specialists. So, the process is observed by different people in different contexts. (Special project manager-H)

Product and process changes in a supply chain context are found to be a complex process comprised of a sequence of unplanned changes, which requires reframing of the shortcomings. New frames have to be applied in the proper manner to ensure the success of new meanings. Experienced top managers with substantial knowledge of the existing frame facilitate adaptation of new products and processes. As one production employee remarked:

Our factory executive in person does the random quality checking of packages. He ensures that final moment's design changes are correctly

added to the package. First, the machine does a print design in an accurate way. Then the cutting of the final package is automatically done using the machine. Our team in the factory checks alignments one by one at the end. Which means 100 percent perfect product goes to the customer. (Production employee 8-D)

#### **4.2.3.2 Group-organizational level of learning process: Integration**

It is crucial to decide the interdependencies of elements before adding and removing new elements that make successful conversion of new learning. Despite the heterogeneity of system changes, the nature of the dynamic supply chains business environment requires proper coordination of changes. Furthermore, in the process of system changes linking different parts of an organization, activities need to occur after considering the sequence of activities. Therefore, coordination and mutual adjustments are critical elements of the integration process.

*Coordination.* The findings indicate that an explicit understanding of how to link the different aspects of organizational activities is particularly crucial to accomplishing a collective set of tasks. Management acknowledges the importance of recognizing interdependencies among the organizational activities prior to recognizing interdependencies among supply chain activities. Mostly, it is the leading characters at a senior management level that develop the arrangements to coordinate. This is described by one senior manager:

Normally, the bottom side of crates gets damaged. We identify that keep those crates separately. And when number build to the certain level. And we negotiate with procurement. Otherwise, if we allow logistics division to keep stocks more, we lose our space. So, once it comes to the substantial

level that is one or two truckloads. We communicate to the procurement division. Then, procurement will coordinate with supplier organization and stock back to them. (Logistics manager-G)

The complex nature of supply chain coordination requires sequencing of activities since it is crucial to proceed one step at a time when linking complex interdependencies. The supply chain context should also be reassessed at the end of each activity step. For example, according to a procurement manager:

The logistics manager generates the requirements. Then, it comes to me. Then, I will look at it. Next level is purchasing assistant, who will raise the purchase orders and communicate with supplier organization. Then, it goes to the logistics department. I think the reverse logistics assistant that is under logistics manager will then coordinate the deliveries with the supplier. And we generally deal with one account manager from the supplier's side, who is the project manager. All of us deal with him. If there is a problem or if canvassing is required, then it will go to their chief executive officer level. Or else I think they have a sales and marketing head. We go to their level. Our front end is the relationship which we have with the supplier organization, which is managed by the special project manager. (Procurement manager-G)

In a complex supply chain context, coordination involves not only formal mechanisms but also informal mechanisms. For instance, in the C-D dyad, a top level manager who is acting as the main coordinator has to deal with all related supply chain actors. In his words:

I am actually the first point of contact when it comes to business. In terms of material ordering or even communicating any issues with them. For

deliveries and any business contract I am the first point of contact. Because I am handling material planning and procurement at the manufacturer organization, I coordinate with the supplier factory and other stakeholders of that organization. It is not only formal meetings. We have to communicate whenever the need arises to manage the processes smoothly. (Procurement executive-C)

Also, in the A-B dyad it appears that the early interpersonal interactions of a coordinator strengthen the possibility of managing interdependencies. For instance, the supply chain manager of the manufacturer organization has dealt with the coordinator of the supplier organization since their early careers. That mutual understanding enriches the management of present arrangements related to tasks.

***Mutual adjustments.*** The findings indicate that there are various ways of adjusting when developing new practices. This involves adding new elements to systems and removing unsuitable elements. Management acknowledges the crucial role of observing interdependencies of elements before adding and removing new elements. The following quote illustrates how visits to a supplier's premises and observing their processes helps to identify the interdependencies between elements of the factory:

Randomly we go to the supplier's premises and observe their process. It gives us productive opportunity to discuss improvements to the process. In that case we have to add new parts as well as remove unnecessary elements of our existing setting. (Supply chain manager-A)

The impact on influential stakeholders must be assessed and addressed before deciding on the new strategy. Accordingly, the combining of new ideas involves subjective processes. In the C-D dyad, one facet that might inhibit the

internalization process is the fear of losing one's job due to possible system changes. However, management faces this challenge by fostering employee transfer strategies within the organization while promoting zero job retrenchments. Such challenges are described by a quality assurance manager:

The most difficult part is combining ideas. We have to think of suggestions for each department and organizations. Of course, removing certain practices endangers employees' jobs. So, we have to think of transferring them to other functions. The acceptance from the people involved in activities is a positive sign of feasibility to move into new strategies. (Quality assurance manager-C)

Supply chains comprise sequences of interdepartmental adjustments. Therefore, management acknowledges suppositions by expert professionals in the respective departments. However, the complexity of supply chains leads to misinterpretation of intersubjective suppositions. For instance, in the E-F dyad, adjustments to operating systems get priority as they introduce drastic changes to the products. Senior management's understanding of unspoken realities such as non-availability of a prototype for a new product, and the risks involved with it, facilitate adjustments to product changes, although there is a risk that personal suppositions can be incorrect. Furthermore, it takes time to understand the organizational realities related to adjustments due to the complexity of supply chain needs. The following quote is representative of the comments that some of the managers made:

Most of the meetings were the management team, us, and the supplier organization. We were not able to decide on the label. How it is going to work and all that. The marketing manager and the team would decide the packaging label.....well.... How attractive, good, or bad it is. Because it is more of a tub, we were basically getting the tub done and the lid was done.

And to make sure that the fitting is proper. So, most of our meetings would be with factory managers. (Procurement manager-E)

In the G-H dyad, moving into new technological concepts required adjustments be made to the prevailing organizational arrangements of both partners. The inter-organizational estimation between the supply chain actors led to new automation being introduced into the existing processes to strengthen the support for the new recycling concept given by communities of both organizations.

#### **4.2.4 Learning elements at the organizational level of supply chain learning**

The main goal of this section is to present patterns obtained from the data analysis regarding the capabilities and processes of the organizational level of supply chain actors. It comprises learning capabilities and processes related to implementation process that ensure successful commercialization of products and processes. It involves Exploitation and an Institutionalization process.

##### **4.2.4.1 Organizational level of supply chain absorptive capacity: Exploitation**

Commercializing new applications is based on enhancing the joint core competencies of the dyad partners. Commercialization of products and processes are conducted through the application process. Therefore, in this research, exploitation capability is expressed in terms of Improvements and Application.

***Improvements.*** The analysis has revealed that the supply chain partners incorporate the new improvements by exploiting new learning to address the rapidly changing



commercial environments. The study showed that supply chain improvement is related to the core business of supply chain relationships. Findings of the case studies indicate the importance of the improvements derived from the product as well as processes implementation. For instance, the A-B dyad new product introductions to the market ensure the dominant position of the supply chain in the market and secure joint future market opportunities. As explained by one of the senior managers:

We hope to introduce the new soft drink to the market. Our supplier always gives us quick operationalization of new processes. I am sure this will be another milestone.... Of course, it improves the image of both organizations in the market. (Supply chain manager-A)

In the C-D dyad, the introduction of new packaging solutions ensures the ability to be a dominant player in the market. It is evident that the supplier is excelling by providing exceptional packaging solutions to the most respected brands in the world. Factory observations and production plans reveal that the supplier organization and its management team focus on production process changes for improvements in packing materials. The supplier is, thereby, improving the core competencies in the product as well as processes with the manufacturer that ensure the market dominance of the supply chain. This process involves introducing new products/services and product/service extensions. The following quote illustrates an example of joint product introduction that ensures dominant market position of the supply chain:

We are pioneers in new package introduction to the market. Not only for Sri Lankan brands but also for international brands as well. So, keeping that trend, we always suggest to our manufacturer the new materials that we can use to enhance the package quality of their products. (Factory manager-D)

*Application.* The cross-case analysis reveals that application is the commercial implementation of joint supply chain activities through contracts. In today's highly dynamic business environment, a high value is placed on dynamism. It is evident that last moment changes affect the products and process; therefore, dyadic partners use explicit as well as implicit contracts to govern implementation; where these contracts continuously evolve. Evolving contracts foster continuous improvements. The contract terms are dynamic and change with specific supply chain partner needs.

Due to the complexity and uncertain nature of the supply chain context, while supply chain contracts are initiated by one supply chain partner, analysis of contract evolution shows that dyad partners are adjusting contracts on an ongoing basis. This necessarily involves continuous negotiation and renegotiation. For instance, in the A-B dyad, continuous improvements require reevaluation of contracts. In the case of the G-H dyad this even extends as far as asset purchases requiring a whole sequence of contracts even after the initial written contract was implemented. It is evident that less compatible agreements become increasingly compatible before the final agreement is reached. The following quotes illustrate some of the dynamics of supply chain contracts:

We have reached agreements at the organizational level to identify the most suitable machine for crate manufacturing. Then, those requirements go as the written agreement. However, it is my experience that these requirements change even in the process of buying the machine ..... I would say, it can change at the installation stage as well. Actually, final changes are reached after mutual agreements between our top managers. (Procurement manager-G)

These audits are done by a third party. We have educated them. They have a system in place and they ensure food safety. Another thing is that they ensure workplace rights. Both of these are qualification criteria and provided they are satisfied they sign a supplier authorization agreement. The agreement has got certain things to ensure that they continuously work on these areas. Continuous improvement.... things like that. That's legally binding. (Quality assurance manager-A)

It seems that supply chain contexts add subjectivity and dynamism into the contracts process. In the C-D dyad, being large firms with volatile regulatory changes in packaging, it is evident that last-minute changes affect the products and the process. These last-minute changes of promises involve subjective judgments by top level managers to handle such implementations. Hence, contracts between supply chain actors can take the form of written, oral, and implied formats and include a combination of many approaches to implementing final moment changes.

#### **4.2.4.2 Organizational level of learning process: Institutionalization**

In this research, two facets of the institutionalization process are revealed: system changes and supply chain investments. Findings indicate the importance of understanding interrelated subsystems in moving to product and process changes. Cross-case analysis emphasizes that key players are mostly manufacturer organizations and system changes need to be communicated to other key players, work.

*System changes.* Findings reveal that it is crucial to understand the interrelated subsystems when making product and process changes. In the C-D dyad, management acknowledges the critical role of balancing the product and process, as well as

knowing the context of the supply chain. Participants commented that the requirements of the individuals, teams, and organizations of the dyad need to be met in the implementation of new strategies. For instance, the supplier's production process is adjusted according to the manufacturer's requirements; therefore, other customers' orders are delayed due to sudden orders from the manufacturer. The supplier changes the machines and designs accordingly in a rapid manner in response to orders. Moreover, the supplier is very helpful in adapting to changes in raw material supply, for instance trying to fulfill orders on time in the face of a very short lead time.

In all the dyads studied, system fluctuations involve communicating changes to key players, working to minimize resisting forces and maximize driving forces, and agreeing on a change plan that affects existing tasks, including informal activities. Key players, who are driving change, engage in strengthening system changes; in contrast, resisting the forces that hinder the change process. The cross-case analysis reveals that the key players are mostly manufacturer organizations: for instance, in the E-F dyad, the local nature of the product gives the manufacturer the authority to make decisions without consulting a parent company. However, it was established that the specialized knowledge competency is only with the suppliers, as all four dyads are complementary knowledge combinations. For instance, in the E-F dyad, the supplier has the expertise to develop the plastic products; therefore, communication with both dyad partners are crucial to agree a change plan. Management acknowledges that maximizing the driving forces provides strong support for system changes. The case study indicates that the supplier adjusts well to changes required by the manufacturer. For instance, the supplier has to obtain the process standards from the manufacturer organization. Accordingly, the perceived changes need to be discussed with the respective parties.

Moreover, system changes involve a sequence of activities; therefore, it is crucial to address concerns in a step by step manner. For instance, the supplier has opted for a lean concept to reduce machine breakdowns. This requires changes to employee skills, activities, diagnosis of current process and evaluation of new processes:

For example, when we are moving into a total productive maintenance system the support given by the supply chain actors is invaluable. Although we had some internal change resistance, we have successfully moved into the new system. (Manufacturing manager-A)

At the end, we decided to implement a lean concept within our factory premises. We set the objectives of the lean process, its advantage for both supply chain partners, set performance targets, and a list of activities to do, training plans and much more. It is not an easy job. Change always requires proper management. (Sales manager-H)

***Supply chain investments.*** In all four dyads studied, management acknowledges that supply chain investments are specific to the needs of dyadic partners. Incorporating these investments involves routines and activities that require the involvement of supply chain employees. In addition, analysis of secondary data related to investment assets and factory observations signals that existing infrastructures facilitate further substantial investments. Thus, the existing infrastructure facilities of the factory enrich the value added to the specific supply chain. From a top manager perspective, those infrastructure investments are focused on specific dyad needs, which make it less valuable outside of the joint learning activities:

As a manufacturing organization we have a special requirement for additional filters, analytical machinery and so on. Because we must use this machine, we have to work with the supplier to upgrade their machinery. We have requested a special tank just for us. (Supply chain manager-A)

The review of the cross-case analysis of secondary data and observations reveals that supply chain investments span across time, money, and people in the development of supply chain learning. The top managers of supply chain partners allocate their personal time to taking decisions regarding such investments and money is allocated without any hesitation to satisfy supply chain implementations. This ultimately leads to core competency enhancements. For example, in the C-D dyad, it is evident that top managers allocate their time to deciding the most appropriate (minimal) stockholding policy. Analysis of secondary data reveals that its supplier organization has invested money into stock arrangements to meet the manufacturer's sudden demand changes and promotional campaigns.

In the E-F dyad, unique investments are based on long-term returns; the supplier has invested time and money to mitigate issues. For instance, the manufacturer adjusts the production schedule for raw material shortages and the supplier deals with potential machine breakdowns. In the respondent's words:

But actually, the supplier is the one who drives this project. I believe mainly because they are the ones who invested. Their intention to invest is very high. They want to make it happen somehow. And when it comes to the manufacturer organization, they also did some changes but I don't think to the same extent which they have done. They support us all the way. (Project manager-E)

### **4.3 Discussion of elements of supply chain learning and its linkages: A multi-level perspective**

As discussed earlier, the analysis of research findings reveals that supply chain learning consists of capabilities and processes. These have a multi-level presence. The following sections discuss the results of the findings by considering the dynamics of the elements of supply chain learning at the individual, individual-group, group-organizational, and organizational levels. In the discussion, prior literature findings are incorporated.

#### **4.3.1 Dynamics of the learning elements at the individual level**

The individual level is considered to be the starting point of supply chain learning (Swart & Harcup, 2013; Dorfler, Baracscai, & Velencei, 2010). Pruzan (2001) recognizes learning as a concept solely belonging to individuals. Literature into organizational learning identifies that organizational learning begins, and ends, with individuals (Rezaei-Zadeh & Darwish, 2016; Felin & Foss 2005; Friedman, 2001), making it critical to explore this dimension. The findings of the study confirm the importance of the individual supply chain actor's role in initiating learning. Examples are initiating a new recycling process, a new gas manufacturing process and introducing new online gas testing methods. Additionally, from the cognitive learning perspective, it is shown that individuals process and interpret information in unique ways (Kirwan, 2013). Moreover, the creation and thinking can only happen within a human head (Gobet, 2017; Dreyfus & Dreyfus, 1986).

As demonstrated by the empirical data analysis at the individual level of supply chain learning, value creation and knowledge access are themes that emerge, where these capabilities are supported by the social-psychological intuition process.

**4.3.1.1 Value creation.** The research introduces value creation as an element of absorptive capacity in the supply chain context. Value creation is identified as understanding the future values that a dyad partner will want. It extends the earlier recognition of the value in relative absorptive capacity theory. From a supply chain perspective, value creation is studied through consideration of supplier value, customer value, internal process value and early supplier involvement (Mena, Humphries, & Wilding, 2009; Jayaram, Kannan, & Tan, 2004; Dowlatshahi, 1999; Dunk, 1993). Particularly, the early research focused mainly on the positivist paradigm of supply chain value creation (Wang, 2016; Jayaram et al., 2004). A review of the early literature indicates less focus on future value creation as an element of supply chain capability (Seo, Dinwoodie, & Kwak, 2014; Eggers & Kaplan, 2013; Jin, Fawcett, & Fawcett, 2013; Skarzauskaite, 2013).

In contrast, this thesis focuses on the constructivist perspective of value creation as a part of learning capability. And, in agreement with Christopher and Ryals (2014), who identify the use of customer insight to identify opportunities to create customer value, this thesis identifies new value creation as generating new future patterns that customers prefer. The thesis also highlights the importance of an Innovative focus and Empowerment as subthemes of value creation.

***Innovative focus.*** Rogers (1995) identified innovation as an idea, practice, or object that is perceived as new by an individual or organization. A focus on innovation is identified as a process in which an organization creates and defines problems, and develops new knowledge to solve them (Eckblad & Golovko, 2016; Nonaka, 1994). Accordingly, the innovation development process consists of all decisions and activities related to recognition of a need or problem through research, development, and commercialization (Rogers, 1995). Early researchers argued that



most innovations are to be found in the research and development processes (Rogers, 1995). Aligned with this early literature, this study indicates that innovation consists of all the decisions that relate to recognition of a future need through to the creation of a model to satisfy that need (Rogers, 1995). Examples of an innovative focus from the cross-case analysis findings are need identification, problem identification, and research and development process.

This study contributes to the literature by highlighting how the nature of a need leads to diverse innovations. For example, a need that results in substantial changes to how supply chain activities are conducted requires the assistance of highly qualified external experts. Also, it was observed that implementing innovations can lead to a chain of further needs identification activities. It was also observed how new, unconventional perspectives can create future values for customers to choose from. In line with earlier findings (Rogers, 1995), relative advantages and user compatibility were found to increase the adoption of innovative ideas. Increased acceptance from professionals in other fields and benefits to the wider stakeholder groups also increases the adoption of innovative ideas.

***Empowerment.*** Saremi (2015) argues that empowerment is the process of giving power to people in the knowledge-based economy. Empowering people is held to be an important skill for a logistics manager (Bisogni, 2008). Delegating freedom of thinking and action enhances the ability to respond to dynamic business environmental changes in supply chains.

Empowerment is considered to be a process of identifying each other's strengths, capabilities and potentialities to reinforce the employees (Saremi, 2015). This study confirms that long-term employer-employee relationships allowed the employees of all four dyads to identify each other's core strengths, capabilities, and potentialities (Saremi, 2015). The thesis identifies that the immediate employers of

subordinates are more capable of identifying an employees' core strengths that may lead to empowering him/her.

Empowered employees attend to processes that involve taking responsibility, which leads to active learning; a finding that is in line with Scott and Jaffe (1991). Examples from the study include the delegation of factory design changes to a packaging manager, and delegation of package design to a factory executive; showing how the employees take full responsibility for the task and create novel designs. This thesis also adds substance to the literature by indicating that delegating full freedom to think about new designs leads to substantial product changes.

**4.3.1.2 Knowledge access.** Knowledge access is normally associated with process and product innovation (Buckley et al., 2009). Hult, Ketchen, Cavusgil and Calantone (2006) identify knowledge access as the extent to which knowledge is easily available and obtainable within the chain. Knowledge access capability comprises speed of access, motivation to share, and transparency in access; the speed of response in accessing knowledge has not been discussed (Klueber & O'Keefe, 2013; Grant & Baden-Fuller, 2004). Study findings indicate that the knowledge access process includes the need for knowledge and speed of response. In fact, the need for knowledge is the supply chain actor's interactions for new knowledge to address knowledge deficiencies.

***Need for knowledge.*** Rusly (2014) identified that beliefs about the need to seek new knowledge enhance the professional's readiness to acquire knowledge. Aligned with previous studies, this thesis identifies that particular knowledge deficiencies of employees play a critical role in the need for new knowledge. This

thesis also enriches the literature by stating that the unique nature of product and process enhancements of strategic supply chain relationships makes knowledge access an activity related to the specific dyad. Therefore, mostly the source of new knowledge is available within the supply chain, which makes it easy to access and leads to the ability to access specific and relevant knowledge. The thesis finds that knowledge needs related to processes are mostly created by the internal employees in all four dyads. To some extent, this finding is in line with that of Rusly (2014), who found that there are differences in identification of new knowledge among organizations; professional organizations use individual professionals for a particular business activity to identify new knowledge, while larger firms focus more on team and management decisions to identify the need for new knowledge. In addition, interactions with external sources were found to enhance the need to expand an existing knowledge base (Rusly, 2014).

The thesis findings confirm the early literature that the value of new knowledge and its relevance, accuracy, reliability, and timeliness to the employee's knowledge deficiency, enhance knowledge access (Hult et al., 2006). Examples from the findings include an incident where capacity planning reports are important to the engineering manager to create a plan to install a new machinery line within the factory to accommodate future production plans. This is consistent with findings that show the relevance of new knowledge to the acquirer's knowledge deficiency (Matusik & Heeley, 2005). Moreover, knowledge value is assessed using usefulness, benefits, and uniqueness (Pacharapha & Ractham, 2012; Ford & Staples, 2006). Willingness to acquire knowledge was found to be higher if the individual perceives the high value of new knowledge to the need in hand (Ford & Staples, 2006).

This thesis identifies the need for updating technological expertise deficiencies of dyads in the industry where a high rate of technological changes is present. Similarly, dyads in an expanding industry require their managers to focus on new opportunities and identify gaps in individual knowledge. This is also in line with the findings of Rusly (2014), who found that evaluation of individual knowledge deficiency stimulates the professional's readiness to acquire knowledge.

*Speed of response.* The knowledge access perspective discusses the speed of accessing knowledge; however, not much discussed is the speed of response in accessing knowledge (Grant & Baden-Fuller, 2004). The dynamic capability perspective argues that firms need to configure internal and external competencies to rapidly changing environments (Teece et al., 1997); while it was identified that the concept of customer response speed is a dynamic capability that enhances supply chain performance (Chiang et al., 2015). Moreover, customer response speed is critical as customer needs are continuously evolving (Chiang et al., 2015; Naim & Barlow, 2003). Aligned with previous studies, this study identifies that the evolving nature of customer needs requires frequent changes. For example, in the C-D dyad, changes in customer needs require frequent design changes.

From the perspective of the scientific study of the human brain, it was found that early anticipation of change leads to a high speed of response in conversations (Magyari, Bastiaansen, de Ruiters, & Levinson, 2014). This study enriches the literature by arguing that early anticipation of design changes enhances quick responses to satisfy customer needs. Also, familiarity with product design processes by individuals makes it easy to track possibilities since they are able to find the sequence of product design changes and respond quickly when the real need arises.

Speed of response involves opportunities to capture market share via high speed responsiveness, reliability and enhanced customer value (Chiang et al., 2015), plus the ability to react rapidly to key supply chain outcomes (Chiang et al., 2015). For example, in the E-F dyad, this involved a quick response to core design changes of the packaging frame to satisfy customers.

Prior literature indicates that quick responses to satisfy customers are critical in today's business environment (Jayachandran, Hewett & Kaufman, 2004), Chiang et al. (2015) state that supply chains with high product variety need to focus more on customer response needs, which is affected by the level of collaboration between the supply chain actors. This was evident in the E-F dyad, where a long-established relationship with a diverse product range led to further product introductions by internal experts.

**4.3.1.3 Intuition.** A review of the early literature indicates that intuitive insights lead to value creation and accessing of knowledge (Dofler & Ackermann, 2012; Einstein, 1949). However, the review also indicates that many parts of intuition are still underdeveloped (Akinci & Sadler-Smith, 2012).

Early researchers identify lack of exploration into the subjective experience of intuition in different contexts (Sadler-smith, 2016). Therefore, this study explores the diverse aspects of the intuition process within the contexts of novel and sophisticated supply chain operations.

**Images.** Prior researchers argue that images can take the form of a diagram (Benedek & Nyiri, 2014). The fundamental means of representing diagrammatically are as objects of knowledge and instruments through which objects are generated and explored (Benedek & Nyiri, 2014). In particular, the role

of diagrammatic play in thinking is considered to be a critical aspect in intuition (Benedek & Nyiri, 2014). "How people think" is considered as being the basis of human agency (Rousseau, 2012). Aligned with the literature, this study identifies the critical role of thinking in visualizing models. For example in the C-D dyad, managers need to deliberate visual quality, physical quality, and machinability of materials when considering new product introductions. To some extent, this finding is in line with that of Benedek and Nyiri (2014), who state that diagrammatic expression allows the problems to be solved to be organized.

Individuals represent real world complexities in drawings, figures, visuals, graphics, schemata, and descriptions (Benedek & Nyiri, 2014). This study enriches the literature by showing that suppliers with a long-term relationship have knowledge of the processes across supply chain entities. This leads to individuals who can represent real world richness in drawings and descriptions. Findings also indicate that the use of effective descriptive mechanisms by supply chain employees is essential for satisfying and transferring the fullness of requirements.

**Synthesis.** Both the E-F and G-H dyad findings indicate that conceptual thinking by experienced top-level managers during product and process innovations assists in putting the elements together and developing a coherent whole. This finding is in line with many previous findings that concentrated on the synthesis process. Bloom's taxonomy theory argues that synthesis is the production of a plan, or proposed set of operations, and is also a derivation of a set of abstract relations (Krathwohl, 2002). Krathwohl argues that synthesis is putting elements together to form a novel and coherent whole or making an original contribution, thus it necessarily involves generating and producing new value. In addition, synthesis is more related to conceptual knowledge (Krathwohl, 2002), and is argued to involve higher mental processing (Akinici & Sadler-Smith, 2012).

The G-H dyad operates within a fast changing industry sector and experiences uncertain directions in product and process improvements that require top managers' non-logical responses and fast decision-making. To some extent, this finding is in line with that of Sadler-Smith (2016), who recognizes the value of self-centered responsibility of new intuition needed to give attention to unconscious and subconscious thinking.

To summarize, this thesis makes the following contributions:

- The individual level of supply chain learning consists of the intuition process that underlies the value creation and knowledge access capabilities;
  - (a) Value creation consists of innovative focus and empowerment;
  - (b) Knowledge access capability consists of the need for knowledge and speed of response; and
  - (c) At the individual level of supply chain learning, the intuition process consists of images and synthesis, which influences the value creation and knowledge access capabilities.

#### **4.3.2 Dynamics of the learning elements at the individual-group level**

This section discusses the learning capabilities and processes at the individual-group level. It integrates findings from literature and derives new insights to enhance new knowledge relating to assimilation capability and interpretation process.

**4.3.2.1 Assimilation capability.** From the absorptive capacity perspective, assimilation refers to the firm's routines that allow it to analyze, interpret, and understand the information obtained from external sources (Zahra & George, 2007; Cannon-Bowers & Salas, 2001; Szulanski, 1996).

*Understanding.* The absorptive capacity perspective argues that developing common understanding is a critical feature of assimilation capability (Noblet et al., 2011). The review of the literature indicates that earlier studies into educational objectives have described understanding as determining the meaning of instructional messages, including oral, written, and graphic communication (Krathwohl, 2002). Similarly, the findings of the present study indicate the importance of oral, written and graphic communication and the value of determining the meaning of those messages.

Understanding capability can take different forms, such as classifying and summarizing information (Krathwohl, 2002). Furthermore, this thesis enriches the literature by arguing that each department classifies messages depending on the existing classification mechanisms of their respective field. These initial classifications lead to identification of further classifications. For example, the behavior of the marketing manager in organization E indicates how he uses existing classification mechanisms, such as a customer's potential reaction, consumer law, and machinability before moving into changing the size of a tub. It is also evident that oral, rather than written, communication mostly signals meaning determination is still ongoing.

To some extent, this finding is in line with that of Min et al. (2007), who state that individual organizations in the supply chain should incorporate norms within the



organization to determine the meaning of communication between supply chain actors. They argue that supply chain norms are viewpoints of the joint efforts of supply chain partners to achieve mutual benefit and individual goals, and that norms foster the processing of knowledge (Min & Mentzer, 2004; Ortony, Schallert, Reynolds & Antos, 1978).

*Analyzing.* The findings highlight the importance of deconstructing communications and identifying the relationships among the parts. For example, in the G-H dyad, a series of team meetings was used to decide the shape of a crate that would be less prone to damage. This indicates the need for a specific purpose "identifying the most suitable shape of the crate" to organize different ideas. This finding is in line with many previous findings focused on analyzing functions. The theory of educational objectives perspective argues that analyzing involves breaking material into its constituent parts and detecting how the parts relate to one another, and to an overall structure or purpose (Krathwohl, 2002). Analysis capability can take different forms such as distinguishing, differentiating, appraising, calculating, comparing, contrasting, organizing, managing, and preparing (Krathwohl, 2002).

The findings of the present study align with that of Bowersox, Closs, and Stank (2000) who argue that supply chain structures need to be flexible to achieve integrated supply chain logistics, since it is being argued that flexibility in organizing supply chain learning activities is required.

This thesis also enriches the literature by showing that top management acknowledges the value of gathering the views of all internal employees during transition periods, when the relationship among the constituent parts of the innovation is unclear. This helps to organize the parts of the innovative product into a coherent whole. To some extent, this finding is in line with that of Feng et al.

(2013), who highlight the importance of adopting flexible analysis to address the diverse concerns of the supply chain actors. In contrast, the present study also highlights how the availability of an exclusive manager to handle the supply chain learning activities can also enhance the proper organization of operations.

**4.3.2.2 Interpretation.** Interpretation refers to the process of explaining, using words and/or actions, of an idea to oneself and to others (Crossan et al., 1999). Interpretation is identified as the conscious element of individual learning (Crossan & Berdrow, 2003) and occurs in terms of cognitive maps. The literature emphasizes the importance of perception and conversations in deriving a specific interpretation (Robbins & Judge, 2013; Schulze, Schmitt, Heinzen, Mayrl, Heller, & Boutellier, 2013).

**Perception.** From an organizational behavior perspective, perception is identified as a process by which individuals organize and interpret sensors and impressions to give meaning to different aspects (Robbins & Judge, 2013). Perception is argued to be substantially different from objective reality and related with an individual's interpretations of reality (Robbins & Judge, 2013; Andrews & Delahaye, 2000). The review of the literature indicates that true reality is both unknown and unknowable to us (Spinelli, 2005). However, people use the term “reality” as experienced by them and its link to mental processes (Spinelli, 2005). In such a context, what is prevailing in the world is constructed meaning (Spinelli, 2005). In line with previous findings, this study confirms that the meaning construction process in a supply chain context does depend on how the world is perceived by specific supply chain actors.

Phenomenological theory argues that reality is a subjective process (Spinelli, 2005). In this sense, nothing ‘exists’ other than mental constructs (Spinelli, 2005). Therefore, human perception plays a critical role in interpretation. Human's experience of reality is a result of interaction between individuals, systems, and processes (Spinelli, 2005).

According to Howard, Restrepo, and Chang (2017), acceptance is an individual act that relies on individual perception. Mostly, top level managers scan and interpret information using their perceptions, and these are given prominent weighting when giving meaning to the various aspects (Thomas, Clark, & Gioia, 1993; Pfeffer & Salancik, 1978). This thesis enriches the literature by arguing how long term dyadic relationships lead to good employee relationships that help to reduce perception gaps and result in a faster decision-making process.

***Conversations.*** Previous research identify conversation as a discussion between two or more people and identify that free flow of relevant information is at the core of successful conversations (Patterson, Grenny, McMillam, & Switzler, 2012). Conversations are simultaneously referred to as dialogues and discussions (Patterson et al., 2012). On the other hand, some researchers identify conversation as the antecedent to dialogue (Isaacs, 1993). Thus, the early literature emphasizes the value of the quality of the conversation to identify critical factors (Boland & Tenkasi, 1995). In the present study, the participants revealed how problem-solving is first approached using informal discussions, which would lead to a free flow of information. It enriches the literature by stating that in informal conversations observers can observe impressions of speakers and thereby manage assumptions and certainties which would encourage free flowing information. In short, the combination of informal conversations and formal conversations leads to identifying supply chain-related problems.

Conversations consist of subjective ideas, objective facts, and actors (Patterson et al., 2012). For example, in the G-H dyad, machine design parameters, machine lifespan, and enhanced brand reputation through the use of new machines were all observed in conversations relating to new machine design.

The mutual purpose or perception that another actor is working towards a common goal, interest or value in conversation is identified as a critical factor of successful conversation (Patterson et al., 2012). Moreover, this thesis enriches the literature by showing that as supply chain actors are working towards the common goal, that they are willing to listen and slow down contrasting views. Thus, to summarize, this thesis makes the following contributions:

- The individual-group level of supply chain learning consists of an interpretation process that underlies assimilation capability;
  - (a) Assimilation capability consists of understanding and analyzing; and
  - (b) An interpretation process consists of perceptions and conversations, and underlies the above assimilation capability.

### **4.3.3 Dynamics of the learning elements at the group-organizational level**

This section discusses the learning capabilities and processes at the group-organizational level. It integrates findings from the prior literature and derives new insights to enhance new knowledge relating to transformative capability and integration process.

**4.3.3.1 Transformative capability.** From the absorptive capacity perspective, transformative capability is recognized as ‘why and how’ organizations are capable of changing existing cognitive schemas to absorb new knowledge less compatible with prior knowledge or built on new cognitive structures (Todorova & Durisin, 2007). Transformative capability requires the reframing of existing knowledge structures in combination with new knowledge (Todorova & Durisin, 2007).

Very few supply chain relationship studies have examined transformative capability (Hallen, Johanson, & Seyed-Mohamed, 1991). Thus, the present findings enhance the literature by introducing the challenging of established practices, and reframing, as critical elements of transformative capability that enhance new cognitive structures.

*Challenging established practices.* The findings indicate that management encourages the construction of new meanings that may lead to corresponding desirable outcomes. For example, in the A-B dyad, management encouraged the move to a total productive maintenance system to satisfy the intended outcomes of reduced manufacturing process delays and improved production and process integrity. This finding is in line with many previous findings that concentrate on the theory of constructive alignment.

From a learning perspective, constructing refers to creating new meaning through learning activities (Biggs & Tang, 2007). The theory of constructive alignment argues that constructing new meaning should correspond to intended learning outcomes (Biggs & Tang, 2007). Early literature argues that the starting point of challenging established practices is in identifying relevant knowledge sources related to a solution (Jonsson, Holmstrom, & Ellinger, 2016; Carlile & Rebentisch, 2003). This thesis similarly argues that there are varieties of sources that need to be considered when deriving new meaning to achieve intended process or product

outcomes. It enriches the literature by indicating how that outcome is needed to be shared between several supply chain actors. Hence, the nature of the intended outcome is inseparable from creators, the solution developers in the supply chain context.

Brookhart (2008) argues that selecting the critical factors and adopting a new learning outcome are critical factors when constructing different meanings. The present findings confirm the importance of selecting the critical factors. For instance, the new concept of total productive maintenance required several major changes to the factory's belt system and the training of employees on the new system. This thesis also enriches the literature by showing that the availability of technical knowledge within top managers and their respective departmental teams drives decisions on the process outcomes that are needed.

This thesis also enriches the literature by stating that complementary knowledge bases make supply chain employees experts in diverse technologies. It is easy for specialized supply chain actors to decide the main aspects of the solution in their specialized domains. To some extent, this finding is in line with that of Carlile and Reberich (2003), who used the knowledge transformation perspective to argue that challenging established knowledge within a given domain is found to be easier when a common language is maintained.

***Reframing.*** Frames can be identified as scripts and scenarios to guide action in specific circumstances. In line with earlier research, the findings indicate the importance of recognizing the implicit frames in use before reframing system configurations. Changing frames can alter how things appear (Bolman & Deal, 2014; Kucukaydin & Cranton, 2012; Hallen et al.,1991), and Mabin and Davies (1995) argue that analysis often depends on the frames in use. Images can be strong in one frame but subject to change under a different frame so that the end results

are a richer picture that recognizes the implicit frames in use (Mezirow, 2006; Mabin & Davies, 1995; Mezirow, 1990). In addressing the driving forces behind decision-making, this study enriches the literature by arguing that recognition of the critical internal and external forces driving the transformation process decided the success of a move to an online system (by the A-B dyad).

The findings also indicate the importance of examining the same situation from multiple points. For example, when checking the accuracy of raw material it is evident that different individuals have shaped the activity in subsequent steps. This finding is consistent with literature that shows examining the same situation from multiple points are the essence of reframing (Bolman & Deal, 2014; Mezirow, 2003; Mezirow, 1997). This thesis also enriches the literature by showing that people engaged in a specific activity are best capable of understanding and reframing it effectively.

The leadership perspective offers the advantage of using multiple angles to reframe a situation (Bolman & Deal, 2014). In complex situations, reframing is considered to be a powerful tool for generating possibilities (Bolman & Deal, 2014). In addition, depending on the means of applying each new frame, it works well or poorly (Bolman & Deal, 2014). A review of the literature indicates how an effective leader changes his/her lens when things do not make sense in a specific context (Bolman & Deal, 2014). This thesis enriches the literature by showing that product and process changes in a supply chain context are often complex, with sequences of unplanned changes that require reframing. Furthermore, experienced top managers with substantial knowledge of the existing frame facilitate adaptation of new products and processes.

**4.3.3.2 Integration.** While challenging established practices generates new cognitive structures, and reframing offers powerful new options to achieve a new cognitive structure (Bolman & Deal, 2014), proper coordination and mutual adjustment processes are required to integrate the new frames.

Prior literature focusing on the extent of the integration of new ideas (Stevens, Johnson, & Ellinger, 2016) and has found difficulties associated with internal integration and external integration (Esper, Defee, & Mentzer, 2010). Further, it argues that managers lacking the ability to integrate inside the firm as the main barrier to internal integration (Fawcett & Magnan, 2002). Empirical findings in this research indicate the coordination and mutual adjustments as critical elements of the integration process.

**Coordination.** Fawcett et al. (2005) argue that people are crucial to supply chain integration and empirical findings indicate that coordination and mutual adjustments are critical elements of the integration process. The literature describes coordination as linking different parts of an organization to accomplish a collective set of tasks (Gerard, 2009; Karl, 2007). The theory of coordination (Crowston, Rubleske, & Howison, 2006) recognizes coordination as the act of managing interdependencies between activities. The present study indicates that linking different parts of an organization, as well as its activities, is particularly crucial to accomplishing a collective set of tasks. Moreover, it enriches the literature by showing the importance of recognizing interdependencies among activities prior to recognizing interdependencies among supply chain actors. The complex interdependencies of transforming knowledge of supply chain activities require a proper coordination process. Dependencies can be categorized into shared resources that require proper managerial decision-making (Gomes & Dahab, 2010; Karl, 2007).



Prior literature emphasizes the value of having a coordinator or a central organization when integrating ideas (Grandori & Soda, 1995). The coordinator can proceed one step at a time in linking complex interdependencies, and essentially chooses activities close to the desired goals and reassesses the supply chain context (Karl, 2007; Fugate, Sahin, & Mentzer, 2006). Knowledge transfer in supply chain relationships also needs sequencing and participation (Karl, 2007). The present study findings confirm that the complex nature of supply chain coordination requires such sequencing of activities and participation. It also enriches the literature by arguing that it is crucial to proceed one step at a time when linking complex interdependencies and each step should be accompanied by a reassessment of the supply chain's context.

The findings indicate how coordination involves not only formal mechanisms but informal mechanisms when linking interdependencies. This is in line with the findings of Zobel (2017), who argues that coordinating is the collection of formal and informal mechanisms that link external knowledge with internal business.

***Mutual adjustments.*** This thesis enriches the literature by stating that the earliest interpersonal interactions of a coordinator strengthen the possibility of managing the interdependencies. Knowledge integration is identified as an important factor to convert new knowledge to the existing system and mutual adjustment plays a critical role in this process (Grant, 1996). The findings indicate that a visit to supplier premises, to observe their processes, helps to identify the interdependencies between the various supply chain activity elements. To some extent, this finding is in line with that of Ram and Edwards (2003), who argue that the ways in which two or more individuals accommodate, adapt to, and potentially struggle with one another to develop practice, are the mutual adjustments of knowledge.

The mutual adjustment of knowledge is largely founded on unspoken, intersubjective guesses, which even involve misinterpretations of organizational realities (Wapshott & Mallett, 2013). For an effective integration process, intersubjective guesses need to satisfy stakeholder interests (Wapshott & Mallett, 2013). The findings confirm the importance of subjective guesses during the mutual adjustment process. For example, in dyad A-B, subjective guessing of the unspoken fear of losing jobs, through system changes, are claimed to have inhibited the internalization process. Similarly, management acknowledges the guesses by expert professionals in their respective departments. This thesis enriches the literature by arguing that the complexity of supply chains leads to misinterpretation of intersubjective guesses. Thus, to summarize, this thesis makes the following contributions:

- The group-organizational level of supply chain learning consists of an integration process that underlies the transformative capability:
  - (a) Transformative capability consists of challenging established practices and reframing; and
  - (b) Integration processes at the group-organizational level of learning consist of coordination and mutual adjustments, and underlie the transformative capability described above.

#### **4.3.4 Dynamics of the learning elements at the organizational level**

This section discusses the learning capabilities and processes at the organizational level. It integrates findings from prior literature and derives new insights to enhance

new knowledge relating to exploitation capability and an institutionalization process. A review of the literature indicates that the institutionalization process leads to the exploitation capability that gives a competitive advantage to the firm (Hernandez-Espallardo, Rodriguez-Orejuela, & Sanchez-Perez, 2010; Campbell, 2007; Teece et al., 1997). Commercialization of new learning enables firms to gain relational rents and obtain supernormal profits.

**4.3.4.1 Exploitation.** The early research focuses on indicators of exploitation capability (Noblet et al., 2011), and the importance of exploitation capability in a supply chain context (Lane & Lubatkin, 1998). Improvements and applications are perceived as the critical aspects of exploitation capability in today's dynamic supply chain contexts.

**Improvements:** Newly transformed knowledge is commercially applied to enrich core competencies of the supply chain under exploitation capability. In terms of the absorptive capacity and core competency perspectives, early researchers identify that exploitation capability is the firm's capacity to commercialize new knowledge to achieve a competitive edge, while addressing changing environmental needs (Noblet et al., 2011; Cohen & Levinthal, 1990).

Prior literature indicates that a focus on developing core competencies leads to achieving competitive advantages (Wals, 2010; Spekman, Kamauff, & Myhr, 1998; Prahalad & Hamel, 1991). The present study aligns with this view and argues that exploitation capability needs to be based on improvements.

The dynamic capability perspective requires reconfiguring of internal and external core competencies through the exploitation of new learning to address rapidly changing environments (Teece et al., 1997). Study findings reveal that supply chain

improvement relates to the core business of the supply chain relationship, which aligns with the terminology of dynamic capability theory that argues core competences relate to fundamental businesses of the firm (Teece et al., 1997). A review of the literature indicates that core competencies are the collection of capabilities in the organization that are more closely linked with products and business units (Prahalad & Hamel, 1990). The present study has identified the importance of improvements derived from joint products as well as process implementations, which result in the dominant position of the supply chain in the market and secure joint future market opportunities.

***Application:*** Resource mobilization in implementing new knowledge is identified as application (Noblet et al., 2011). The early literature mostly highlights the outcome of the application (Noblet et al., 2011) and focuses on the explicit aspects of the product commercialization process, such as rules and regulations (Cohen & Levinthal, 1990); dynamic aspects are not much considered (Coltman, Bru, Perm-Ajchariyawong, Devinney, & Benito, 2009). Coltman et al. (2009) also argue the critical role in the process of supply chain contracts to the success of supply chain application, and reveal how the complexity and uncertain nature of the supply chain context requires ongoing adjustment of contracts (Coltman et al., 2009). Supply chain contract design involves considering initial expectation, negotiation, renegotiation, execution, and reevaluation of contracts (Coltman et al., 2009).

The present thesis enriches the supply chain literature by stating that contract evolution is a cyclical process, and it is difficult to find an endpoint. Moreover, the review of the literature indicates that the implementation of promises is achieved through contracts; subjectivity is inherent in all contracts (Rousseau, 1989). Psychological contracts and implied contracts are two forms of subjective contracts. While psychological contracts refer to the perception of an individual, an implied

contract refers to the mutual obligation on characterizing a relationship (Rousseau, 1989). Prior literature indicates that contracts in a supply chain context add more subjectivity and dynamism (Coltman et al., 2009; Rousseau, 1989). The present study enriches the literature by showing that last-minute changes of promises involve the subjective judgments of top-level managers.

**4.3.4.2 Institutionalization.** Institutionalization indicates the process of implementing individual and group level learning at the organizational level (Crossan et al., 1999). System changes and supply chain investments are frequent features of this institutionalization process (Crossan et al., 1999).

*System changes.* System changes are an important aspect of the institutionalization process (Crossan et al., 1999) that occur in organizations due to the institutionalization process (Crossan et al., 1999). In today's dynamic business environments, organizations are considered as being open systems and consist of a set of interrelated sub-systems designed to balance the rapidly changing environmental needs (Cameron & Green, 2009). This approach argues that there is no single best method to design and manage an organization and it is important to maximize the fit between individuals, groups, and organizational needs during system changes (Cameron & Green, 2009). The present study not only indicates the importance of maximizing fit, but also enriches the literature by showing the critical role of balancing needs of the product and process, as well as the context of the supply chain.

System alterations involve communicating changes to key players, working to minimize resisting forces, maximize driving forces, and agreeing on a change plan that affects tasks and informal activities (Cameron & Green, 2009). Key players

who are driving change, engage in strengthening system changes; in contrast, resisting forces hinder the change process. The present study similarly indicates the importance of communicating changes to key players, and further enriches the literature by showing that complex supply chain system changes involve a sequence of activities; therefore, it is crucial to address concerns in a stepwise manner. Some practitioners value starting the system changes on a small scale, growing steadily, and not planning whole changes; they expect challenges and chaos during the system change process (Cameron & Green, 2009). Bullington and Bullington (2005) found that close supply chain relationships tend to smooth out the effects of unplanned changes and maximize the benefits. System changes in a supply chain context are a complex process. The literature review indicates that future logistics system changes require comprehensive, long-term leadership and planning (Bowersox et al., 2000). Supply chain system changes are estimated to require 20 percent of the scope to be under the direct control of the respective executive, and around 80 percent under other managers (Bowersox et al., 2000). In short, logistics change leaders need to sell ideas and become cross-functional catalysts (Bowersox et al., 2000).

***Supply chain investments.*** Supply chain investments refer to investments in diverse aspects of the organization when embedding new learning (Nooshinfard, & Nemati-Anaraki, 2014; Crossan et al., 1999). Such investments are identified as the investment of time, money and people in the development of inter-organizational relationships (Kocabasoglu, Prahinski, & Klassen, 2007). This study enriches the literature by arguing that investments, in terms of top management time and money allocation, enrich the implementation of supply chain learning while facilitating enduring core competencies. The early literature mostly focused on physical investment and information technology in the supply chain context (Fawcett, Wallin, Allred, & Magnan, 2009; Blankley, 2008; Cannon & Perreault, 1999) so

that minimal attention was given to human aspects of investment and specifically intention (Cannon & Perreault, 1999). In today's knowledge-based economy, investment theory is extended to encompass intellectual capital, the value of knowledge and human capital (value of the investment of human skills and education) (Kocabasoglu et al., 2007). Cannon and Perreault (1999) argue that the value of investment in adaptations to process, product or procedures is specific to the needs and capabilities of supply chain partners and has little value outside the specific relationship. Similarly, the present findings indicate that supply chain investments are specific to the needs of dyadic partners and build on existing infrastructure. Thus, to summarize, this thesis makes the following contributions:

- The organizational level of supply chain learning consists of an institutionalization process that underlies exploitation capability;
  - (a) Exploitation capability consists of improvements and application.
  - (b) Institutionalization processes at the organizational level of supply chain learning consist of system changes and supply chain investments, and underlies the exploitation capability described above.

Thus, to summarize, the empirical findings of this study argue that supply chain learning consists of capabilities and processes.

The review of the literature indicates that linking micro- and macro-levels of dynamic capabilities enriches management theory (Barney & Felin, 2013; Teece et al., 1997). Only a few studies have examined the multi-level dimensions of supply chain learning (Martinkenaite & Breunig, 2016). Rezaei-Zadeh and Darwish (2016) identify that dynamic capabilities are accomplished through processes and routines. Moreover, early researchers argue that greater learning capacity is determined by absorptive capacity (Bravo, Moreno, & Llorens-Montes, 2016). Nevertheless, there

is no consensus in the early literature regarding the linkages of capabilities and processes in a supply chain context (Rezaei-Zadeh & Darwish, 2016). This thesis develops such a framework, thereby enriching the literature by linking the supply chain learning elements of capabilities and processes.

Thus, this thesis empirically establishes that supply chain learning processes underlie supply chain learning capabilities and provide a comprehensive way of linking micro- and macro-elements of supply chain learning.

The findings answer the following research questions:

**Research question one:**

- What are the dynamics of the elements of supply chain learning?

**Summary of findings - Research question one:**

The chapter has triangulated the empirical data with the supply chain relationships and organizational learning literature. It has also moved it forward via knowledge of the social-psychological dynamics of the elements of supply chain learning at multiple learning levels. The elements of supply chain learning have been shown to consist of five learning capabilities and four learning processes, which extends the literature into dyadic supply chain learning. By introducing value creation as the capability at the individual level of supply chain learning, this research emphasizes the need to go beyond merely acquiring knowledge, which is the focus of most of the early research on relative absorptive capacity.



**Research question two:**

- What are the linkages among the elements of supply chain learning?

**Summary of findings - Research question two:**

The findings elaborate on the cyclical nature of the socio-psychological processes of learning capabilities and processes. Further, this study identifies that supply chain learning processes influence supply chain learning capabilities and provide a comprehensive way of linking micro and macro elements of supply chain learning.

Overall, the multi-level lens that was used to study supply chain learning phenomenon led to the framework presented in this chapter, which opens the way for understanding the critical role of value creation and behavioral dynamics in elements of supply chain learning.

The next chapter elaborates on these findings to discuss enabling characteristics, and how they affect the elements of supply chain learning at the various levels of learning.

# **Chapter 5: Findings and Discussion: Impact of enabling characteristics on supply chain learning: A multi-level perspective**

## **5.1 Introduction**

Findings obtained from analysis of the four dyads confirm that certain factors, referred to as enabling characteristics, enhance supply chain learning. This chapter further addresses the findings and discusses the impact of these enabling characteristics on supply chain learning. Here ‘enabling’ is taken to mean “make able,” in the dynamic context of the four dyads studied. It is recognized that certain human-related factors provide the capability to make supply chain learning a success. These include intrinsic motivation, knowledge power, prior experience, and interpersonal interaction. Also identified is the multi-dimensional nature of specific enabling characteristics and their impact on the supply chain learning elements.

The chapter describes the findings of the cross-case analysis and discussion under individual, individual-group, group-organizational, and organizational levels of supply chain learning. It then articulates the conceptual model and the contribution at each level of supply chain learning. The cross-case findings and discussion related to the following research questions:

- What are the enabling characteristics of supply chain learning?
- How do these enabling characteristics affect supply chain learning?

## 5.2 Enabling characteristics of supply chain learning

For this study, enabling characteristics are the major contributors that drive supply chain learning in a dynamic supply chain context. The key themes derived from the data are summarized in Table 5.1. It was found that all of the factors are human-related. However, findings from the four dyads reveal that different types of enabling characteristics impact the multi-levels of supply chain learning. Also, some contextual factors impact the causal relationship that exists between enabling characteristics and supply chain learning.

Table 5.1: Enabling characteristics of (multi-level) supply chain learning

Abstract concepts	Themes	Impact to level of supply chain learning			
		Individual	Individual-group	Group-organizational	Organizational
Intrinsic motivation	Self-efficacy	√			
	Recognition		√		
	Engagement			√	
	Achievement				√
Knowledge power	Specialized knowledge power	√			
	Diverse knowledge power		√		
	Co-creating knowledge power			√	
	Co-specialized knowledge power				√
Prior experiences	Prior experience in related field	√			
	Prior experience in unrelated field				√
Interpersonal interactions	Trust in competence	√			
	Participation in decision making		√		
	Naturally occurring			√	
	Arranged				√

### 5.3 Enabling characteristics at the individual level of supply chain learning- Findings and discussion

The empirical findings reveal that enabling characteristics facilitate various elements of supply chain learning at the individual level. The key insights derived from the data are indicated in Table 5.2. The enabling characteristics were revealed to be self-efficacy (considered to be a component of intrinsic motivation); specialized knowledge power (knowledge power); prior experience in related fields (prior experience); and trust in competence (interpersonal interaction).

Table 5.2: Enabling characteristics at individual level of learning

<b>Abstract concept</b>	<b>Theme</b>
<b>Intrinsic motivation</b>	Self-efficacy
<b>Knowledge power</b>	Specialized knowledge power
<b>Prior experience</b>	Prior experience in related fields
<b>Interpersonal interactions</b>	Trust in competence

#### 5.3.1 Role of self-efficacy

Self-efficacy is the individual's belief of capability to perform a task (Robbins & Judge, 2013). Analysis of the data indicates that individual interpretations of self-accomplishments are crucial for creating self-efficacy. This process is illustrated by a packaging manager expressing how his new packaging solution makes him feel proud:

Even I put most of the time for this thing. Because something novel is coming to the Sri Lanka as well as to the manufacturing organization. It gave me some proud to means. If I can do this. I have done something. Because of that I led exploring the same manner. (Packaging manager-E)

Verbal feedback provided by the supply chain actors enhances the individual's belief of their ability to perform a specific task. Further, it is evident that the task-specific natures, plus personality characteristics, are embedded in this belief. The following quote from a packaging manager illustrates that his interpretations of ability are related to a specific activity. The interview extract and observation of his gestures show that he is an outgoing, ambitious and proactive personality:

I have gone there and for particular labeling. In this particular task, if you have a personal interest, you go an extra mile. (Packaging manager-E).

Belief of the ability to create product and process enhancements depends on competencies. The findings indicate that people tend to select activities they feel competent with. For instance, in the E-F dyad, a supplier's employees are competent in new labeling technology; thus, those experienced professionals feel comfortable with labeling technology and extend their full effort towards further development.

In contrast, the manufacturing organization's employees judge themselves less competent with labeling technology, causing those employees to feel less able to perform that specific task. The following quote from a senior manager illustrates how experienced professionals in the supplier organization feel comfortable with labeling technology and how they expend their full efforts towards development of a new labeling project:

The idea itself came from the supplier organization, it was not our idea to begin with. They asked... Why don't we do something like this? From that time onwards...It was a very difficult road. At every possible turn their [the supplier's] input was used as they were the experts. At the same time, we gave them some opportunities to visit a foreign country to understand how another manufacturer handles labeling. There was knowledge transfer from us to them and them to us. (Procurement manager-E)

Employees involved with a specific activity for a long time period can best decide the most relevant areas to improve. Long-term task performance creates not only deep interest but also the ability to set challenging goals and the commitment to achieve them. For instance, a manufacturing manager in the A-B dyad, who is specialized in soft drink production line leakages reports:

There are two types of losses. One is through line leakage. My experience with other organizations indicates that this is mainly because of design errors. Using my extensive knowledge I can design a new layout that reduces leakage. This reduces the losses to both organizations. This is my main focus these days. (Engineering manager-A)

His continuous exploration enables him to visualize new design layouts to reduce the factory's leakages. Hence, it can be argued that related knowledge, skills, and a positive attitude toward a specific activity gives supply chain actors an intrinsic desire to design a new soft drink line layout in a successful manner.

### **5.3.1.1 Discussion on the role of self-efficacy**

This study demonstrates that greater self-efficacy leads to a higher level of individual supply chain learning. To some extent, this finding is in line with the extant literature. This illustrates how human motivation is both complex and important (Amabile, 1997). From a humanism learning perspective, feelings and aspects of individuals are critical to individual learning since it is shown that individuals process and interpret information in unique ways (Kirwan, 2013).

It is important to explore the types of motivation that lead to creativity and thereby impact on the organization (Amabile, 1997). In this regard, early motivation theory argued that self-efficacy is an individual belief of capability to perform a task (Robbins & Judge, 2013; Benabou & Tirole, 2002) that depends on actual experience, including past successes and failures (Jena & Goswami, 2014; Bandura, 1977). The later researchers argue that self-efficacy depends on the individuals' interpretations of self-accomplishment and on the verbal feedback provided by others (Allred, Harrison, & O'Connell, 2013; Stevens, Olivarez, Lan, & Tallent-Runnels, 2004). Very few researchers argue that self-efficacy is task-specific rather than a personality characteristic (Jackson, 2002). However, this study confirms the crucial importance of individual interpretations of self-accomplishment on self-efficacy. For example, the packaging manager in Organization E reported how his new packaging solution made him feel proud. Moreover, this study enriches the literature by stating that both the task-specific nature and personality characteristics are embedded in the individual's belief of their ability to perform a task. One example is the outgoing, ambitious and proactive packaging manager in Organization E and his ability is related to specific packaging innovations.

Social cognitive theory argues that how one values one's own knowledge and skills determines how the individual responds to workplace challenges. Self-efficacy

intervenes in individual goal setting and individuals create self-inducements to persist in the effort matched with goals (Bandura, 1977). Similar to earlier research, this study argues that people tend to select and expend greater effort on activities when they feel competent to undertake them (Bandura, 1977); they focus on those problems and persist for longer periods of time compared to low self-efficacy holders (Allred et al., 2013; Jackson, 2002). Earlier studies do not address the issue of creation of organizational value, hence this study enriches the literature by showing that, when individuals hold complementary dyad knowledge, they feel more confident to generate new knowledge within their specific area of expertise.

The findings also reveal that self-efficacy enhances individual intuition. Long-term task performance creates not only deep interest but also the ability to set challenging goals and a commitment to achieve. For example, in Organization A, the engineering manager's continuous exploration of design errors gave him the ability to visualize new layouts to reduce leakages within the factory. This finding is confirmed by Robbins and Judge (2013), who affirm that self-efficacy is related to creative performance. To some extent, it is also in line with findings by Hyland et al. (2003), who found that creativity only occurs when motivational levels are high. It also recognizes autonomy as a crucial factor in knowledge creation (Hustad, 1999). To some extent, this finding is in line with that of Bandura (1977), who states that an individual's long-term synthesis of feedback information in a specific context decides one's ability to quickly recognize future patterns; and represents intrinsic motivation. Furthermore, individual self-efficacy determines coping behaviors, effort expended, and ability to tackle obstacles (Bandura, 1977).

The findings suggest that strong individual belief of capability to perform a task leads to sensible decision making and value creation, while also accessing relevant knowledge in an appropriate manner. In summary, the study finds that greater the



self-efficacy of the supply chain actors, the greater the supply chain learning at the individual level.

The next section discusses the role of specialized knowledge power and how the related factors trigger the individual level of supply chain learning.

### **5.3.2 Role of specialized knowledge power**

Analysis of the secondary data related to supply chain activities reveals that there are a large number of similar processes. The expert managers responsible for specific activities are capable of distinguishing those process and identifying related problems. Their in-depth knowledge also means they are able to organize knowledge to solve the problems, and are capable of drafting possible solutions. For instance, from a factory visit involving the A-B dyad, observations indicated the existence of a sequence of many processes. Management acknowledged the use of experts to identify the sequence of addressing problems. The following quote exemplified this finding by showing how worker improvement projects address root causes for problems:

We have separate projects called worker improvement projects. They identify opportunities for improvement. It is a methodical approach to total productive maintenance. We have two types of processes, so we have to identify the losses in each and identify which one to address first. An ongoing project is to explore whether there is an alternative to the gas we are using, so we can try it out. We have to consider the cost and the quality. We need to improve the yield. So, which is cheaper without compromising quality and safety? (Manufacturing manager-A)

A similar scenario prevails in all four dyads that some of the supply chain actors are constantly undertaking a variety of academic and professional qualifications that are vital to mastering a specific activity. This accumulated expertise makes the employee able to see the big picture problem. They are also more efficient at processing new knowledge related to tasks. The following quote captures this:

I am a graduate and an MBA student. I am also a UK registered lead auditor for food safety, environmental management systems, and a UK registered chartered trainer for system certifications. The system certification knowledge is a basic foundation for me to come here and conduct all required certifications related to supplier activities. I am the only person with in-depth knowledge of systems certification in my department. I am also responsible for creating new systems to manage the quality of supplier activities. (Systems manager-A)

A specialist with in-depth knowledge of specific activities utilizes these skills to solve problems in specific areas. However, they are unable to share that knowledge with novice actors who do not possess such in-depth knowledge. Also, it is evident that novice supply chain actors are not capable of understanding the solutions created by expert supply chain actors:

On the material side, they are the experts. We are open to their suggestions. Their employees usually give quick responses to novel issues using their specialized knowledge. (Quality assurance manager-C)

The factory manager suggests innovative ideas. However, we are not able to benefit from them because we don't have that expertise. However, history has shown that those ideas turn out to be the best solutions for the many problems we have had. (Procurement executive-C)

### **5.3.2.1 Discussion of the role of specialized knowledge power**

This thesis enhances the literature by demonstrating that greater specialized knowledge power leads to higher supply chain learning at the individual level. The literature shows that power processes at the supply chain level are more complex than power processes at the group and organizational levels (Cheng, 2012). This study similarly identifies that knowledge power at the boundary spanning level is more situated and tacit in nature. In addition, non-dominant firms in a supply chain dyad are said to be constrained by the partner's commands (Cheng, 2012). The findings indicate that in-depth knowledge of specific activities allows individual actors to organize supply chain knowledge to solve problems at the individual level of supply chain learning. In this regard, it can be argued that the specialized knowledge holder has accumulated expertise about the specific activity. To some extent, this finding is in line with that of Grawe et al. (2015), who found that the most facilitative sources of influence at the boundary spanning level are expert and referent power. In such a context, expert and referent power bases are positively related to the strength of supply chain relationships (Maloni & Benton, 2000). Referent power is the ability to influence agents to affect the target of influence using personal characteristics (Raven, 2008). On the other hand, expert power is the specialized expertise of the influencing agent as seen by the influence (Raven, 2008; Brusoni, Prencipe, & Pavitt, 2001).

The findings indicate the importance of those expert managers who are responsible for identifying problems as those employees can perceive the root causes of problem and are also capable of drafting solutions. This situation was illustrated in Organization E, when managers decided on autonomous and planned maintenance as its strategy to handle process losses. Like Dreyfus (2004), this researcher agrees

that proficient performers have the ability to identify root causes and quickly draft solutions, which necessarily involves deep thinking, access to new knowledge, and new value creation. To some extent, this finding is in line with that of Grant (1996), who identifies that knowledge resides within individual organizational members in a specialized form. Moreover, specialized knowledge is processed and acquired in the mind (Faber & Leon-Arauz, 2016). In such a context, the integration of an individual's specialized knowledge is the essence of organizational capability (Grant, 1996). An expert is more capable than a novice of refining situational discrimination in arriving at decisions (Markus, 2001; Dreyfus, 2004). The expert has learned to distinguish those situations by decomposing many situations into subclasses and can offer an immediate intuitive situational response (Dreyfus, 2004).

Specialized knowledge owners possess a depth of knowledge (Markus, 2001; Daugherty, 1992) and this study enriches the literature by stating that there, due to many similar supply chain processes, it is crucial to use experts to identify the best solution sequence. Similarly, it was found that highly specialized employees are unable to share knowledge with novice supply chain actors who do not possess in-depth knowledge of specific activities. In summary, the study finds that greater the specialized knowledge power, the greater the supply chain learning at the individual level.

The next section discusses the role of prior experience in related fields, and, how those factors trigger the individual level of supply chain learning in the context of four dyads.

### **5.3.3 Role of prior experience in related fields**

The cross-case analysis indicates that prior successes and failures stimulate further initiative development for products and processes. Such prior experiences enhance the characteristics of initiatives and their match with company requirements; therefore, prior experience also avoids reinventing the wheel:

[Given our continuous improvement activities] we always look at past experiences as the way for success. It could be positive. It could be negative. We use that past experience to see what we need to achieve in future. Take that learning rather than reinventing the wheel. [For example,] from past experience we know that having two types of packaging with a single machine may not be the best option. That is why we have two machines and we are managing two sections. That's the learning we are implementing in order to get benefits. (Procurement manager-C)

The findings indicate that the supply chain actor's early experiences create options for identifying new creative ideas related to a specific activity. Prior experience with a specific activity accumulates a rich information base for that task, which also ensures the ability to challenge assumptions and provide solutions in the appropriate manner. For instance, in Organization A, the manager's risk assessment experience meant he was able to monitor critical control points:

My successful experience with another food products manufacturing organization is also helpful to understand food safety, identify critical points and realize how to monitor the critical control points. We did critical control point analysis at that product manufacturing organization. (Quality assurance senior manager-B)

Long years of continual reconstruction of experiences generates a collection of feedback from self-reflection, and feedback from others, related to specific activity which help to generate refined ideas:

I have been in the printing industry since I was in school. In fact, my career began in printing. We had a press in school. Every three months, we published a souvenir. This work influenced my choice of trade. And familiarity with diverse printing methods allows me to generate better printing materials. (Factory executive-D)

Findings reveal that prior experiences are contributors to insight generation in the respective context. In the A-B dyad, long-time employees involved with continuous and repetitive engagement of a specific task have an in-depth focus on activities and can generate new ideas:

They have the expertise for corrective and preventive actions. Managers and assistants are very experienced people. They have more than 10 years of experience here. Experienced guys. They know each and every part of the machines. Root-cause analysis is very easy for them. (Quality assurance senior manager-B)

Similarly, production workers in the C-D dyad have been in the organization from the beginning of the contract. They are professionals who can spot problems in a matter of seconds. In the respondent's words:

We have a group of production workers who have been here from the beginning of the supply chain relationship. They are very fast. They have an unconscious sense to spot design deviations. (Factory executive-D)

Employees' long-term involvement with joint learning activities in the C-D dyad results in a deep understanding of new product creation (depth, breadth, colors, and printing techniques of the product). The dyad partner is, consequently, motivated to develop many suggestions for the benefit of the other partner.

### **5.3.3.1 Discussion on the role of prior experience in related fields**

This thesis enhances the literature by stating that the more experience an individual supply chain actor has in a related field, the higher is the individual level of supply chain learning. The literature reports that wide-ranging, deep and diverse experience contributes to creativity (Moutafi, Furnham, & Paltiel, 2004; Shane, 2000). In addition, direct task experience is found to lead to more creative products than does indirect experience (Nelissen, 2013; Montero & Evans, 2011; Gino et al., 2010; Argote, Beckman, & Epple, 1990).

Prior experience can impact radical initiative taking regarding the dimensions of processes; content; and motivation (Deichmann & Ende, 2014). The processes dimension concerns knowledge about the development stages, the evaluation criteria, and managerial expectations in these distinct phases (Deichmann & Ende, 2014). The content dimension relates to knowledge about the characteristics of the focal initiative and how it matches with company requirements, current needs, or problems (Deichmann & Ende, 2014). Finally, the motivational dimension of experience indicates why certain performance outcomes elicit more intense knowledge seeking and acquisition than others (Deichmann & Ende, 2014).

Findings indicate how prior success and failure stimulates further initiative development of products and processes. For example, a new machine allocation at

Organization C was refined by using prior experience related to machine adjustment problems. Experience serves as one key ingredient from which people make inferences to do product or process improvements again and to do product and process improvements better than previously; however, early studies found that failures rather than successes of new initiatives increase the likelihood of repeated initiatives (Deichmann & Ende, 2014). Some researchers argue that this is because people who experience failure seek increased risk (Sitkin, 1992) or that failure causes feelings of being positively challenged (Amabile, Barsade, Mueller, & Staw, 2005), stimulating individuals to experiment and develop refined ideas (Sitkin, 1992). On the other hand, successful prior experience outcomes are reinforced by positive feedback or rewards which can motivate them to take further initiatives (Deichmann & Ende, 2014).

This thesis enriches the literature by showing how knowledge about the characteristics of a specific initiative and matching these with company requirements, current needs, or problems avoids reinventing the wheel. The findings indicate that early experience creates options for identifying related new creative ideas. Prior experience with a specific activity is found to accumulate rich information and gives the ability to challenge assumptions and draft new solutions to problems. This finding is consistent with that of Shane (2000), who identifies that prior experience triggers identification of new creative ideas. This is also in line with the findings of Kolb and Kolb (2009), who make it clear that continuing reconstruction of experiences, according to feedback from self-reflection and feedback from others, leads to more refined ideas.

Organizational experience provides context-dependent knowledge to supply chain professionals (Bisogni, 2008). Some researchers argue that people who contribute to an idea bring prior experiences for further idea generation (Madsen & Desai,



2010). Similarly, findings indicate the importance of context-specific prior experience in idea generation. For instance, in the C-D dyad, employees' long-term involvement provided in-depth understanding of new product creation regarding the depth, breadth, colors, and printing techniques of the product.

This thesis enhances the literature by stating that prior experience in a specific activity leads to the ability to rapidly identify deviations. In summary, the research finds that greater the prior experience in related fields, the greater the supply chain learning at the individual level.

The next section discusses the role of trust in competence and, how this factor triggers elements at the individual level of supply chain learning in the context of the four dyads.

#### **5.3.4 Role of trust in competence**

Knowing the best person to contact is enhanced if the competence and goodwill of employees in the business relationships is known to all parties; especially when responding to diverse customer needs in a speedy manner. C-D dyad is having frequent interactions with employees of the supply chain partner and is capable of developing positive perceptions about abilities. Moreover, besides positive attitudes and understanding of processes, it also fosters knowledge sharing with employees. The following quotes exemplified this finding by showing how frequent interactions generate positive perception of individual competence and goodwill and how it supports getting the most updated knowledge:

I know the quality assurance manager is the most suitable person to contact in case of gas combination changes, and the marketing manager is the most

suitable person to contact for supply issues. Of course, from experience I am confident about their capabilities. So, I would rather just be a facilitator. They are driving process from their end in very effective manner. (Quality assurance manager-A)

If you wait for a while you will see somebody from the supplier organization come and talk to our people. That's the kind of relationship we have. So, we can get to know about updated issues quickly. They are experts in their roles. We don't have doubt about it. (Procurement manager-C)

#### **5.3.4.1 Discussion on the role of trust in competence**

Trust has been studied in different contexts and the review of the literature indicates that competence trust consists of technical capabilities, skills, and know-how; it is capable of changing behaviors of persons (Blomqvist, 1997). Earlier findings suggest that trust in competence provides assurance of ability in dealing with each other and in selecting the knowledge source to access (Lee, Wang, & Liu, 2011; Janowicz & Noorderhaven, 2002; Morgan & Hunt, 1994). Goucher (2009) identifies gaining an accurate perception of others' views as being required for trust and that inter-organizational trust is harder to achieve due to the diverse interests. This study enhances the literature by showing that heightened trust in another's competence leads to a higher level of individual level supply chain learning. The study revealed that the most effective type of trust that is useful at the individual level of supply chain learning is trust in competence that is related to a specific person. This finding is consistent with that of Blomqvist and Stahle (2000), who state that people trust one another and not the organization. The authors also state that unconditional trust creates positive effects and friendships, which positively

enhances role and tasks. On the other hand, Cheung et al. (2010) report that trust did not have a significant positive effect on relationship learning.

Because a hidden cost of trust is how it limits the search for critical information (Cheung et al., 2010; Becerra, Lunnan, & Huemer, 2008), the literature urges researchers to focus on the capability perspective of trust (Arnulf, Dreyer, & Grenness, 2005; Kwon & Suh, 2005). Hence, this thesis enriches the literature by introducing trust in competence as a critical dimension of interpersonal interactions in the supply chain context. This thesis also reveals that goodwill and an accurate perception of individual competence helps identify the most appropriate person, especially when needing to respond to diverse customer needs in a timely manner. To some extent, this finding is in line with that of Siachou and Gkorezis (2014), who identified the competencies of employees to be highly related to absorptive capacity. It is also in line with Blomqvist and Stahle (2000), who identify competence and goodwill as components of trust in professional relationships.

Although various types of trust are explored in the supply chain learning literature (Sengun & Onder, 2011; Levin & Cross, 2004; Blomqvist & Stahle, 2000; Mayer, Davis, & Schoorman, 1995; Lewis & Weigert, 1985), little attention has been given to identifying the most suitable aspect of trust in the supply chain learning context. However, research findings from the Organization C highlighted how frequent interactions result in appropriate and timely knowledge access and a speedy response to customer needs. Therefore, this thesis advances the literature by stating that sound interdependent interactions result in identifying the need for new knowledge that will improve the ability to develop speedy responses to customer needs. In summary, the research finds that the greater the trust in competence, the greater the supply chain learning at the individual level.

### **5.3.5 Role of self-development opportunities**

Providing opportunities for employee self-development enriches the individual and gives self-direction. Also, identification of career paths provides direction and encourages aspiration. In all four dyads, the findings indicate that self-development opportunities exist and are crucial for enhancing individuals' belief in their ability to perform tasks. The findings also reveal that self-development value is enhanced when it is:

- well planned;
- addresses employee concerns about specific activities;
- well communicated; and
- evaluated properly via continuous feedback.

In the A-B dyad, a nurturing culture has enhanced employee capability. For example, A-B dyad has extensive training programs, as indicated in Appendix 8. Having assured career paths motivates personnel to carry out research into new possibilities related to product and process development. Thus, employees enjoy the privilege of being able to research incrementally, and explore and acquire knowledge through various engagements. Application of this knowledge leads to the creation of new company value.

Similarly, with the C-D dyad, there is a focus on employee training that strengthens the individual's ability to visualize their future career and feel positive about it. The dyad partners have international (and local) training programs, which enhance the supply chain actors' specialized knowledge and offer access to rich training materials and world-class experts. Specialization, relatedness of training program content to supply chain learning activities, and opportunities to apply new skills on the job are among the positive outcomes. Findings indicate that the manufacturing organization has a very high profile in training and development. The richness of

its training and development involves a thorough needs analysis to identify clear training objectives, selection of training media, and pretesting of trainees via formal and informal methods. The specified training programs for the supply chain actors are commitment based:

I have worked for this organization for many years. There are lots of training opportunities to enhance our capabilities. I use those to improve my ability to increase my contribution of value to the supply chain relationship. It gives us an opportunity to carry out an in-depth analysis of activities. (Operations manager-D)

In the G-H dyad, the supply chain actors can mutually agree their self-focused career plans, and may select areas of specialization. Consequently, employees discuss with employers the training programs and providers and means of funding. This support enriches employee's engagement and gives the organizations some future assurance that valuable skills will not be lost to the competition. Because such mutually agreed upon decisions improve the careers of the supply chain actors, it leads to willingness to research possibilities:

I have given them the freedom to think about what they want in the next four-five years. If they want to continue in logistics, they can select good training courses. They have basically had discussions with me. And they have started on training. I got the company to sponsor in-house and external training for them to basically give a better output within the position. [This develops a] specialized employee base which, [with] the increases in new models of recycling crates, helps us move into new related businesses such as pallets. (Logistics manager-G)

In Organization A, the supply chain actors' jobs' evident security means that the dyad partners have a strong policy of developing employee potential along with the organization:

No retrenchments or anything. We absorb people into other areas and divisions. After that, there are no retrenchments. We recruited about 60-70 people. When you give a visible career future, employees are focused. So, it gives them opportunity to excel in job functions we need for new product development. Our organization ensures every possible support in every step of their career. (Supply chain manager-A)

Essentially, the relationship between self-efficacy (an enabling characteristic) and supply chain learning at the individual level is made stronger when self-development opportunities are available. This effect extends to top management since the training given to top managers was observed to increase their competence in decision-making in specific fields of study:

And of course, when I got into procurement I went for training. I have actually been on two courses and a third one is pending. I can obtain a full qualification after that. I am now more confident to make hedging decisions [compared with] others in our organization. (Procurement manager-G)

In contrast, even the top managers are not capable of analyzing the hedging pricing reports that are prepared by procurement manager-G, as training programs into “hedging” develop high confidence in the ability to take upon strategic decisions that improve raw material price advantages.

As the procurement manager, I am the only employee who is privileged to attend the hedging pricing training program offered by our mother company. Even my senior management team does not have the competency

to understand hedging pricing reports prepared by me. During the last five years, we gained profit from raw material hedging. I am now confident that I can continue in predicting prices. (Procurement manager-G)

Thus, the relationship between specialized knowledge power (an enabling characteristic) and supply chain learning at the individual level is also made stronger when self-development opportunities are available. In Organization F assurance of a long-term career path encourages employees to build up unique competencies in specific supply chain activities, and to accumulate a rich base of specialist tacit knowledge. Such employees are experts at specific activities and can quickly see what needs to be done and how to do it, compared to novice employees. However, such expert employees report that it is difficult for them to share tacit knowledge with employees that do not possess this in-depth knowledge. The following quotes exemplified this finding.

Our organization aims to build an enterprise planning system by 2021. As a sales manager, I have drafted a series of training programs, including enterprise resource planning system training programs, to my executive team. These plans will ensure that my team is capable of handling the enterprise planning system. (Sales manager-F)

#### **5.3.5.1 Discussion on role of self-development opportunities**

The findings obtained from the study of all four dyads indicate that self-development opportunities are crucial for enhancing belief in individuals' ability to perform tasks. Findings reveal how the reported self-development opportunities address the concerns of employees regarding their specific activities, provided that

the opportunities are well planned, well communicated, properly evaluated, and continuous feedback on progress is provided. This is in line with much of the research on self-development in career management and employee training. Employee training and career planning are found to be critical factors for creating self-development opportunities (Agić, 2012) and the early literature states that firms need to plan career opportunities for knowledge workers in a manner that satisfies individual and organizational strategies (Lin et al., 2016; Gowen & Tallon, 2003; Kelly et al., 2011).

This thesis shows that, when supply chain employers are supportive of career plans, employee involvement is enriched. To some extent, this finding is in line with that of Gowen and Tallon (2003), who found that training has a positive relationship with supply chain performance. Similarly, Lepak and Snell (1999) show that training positively impacts organizational commitment in a supply chain context. In all four dyads, longstanding and specific training programs for the supply chain actors exist. Such a commitment-based training process begins with a needs assessment and setting of training objectives, followed by selection of appropriate training media, and pretesting using formal and informal methods. To some extent, this is in line with Shub and Stonebaker (2009), who found that relationship-based training is extensive and customized and involves mentoring. Kelly et al. (2011) argue that employee self-interest also needs to be considered when deciding which knowledge and skills are appropriate for employees; not only in today's organization but for potential future employment (Leon & Uddin, 2016).

This thesis enhances the literature by showing that the relationship of enabling characteristics (self-efficacy) and the individual level of supply chain learning is made stronger when self-development opportunities are available to employees:



- future visibility of career positively shapes individual's interpretations of self-accomplishment;
- verbal feedback generates a keen sense of the employee's belief of their capability to perform specific tasks; and
- the employee can put elements together to form novel, intuitive response.

This research also identifies the value of individualizing careers for creating employee commitment and engagement. To some extent, this finding is in line with that of Baruch, Szucs and Gunz (2015), who emphasize the importance of the individual as the unit of analysis within the career literature, suggesting that future research should focus on individualization of careers for today's dynamic business contexts (Leon & Uddin, 2016; Baruch et al., 2015; Rao, 2015). Lack of career opportunity is one of the top three reasons for the reduction in job commitment and engagement and leads to attrition (Davis, 2015; Newman, Thanacoody, & Hui, 2011). Davis further highlights that many organizations have no plans in place for employee career development so it is left to the individuals themselves (Davis, 2015).

The findings highlight the importance of the depth of training and how this provides motivation for employees to identify future opportunities and to have the confidence to take the initiative. Well-respected external training programs with deeper knowledge bases broaden the supply chain actors' knowledge and skills and build professional contracts with experts into specific activities that enrich decision-making. This finding aligns with the literature showing that active involvement with professional development activities increases employee self-efficacy belief, increases self-awareness and problem-solving skills, and enhances autonomous learning (Cabarouglu, 2014).

Orvis and Leffler (2011) found that a proactive personality has a significant positive relationship with self-development. Holders of self-efficacy high are proactive personalities who identify opportunities and take initiatives (Orvis & Leffler, 2011). The literature identified that creative self-efficacy is associated with creativity among individual employees (Bambale, 2014; Tierney & Farmer, 2004). Also, education and job title are factors that affect an employee's sense of creative self-efficacy (Tierney & Farmer, 2004). This research also shows that training top managers increases their creative self-efficacy, making them feel competent in their decision-making ability. For instance, the procurement manager in Organization G, who was willing to spend time and effort on his own training, was more willing to take risky decisions related to hedging. In summary, the research finds that the relationship between self-efficacy and the individual level of supply chain learning is stronger when backed by self-development opportunities.

This thesis also enhances the literature by stating that the relationship of enabling characteristics (specialized knowledge power) and the individual level of supply chain learning are stronger when backed by self-development opportunities; provided that neither party to supply chain learning is able to offer expertise to the other dyad partner. Non-availability of core competencies in suppliers' expertise leads to arranging outside training programs. This is in line with early research that recognized that the range and sophistication of disciplines needed for a firm's innovation is expanding (Wang & Von Tunzelmann, 2000), making it difficult to source entirely in-house (Brusoni, Prencipe, & Pavitt, 2001).

The literature shows that proper career development enhances the positive psychological contract with employees and allows employees to focus on specific career path and career advancements (Davis, 2015). Long-term career development

strategies are also found to enhance creative thinking and ability to see the big picture (Ellinger & Ellinger, 2013).

The findings of this thesis confirm the importance of employees' long-term career path planning and found evidence that it enhances the tacit, explicit and strategic knowledge that make employees expert in a specific activity. These employees are capable of seeing what needs to be done and how to do it more quickly than the novices in that field; given enough knowledge and experience in a specific activity, experts compose situations into categories and see the specific intuitive response (Dreyfus, 2004). Similar to the findings by Ellinger and Ellinger (2013) it was found that training methods that focus on learning-by-doing approaches enhance deeper knowledge of the tasks. Employee developmental initiatives were found to enhance employees' tacit, explicit and strategic knowledge that make an expert into specific activity (Aguinis & Kraiger, 2009).

This thesis also enriches the literature by stating that it is difficult to share tacit knowledge with non-specialized employees and employees with less in-depth knowledge of a specific activity. In addition, a shortened career paths, perhaps due to frequent transfers, promotions and staff turnover, affects an employee's level of expertise, and can give rise to an over-reliance on outside parties. In summary, the research finds that the relationship between specialized knowledge power and the individual level of supply chain learning is stronger when backed by self-development opportunities.

In summary, the conceptual model relating to the individual level of supply chain learning is shown in Figure 5.1.

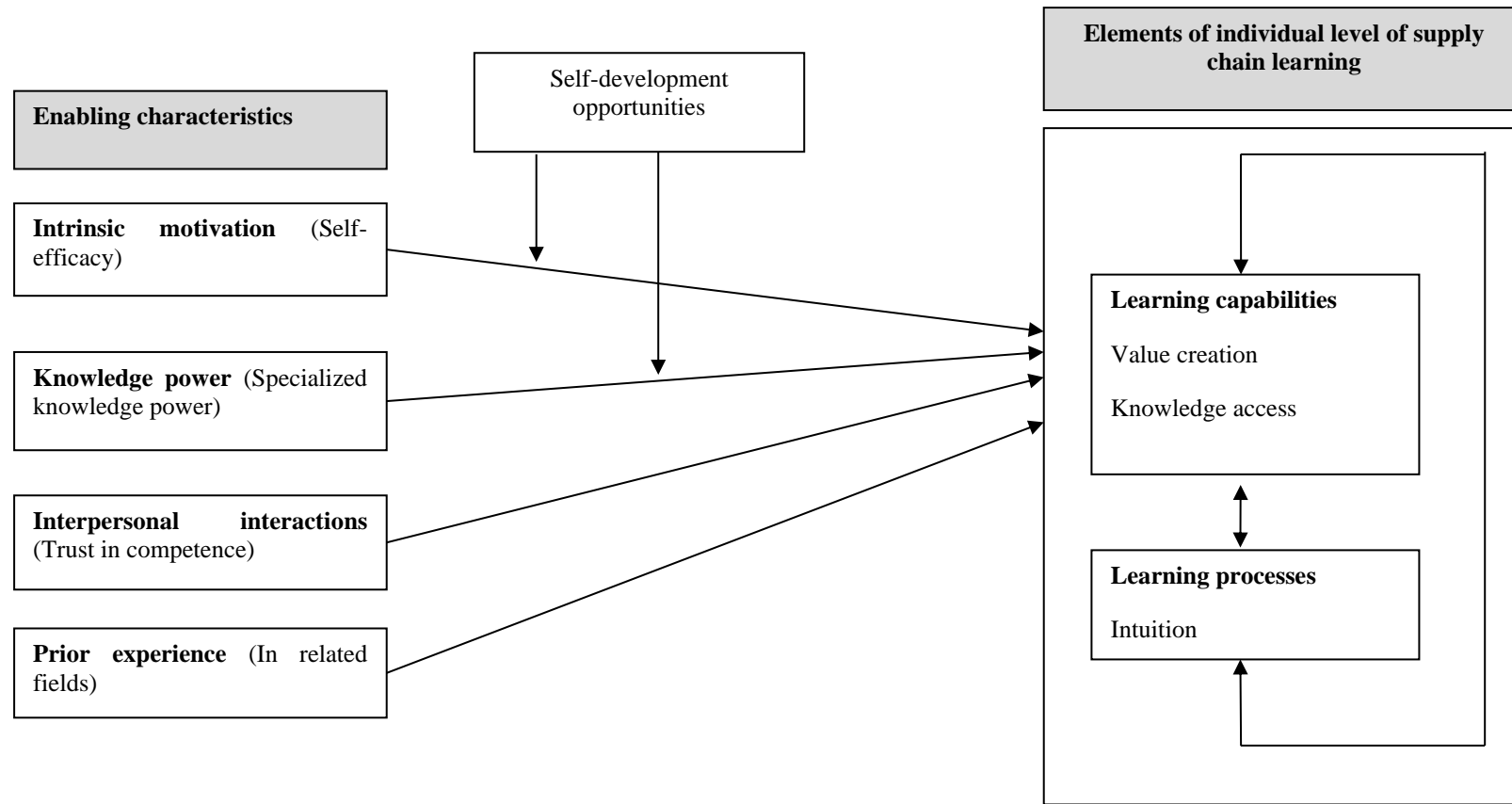


Figure 5.1: Conceptual model for enabling characteristics - Individual level of supply chain learning

## 5.4 Findings of enabling characteristics of individual-group level of supply chain learning-Findings and discussion

This section discusses the impact of enabling characteristics on elements of the individual-group level of supply chain learning, and enhances the literature by articulating new insights. The empirical findings indicate that recognition, diverse knowledge power and participation in decision-making enrich teamwork at the individual-group level of supply chain learning, Table 5.3.

Table 5.3: Enabling characteristics at individual-group level of supply chain learning

Abstract concept	Theme
Intrinsic motivation	Recognition
Knowledge power	Diverse knowledge power
Interpersonal interaction	Participation in decision making

### 5.4.1 Role of recognition

Commonly, supply chain team members are recognized and praised for their ability to understand requirements and for having a positive mindset. The major challenge in the supply chain context is that interpretations that go against those of the dominant supply chain team would cause insecurity in supply chain activities. The following quote illustrates how, when a supplier organization purchases materials that satisfy the manufacturer's needs, it is praised:

These people are very good. We are really satisfied especially from our side. We are openly telling that they are very good. It is a very good positive mindset that they are having. So, we are really happy about that one.

Everything is coming because of our relationship. I think. (Quality assurance manager-C)

Each supply chain partner possesses a relatively small number of experts qualified to postgraduate level. This academic knowledge enables them to identify all aspects related to an issue and they are eager to confirm the validity of interpretations. In turn, this ensures they become the dominant people who develop interpretations on behalf of their respective team. The following quote illustrates how other people accept the views of educated employees, regarding the possible changes in the package of the product:

Of course, academic qualifications give validity to our interpretations. Other people accept our views of possible changes in the packaging of the product. Academic achievements in related fields give us in-depth knowledge needed to generate strong arguments about package design. (Assistant sourcing manager-C)

Being multi-national, the supply chain managers in organizations A, B, C, E, and G need to use their knowledge of (wider) organizational norms when analyzing their local supply chain needs, for example when considering opportunities for product and process development. These norms are found to be influenced by internal and external needs of the supply chains:

If we wanted to identify the development or let's say area for improvement today, but say, still within the existing machine design, I don't think we can do an immediate change. But if I think a couple of years back, when both companies identified we needed to change the machine design, we knew that it was the right time to accommodate them. (Logistics manager-G)

#### **5.4.1.1 Discussion on role of recognition**

This thesis enhances the literature by showing that a greater recognition of the individual leads to a higher individual-group level of supply chain learning. Motivation theory identifies recognition as a need for status and attention, which is a higher order and positive need (Robbins & Judge, 2013). Similarly, the findings indicate the importance of recognizing supply chain team members by praising their ability. For instance, in the C-D dyad, the supplier organization purchases materials that satisfy manufacturer needs, which the manufacturer organization openly acknowledges. This finding is in line with previous research on the recognition from motivation theory perspective that acknowledges how human nature is to be recognized (Grawe et al., 2015; Neuhouser et al., 2010; Kennedy & Lawrence, 2009). However, research has shown that individuals who are recognized and praised and not always criticized and sanctioned can develop self-conscious personhood in a team (Krijnen, 2014). The literature also indicates that individuals may have to fight for recognition in order to become an autonomous person; and that holding a view which competes with a dominant personality can result in insecurity and self-doubt (Krijnen, 2014). This study enriches the literature by showing that the major challenge in the supply chain context is that holding a view which competes with a more dominant team can result in insecurity in supply chain activities.

This research confirms the literature indicating that higher educational qualifications are related to higher ranked jobs and social status (Hobcraft, 2000). It also expands on this by showing that formal and informal academic knowledge leads to eagerness to be convinced of the validity of interpretations. These employees also tend to become the dominant in a team and develop interpretations for the team.

This research confirms the importance of the main concern of having a close community and adherence to its norms regarding understanding and analyzing to ensure recognition from that community (Krijnen, 2014). Although some literature considers such obedience to the norms of a community of practice ensures recognition (Krijnen, 2014), these studies do not address the value of also considering the main concerns of key players when analyzing opportunities in a product and process development context. Hence, this study makes a contribution to the literature by illustrating the role of main concerns of key players play in determining the directions to analyze opportunities for product and process development. In summary, the research shows that a higher level of recognition leads to greater supply chain learning at the individual-group level.

#### **5.4.2 Role of diverse knowledge power**

The findings show that, because it is not possible for individuals to be specialized in every area, combining the expertise of several supply chain actors is necessary to develop common understandings for the dyad. This is vital, for example, when the problem-solving relates to complicated product and process development. It is also evident that supply chain value creation requires a diverse range of knowledge by supply chain actors in order that they can understand and analyze identified needs. Furthermore, when certain aspects of expertise are not available locally within the supply chain team, the organization will seek help from outside expert teams. For example, when professionals in the A-B dyad needed the assistance of external experts to understand the matters related to user interface board, a manager reported that:



We are not in a position to rectify [problem] as we don't have knowledge into all the aspects of the process. Our people can identify the readings and its interpretations. But we need to get help from a reputed Asian country regarding matters related to the user interface board. (Operations and supplier manager-B)

The challenges faced by specialized supply chain actors mean that it is sometimes difficult for them to share their specific knowledge with other supply chain actors.

The domain-specific knowledge of employees is argued to be related to understanding and analyzing requirements for product and process designs. Employees with domain-specific general knowledge are capable of identifying a variety of opportunities for alternative tasks and can comprehend new knowledge. For instance, the manufacturer in the C-D dyad sends the package design they wish to have printed. The supplier's software design manager, who is responsible for converting this into a printing layout, uses his knowledge to articulate the design. The following quote explains how the manufacturer and supplier use their general knowledge to design a standard for paper as well as comprehend new knowledge in order to make a printer-ready layout:

There are lots of issues that my team look at when we convert the [manufacturer's] paper model. At the reading stage, we face a lot of issues because the manufacturer doesn't know the issues we face when making their design into a printer-ready version. Sometimes we discuss it with them and change the paper model. (Software design manager-D)

#### **5.4.2.1 Discussion on role of diverse knowledge power**

This thesis enhances the literature by showing that a greater diversity of knowledge power leads to a higher individual-group level of supply chain learning. The review of the literature indicates that due to the cognitive limits of the human mind, the increase in depth of knowledge leads to a reduction in breadth (Grant, 1996). However, Grant (1996) also argues that value creation requires a diverse knowledge base and identifies combining the specialized knowledge of a number of individuals as a strategy to deal with this need. Aligned with earlier research, this study argues that ownership by employees of different knowledge bases is crucial in problem-solving when it relates to complicated product and process development. For instance, in Organization B there is a need for external experts to understand the matters related to user interface boards.

Kelly et al. (2011) identify a technical generalist as an employee who gains additional specialist educational qualifications in other areas. These new skills allow them to develop shared language across disciplines (Grillitsch & Nilsson, 2015; Kelly et al., 2011; Mohammed & Dumville, 2001). However, this thesis found that the challenges faced by specialized supply chain actors mean that it is sometimes difficult to share diverse knowledge because the other supply chain actors do not have general knowledge of supply chain needs. This situation acts as barrier to developing shared language across supply chain activities.

Complementary resource availability is considered to be a driver that decides the closeness of a supply chain relationship (Golicic & Mentzer, 2005). Previous studies discuss how the relevance of one dyad partner's basic knowledge to the other dyad partner's knowledge base is positively associated with inter-organizational learning (Lane & Lubatkin, 1998). However, it is further argued that the relevance of one dyad partner's specialized knowledge to the other dyad partners knowledge

is a negative association (Lane & Lubatkin, 1998). Cohen and Levinthal (1990) argue that there must be a portion of diverse knowledge within the two organizations to creatively utilize that knowledge. It encourages multiple individuals to integrate specialized knowledge to the organization (Foss, 1998; Baker & Salas, 1997; Grant, 1996). Moreover, the domain-specific knowledge of employees is argued to be related to acquiring and assimilating knowledge (Brown & Duguid, 1991). Generalist knowledge owners are capable of interpreting problems and situations from a variety of perspectives (Bunderson & Sutcliffe, 2002). Generalist human capital is argued to be more linked with the ability to identify a variety of opportunities for alternative tasks and comprehend new knowledge (DeChurch & Mesmer-Magnus, 2010; Taylor & Greve, 2006; Shane, 2000). This study confirms these previous studies and expands on them. This thesis stresses the importance of domain-specific knowledge being held by a number of employees to understand and analyze the requirements for product and process designs. For instance, in the C-D dyad, the manufacturer and supplier employees used their general knowledge to design a standard for paper and to comprehend new knowledge to make a printer-ready layout. In summary, the findings show that a higher level of diverse knowledge power leads to greater supply chain learning at the individual-group level.

#### **5.4.3 Role of participation in decision making**

The findings indicate how, in the context of specific work activities that relate to them, employees are given the chance to become involved in the wider group's decision-making. Organization E is a well-regarded organization with regard to employee talent development, and cultivating friendly, effective working interactions such as openness. The interviews and observations provide strong

support for this view. The following quote illustrates how supply chain partners can directly participate in discussion with all employees, including the chief executive officer. These practices give an impression that employees are given the chance to participate in decision-making (although final decisions are taken by top management):

We even can contact the chief executive officer of the supplier any time for any issue. (Procurement manager-E)

In the G-H dyad, where a dynamic production process and warehouse management facilities require instance decision-making, it is critical to be able to quickly contact the relevant field expert to seek their views, as needs arise:

He is involved with procurement. There is another head handling production. Another guy is in packaging. I am involved in only with logistics. The problem is if I don't have proper communication with them. Then definitely, I will have a problem. If something goes wrong, the production will stop. (Logistics manager-G)

In this case, the supplier has authorized direct contact with third-party experts. The following remark by a senior manager and reverse logistics assistant indicates this point well:

The most senior manager allows us to deal with the supplier without any disturbance. (Reverse logistics assistant-G)

In all four dyads studied, the employees that perform specific activities are knowledgeable about them, and are allowed to diagnose related problems. The A-B dyad partners rely on internal employees to settle job-related problems. These employees are freed to communicate and participate in decision-making with the

relevant people when analyzing problems, and when the problem is critical it requires the attention of top management. The following quote explains how employees are given the chance to be involved in decision-making, provided that the specific work activities relate to the employee:

If we had an issue related to spare parts ordering I would immediately contact the supplier's quality assurance people for assistance. Then, we would hold a meeting here to discuss things and decide what to do. If it is a critical issue, we have to discuss that with my boss. Otherwise, we have freedom to discuss it with the supplier employees and settle it.  
(Procurement manager-A)

#### **5.4.3.1 Discussion on role of participation in decision making**

This thesis enhances the literature by showing that greater participation in decision-making leads to higher individual-group levels of supply chain learning. Early research reveals that the organizational mechanisms related to coordination capabilities such as cross-functional interfaces, participation in decision-making, and job rotation are more related to potential absorptive capacity (Jansen et al., 2005). Participation in decision-making involves active participation of employees in making decisions, through giving and receiving information and sharing experiences (Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002). Employees are allowed to be involved in problem-solving and other decision-making activities (Prisca, 2011).

It can be argued that decision-making involves understanding and analyzing information related to new value creation, when two or more people influence each

other in making decisions (Prisca, 2011). The interpersonal perspective of participation focuses on involvement of a person in group contexts and contributions to goals of the group (ibid.). Although some studies (Prisca, 2011) explore the active participation of employees in decision-making, this study makes a contribution to the literature by illustrating how, even though the final decisions are taken by the top management, strategic decision-making allows employees to participate. For instance, in Organization E a variety of practices help to give the impression that employees are given a chance to participate in decision-making and how the final decisions are taken by top management. This finding is to some extent consistent with that of Vroom (1982), who found that employees thinking they participate in decision-making and employees actually involved in decision-making are fundamental aspects of employee participation. The literature also indicates that employee participation mitigates conflict and disagreement in conversations (Prisca, 2011).

In the context of specific work activities, Organization E's employees are given the chance to be involved in decision-making, which is consistent with the findings by Prisca (2011). Prisca also acknowledges that employees who perform activities know the importance of them, so should be allowed to understand and analyze related problems. The findings from all four dyads confirm this view. In summary, the findings show that the greater the employee participation in decision-making the greater the supply chain learning at the individual-group level.

#### **5.4.4 Role of helping behavior**

Findings indicate that facilitation is needed to understand and analyze an issue when diverse knowledge is involved. When problem-solving, it was observed to be

critical to summarize the main points and then proceed with understanding and analyzing the issue. Summarization of issues can be conducted by employees who are familiar with the context. For instance, the A-B dyad actors had experienced similar operations within the factory before outsourcing the operation to their supplier. That familiarity with basic concepts helped them to support the problem-solving process related to subsequent issues:

We have experience in gas production, as we had gas production inside our plant, before outsourcing it. So, we have a few employees who were there at that time and are now working in the dyadic relationship. I am one of them. So, I am acting like an employee who helps our guys and the supplier's experts in the gas manufacturing field. It helps all of us to decide which way to go. There were a few meetings which I was unable to attend...our guys were unable to facilitate the meetings as they don't have the needed gas production knowledge. (Quality assurance assistant-A)

In all the other dyads there are no employees who have experience similar to that of their suppliers. These employees are unable to summarize the main issues and conclusions early on, which makes it difficult for everyone to understand the problems being faced. The following quote explains how management uses diverse communication methods to understand the existing status of diverse knowledge to facilitate understanding:

I have no knowledge of engineering. So, when the supplier's packaging manager gives me a written document for a newly designed package, I was not confident to go ahead with a meeting where our senior managers are also present. So, what I did was... I asked for paper drawings and specifications. Of course, he can give that to me quickly, he is a very helpful guy. Then, I have the confidence to talk about it in the next meetings where

senior managers of both parties will attend. I can even critique the new drawings to incorporate our expectations. (Marketing manager-E)

It was observed that understanding of the exact needs is crucial when analyzing technical supply chain problems. The findings show that helping professionals to openly espouse their concerns facilitates and brings clarity in understanding and sharing complementary knowledge. As was reported by a participant from the A-B dyad:

Both of us are in the quality field. I always discuss problems with my senior manager, as and when it arises. She helps me as well and I give my fullest co-operation to her to solve issues related to a newly introduced gas analyzer. We can reach a decision very quickly. (Quality assurance senior assistant-B)

In contrast, participants from the C-D, E-F and G-H dyads reveal that being specialized in different fields hinders knowledge sharing. In such instances, management acknowledges that the use of supportive communication methods in understanding needs of the problem. The following quote describes how a factory manager and an assistant sourcing manager solve a color combination problem:

The factory manager at our supplier suggests variations in color combinations. He has been in the printing industry for decades. But, I am into sourcing. I actually can't identify those color combinations. What he did was, he invited me and my team to his factory and showed us the impact of color combinations on our new design. Actually, only then can I go ahead with the discussion. (Assistant sourcing manager-C)

This finding shows that the relationship between the enabling characteristic 'participation in decision-making' at the individual-group level of supply chain



learning is stronger when helping behavior is present. Findings indicate that management-helping behavior enhances employee participation in decision-making. Furthermore, employee participation at the different stages of the process allows the sharing of diverse interpretations and provides an ability to respond to contextual issues in a speedy manner. In the E-F dyad, continuous changes are shared within the network meetings. Supplier employees are motivated to express their views on improvements throughout the process at network meetings. This leads to employee participation and a belief that everybody gets a chance to express views, so decisions are perceived to be fair:

We can contact any related party freely. [For example] I contacted my factory manager to decide on the most suitable material for packaging. Of course, he gives me several options and shows me the best option. We have several options for importing that material. We discussed them and decided to go with an air freight partner to meet a tight timeline. (Sales manager-F)

In the G-H dyad, management acknowledges the value of supporting behavior to encourage respective employees to become involved in sudden changes to the process. Management believe that everybody gets a chance to express views and the decisions are perceived as fair. Employee participation allows both teams to identify their special needs to address using different helping behaviors. These supports for the supply chain actors enhance their confidence to share views for continuous problem-solving.

There were a few instances where less supportive behavior is reflected. In the A-B dyad, a few supplier employees who have worked there for over thirty years are reluctant to hear the diverse concerns of the manufacturer. Less supportive behavior has resulted in a belief that others' views are not considered when decision-making. This creates a situation where supply chain actors are reluctant to contact the

experienced staff for problem-solving related to product demand. Thus, the conversations that occur with these supply chain actors are less value adding for solving supply chain issues:

Manager X has been working for a few decades for our supplier. He is not willing to listen to some of our concerns. Maybe he has confidence with the demand patterns. Because his behavior is not supportive of our concerns, I am reluctant to contact him. I normally discuss issues with my senior managers and my senior manager will discuss those with that manager.  
(Procurement manager-A)

The next section compares and contrasts these empirical findings with the relevant literature, and enhances the literature by articulating new insights.

#### **5.4.4.1 Discussion on the role of helping behavior**

This thesis enhances the literature by showing that the relationship between certain enabling characteristics and the individual-group level of supply chain learning is stronger when backed by helping behaviors. The findings reveal that employees in all four dyads commonly exhibit helping behaviors in terms of attending, getting started, listening, genuineness and summarizing. This is in line with many authors in the organizational behavior literature who focus on helping behavior theory. The literature shows that helping behavior is an interpersonal behavior (Organ, 1997; Van Dyne, Graham, & Dienesch, 1994). Interdependent roles require helping behaviors that lead to employee cooperation, which ultimately enriches overall performance (Podsakoff, MacKenzie, Paine, & Bachrach, 2000; Van Dyne & Le Pine, 1998; Saavedra, Earley, & Van Dyne, 1993; Organ & Konovsky, 1989). Smith, Organ and Near (1983) identify helping behavior as self-reported helping

behavior. Higher levels of organizational support for employees leads to positive attitudes and behaviors of employees towards the organization (Van Dyne & Le Pine, 1998), which enhances employee performance and leads to further helping behavior (Eisenberger, Fasolo, & Davis-LaMastro, 1990). Also, altruistic helping behaviors are found to be related to collective goals, collective identity and collective interest (Campbell et al., 2016), indicating its presence at a group level. The present study confirms that helping behavior is an individual-group level phenomenon.

This thesis indicates that the specific relationship between the enabling characteristic diverse knowledge power and the individual-group level of supply chain learning is made stronger with helping behavior. A diverse knowledge base facilitates opportunities for enhanced learning and development of new capabilities (Harrison, Hitt, Hoskisson, & Ireland, 2001). This study enhances the literature by showing that problems in the supply chain learning context are complex and call for a broad base of knowledge.

Harrison et al. (2001) show that having only diverse knowledge is insufficient to achieve synergy and that good intentions and good understanding of needs is crucial in assisting in terms of words or behaviors (Howe, 2005). The present findings highlight the importance of summarizing the key issues and conclusions for assisting understanding and analyzing new ideas. For instance, Organization E employees with a basic knowledge of the gas manufacturing process helped others become familiar with the problems and helped them to get started on organizing solutions.

From a helping behavior perspective, this finding is consistent with Howe (2005) who shows that helping professionals bring their concerns related to the situation both facilitates clarity and understanding, and helps analyze complementary

knowledge. This thesis further enriches the literature by showing the importance of using diverse communication methods to understand the status of diverse knowledge to facilitate understanding. For instance, in the C-D dyad, the factory manager addressed the color combination problem by showing the impact of color combinations on a new design to the assistant sourcing manager. In summary, the research shows that the relationship between the enabling characteristic diverse knowledge power and the individual-group level of supply chain learning is stronger when backed by helping behaviors.

This thesis also enhances the literature by showing that the relationship between the enabling characteristic participation in decision-making and the individual-group level of supply chain learning is stronger when backed by helping behaviors. Employee participation in decision-making results in a positive attitude to job and organization (Zubair, Bashir, Abrar, Baig, & Hassan, 2015), and the present findings highlight the importance of management helping behaviors for enhancing employee participation in decision-making. For instance, in Organization F, management emphasizes network meetings to get employee participation. This leads to employee participation and a belief that everybody gets a chance to express views, so decisions are perceived to be fair. This finding is consistent with that of Zubair et al. (2015) who found that supportive management behaviors enhance employee participation in decision-making. Employee participation is reported to enhance social interactions and discussion (*ibid.*), which is line with the findings of McFarland (1968) who made it clear that the roots of participative decision-making depend on managerial style.

Campbell et al. (2016) found that transformational leadership is positively related to altruistic helping behavior. Furthermore, a high degree of management support demonstrates trust and confidence toward employees to participate in decision-

making, which leads to a great deal of interaction between managers and employees and a belief that everybody gets a chance to express views that lead to fair decisions (Prisca, 2011). On the other hand, this study enriches the literature by showing that autocratic management behavior results in a belief that others' views are not considered important in decision-making and results in less value adding when solving supply chain issues. In summary, the research shows that the relationship between the enabling characteristic participation in decision-making and the individual-group level of supply chain learning is stronger when backed by helping behaviors.

In summary, the conceptual model relating to the individual-group level of supply chain learning is shown in Figure 5.2.

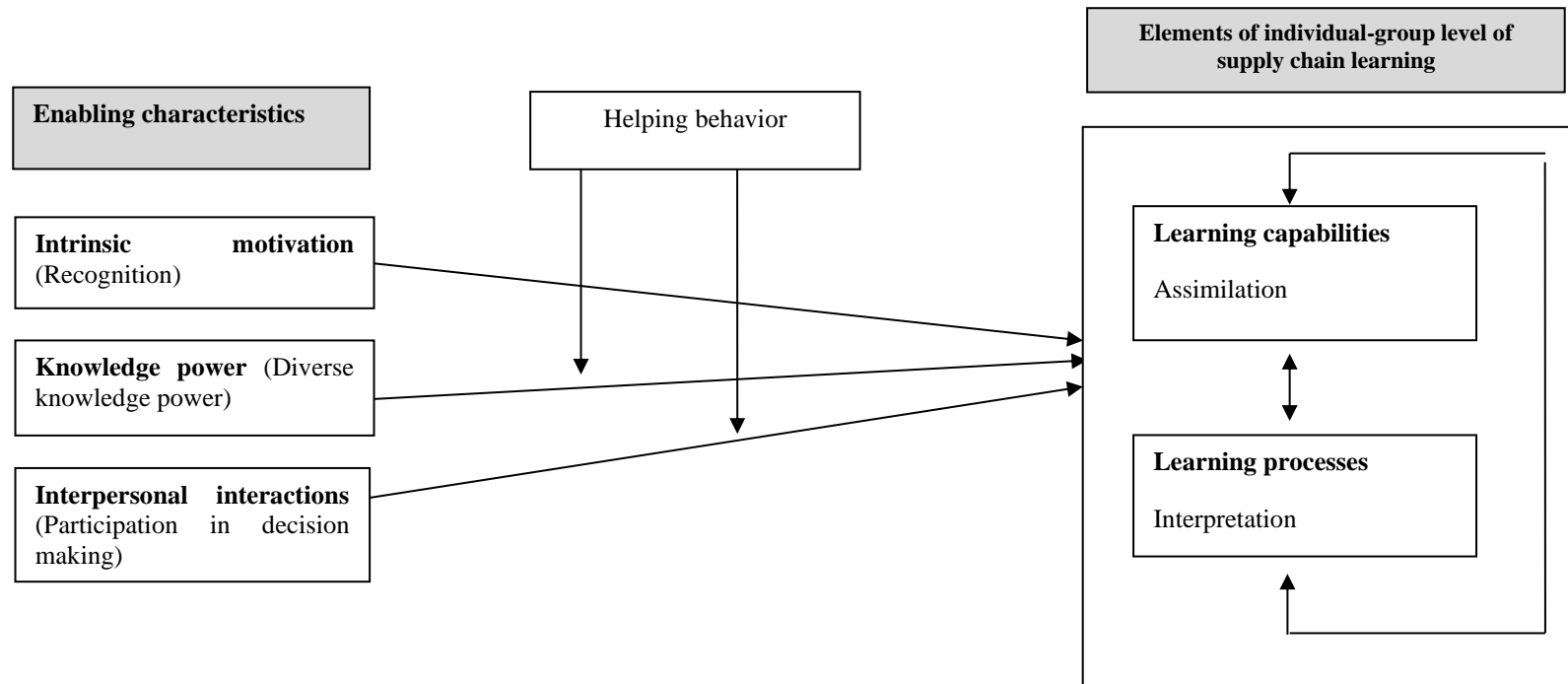


Figure 5.2: Conceptual model for enabling characteristics -Individual-group level of supply chain learning

## 5.5 Enabling characteristics of group-organizational level of supply chain learning-Findings and discussion

This section discusses the impact of enabling characteristics on elements of the group-organizational level of supply chain learning, and enhances the literature by articulating new insights. The empirical findings indicate that engagement, co-creating knowledge power, and naturally occurring interactions enrich teamwork at the group-organizational level of supply chain learning (see Table 5.4).

Table 5.4: Enabling characteristics at the group-organizational level of supply chain learning

<b>Abstract concept</b>	<b>Theme</b>
<b>Intrinsic motivation</b>	Engagement
<b>Knowledge power</b>	Co-creating knowledge power
<b>Interpersonal interactions</b>	Naturally occurring interactions

### 5.5.1 Role of engagement

The findings reveal that engaged employees are more likely to search out new methods, techniques, and instruments and will transform innovative ideas into useful applications and have skills in challenging established patterns. Engaged employees also demonstrate a faith in their ability to face change and not focus on mistakes in challenging situations, and are capable of acting calmly in pressured situations. All four dyads highlight how the nature of supply activities requires full attention as mistakes often cannot easily be rectified. For instance:

Our team is in charge of arranging color variations in the printing process. It is a critical part of printing. We have to ensure exact color mixing otherwise the quality of color is affected. So, we have to coordinate with the factory executive, operations manager and everybody to ensure the right mix is created [or suffer financial loss]. (Production employee 6-D)

The findings indicate that highly engaged employees can unite all involved people behind a common purpose and direction, and use different methods to ensure involvement. For instance, in the G-H dyad highly engaged employees have a positive attitude towards errors and encourage testing of novel packaging methods in prototype formats:

Not only we do give them a forum to make suggestions for proposed changes, if they come up with a good plan, we can communicate it to the management. And then basically we have the scheme to reward them. Every year, one or two guys earn these rewards. (Procurement manager-G)

These highly engaged employees have the opportunity to directly contact the chief executive of the supplier organization. The forum makes their suggested changes known so that mid- and low-level managers can participate and be rewarded for good suggestions. This encourages employees to engage in the supply chain change process.

#### **5.5.1.1 Discussion on the role of engagement**

This thesis enhances the literature by showing that greater levels of engagement lead to a higher group-organizational level of supply chain learning. Thesis findings reveal that employees' engagement is an investment in terms of physical, cognitive



and emotional energies toward job tasks, which closely aligns with the findings by Robbins and Judge (2013). To some extent, this finding is also in line with those of Schaufeli, Salanova, Gonzalez-Roma and Bakker (2002) who described work engagement as persistence, positive fulfilling of work-related states of mind, dedication and concentration; and employee involvement in tasks with enthusiasm as an individual and collectively (Meyer, Gagne, & Parfyonova, 2010). Literature also shows a positive relationship between employee engagement and safety behavior and multiple business unit performances (Baxter, 2013).

Early researchers stress the importance of aligning individual values and organizational values for achieving a higher level of engagement (Byrne, 2014). In the engaged state, employees perceive activities as worth doing as they move closer to goal attainment (Byrne, 2014; Nakamura & Csikszentmihalyi, 2009). Engaged employees are more involved with their work and reframe existing solutions to increase organizational productivity (Byrne, 2014). They are also more likely to search out new methods, techniques, instruments and transform innovative ideas into useful applications (Saleem, Saqib, & Zahra, 2015; Byrne, 2014). The findings indicate the importance of having faith in a capability to face changes and not focus on mistakes in challenging situations and to act calmly in pressured situations (Bridger, 2014).

This thesis further enriches the literature by showing that the nature of the product and process changes requires full engagement with the change process as mistakes often cannot easily be rectified. For example, in Organization D, the production workers in the color mixing machines needed to pay full attention to ensure the right quantity and quality of color was going to the machines or face financial losses.

Findings indicate the importance of having engaged employees who can unite everyone involved behind a common purpose and direction. This finding is in line with earlier research, which also argued that engaged employees are more likely to engage with change as they believe in the need for, and benefits of, change (Bridger, 2014). Such employees are also more capable of linking multiple views and making sense of reality (ibid.). This study enriches the literature by highlighting how engaged employees use different methods to ensure the active involvement of all related parties. For instance, in Organization G, the actors have a forum which makes their suggested changes known so that mid- and low-level managers can participate and be rewarded for good suggestions. This encourages employees to engage in the supply chain change process. In summary, the findings show that the greater the engagement of the supply chain actors, the greater the supply chain learning at the group-organizational level.

### **5.5.2 Role of co-creating knowledge power**

Findings indicate that combining different knowledge domains into joint product and process decisions enriches the product development process, indicating connectedness between knowledge integration and power embedded in knowledge. Deciding on the knowledge to integrate and how to integrate that knowledge is a critical decision in all four dyads studied. The following quote illustrates how different supply chain actors emphasize various aspects of knowledge needing to be integrated into a new product:

We are mainly focused on diverse combinations of gas that improve the taste of our soft drinks. It is about the raw materials. However, our suppliers have engaged with a more eco-friendly gas manufacturing concept. So, we

decided to add a few new ingredients to our gas mixture. At the same time, we removed a few ingredients from the soft drinks. (Quality assurance manager-A)

The different knowledge domains of the supply chain partners can also eliminate concerns from decision-making and encourage selected activities that influence knowledge integration. In-depth explanations and critiques help in co-creating knowledge, thereby increasing the internalization process:

I and my team have to adjust the offset layout. What happens is they send the visual printing design with the printout colors. But, it is difficult to use the same printout colors in offset printing. So, we need a lot of coordination with their procurement team to adjust the colors that match with offset printing needs. We always try to get the views of all relevant parties so we can adjust colors in an effective way. (Software design manager-D)

In the E-F dyad, management acknowledged the concerns of both supply chain partners during knowledge co-creation. For instance, when the supplier suggested using a square tub and the manufacturing organization a round tub, several rounds of discussion led to agreement. The manufacturer Organization E suggested the use of a robotic arm for new package manufacturing. As one senior manager stated:

We have continuous discussions around evaluating the different possibilities of creating designs for the curved tub for selected food products. (Procurement manager-E)

As complementary knowledge holders, it is evident that both dyad partners are owners of different knowledge domains. Consequently, the incorporation of partner expertise facilitates knowledge integration within product and process innovations. For instance, E-F dyad supplier employees have expertise in plastic molding while

the manufacturer employees have expertise in designing tubs for food products. Therefore, incorporation of both party's expertise leads to many possibilities for the new shape of plastic food package designs and involves decisions on what knowledge to integrate, what knowledge to remove, and what knowledge to add.

Similarly, the G-H dyad is creating unique new products that require consideration of both dyad partner knowledge domains concerning issues related to the strength of the plastic molds. Both dyad partners introduced a different way of handling the crate using their expertise, which was partially incorporated into the final solution:

There was a problem with crate handling. They added their expertise in plastics. We added our expertise in handling another material for another customer. The knowledge was combined, and we developed a new plastic crate handling system for the new factory. So, the design was developed by both of us. (Procurement manager-G)

#### **5.5.2.1 Discussion on role of co-creating knowledge power**

This thesis enhances the literature by showing that greater co-creating of knowledge power leads to greater group-organizational level supply chain learning. The findings indicate that diverse supply chain actors emphasize different aspects of knowledge needing to be integrated into products and processes. This finding is consistent with that of Skarzauskaite (2013) who found out that value co-creation includes involvement of at least two actors and integration of resources. Some researchers argue that co-creation is identified as two joint problem solvers creating a unique value (Leavy & Moitra, 2006; Mathieu, Heffner, Goodwin, Salas, &

Cannon-Bowers, 2000). It reflects that co-creation happens at the group and organizational levels.

Early research argues that combining and applying distributed knowledge from different knowledge domains into joint decisions and actions, in a new product development process, shapes the innovation process as per specific stakeholder knowledge and concerns (Matheus et al., 2016; Eisenhard & Santors, 2002). This indicates connectedness between knowledge integration and power embedded in knowledge (Matheus et al., 2016; Newell, Robertson, Scarbrough, & Swan, 2009; Eisenhard & Santors, 2002). Similarly, the findings indicate the importance of specific supply chain actor knowledge and concerns when combining and applying different knowledge domains into joint product and process decisions and actions in the new product development process. Similarly, to earlier research (Matheus et al., 2016; Newell et al., 2009), the findings highlight how knowledge domains and concerns of supply chain partners can exclude certain concerns from decision-making and legitimize selected activities that influence knowledge integration.

The knowledge as possession perspective argues that incorporation of partner expertise facilitates innovation (Matheus et al., 2016; Miles & Snow, 2007). This study enriches the literature by showing that, being complementary knowledge holders, both dyad partners are owners of different knowledge domains. Hence, incorporation of partner expertise and concerns facilitate effective knowledge integration in product and process innovations.

For instance, in Organization D adjustment of the offset layout required much coordination with the partner's procurement team to match with the needs of offset printing. In summary, the findings show that the greater the co-creating knowledge power of the supply chain actors, the greater the supply chain learning at the group-organizational level.

### **5.5.3 Role of naturally occurring interactions**

The study findings indicate that positive ad-hoc interpersonal interactions facilitate timeliness, address changing needs, and meet implicit and explicit customer expectations of product and process transformation. Such informal dealings to obtain data and clarifications in the usual course of activities without necessarily having a clear goal in mind, play a critical role in handling complexities in the change process. First-hand observation of day-to-day interactions in the supply chain context revealed how the diverse technical requirements require continuous support. For instance, there were numerous occasions when a supply chain partner needed clarification that required daily discussions over the phone regarding technical matters. Also, frequent visits by a dyad partner to collect samples created more opportunity for discussion that settled materials discrepancies. Observations of the behavior of the supply chain actors was also evidence of understanding and friendly dealing among the parties, and informal discussions conducted as needs arose:

I always contact the quality assurance manager whenever there are technical problems. See...I don't have technical expertise in those issues. Of course, there are no specific purposes of contacting. (Manufacturing manager - A)

I have a chat with the quality assurance assistant twice a week. It helps us to discuss discrepancies in our reports. Ultimately, it decides ways to reduce the discrepancies in gas components. (Quality assurance senior manager-B)

Such frequent informal communication among the supply chain actors enriches the coordination of mutual adjustments by addressing the concerns of the supply chain partners.

Managers in the C-D dyad acknowledge the value of informal interactions for sharing knowledge and observing processes. For instance, as was reported by a factory manager who visits and observes the processes:

I usually visit the manufacturer's premises to observe the process from A to Z. This gives me an opportunity to identify the necessary changes. Of course, these visits give me the opportunity to discuss problems with respective employees of manufacturer organization. We normally are able to reach an acceptable solution to problems. (Factory manager-D)

The cross-case evidence suggests it is fruitful to follow the course of self-interested, naturally occurring discussions. In the E-F dyad, supply chain actors are interested to freely communicate their self-interest during problem-solving. This helps them to develop confidence that leads to active engagement when problems require swift solutions. The findings also show that informal meetings lead to the identification of the need for formal meetings:

For many solutions a starting point emerges at an informal meeting. However, the application is ensured mostly, though a formal meeting. (Project manager-E)

### **5.5.3.1 Discussion on the role of naturally occurring interactions**

This thesis enhances the literature by stating that having more naturally occurring joint learning interactions leads to greater group-organizational level supply chain learning. It reveals that naturally occurring (and arranged) interactions with identified people are more related to realized absorptive capacity, which aligns with earlier studies that show how organizational mechanisms related with socialization

capabilities such as connectedness and socialization techniques are more related to realized absorptive capacity (Gligor & Holcomb, 2013; Jansen et al., 2005).

Some researchers have identified the blurring of lines between organizations as the contributor toward supply chain collaboration (Min et al., 2005). Mintzberg and Westley (1992) argue that mutual adjustments achieve the coordination of work via a process of informal communication. A review of the literature highlights explicit instances of formal and informal negotiation and influence on mutual adjustments (Wapshott & Mallett, 2013; Granovetter, 2005). Positive interpersonal interactions shape timeliness and address problems in changing needs and implicit and explicit customer expectations (Granovetter, 1983). Similarly, these findings also indicate the importance of positive ad-hoc interpersonal interactions that facilitate timeliness and addressing problems in changing needs. Informal dealing to obtain data and clarifications without a clear goal in mind plays a critical role in handling complexities in the change process. Furthermore, addressing mutual concerns of the supply chain actors in the change process effectively happens within naturally occurring interactions. For instance, in Organization B, the quality assurance employees conduct meetings twice a week in support of discussing discrepancies in reports as perceived by stakeholders.

The findings reveal that, in the context of the firms studied, self-interest communicated by the supply chain actors helps develop their self-confidence. In alignment with this finding, Fawcett, Ogden, Magnan and Cooper (2006) state it is easy for each supply chain member to freely follow a course of self-interest and interaction. To some extent, this finding is also in line with that of Hyland et al. (2003), who argue that intangible knowledge is found to emerge from informal interactions and activities.



The review of the literature indicates that managerial commitment needs to be supported and reinforced by an effective governance system (Fawcett et al., 2006), and this thesis enriches the literature by showing that informal meetings lead to the identification of the need for formal meetings. For instance, informal discussions by the supply chain partners in Organization E, which they refer to as pocket discussions, identified the discussion points to facilitate the change process and the need for formal meetings. In summary, the research study shows that the greater the naturally occurring interactions of joint learning activities, the greater the supply chain learning at the group-organizational level.

In summary, the conceptual model relating to the group-organizational level of supply chain learning is shown in Figure 5.3.

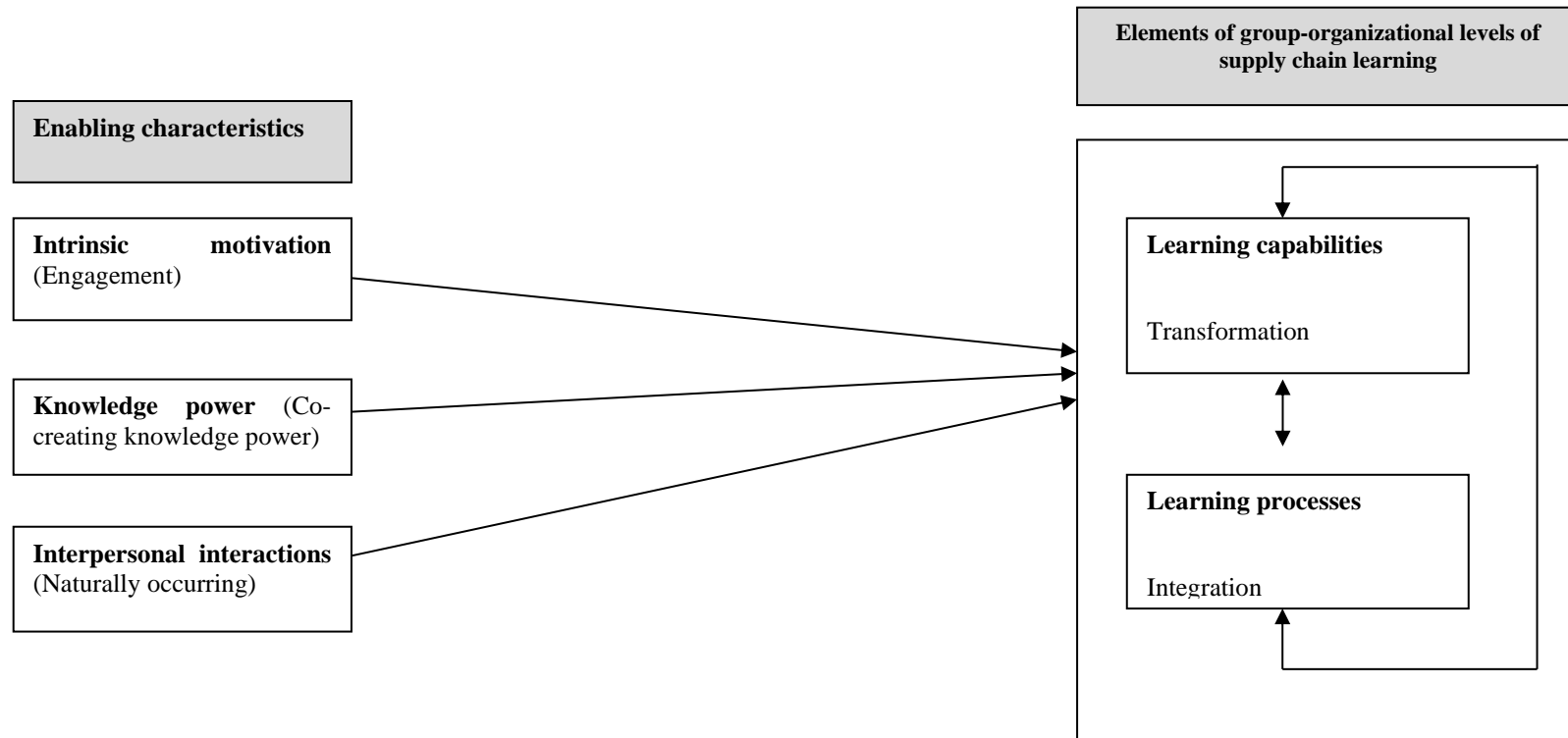


Figure 5.3: Conceptual model for enabling characteristics – Group-organizational level of supply chain learning

## 5.6 Enabling characteristics at the organizational level of supply chain learning-Findings and discussion

Empirical findings with the four dyads reveal the enabling characteristics that facilitate the various elements of supply chain learning at the organizational level. These enabling characteristics were revealed to be: Achievement, Co-specialized knowledge power, Arranged interactions and Prior experience in unrelated fields, Table 5.5.

Table 5.5: Enabling characteristics at the organizational level of supply chain learning

<b>Abstract concept</b>	<b>Theme</b>
<b>Intrinsic motivation</b>	Achievement
<b>Knowledge power</b>	Co-specialized knowledge power
<b>Interpersonal interactions</b>	Arranged interactions
<b>Prior experience</b>	Prior experience in unrelated fields

### 5.6.1 Role of achievement

The research findings reveal that the need to achieve successful supply chain implementations is a driver of the inter-organizational relationship. Such achievements provide direction for both organizations to understand successful implementations that focus on core competency enhancement. A positive supply chain actor attitude, which is derived from successful implementations, also increases behavioral intention to act. In particular, secondary research data indicates how successful implementations have acted as a motivator for pursuing future relationships, such as involving product extensions:

We are all interested in new initiatives. Team spirit gained through continuous success drives the implementation of new initiatives in a successful manner. (Supply chain manager-A)

Collective teamwork in achieving dyadic goals enhances the sense of achievement of the team members. In Organization D, several of the factory employees have worked on behalf of the supply chain partnership for many years. This particular dyad worked well in teams because their joint learning activities had increased their cohesiveness. A factory executive described the sense of achievement:

I have a good team of permanent and contract employees. They are professionals. They are people who have worked here from the beginning of the contract. They now have a sense of implementation. (Factory executive-D)

Furthermore, the feeling of fulfilling the joint learning projects by the respective organizations could increase future implementations. In the E-F dyad, the supply chain partners' successful new product development with another category ensures movement into new product introductions. The collective effort to commercialize new products into diverse areas also enhances the competitive edge of the dyad:

Our organization has the relationship with this supplier for several decades. Early on they have the relationship with us for several other products. That is why we start the relationship with the same supplier for this product range as well. We are confident about their ability to move into new innovative products. It is a proven ability. No doubts... (Marketing manager-E)

Apart from the focus on achievements, the findings acknowledge the context-specific nature of goals and the relatedness to specific tasks. It is important to consider whether individual, team, and organizational goals are compatible with the

supply chain goals. Any differences require decisions on which supply chain actor/s should be involved in the implementation of specific supply chain goals. The following quote illustrates the need to align individual, team and organizational goals with the customer's requirements in a supply chain learning implementation:

We are actually at the implementation stage. What we do is we always go with the customer's requirements. And we work as a team. We interact with marketing people, production people, and everyone. All the relevant people are involved in this phase. And, the design engineer and I go and help to develop solutions. They may not see something which we have experienced in other industries. So, then we share that knowledge. It is the best outcome for both parties in realizing the implementation of new initiatives. (Sales manager-H)

#### **5.6.1.1 Discussion on role of achievement**

This thesis enhances the literature by showing that the need to achieve leads to greater supply chain learning at the organizational level. Analysis of the records of several implementation attempts indicates success when compared to set standards. This finding is in line with motivation theory research into achievement need theories focusing on excelling relative to high standards (Robbins & Judge, 2013). The need to achieve is a higher order motivation factor and the early literature discusses the concept related to goal setting and goals achievement (Robbins & Judge, 2013). Achievement goals are related to competence and a desire to master the environment and do things well (Durik & Harackiewicz, 2003). The findings show that successful joint learning implementations foster future implementations. This is in line with Golicic and Mentzer (2005), who consider that successful supply

chain partner performance over a period is a key driver of inter-organizational relationships.

The feeling of fulfilling joint learning implementations enhances the achievement mindset of the team members. This finding is consistent with the theory of planned behavior, which argues that positive expected outcomes increase behavioral intention and positive social perception leads to positive behavioral intention (Jin et al., 2013; Fishbein & Ajzen, 1975). Similarly, the findings indicate the importance of supply chain goals that focus on core competency achievement. This study enriches the literature by showing that the feeling of fulfilling joint learning projects by respective teams and organizations could increase their future involvement in diverse product and process implementations.

Early research argues that context defines what is important, and individuals and teams pursue situationally influenced goals related to the purpose of the specific task (Durik & Harackiewicz, 2003). It is also crucial to consider whether situational goals are matched with individual actor achievement orientations (Durik & Harackiewicz, 2003). This study enriches the literature by showing that, apart from the focus on goals, the findings acknowledge the context-specific nature of goals related to specific supply chain tasks, and the importance of supply chain actors that have goals compatible with supply chain goals. In summary, the findings show that the greater the achievement needs of the supply chain actors, the greater the supply chain learning at the organizational level.

### **5.6.2 Role of co-specialized knowledge power**

When working on aspects of the supply chain, the actors develop joint knowledge assets related to mutual learning activities and increasingly depend on co-

specialized knowledge; which creates power imbalances. A critical feature of co-specialized knowledge power is the supply chain actors' enhancement of the existing unique knowledge base, creating inimitable core competencies:

We have knowledge of beverage manufacturing. On top of that, our parent company has a wide network of experts of beverages as well as gas manufacturing. And most importantly, our supplier has knowledge about testing gas quality. From time to time we introduce changes to our gas components. The supplier's gas experts decide the most suitable practical solution for new gas production every time [and] initial suggestions seem to be a failure. However, the experts in both organizations somehow come to an agreement at the end. (Quality assurance manager-A)

The findings also reveal that matching needs and removing constraints is important for developing co-specialized knowledge. For instance, the reason the C-D dyad was able to implement new promotional packages over the last few years was a unique new design for the dyad and the result of incorporation of strategic philosophy and operational needs. This has enhanced the sustainability of the supply chain core competence:

In designing new packages, our supplier adds the type of paper, availability of raw materials, etc. We are actually concerned about the strategic philosophy of the product's packaging. Both organizations created specialized knowledge together which enriches customer perception about the product. (Assistant sourcing manager-C)

Further, long-term evolution of co-specialized knowledge between specific supply chain actors enhances the matching needs and removes constraints embedded in co-specialized knowledge power. The case findings provide strong support for the

understanding developed over time in developing co-specialized knowledge and how it facilitates matching supply chain needs. For instance, in the E-F dyad, long years in the industry have resulted in the accumulation of co-specialized knowledge assets.

Co-specialized knowledge focuses on what knowledge to apply in the joint learning context and how to apply it in a manner that satisfies supply chain needs.

#### **5.6.2.1 Discussion on the role of co-specialized knowledge power**

This thesis enhances the literature by stating that greater co-specialized knowledge power leads to greater supply chain learning at the organizational level. Previous studies discuss co-specialization as a specific, irreversible investment by partners in a collaborative context, and mostly discuss co-specialization in terms of physical investments (Heiman & Nickerson, 2004). In addition, Peterson (2009) introduces the concept of New knowledge, which is identified as knowledge that comes from outside justified true belief (Peterson, 2009).

The findings indicate that increased dependence in co-specialized knowledge creation creates power imbalances in the supply chain. This finding is consistent with the perspective that two entities with knowledge assets specific to mutual transaction increase both dependence and the problem of opportunism between supply chain's partners (Sridharan & Akroyd, 2011). This study enriches the literature by showing that enhancement of the existing unique knowledge base triggers non-imitable core competencies. For example, when the supply chain partners created new gas combinations unique to the dyad, thereby increasing non-imitable core competencies.



The findings highlight the importance of matching needs and removing constraints when developing co-specialized knowledge. This confirms Sridharan and Akroyd (2011) who state that specific human assets continually contribute to the firm's objectives by matching needs and removing constraints to the efficient transfer of knowledge to the firm. This study further enriches the literature by arguing that long-term evolution of co-specialized knowledge between specific supply chain actors enhances the needs matching and removal of constraints embedded in co-specialized knowledge power. In summary, the findings show that the greater the co-specialized knowledge power of the supply chain actors, the greater the supply chain learning at the organizational level.

### **5.6.3 Role of prior experience in unrelated fields**

The participants perceive that the diverse experiences of multi-team members facilitate successful implementations of product extension strategies. For instance, in the E-F dyad, supply chain actors have prior experiences of a diverse range of manufacturing technology:

Our supplier production team has experience with round tub in-mould labeling for other reputed brands in the Sri Lankan market. We used that experience to move into round tub manufacturing for our new product. Of course, their experience with machines, raw materials, factory arrangements, technical expertise into loading and unloading machines, framing moulds, of course, helped us to go ahead with the round tub manufacturing within few months. (Packaging manager-E)

Similarly, in the G-H dyad, the manufacturer organization has experience with using different crate arranging techniques to increase the efficiency of warehouse

operations. Their collective diverse experience enabled them to successfully introduce new crate handling mechanisms to the production floor:

My warehouse team has experience with different methods of stock arrangements to enhance the warehouse product movements for other products that we have handled for years. That is not only within our factory warehouse, but also within several other remotely located warehouses. We found that using stock arranging techniques for our new plastic crate handling is very useful for us to enrich the warehouse operations. (Logistics manager-G)

Experience gained in other industries allows employees to apply different patterns of work to their current work. However, allowing a reasonable time to change the practices was found to be crucial when the other party has no prior experience with the new, introduced practices:

I have worked with several local and international suppliers. I have experience in how to change the supplier's practices. It should be a step by step process. We need to give them time so the change process will go well. First, we try to deal with lower minimum stock levels. Supplier's responses are good. However, there is instance that we have to wait for stocks due to their transportation issues... (Procurement executive-C)

In contrast, in the A-B dyad, where the supply chain teams lacked experience of gas purification, they employed an external third party:

Neither our organization nor our supplier organization has expertise into some gas purity testing procedures. So, most of the time when we introduce new gas combinations we send it to reputed gas laboratory in a well-developed country. Then, after some time we get their confirmation of

purity reports. Then only we go ahead with adopting commercial gas manufacturing. (Quality assurance manager-A)

#### **5.6.3.1 Discussion on the role of prior experience in unrelated fields**

This thesis enhances the literature by showing that more experience gained in unrelated fields leads to a higher level of supply chain learning at the organizational level. Findings indicate the importance of diverse experiences of multi-team members and its role in facilitating successful implementations of product and process extension strategies. This finding is in line with many previous findings focused on the impact of diverse experiences in successful performance (Easton & Rosenzweig, 2015; Dekker & Abbeele, 2010; Lorentz, 2008). Taylor and Greve (2006) recognize that prior experience leads to the implementation of successful initiatives.

The review of the literature indicates that multiple knowledge domains produce novel combinations of values, and that extensive experience ensures innovation output with high success (Taylor & Greve, 2006). It was found that multi-member teams with experience of working together produced innovations with greater variation in value, and that their diverse experience contributes to the successful performance (Taylor & Greve, 2006).

Prior literature indicates that dynamic capabilities are created via a prior adaptation experience (Eggers, 2012). Early studies into product development capability identified that greater experience of adapting a product development process for different niches increases the firm's chances of success for new niches, although initial hurdles will need to be overcome (Castellaneta & Zollo, 2014; Eggers, 2012; Gulati, 1999). This study enhances the literature by identifying the need for granting

suppliers a reasonable time to change implementation practices for new product and process extensions, particularly when the supplier team has no prior experience with diverse practices. This indicates the crucial role of both supply chain partners having prior experience in different domains. In summary, the findings show that the greater the unrelated prior experience, the greater the supply chain learning at the organizational level.

#### **5.6.4 Role of arranged interactions**

The findings reveal the quantity and quality of human interactions to be a major factor in deciding the success or failure of implementations. Recurring activities require recurring meeting arrangements and entail processes and specific steps. Supply chain actors in charge of these activities schedule the meetings and discussions that are crucial for implementing the activities. From the participant perspective, physical distance does not constitute a barrier to communication between the relevant supply chain actors:

Whenever there are changes in gas components I arrange several meetings with my colleague in the manufacturing organization to ensure the correct material goes to forthcoming orders. (Quality assurance senior manager-B)

Alignment of the supply chain actors' goals with those of the supply chain is crucial if supply chain interactions are to be take place that focus on implementation. Communication of technical goals to the team members is also critical for successful implementation. Thus, meetings and long-range phone and email conversations communicate the most updated supply chain goals to those employees so that they can be reflected in design changes. For instance, in Organization C, meetings with selected managers ensures the efficacy of the design

process and guarantees that the most updated version of a product proceeds to the final stage:

The suppliers are welcome to our premises at any time. They visit and talk with our production people. They have the opportunity to give their suggestions about improving the process. (Stores executive-C)

In addition to initial goal alignment, it is critical to decide the sub-goals at different stages of the implementation process, and align these in a timely manner. For instance, when Organization G was implementing an expensive value system, regular discussions were held between related supply chain actors about practical problems and how to implement new changes:

To design the monthly product plan, we arranged a few rounds of official meetings. We expect attendance by the respective parties for the meetings. Especially, we arrange meetings for the implementation of the plans because you know in implementation there is less room for error. It is natural that there will be changes to the targets throughout the process till we get the final product. (Logistics manager-G)

#### **5.6.4.1 Discussion on the role of arranged interactions**

This thesis enhances the literature by showing that formally arranged interactions related to joint learning activity increase supply chain learning at the organizational level. The supply chain management literature identifies improper human interaction as a major failure factor in the development and implementation of innovations (Maghsoudi & Pazirandeh, 2016; Bergiel, Gainey & Bergiel, 2015; Russell & Hoag, 2004; Laudon & Laudon, 2006; Hansen, 1999). The findings

highlight the importance of aligning the goals of the supply chain actors with supply chain goals; requiring formally-arranged supply chain interactions that are focused on implementation matters. This is in line with findings by Zouaghi and Laghouag (2012) that indicate alignment of individuals' goals with supply chain goals is crucial for interactions that focus on implementation. This thesis enhances the literature by showing that the communication of supply chain-related technical goals to team members is critical for successful implementation. It is also critical to agree the sub-goals at different stages of the implementation process and alignment of these adjusted goals in a timely manner. Findings show that the greater the number of formally arranged interactions related to joint learning activity, the greater the supply chain learning at the organizational level.

#### **5.6.5 Role of mutual benefit in arranged interactions**

The findings indicate a dynamic, continuous and interactive value-claiming process exists between the dyad firms, and that the causal relationship between arranged interactions and the organizational level of supply chain learning is moderated by mutual benefit. Supply chain implementations are based on each dyad partner's view of the enhancement of core competency. For instance, in the E-F dyad, although a single partner had derived a new product design, future implementations by the dyad were more favorable due to the perceived the mutual benefit to both partners.

This project gives us revenue plus many things, technological advancements, image etc. From their end, they have trusted the supplier with future projects. (Packaging manager-F)

Findings indicate that formally-arranged communications, to recognize specific issues, and a risk mitigation program are crucial factors for successful supply chain implementations. The following two scenarios reflect that the decision for arranged interactions to implement new products is driven by mutual benefit.

The C-D dyad prioritizes fulfilling the needs of customers from which they derive most mutual benefit, while also mitigating the risks. In this case, a backup factory is available and the supply chain actors arrange meetings between the respective parties to ensure smooth production of new designs. While this arrangement provides high mutual benefit and loss mitigation, the findings indicate that the arrangement results in delays to the orders of the other 'less mutually-beneficial' customers:

We give priority to the manufacturing organization because we get business from them every day. We have a similar factory to this. If we can't do it here, we do it at the other factory, which has the same system. So that time, we used that factory. I am not the production manager there. But we can talk and do it. Our planners will decide what jobs can be done there, or assign a customer's job to another plant and do the manufacturer's job here. (Factory manager-D)

In contrast, in the G-H dyad, discussions between dyadic partners about whether to proceed with producing their own new pallet led to choosing a foreign supplier because producing them in-house would not be a mutually-beneficial option. It would require a large initial investment by the supplier organization:

We had a number of rounds of discussions with our supplier to see whether they can produce new pallets for our crates. Actually, we like to go ahead with pallet manufacturing with our supplier. But, there was a problem from

their side. It involves huge initial investment for them. As a result, we have gone ahead with the foreign supplier. (Procurement manager-G)

#### **5.6.5.1 Discussion on the role of mutual benefit in arranged interactions**

This thesis enhances the literature by stating that the causal relationship between arranged interactions (an enabling characteristic), and the organizational level of supply chain learning, is moderated by mutual benefit.

Power (2005) identifies how consistent communications that have positive actions to identify and manage key risks are critical for successful supply chain implementations. The findings similarly highlight how effective communication to manage supply chain risk is a crucial factor for successful implementations. This aligns with the view that some supply chains are unsuccessfully implemented due to the supply chain partners being unable to come to an agreement on terms (Power, 2005; Baum, 1997). Improved processes, shared risks and rewards, better prices, and higher profits derived from supply chain relationships all motivate the implementation of new designs commercially (Noemi, 2012; Golicic & Mentzer, 2005).

Di Domenico, Tracey and Haugh (2009) identify three stages of inter-organizational arrangements. The first involves exchanging assets and resources perceived to be to mutual advantage (*ibid.*). Thereafter, tensions among actors lead to conflicts, and finally, reconciliation of tensions leads to new organizational arrangements in a cyclical process (Di Domenico et al., 2009).

This thesis enriches the literature by showing that not having mutual benefit hinders the rounds of communication efforts to implement new product introduction.



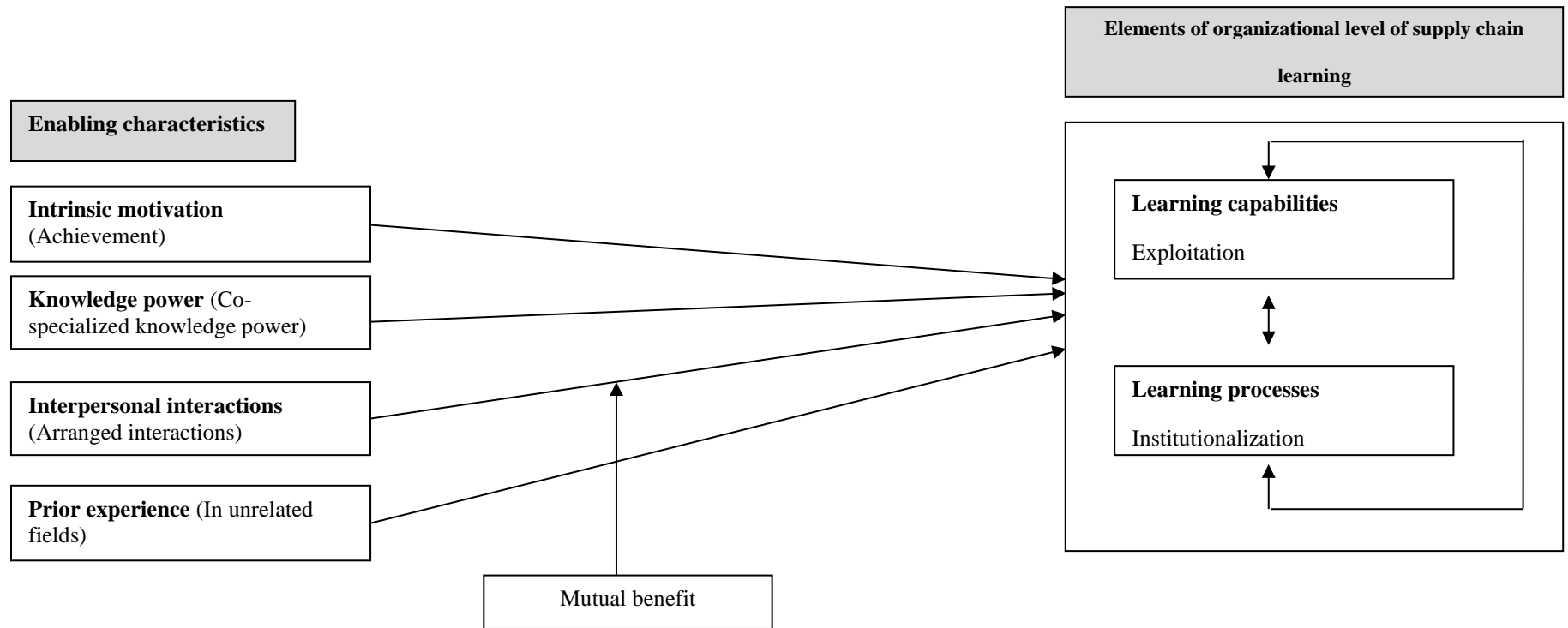
According to the findings, mutual benefit is the most important catalyst when making choices about supply chain implementation; a finding that is in line with many previous studies. Mutual cost and benefit of the relationship indirectly underlie the concept of supply chain attractiveness. Furthermore, the use of equal sharing of mutual benefits creates perceptions of fairness and willingness to collaborate in the future (Simatupang, Wright, & Sridharan, 2002; Jap, 2001).

Jap (2001) argues that ability to separate each organization's input into collaboration and joint creation of idiosyncratic input improves relationship quality. The findings in all four dyads studied reveal the availability of diverse methods of sharing tangible and intangible benefits and fairness. However, this is based on anticipated benefits to supply chain partners. In contrast to the concept of equal sharing of supply chain value, Perez and Cambra-Fierro (2015) introduce the dual-appropriation concept, where, in a dynamic, continuous and interactive value-claiming process, both firms assume full appropriation of a different and unique value.

A review of the literature reveals that it is difficult to study mutual benefits in networks with unclear supply chain actor contributions, gains, and competencies, and most knowledge-intensive industries fall into this category (Jap, 2001). Aligned with the literature, this study reveals that in today's dynamic supply chain context, the major part of benefits and costs are intangible aspects. Jap (2001) found that relational concerns (Organ, 2004) and norms of fairness motivate allocations among participants. The present study showed that ineffective communication of potential benefits is a challenge to developing mutual trust (Kwon & Suh, 2005). A social exchange theory perspective argues that individual or organizational interactions are based on the logic of mutual benefit or avoiding punishment (Zouaghi & Laghouag, 2012; Emerson, 1976). Day (1995) states that for an alliance

to be valuable, it must offer mutual value. In summary, the findings show that the relationship between arranged interactions (an enabling characteristic) and the organizational level of supply chain learning is stronger when there is mutual partner benefit.

In summary, the conceptual model relating to the organizational level of supply chain learning is shown in Figure 5.4.



Source: Liyanage (2017b)

Figure 5.4: Conceptual model for enabling characteristics – Organizational level of supply chain learning

## **5.7 Summary**

This chapter has triangulated the empirical data with earlier literature concerning supply chain relationships and organizational learning. It has also advanced knowledge regarding the effects of enabling characteristics on the elements of supply chain learning at multi-levels of learning. Facets of the enabling characteristics within and across levels are several and diverse. By introducing enabling characteristics as the most critical facilitator of elements of supply chain learning, this research emphasizes the need to go beyond prior knowledge and structural elements which has been the focus of most of the absorptive capacity and relative absorptive capacity literature.

The research extends literature into higher order motivation as the core enabler of elements of supply chain learning capabilities and processes at multi-levels of learning. Particularly, this finding extends the early literature by introducing self-efficacy, recognition, engagement, and achievement need as sub-themes of intrinsic motivation, as crucial aspects that enhance elements of supply chain learning.

By introducing knowledge power as an enabler of supply chain learning, it extends knowledge into the impact of power embedded in knowledge for enhancing supply chain learning. Further, by introducing specialized, diverse, co-creating and co-specialized knowledge power as sub-themes of knowledge power, this study substantially changes and enhances the traditional focus of sources of power, such as expert power, referent power, reward power and authoritative power that impact on supply chain learning.

The present study discovered the need to focus on prior experiences and emphasizes the role of related and unrelated aspects of prior experiences on supply chain

learning. Hence, this study substantially re-conceptualizes the early focus of task and non-task experiences on elements of supply chain learning.

By introducing interpersonal interactions as an enabler of supply chain learning, this research advances knowledge of the impact of interpersonal interactions on enhancing supply chain learning. Further, by introducing trust in competence, participation in decision-making, naturally occurring and arranged interactions as sub-themes of interpersonal interactions, this study substantially enhances the literature on the role of interpersonal interactions that impact supply chain learning.

Using a multilevel lens to study supply chain learning phenomena, the frameworks presented in this chapter substantially enhance and open up a diverse perspective to the understanding of the critical role of enabling characteristics on elements of supply chain learning.

The next chapter concludes the research by addressing the main conclusions of the study, its theoretical contribution, practical implications, and limitations. Most importantly, future research directions derived from this study are presented.

## **Chapter 6: Conclusions and future work**

### **6.1 Introduction**

The findings of this study underscore the value of effective supply chain learning as an opportunity to significantly improve the competitive advantages of dyadic supply chains (Yang et al., 2019; Yang, 2016). This concluding chapter elaborates on the theoretical contributions of this thesis, practical implications, and future research directions. As the field is still immature, many gaps are addressed by this study.

### **6.2 Conclusions**

The study advances knowledge of the dynamics of elements of supply chain learning at multi-learning levels, and describes the enabling characteristics that enhance supply chain learning.

To develop theories relevant to a present fast-paced business context, supply chain learning should be viewed as a bundle of dynamic capabilities and processes. Synthesis of the literature also indicates that supply chain learning is inherently a multi-level phenomenon (Razaei-Zadeh & Darwish, 2016; Zahra & George, 2007). Nonetheless, most theories of organizational learning (Crossan et al., 1999), including the relational view (Dyer & Singh, 1998), have not considered the multi-level of learning within a supply chain context. Hence this study emphasizes that, to have the required validity, theories of supply chain learning must incorporate the units (supply chain actors), the learning elements and linkages between the elements, and should recognize the context of learning, via enabling characteristics.

The findings reveal that supply chain learning in a dyadic context consists of two main elements: capabilities and processes. Furthermore, the processes of learning have a link with the learning capability in the supply chain context. Though the organizational learning (Crossan et al., 1999) and the relational view theory (Dyer & Singh, 1998) hold much promise in terms of addressing the concerns of supply chain learning, these theories have not explored the socio-psychological aspects. Therefore, in order to obtain an in-depth understanding of the behavioral dynamics of the elements of supply chain learning, the scope of the study was extended beyond cognitive-psychological aspects to a social-psychological perspective. Further, the findings of this thesis contribute to the understanding of the socio-psychological dynamics of supply chain learning capabilities and processes.

This study partly extends the behavioral framework of Gino & Pisano (2008) model in which two categories are identified, i.e. the properties of individuals and properties of groups and organizations. “These behavioral properties are considered based on to the cognitive psychological and social-psychology theories” (Gino & Pisano, 2008, p. 680). “Cognitive psychology studies mental processes that underlie behavior, including thinking, deciding, and reasoning” (Gino & Pisano, 2008, p. 680; Schorsch, 2017). “Social-psychology is the study of the nature and causes of human social behavior, including social interactions, social influence, and power” (Gino & Pisano, 2008, p. 680; Schorsch, 2017). The only change in cognition or change in behavior without changing the other (cognition and behavior) places a supply chain actor in a transitional status that creates tension between one’s belief and one’s actions (Inkpen & Crossan, 1995). This study has identified that social-psychological dynamics and behavioral dynamics of intrinsic motivation, knowledge power, interpersonal interactions, and prior experience effectively contribute to managing the tension in one’s belief and one’s action, which leads to effective supply chain learning.

This model is the first attempt to study the social-psychological aspects of supply chain learning capabilities and processes. Secondly, this model is the first to investigate enabling characteristics that enhance supply chain learning.

Empirical findings from the thesis triangulated with earlier literature, concerned with supply chain relationships (Dyer & Singh, 1998) and organizational learning (Crossan et al., 1999), advances knowledge into the impact of the enabling characteristics on elements of multi-level supply chain learning. And, Figure 6.1 shows the conceptual model derived from this study.

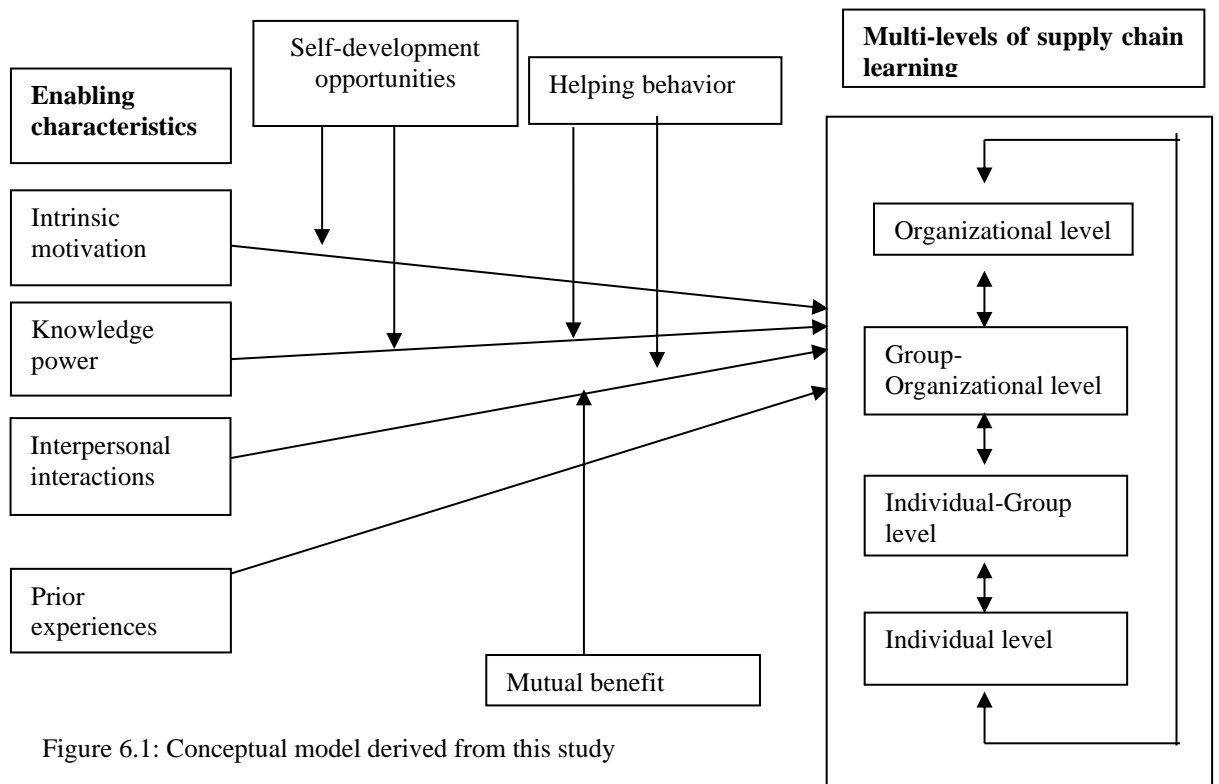


Figure 6.1: Conceptual model derived from this study

Facets of the enabling characteristics within and across levels are diverse, as was elaborated upon in Chapter 5. The enabling characteristics consist of intrinsic motivation, knowledge power, interpersonal interactions, and prior experience. By



introducing enabling characteristics as facilitator of elements of supply chain learning, this research emphasizes the need to go beyond prior knowledge and structural elements, which has been the focus of most of the earlier research on relative absorptive capacity and supply chain learning literature (Yang et al., 2019).

Supply chain learning necessarily involves human beings and their interactions with systems and processes. For this reason, the most suitable epistemological stance was judged to be constructionism, with a theoretical stance of interpretivism. The research used multiple triangulation methods by applying multiple theoretical perspectives (dynamics capability, absorptive capacity, relative absorptive capacity, relational view, supply chain relationships and organizational learning). This triangulation provided the evidence needed for interpreting the source data, and for articulating a separate model for each level of analysis.

The thesis offers several contributions; understand the learning capabilities and processes, identifying the enabling characteristics in the supply chain context by extending the social-psychological theories of organizational learning. The next section provides the theoretical and practical contributions of the study.

### **6.3 Theoretical contribution**

According to Corley and Gioia (2011), theoretical contribution can be measured on two dimensions: originality (incremental or revelatory) and utility (scientific or practical). Theory is a statement of concepts and their inter-relationships showing how and/or why a phenomenon occurs (Corley & Gioia, 2011; Gioia & Pitre, 1990). The top management journals publish theories that move theoretical conceptualization forward in the field of management; and/or indicate new theoretical linkages with rich potential for theory and research in management; and

provide clear implications for theory for problem-solving, in administrative and organizational situations (Corley & Gioia, 2011, p.14). Originality means to challenge and extend existing knowledge, or the potential contribution of the articulated new insights (Corley & Gioia, 2011; Colquitt & Zapata-Phelan, 2007).

The present study contributes to the literature on organizational learning in supply chains and makes several important theoretical contributions (Dyer & Singh, 1998; Crossan et al., 1999). The crafted theory of this study both challenges and offers new insights into the domains of organizational learning, dynamic capability, relational view, and supply chain relationships. Therefore, this thesis extends the theoretical knowledge in several ways.

This study examines how learning at the dyad flows forwards and institutionalizes within the organization. Dyadic supply chain learning has unique dynamics not observed in an organization. In order to explore these dynamics, this study examines the social-psychological processes of supply chain learning. This study applies organizational learning theory to supply chains in order to identify the behavioral aspects of supply chain learning (Crossan et al., 1999). By proposing a socio-psychological theory of supply chain learning, this thesis makes a significant contribution to theory building in supply chain learning theory. Further, this study recognized the crucial role of human beings in today's complex supply chain relationships.

In particular, findings extend knowledge by introducing five learning capabilities and four learning processes show how organizational learning (Crossan et al., 1999; Dyer & Singh, 1998) takes place within a supply chain dyad. Early research shows that firms create customer value through effective utilization and integration of capabilities (Castro & Neira, 2005). Dynamics of value creation is a critical gap in the dynamic capability literature (Dyer & Singh, 1998); therefore, this research

extends knowledge acquisition capability to address the ability to sensing new opportunities and adapting to the business environment.

The elements of supply chain learning capabilities and processes are recognized in certain works in extant literature (Razaei-Zadeh & Darwish, 2016; Tam & Gray, 2016; Bessant et al., 2013; Dyer & Singh, 1998; Lane and Lubatkin, 1998). None of the work, however, has addressed the linkages among supply chain learning capabilities and processes. The present thesis elaborates on the links between the elements of supply chain learning, thereby extending the literature related to linking micro and macro aspects of supply chain learning. Hence, this study brings unique insights to the relational view theory and relative absorptive capacity theory.

In addition to the above contribution, the study also addresses the other gaps in the literature, such as behavioral facilitators of supply chain learning literature. Although the structural elements as facilitators are discussed extensively in supply chain learning literature, the role of enabling characteristics in supply chain learning has so far received scant attention. Previous literature has discussed numerous intra-organizational and inter-organizational drivers of supply chain learning, intra-organizational facilitators comprise of high learning intent (Yoo et al., 2016), open culture (Seckman et al., 2002), greater internal complexity (Selnes & Sallis, 2003) and top management support (Manuj et al., 2013). Similarly, inter-organizational facilitators include cultural differences (Liu & Zhang, 2014), high partner fit (Cheung et al., 2010), technological distance (Subramanian et al., 2018), intergroup structure (Yan & Nair, 2016), active network context (Rebolledo & Nollet, 2011) and contracting (Selviaridis & Spring, 2018). All these facilitators are related to the structure of a supply chain (Yang et al., 2019). In contrast, the present study argues and extends the extant literature, identifying that supply chain learning is dependent on certain enabling characteristics; intrinsic motivation, knowledge power,

interpersonal interactions, and prior experience. Thus, the present study brings unique original insights. The research thereby extends the literature into the context of supply chain learning theory (Gong et al., 2018; Li et al., 2018; Willis et al., 2016) by addressing behavioral interdependencies within the supply chain context, which contributes to the literature that focuses on structural elements as the facilitators of supply chain learning. Behavioral interdependencies are the impact of context on behaviors. The resource dependency theory argues the importance of the context of a specific behavior (Hillman et al., 2009). Interorganizational relations involve a network of interdependencies reflected in power, intention, interpersonal interactions, and prior experiences in the supply chain learning context (Pfeffer & Salancik, 1978; Larsson et al., 1998; Hamel, 1991).

#### **6.4 Practical implications**

The major practical implication of this study includes the need to pay attention to both micro and macro elements of the supply chain learning, to ensure the effectiveness of the supply chain learning. Practitioners' attention should also center significantly on the behavioral aspects of supply chain learning.

Based on the findings of this research, practitioners need to recognize those elements of core supply chain learning capabilities and processes that must be augmented for effective joint supply chain learning. This research emphasizes the need to go beyond acquiring knowledge, hence managers need to focus on value creation as the capability that is required at the individual level of supply chain learning.

Supply chains consist of people working in groups who create new knowledge and implement new things, and manage and interact to create new learning and exploit opportunities that span boundaries. This study opens the way for understanding the

critical role of behavioral characteristics and dynamics at multi-levels to foster supply chain learning. Practitioners need to concentrate on the fundamentals that underpin supply chain relationships, to ensure better functioning supply chains. In short, practitioners must focus on those social-psychological aspects that enrich supply chain learning.

Practitioners need to concentrate on the intrinsic motivation mechanisms such as hiring self-confident employees, setting goals for learning, and building continuous engagement towards learning, which may provide many opportunities to increase supply chain learning. Further, having an employee pool with specialized knowledge enriches new insight generation. In addition, supply chains need to have technical generalists to understand the meaning of “new knowledge” to their organization. Similarly, managers should encourage multiple employees to take opportunities to co-create new knowledge in order to enhance relation specific assets.

Managers should encourage employee participation in programs for the purpose of sharing knowledge, especially with long-term experienced employees in supply chain learning. Further, top managers need to create a challenging environment and encourage learning by errors. Especially, the use of multiple employees with diverse experiences in teams would enhance the realization of relation specific assets.

## **6.5 Limitations of the study**

Broader application of study findings is hindered by some limitations of this research. Only four dyadic learning relationships were studied, and the sample of supply chain dyads was limited to a handful of industries. It may, therefore, be

inappropriate to generalize the findings to other industries. On the other hand, the majority of supply chain relationships are relatively standard, and for day to day operations of the firms. This study investigated supply chain relationships under such an operational context to uncover hidden facets and shed light on supply chain learning.

In this research, dyads were considered. Each of the dyads had a manufacturer and a strategic supplier. The suppliers were involved in producing and supplying a narrow range of products, and hence the data collected through interviews converged on these narrow range of engagement. For these reasons, the research is situated within dyadic relationships and around common sets of activities. However, future research should consider dyads, where both parties focus on a particular product/service/project, thereby providing a greater focus around a similar phenomenon.

## **6.6 Future research directions**

Most supply chain learning research utilizes empirical approaches, rendering the field theoretically immature and hindering scientific development of the field. Also, very few research studies can address every aspect of a selected research problem (Christopher & Mangan, 2005). While this study has produced several contributions to theory building with regard to supply chain learning, further qualitative research is needed in this field, to uncover valuable insights and evidence in support of theory.

This study has come up with several research findings that need to be empirically validated by quantitative researchers (to test generalizability). The understanding of supply chain learning processes, capabilities, and the enabling characteristics

require study in different industries and cross-cultural settings to validate the applicability of this study's findings in a broader area. Theory building from longitudinal case studies at the dyadic supply chain level can also further enrich the field. Then researchers can confidently move relevant topics into the triad and network contacts to further validate the applicability of the findings. Such investigations would serve to fill major gaps in the nascent field of supply chain learning.

There are many black boxes about individual supply chain learning, perhaps due to the difficulty of unequivocally demonstrating the unconscious processes of the human mind. Hence, individual learning within the supply chain must be investigated through qualitative methods. Overall, future research should develop insights related to the social-psychological processes of supply chain learning. Creation of value is best studied from the perspective of organizational learning. The role of an innovative focus and empowerment in creating future value needs to be explored. Qualitative research will also illuminate the processes of knowledge access. The need for knowledge and speed of response toward knowledge access adds value to the enhancement of knowledge in the field. The facilitators and consequences of the need for knowledge and speed of response develop a holistic understanding of the concept. Intuition is a most critical aspect worth further researching, as intuition can potentially add enormous value to supply chains. While the unconscious parts of the intuition process present challenges to conducting scientific research, the role of images and synthesis in intuition in a supply chain context can be further explored.

Group learning is a critical component of supply chain learning. Future research may usefully look at the concepts of understanding and analyzing, and their role in assimilating innovative ideas in different industries. Exploratory study can focus on

in-depth analysis of the use of language, cognitive maps, conversations, dialogue, prior discussions, and effort put into the conversation in a triadic and network context. This research has emphasized the perceptions of supply chain actors at the individual-group level of supply chain learning. The most important factors of assimilation in supply chain learning at the individual-group need to be elucidated through a longitudinal study. Study of the facilitators and the consequences of assimilation and interpretation in different types of learning would also add value to the knowledge base of supply chain learning.

Transformative capability is an important dimension in making things happens. Therefore, an in-depth study of the concepts involved when challenging established thinking and reframing it would be helpful for realizing supply chain goals in different industries. Also, the role of mutual adjustment and coordination in the process of integration in triadic and network contexts needs more study. The linkages between transformative and integration with supply chain integration would enrich the supply chain learning and supply chain management fields.

The exploitation process helps to realize new intuition; thus, future research could examine the dynamics of resource use in joint learning activities to identify the impact of the improvements. Special attention also needs to be paid to the use of human capital in exploitation. In addition, research should focus on insights related to the enabling characteristics.

A strong theory of supply chain learning is required in today's knowledge-based economy. Since early research consisted mainly of empirical studies, the field was relatively underdeveloped where theory is concerned. Therefore, future research needs to take advantage of different theoretical perspectives and study a variety of industries. Qualitative research followed by quantitative investigation is recommended, moving on to mixed methods research to develop legitimate



theories. In particular, a positivist paradigm would uncover highly productive insights about the dynamics of intrinsic motivation, knowledge power, prior experience and interpersonal interactions on the various aspects of supply chain learning.

Further, prior research applied resource-based theory to study manager's cultural adaptation and mutual benefits in supply chain learning (Jia & Lamming, 2013). Future researchers can explore the impact of hybrid cultures on the learner and learning process in the supply chain context.

Supply chain learning consists of interactions among employees. Future research could address the issue of how interpersonal interactions within a supply chain context lead to achieving effective learning interactions. Future researchers can apply social network theory and network theory to investigate the role of interpersonal interactions within supply chain learning capabilities.

Institutional pressures and external environment affect supply chain learning capabilities and processes (Golgeci & Arslan, 2014). Future research could address the issue of how institutional pressures and the external environment affect supply chain learning, using intuitional theory.

The present study focuses on enabling characteristics of supply chain learning, where the behavioral characteristics are primarily positive. However, behavioral aspects include not only positive aspects but also negative aspects (Anderson & Jap, 2005). This study primarily took a more positive stance with regards to supply chain learning, which is also a limitation. Future researchers can use psychological and behavioral theories to explore the impact of failures, stress, disruptions, conflicts, self-interests, and poor outcomes of supply chain learners. Learning happens not only through success, but deeper learning can come from failures and conflicts. The

role that these failures and conflicts play in supply chain learning is worthy of future investigation. This can be done by selecting case studies that represent low, medium, and high levels of supply chain learning.

This thesis demonstrates that the human dimension in supply chain learning is a highly productive area for future investigation, as human dynamics necessarily involve social-psychological elements. Future researchers are encouraged to uncover the role of those social-psychological aspects which, in today's dynamic supply chain contexts, can lead to enhanced supply chain learning and value creation.

## 7. References

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## 8. Appendixes

### 8.1 Appendix 1: Application for ethical approval-Outline of research project

*Application for Ethical Approval*

*Outline of Research Project*



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

*Waikato Management School*  
Te Raupapa

*Template:*

**Use clear and simple language. Avoid technical terms wherever possible.**

*Please allow **at least two weeks** for your application to be reviewed by the WMS  
Ethics Committee.*

*You must gain ethics approval prior to the commencement of data collection for  
your research project*

*See How to fill out the form for guidance.*



## 1. IDENTIFY THE PROJECT.

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**1.1 Title of Project :** The Social-Psychological Processes of Supply Chain Relationship Learning Capabilities: A Dyadic Perspective

### **1.2 Researcher(s) name and contact information:**

Ms. Harishani Lasanthi Liyanage  
Doctoral Student  
Department of Management Systems  
University of Waikato  
New Zealand  
E-mail:[hll13@waikato.ac.nz](mailto:hll13@waikato.ac.nz)

### **1.3 Supervisor's name and contact information (if relevant):**

Chief Supervisor: Dr. Peter Sun  
Associate Dean Enterprise  
The Centre for Corporate & Executive Education  
Waikato Management School  
The University of Waikato  
Tel: +64 7 838 4283  
Fax: +64 7 838 4675  
Mob: + 64 27 588 7728  
E-mail:[petersun@waikato.ac.nz](mailto:petersun@waikato.ac.nz)

#### **1.4 Anticipated date to begin data collection:**

01 February, 2013

## **2. DESCRIBE THE RESEARCH.**

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### **2.1 Briefly outline what the project is about including your research goals and anticipated benefits. Include links with a research programme, if relevant.**

The research will be conducted as a partial fulfillment of the PhD in Management Systems Degree. Partners in a supply chain relationship engage in learning, and through these learning new initiatives are introduced and implemented. These will improve the overall effectiveness of the supply chain. The purpose of this research study is to understand how supply chain partners engage in learning behaviors (referred to as the social-psychological processes of learning). The research questions of this study are:

1. What are the social-psychological processes of supply chain relationship learning?
2. How do the social-psychological processes of learning create supply chain relationship learning?
3. How do the social-psychological processes of learning implement supply chain relationship learning?

The anticipated benefits of the project are as follows:

The anticipated outcome of the study would be to develop a framework that addresses the social-psychological processes of supply chain learning at different levels and their interplay.

This study extends organizational learning theories and supply chain relationship learning theories to develop a theory of social-psychological processes of supply chain relationship learning.

In addition, the study will help managers to identify the dynamics of supply chain learning to enhance the dyadic supply chain learning processes.

The study is not linked to any research programme.

## **2.2 Briefly outline your method.**

This study utilizes multiple qualitative case study methodology. For data collection, I will be using three dyadic supply chains comprising six organizations in a Sri Lankan context. The dyadic supply chain consists of a focal manufacturing organization and a supplier.

I have already contacted top level managers of the selected three focal organizations and gained their initial consent to conduct the data collection. Next I will submit the cover letter, participant information sheet and contact details of the researcher to the corresponding parties of the focal manufacturing firm.

Then the focal three organizations can decide on the likeliness of their participation in the case study research. I will ask them to select the most suitable supplier who is having joint learning activities for the study. Then I will contact the supplier for

data collection. I will submit the cover letter, participant information sheet and contact details of the researcher to the corresponding parties of the supplier.

The research study is a qualitative study. Therefore, I will conduct initial interviews with selected employees of the six organizations. The interview list will grow as the data is gathered from initial interviewees. The number of participants involved and the relevant participants will be decided in the initial data collection stage. The researcher will select diverse individuals who have different perspectives on the central phenomena of interest.

I will use multiple unit of analysis for the study. This consists of the social-psychological processes of learning of boundary spanning individuals and individuals of two supply chain partners who interact with boundary spanners.

I will use mainly semi-structured face-to-face interviews in collecting data. In addition, I will use field observation, participant observation and content analysis to triangulate the findings from the interviews.

I wish to tape record all the interviews, after getting due permission. Otherwise I will take notes during interviews. I will take field notes of field observation and participant observation.

The collected data will be stored and handled in strictly confidential manner.

The data collected will be analyzed using Nvivo software.

### **2.3 Describe plans to give participants information about the research goals.**

I will give a covering letter (Attachment 1) to each organization's primary contact person (top level managers) at the first round of contact. Further, I will send the "participant information sheet" and "consent form for participants" for each participants.

The cover letter, consent form for participants and participant information sheet, will include information about the purpose of the research, research and supervisor information, participant's responsibilities, time commitment of the participants, material to be collected, statement of protection of confidentiality and procedures of data collection.

This includes a statement of confidentiality and ability of the participants to opt out of answering any question.

### **2.4 Identify the expected outputs of this research (e.g., reports, publications, presentations), including who is likely to see or hear the reports or presentations on this research.**

1. The primary output of the research is the doctoral thesis. I will submit one copy (digital copy) to the library. The wider student groups have access to the copy.
2. Academic publications: The wider academic community has access to the refereed journal articles.
3. Presentations at research conferences: The academic and public community attending research conferences has access to the conference proceedings.

4. Analysis of the data collected: The summary of analyzed data would be sent to the top management of the respective organizations.

I will not include any identifying names or characteristics of the organizations and the participants in any output of the research study.

**2.5 Identify the physical location(s) for the research, the group or community to which your potential participants belong, and any private data or documents you will seek to access. Describe how you have access to the site, participants and data/documents. Identify how you obtain(ed) permission from relevant authorities/gatekeepers if appropriate and any conditions associated with access.**

**The physical location(s) for the research;**

The interviews will be held on the office premises of the participants. A quiet place will be selected as the interview location with the consent of the interview participants. This will ensure the lower disturbances to the interview process.

**The group or community to which your potential participants belong;**

The respondents will be selected from the top, middle and lower level layers of the organization. The respondents are to be selected from boundary spanners and other employees working within the dyadic organizations.

**Any private data or documents you will seek to access;**

There is no need to collect private data. The data consist of official documents of the selected organizations.

**How you have access to the site, participants and data/documents?**

First I will contact the top level manager and get the permission from the relevant authority to access the premises. Then I will get the consent to hold the interviews from the respective participants in the selected organizations. The documents needed to strengthen the interview data collected would be identified during the interview process. Then I will contact the relevant person and gain permission to access the data.

**How you obtain(ed) permission from relevant authorities/gatekeepers?**

I have already obtained the initial consent to collect data from three manufacturing organizations in Sri Lanka.

Then, I will contact the top level manager and get the permission from the relevant authority to access the premises. I will adhere to the rules and regulations for obtaining the permission in the organization.

**3. OBTAIN PARTICIPANTS' INFORMED CONSENT, WITHOUT COERCION.**

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**3.1 Describe how you will select participants (e.g., special criteria or characteristics) and how many will be involved.**

The researcher will intentionally select the participants for the interviews, from those who are involved with the supply chain learning activities. I will select diverse individuals who have different perspectives on social-psychological processes of supply chain learning. The number of participants and the relevant participants will be determined at the initial data collection stage.

### **3.2 Describe how you will invite them to participate.**

First, I will contact the top managers of the selected organizations and then identify a few participants as per their recommendations for initial data collection.

Then I will contact participants separately to arrange interview sessions with them. I will send a covering letter, participant information sheet and consent form for participants.

I will inform them of the purpose of the study, the interviewee's right to withdraw at any stage of data collection and even immediately after the interviewing and right to decline to answer any questions.

After discussing these issues, I will invite them to participate in the interview process.

### **3.3 Show how you provide prospective participants with all information relevant to their decision to participate. Attach your information sheet, cover letter, or introduction script. See document on informed consent for recommended content. Information should include, but is not limited to:**

The information sheet, cover letter and consent form is attached.

- **What you will ask them to do;**

I will send an information sheet and cover letter to each individual participant, then get their consent to participate in interviews. I will arrange time of interview as



convenient for them. Further, at the start of the interview, I will provide a briefing of the purpose of the study and the content of the participant information sheet and consent form for participants for the second time.

Then participant observations will be arranged at a time as suggested by the participants, without disturbing their work.

- **How to refuse to answer any particular question, or withdraw any information they have provided at any time before completion of data collection;**

At the beginning of the interview, the participants are informed about their right to not answer any question by saying “No comments” or any other appropriate statement.

The participants are given the option to withdraw any information given even after the data collection but before the finalizing the thesis results.

- **How and when to ask any further questions about the study or get more information.**

The participants can change the answers given for up to two months after data collection.

The researcher’s and chief supervisor’s contact numbers will be given to the participants, thus they will have the freedom to contact the researcher and/ or chief supervisor for any further clarification. I will inform of this before getting their consent to participate in the interview and remind them after starting the interview.

- **The form in which the findings will be disseminated and how participants can access a summary of the findings from the study when it is concluded.**

I will e-mail the summary of the findings to the participants in the respective organizations. The names and any identification characters of the participants will not be revealed in any case.

The findings of the research will be disseminated in the forms of doctoral thesis, refereed journal articles, and conference proceedings.

I will not include any identification names or characteristics of the participants and the organizations in any output of the research study.

#### **3.4 Describe how you get their consent. (Attach a consent form if you use one.)**

The consent form is attached.

Participants are provided with the Consent Form for Participants, and Participant's Information Sheet before giving their consent.

Briefing will be done before starting the interviews.

#### **3.5 Explain incentives and/or compulsion for participants to be involved in this study, including monetary payment, prizes, goods, services, or favours, either directly or indirectly.**

There are no any monetary incentives for the participants. The summary of the findings of the study will provide insights to the participants.

#### 4. MINIMISE DECEPTION.

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**4.1 If your research involves deception – this includes incomplete information to participants -- explain the rationale. Describe how and when you will provide full information or reveal the complete truth about the research including reasons for the deception.**

There is no deception involved in this research. A full description of the purpose of the study, in the Participant Information Sheet and Consent Form is given to the participants before getting their consent.

#### 5. RESPECT PRIVACY AND CONFIDENTIALITY

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**5.1 Explain how any publications and/or reports will have the participants' consent.**

The participants are informed about the outputs of the study before giving their consent. The details are included in the participant information sheet.

**5.2 Explain how you will protect participants' identities (or why you will not).**

Every possible method is used to protect the confidentiality of the participants and the information provided.

At the stage of getting the participant's consent, I will inform them the ways of protecting participant's confidentiality.

I will not publish the names of the organizations and participants or any identifying characteristics in any output of the research.

Every organization is assigned with hypothetical name for analysis. I will not reveal the hypothetical name of the organizations to anyone else.

The names of the participants and any identification characteristics will not be revealed in any output of the research.

The data collected in terms of tape recordings, field notes will be converted to soft copies in an appropriate manner. The hard copies are kept in the cupboard to which I have the only key.

I will assign a password for the soft copies of the documents. The key and the passwords are belonging and known only to me.

The nature of confidentiality is stressed on the consent form for participants, in initial e-mails send and during the interview processes.

**5.3 Describe who will have access to the information/data collected from participants. Explain how you will protect or secure confidential information.**

I will share the coded data with my chief supervisor and second supervisor in discussing the findings of the study. My chief supervisor and second supervisor are the only participants that have access to coded data.

I will not disclose raw data to anyone. I will be the only person having access to the locked cupboard and password protected laptop computer which includes soft copies of data.

The soft copies and the hard copies of data will destroyed after obtaining PhD in Management Systems.

The transcripts of the documents directly related to the journal publications and doctoral thesis will be kept with the researcher under strict confidentiality.

## 6. MINIMISE RISK TO PARTICIPANTS.

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**‘Risk’ includes physical injury, economic injury (i.e. insurability, credibility), social risk (i.e. working relationships), psychological risk, pain, stress, emotional distress, fatigue, embarrassment, and cultural dissonance and exploitation.**

**6.1 Where participants risk change from participating in this research compared to their daily lives, identify that risk and explain how your procedures minimize the consequences.**

There is no risk associated with this research to the participants.

The participants are given full freedom to opt out of answering any question or withdrawing from the study at any stage, if they wish to do so.

**6.2 Describe any way you are associated with participants that might influence the ethical appropriateness of you conducting this research – either favourably (e.g., same language or culture) or unfavourably (e.g., dependent relationships such as employer/employee, supervisor/worker, lecturer/student). As appropriate, describe the steps you will take to protect the participants.**

The researcher does not have any dependent relationship with the participants of the research.

I will comply with the organizational culture, rules and regulations of the respective organizations.

The interviews will be conducted in Sri Lanka, the medium of language would be English.

The researcher and participants are familiar with English language.

**6.3 Describe any possible conflicts of interest and explain how you will protect participants' interests and maintain your objectivity.**

The data provided by the participants are interpreted by the researcher to address the research questions in accordance with the interpretative approach.

The research outputs will not include any sort of identification names or characteristics of the participants.

**7. EXERCISE SOCIAL AND CULTURAL SENSITIVITY.**

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**7.1 Identify any areas in your research that are potentially sensitive, especially from participants' perspectives. Explain what you do to ensure your research procedures are sensitive (unlikely to be insensitive). Demonstrate familiarity with the culture as appropriate.**

The research does not include any potentially sensitive social and cultural information. The interviews will be conducted in Sri Lankan organizations, and the researcher, as a citizen of Sri Lanka, is familiar with the Sri Lankan culture.

**7.2 If the participants as a group differ from the researcher in ways relevant to the research, describe your procedures to ensure the research is culturally safe and non-offensive for the participants.**

The research is conducted considering social and cultural conditions of the interview context.

**Attachment 1: Interview and Observation Protocol  
Covering letter**

**A Study on “The Social-Psychological Processes of Supply Chain  
Relationship Learning Capabilities: A Dyadic Perspective”**

Dear Sir/Madam,

**To collect data for independent research study**

I am Harishani Liyanage, doctoral student attached to the Department of Management Systems, presently reading for PhD degree in Management Systems from University of Waikato. I am forwarding herewith the interview protocol for data collection for the thesis, as partial fulfillment of the requirements of my PhD in Management Systems. You are kindly requested to suggest a joint supply chain learning partner in your organization. And also please be kind enough to send me a list of names and contact details of top, middle and operational level employees who are involved in joint learning activities, and who I can contact and interview for initial data collection.

Specifically, this research will help to understand the social-psychological processes of supply chain relationship learning capabilities and their dynamics. The information collected from interviews of employees of your organization will be considered as strictly confidential data.

Thank you very much indeed in advance for your time and support extended towards my effort.

Yours Faithfully,

Harishani L. Liyanage  
Doctoral Student  
Department of Management Systems  
University of Waikato  
New Zealand  
E-mail: [hll13@waikato.ac.nz](mailto:hll13@waikato.ac.nz)

**Part 1: Background questions**

1. How long you have been with this organization and in your current job?
2. Can you please explain your responsibilities and with whom you are dealing mostly in performing your job duties?

Probe: Job duties, supply chain partner's employees, superiors, peers and subordinates



**Part 2: Nature of supply chain relationship with the selected supply chain partner**

1. How long has your organization been involved with joint learning activities with the selected partner company?
2. What is the primary focus of your organization and your supply chain partner?  
Probe: Industry, why you need to have relationship with them (to get the access to knowledge), familiarity with the supply chain partner's business
3. Could you please explain a critical incident which occurred in dealing with your supply chain partner? What kinds of implications were reflected regarding following factors?
  - a. Reliable promises made by them is maintained with special arrangements
  - b. Extent of concern by partner regarding the well-being of the company
  - c. Mutual understanding
  - d. Patience reflected towards mistakes happen in dealing
  - e. Do you believe that your supply chain partner adds value in solving matters?
  - f. What sort of influence does the top management of the supply chain partner company exert?

Probe: One positive event and one negative event

4. How long have you been involved with managing relationships in joint activities with the selected partner company?
5. How old is the joint partnership with the selected dyadic member?
6. Could you please explain barriers you come across in dealing with your supply chain partner?

Probe: Incentives are not enough, dominant belief held by them that is against with your organization's belief system

**Part 3: The social-psychological processes of supply chain relationship learning (Boundary spanning employees and other employees having linkages with boundary spanners)**

Note: Please consider your selected supply chain partner in answering following questions.

1. How does your organization identify new knowledge from your supplier/ manufacturer?

Probe: Informal talk

2. What are the barriers your organization face in identifying new knowledge?
3. Are you using experiences with them in identifying new knowledge?
4. How frequently you are involved in identifying new knowledge?

Probe: In case of critical incident

5. Is there any problem that you have encountered due to not recognizing new knowledge in the correct time in dealing with supply chain partner?
6. How does your organization acquire new knowledge that you believe is value adding?

Probe: As a part of contractual agreement, participation in decision making

7. How does your organization support acquisition of new external knowledge?

Probe: Prior experience with your supplier/ manufacturer

8. What are the facilitators in the knowledge acquisition activities of your organization?
9. What are the hindrances of knowledge acquisition activities of your organization?
10. How is your organization involved in interpreting newly acquired knowledge?

Probe: Systems, meetings, teams and communities

11. What are the facilitators in the interpreting newly acquired knowledge of your organization?
12. What are the hindrances of interpreting newly acquired knowledge of your organization?
13. How does your organization refine newly assimilated knowledge to the benefit of your organization?

Probe: Use in new product development, product modification, removal of current practices to add new practices

14. What are the facilitators in the refining new knowledge in your organization?
15. What are the hindrances of refining new knowledge in your organization?
16. How does your organization implement new changes within your organization?
17. What are the facilitating factors of joint work implementation in your organization?
18. What are the hindrances of joint work implementation activities?
19. How frequently is your organization implementing new ideas of supplier/manufacturer?

Probe: In a crisis situation

**Part 4: Any other comments**

1. Are there any other areas that you believe are important to the topic being discussed?

**Part 5: Observation protocol**

1. Activities of the boundary spanners
2. Relationships of the boundary spanners and other employees
3. Frequency of interactions of boundary spanners
4. Modes of interactions
5. Formal and informal communication
6. Co-evolution of the supply chain learning processes

## 8.2 Appendix 2: Information sheet

### *Participant Information Sheet*

*Waikato Management School*

Te Raupapa



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

**The information sheet for research participants needs to include the following:**

- The purpose of the research

Supply chain partners engage in learning. The creation and implementation of new initiatives of supply chain learning result in improving the overall effectiveness of the supply chain. The purpose of this research is to understand how supply chain partners engage in learning behaviors (refer to as the social-psychological processes of learning). Then a framework of processes of supply chain learning and its dynamics at the supply chain level will be developed.

The research questions of the study are as follows:

1. What are the social-psychological processes of supply chain relationship learning?

2. How do the social-psychological processes of learning create supply chain relationship learning?
  3. How do the social-psychological processes of learning implement supply chain relationship learning?
- Who is associated with the research: investigators, supervisors, sponsors, funding agencies, and institutions?

The chief supervisor of the study is Dr. Peter Sun and the researcher is Ms. Harishani Lasanthi Liyanage. The study is being carried out as partial fulfillment of the requirements of the degree of Doctor of Philosophy.

There are no other investigators, sponsors, funding agencies and institutions associated with the research.

- How to contact the researchers and supervisors?

The researcher can be contacted using following contact information:

Ms. Harishani Lasanthi Liyanage  
Doctoral Student  
Department of Management Systems  
University of Waikato  
New Zealand  
E-mail: [hll13@waikato.ac.nz](mailto:hll13@waikato.ac.nz)

The chief supervisor can be contacted using following contact information:

Dr. Peter Sun

Associate Dean Enterprise

The Centre for Corporate & Executive Education

Waikato Management School

The University of Waikato

Tel: +64 7 838 4283

Fax: +64 7 838 4675

Mob: + 64 27 588 7728

E-mail: [petersun@waikato.ac.nz](mailto:petersun@waikato.ac.nz)

- What's involved for the participants - what they'll be asked to do if they participate, how much time it will take?

The study mainly involves semi-structured interviews with participants. One interview with each participant may range from 60-90 minutes. The participants are given the option to opt out of answering any questions.

The participant observations will be arranged at the discretion of the participants. The site observations will be arranged accordingly.

The supporting documents to be referred to are identified in the interview process and observations.

All activities that involve participants will be arranged without disturbing their day to day work.

- What will happen to material collected from them: who will see it, how it may be used, whether they will be identified or identifiable, safeguards you will implement to protect confidentiality, the form in which results will be accessible (e.g., reports, articles, raw data, aggregated data)?

This research will produce a PhD thesis, journal articles and conference proceedings.

- Who will see it?

A digital copy of the PhD thesis is given to the library. The wider scholarly public can refer to the journal articles and conference proceedings.

- How it may be used?

The wider scholarly public may use the journal articles and conference proceedings for literature reviews.

- Whether they will be identified or identifiable?

The analyzed data will be published. The raw data and documents collected will be kept under confidentiality. The published data does not include any names of the people or organizations or any identification characteristics.

- Safeguards you will implement to protect confidentiality

The tape recorded data, field notes and written notes will be kept in a locked cupboard. The soft transcripts will be stored within a password protected computer. The collected raw data will not be given to any person other than the researcher. I will discuss the analyzed data with my supervisors. This is only for the purpose of getting direction to the research.



- The form in which results will be accessible

The results will be given to the appropriate organizations that participate in the data collection process.

- If relevant, how the investigators will handle the potential risks for participants (or for investigators)?

There are no risks for the participants as a result of being involved in this research.

- How to opt out (name a specific date for participants to opt out)?

The participants can withdraw at any time in the interview process. Even after the data collection they can inform the researcher if they do not wish the information given to be processed.

Participants can alter data within two months after data collection. Then the researcher will erase the respective data.

- How to get more information?

If participants need to get more information they can approach the researcher or chief supervisor using the following contact details.

The researcher can be contacted using the following contact information:

Ms. Harishani Lasanthi Liyanage

Doctoral Student

Department of Management Systems  
University of Waikato  
New Zealand  
E-mail: [hll13@waikato.ac.nz](mailto:hll13@waikato.ac.nz)

The chief supervisor can be contacted using the following contact information:

Dr. Peter Sun  
Associate Dean Enterprise  
The Centre for Corporate & Executive Education  
Waikato Management School  
The University of Waikato  
Tel: +64 7 838 4283  
Fax: +64 7 838 4675  
Mob: + 64 27 588 7728  
E-mail: [petersun@waikato.ac.nz](mailto:petersun@waikato.ac.nz)

### 8.3 Appendix 3: Consent form for participants

## **Consent Form for Participants**

*Waikato Management School*

Te Raupapa



THE UNIVERSITY OF

**WAIKATO**

*Te Whare Wānanga o Waikato*

*The Social-Psychological Processes of Supply Chain Relationship Learning*

*Capabilities:*

*A Dyadic Perspective*

### **Consent Form for Participants**

I have read the **Information Sheet for Participants** for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study at any time, or to decline to answer any particular questions in the study. I agree to provide information to the researchers under the conditions of confidentiality set out on the **Information Sheet**.

I agree to participate in this study under the conditions set out in the **Information Sheet** form.

Signed: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Researcher's Name and contact information:

Ms. Harishani Lasanthi Liyanage,  
Doctoral Student  
Department of Management Systems  
University of Waikato  
New Zealand  
E-mail: [hll13@waikato.ac.nz](mailto:hll13@waikato.ac.nz)

Supervisor's Name and contact information:

Chief Supervisor: Dr. Peter Sun  
Associate Dean Enterprise  
The Centre for Corporate & Executive Education  
Waikato Management School

The University of Waikato

Tel: +64 7 838 4283

Fax: +64 7 838 4675

Mob: + 64 27 588 7728

E-mail: [petersun@waikato.ac.nz](mailto:petersun@waikato.ac.nz)

## **8.4 Appendix 4: Interview and observation protocol**

### **Covering letter**

#### **A Study on “The Social-Psychological Processes of Supply Chain Relationship Learning Capabilities: A Dyadic Perspective”**

Dear Sir/Madam,

#### **To collect data for independent research study**

I am Harishani Liyanage, doctoral student attached to the Department of Management Systems, presently reading for PhD degree in Management Systems from University of Waikato. I am forwarding herewith the interview protocol for data collection for the thesis, as partial fulfillment of the requirements of my PhD in Management Systems. You are kindly requested to suggest a joint supply chain learning partner in your organization. And also please be kind enough to send me a list of names and contact details of top, middle and operational level employees who are involved in joint learning activities, and who I can contact and interview for initial data collection.

Specifically, this research will help to understand the social-psychological processes of supply chain relationship learning capabilities and their dynamics. The information collected from interviews of employees of your organization will be considered as strictly confidential data.

Thank you very much indeed in advance for your time and support extended towards my effort.

Yours Faithfully,

Harishani L. Liyanage  
Doctoral Student  
Department of Management Systems  
University of Waikato  
New Zealand

**Part 1: Background questions**

1. How long you have been with this organization and in your current job?
2. Can you please explain your responsibilities and with whom you are dealing mostly in performing your job duties?  
Probe: Job duties, supply chain partner's employees, superiors, peers and subordinates

**Part 2: Nature of supply chain relationship with the selected supply chain partner**

1. How long has your organization been involved with joint learning activities with the selected partner company?
2. What is the primary focus of your organization and your supply chain partner?

Probe: Industry, why you need to have relationship with them (to get the access to knowledge), familiarity with the supply chain partner's business

3. Could you please explain a critical incident which occurred in dealing with your supply chain partner? What kinds of implications were reflected regarding following factors?
  - a. Reliable promises made by them is maintained with special arrangements
  - b. Extent of concern by partner regarding the well-being of the company
  - c. Mutual understanding
  - d. Patience reflected towards mistakes happen in dealing
  - e. Do you believe that your supply chain partner adds value in solving matters?
  - f. What sort of influence does the top management of the supply chain partner company exert?

Probe: One positive event and one negative event

4. How long have you been involved with managing relationships in joint activities with the selected partner company?
5. How old is the joint partnership with the selected dyadic member?
6. Could you please explain barriers you come across in dealing with your supply chain partner?

Probe: Incentives are not enough, dominant belief held by them that is against with your organization's belief system

**Part 3: The social-psychological processes of supply chain relationship learning (Boundary spanning employees and other employees having linkages with boundary spanners)**



Note: Please consider your selected supply chain partner in answering following questions.

1. How does your organization identify new knowledge from your supplier/ manufacturer?

Probe: Informal talk

2. What are the barriers your organization face in identifying new knowledge?
3. Are you using experiences with them in identifying new knowledge?
4. How frequently you are involved in identifying new knowledge?

Probe: In case of critical incident

5. Is there any problem that you have encountered due to not recognizing new knowledge in the correct time in dealing with supply chain partner?
6. How does your organization acquire new knowledge that you believe is value adding?

Probe: As a part of contractual agreement, participation in decision making

7. How does your organization support acquisition of new external knowledge?

Probe: Prior experience with your supplier/ manufacturer

8. What are the facilitators in the knowledge acquisition activities of your organization?
9. What are the hindrances of knowledge acquisition activities of your organization?
10. How is your organization involved in interpreting newly acquired knowledge?

Probe: Systems, meetings, teams and communities

11. What are the facilitators in the interpreting newly acquired knowledge of your organization?
12. What are the hindrances of interpreting newly acquired knowledge of your organization?
13. How does your organization refine newly assimilated knowledge to the benefit of your organization?

Probe: Use in new product development, product modification, removal of current practices to add new practices

14. What are the facilitators in the refining new knowledge in your organization?
15. What are the hindrances of refining new knowledge in your organization?
16. How does your organization implement new changes within your organization?
17. What are the facilitating factors of joint work implementation in your organization?
18. What are the hindrances of joint work implementation activities?
19. How frequently is your organization implementing new ideas of supplier/manufacture?

Probe: In a crisis situation

**Part 4: Any other comments**

1. Are there any other areas that you believe are important to the topic being discussed?

## **Part 5: Observation protocol**

1. Activities of the boundary spanners
2. Relationships of the boundary spanners and other employees
3. Frequency of interactions of boundary spanners
4. Modes of interactions
5. Formal and informal communication
6. Co-evolution of the supply chain learning processes

## 8.5 Appendix 5: Literature review using NVivo 12 PLUS

### NVivo 12 PLUS literature review

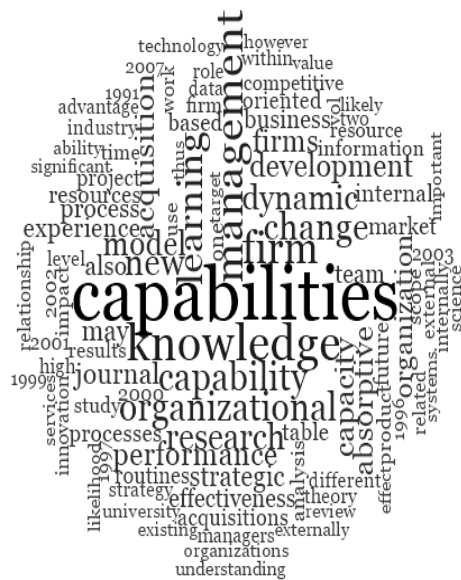
The screenshot shows the NVivo 12 PLUS interface. On the left is a navigation pane with 'Autocoded Themes' selected. The main area contains a table of themes and their frequencies, and a list of references on the right.

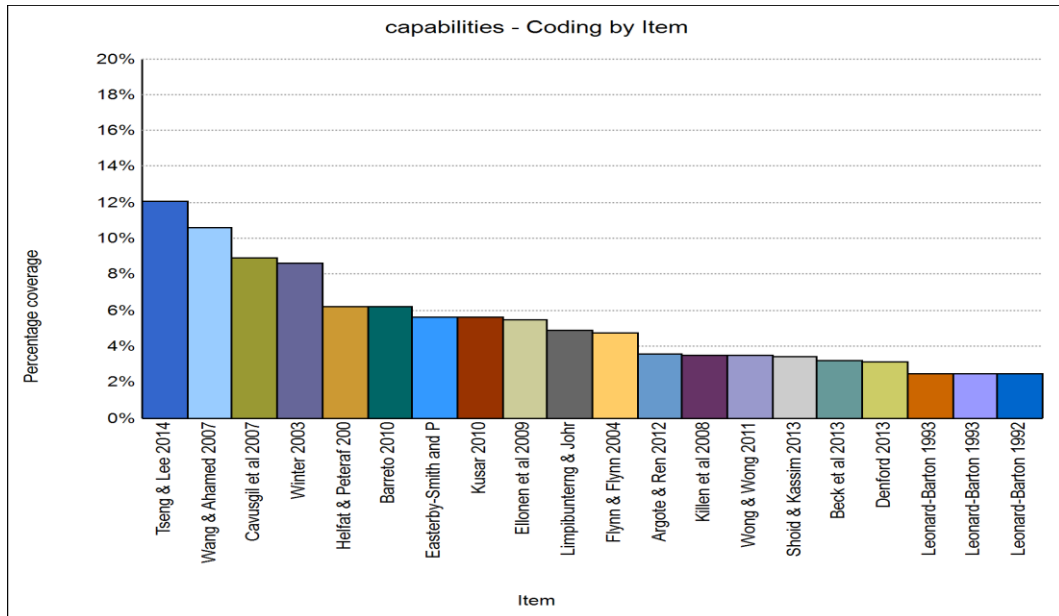
Name	Files	Reference
capabilities	50	1261
organizational capabilities	12	47
combinative capabilities	8	11
operational capabilities	8	43
technological capabilities	7	9
capability development	7	10
core capability	7	12
learning capabilities	6	14
existing capabilities	6	59
process capability	5	15
particular capability	5	11
managerial capabilities	5	7
current capability	5	11
capability building	4	4
internal capabilities	4	9
capability change	4	6
innovative capabilities	4	4

References shown in the right pane:

- Reference 139 - 0.01% Coverage: When a firm has experienced a decline in capability effectiveness, it struggles to apply its existing capabilities in routine day-to-day operations.
- Reference 140 - 0.01% Coverage: These firms will avoid further stretching their already deteriorating capabilities in a new setting (Greve, 2003; Nohria and Gulati, 1996).
- Reference 141 - 0.01% Coverage: 77. Consequently, it is likely that a decline in capabilities effectiveness following acquisition is associated with a low likelihood of pursuing subsequent internal development.
- Reference 142 - 0.01% Coverage: H7: As the change in the scope of capabilities increases, the likelihood of future internal development increases.
- Reference 143 - 0.02% Coverage: Section 7 of 11

### Word frequency query





Items clustered by word similarit

Clusters: 10

Show Cluster ID

Word Frequency

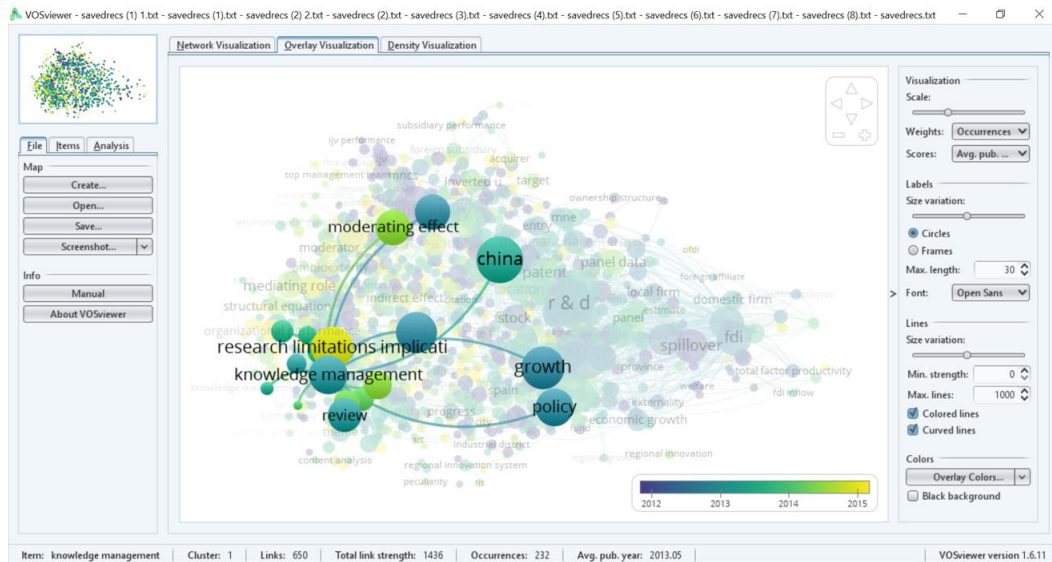
Select Data Options

Code A	Code B	Jaccard's coefficient
Nodes\\Autocoded Themes\\ca	Nodes\\Autocoded Themes\\ac	0.275804

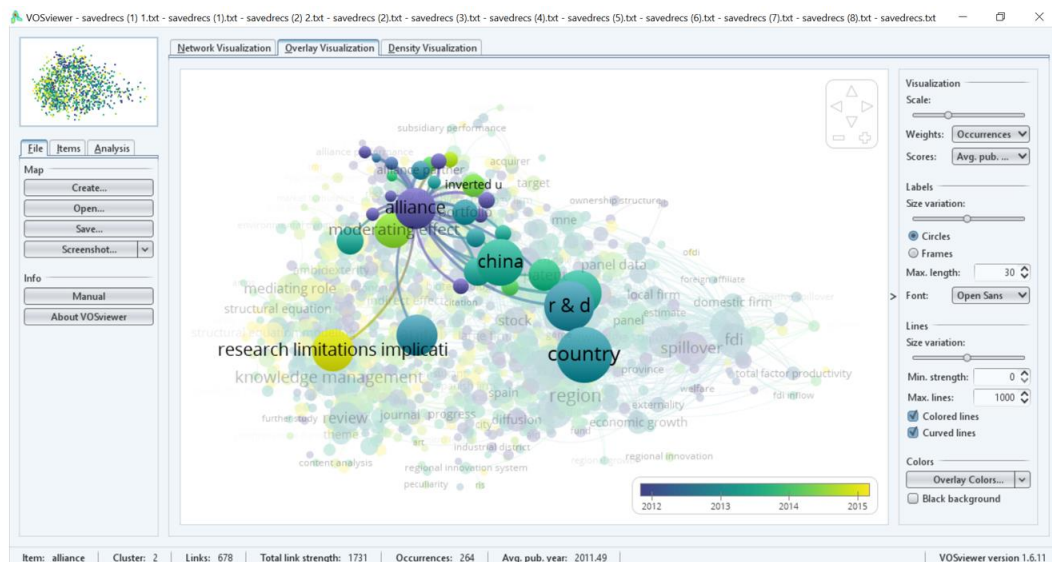
Diagram Summary



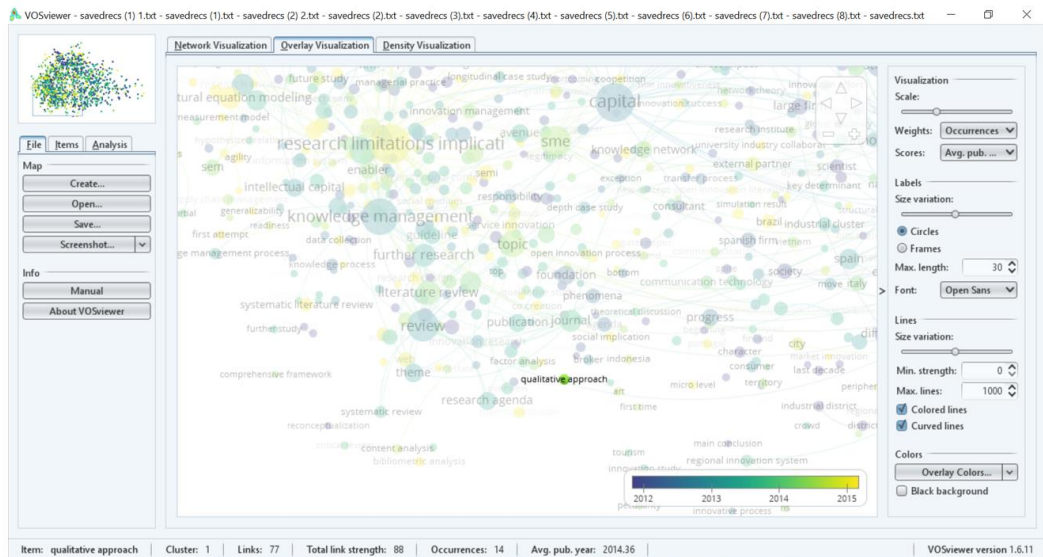
The following VOS Viewer screenshot shows that the absorptive capacity literature mostly focusses on explicit knowledge and a positivist perspective.



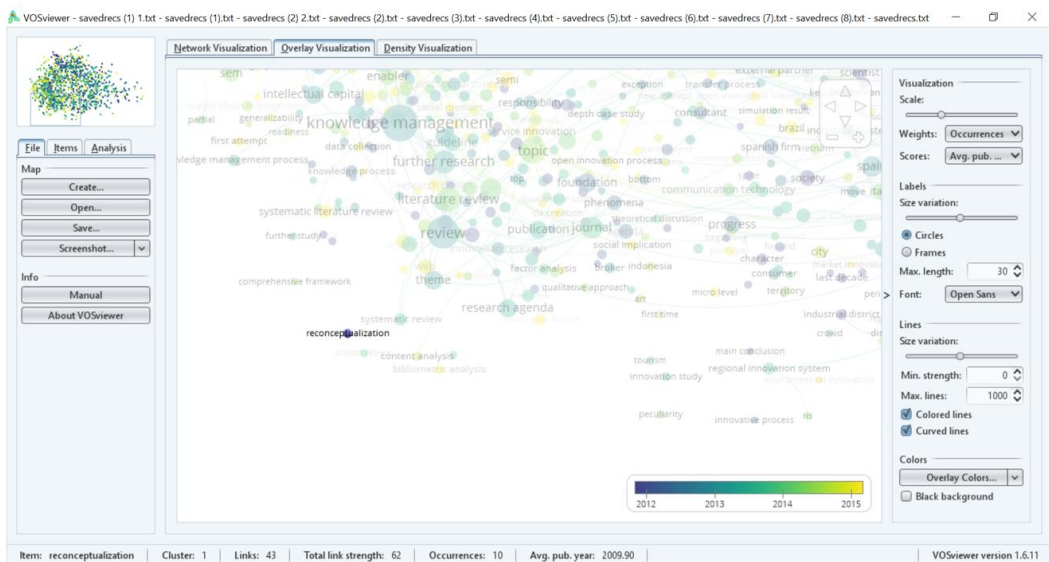
The following VOS Viewer screenshot shows that the absorptive capacity literature mostly focusses on research and development contexts.



The following VOS Viewer screenshot shows that the absorptive capacity literature less focuses into qualitative methodologies.



The following VOS Viewer screenshot shows that the absorptive capacity literature less focuses into reconceptualization.





## **8.7 Appendix 7: Parameters of VOS Viewer**

### **Web of Science search parameters (as at a selected date).**

Search term: Absorptive capacity

Refined by: WEB OF SCIENCE CATEGORIES=(MANAGEMENT OR BUSINESS OR ECONOMICS OR SOCIOLOGY OR OPERATIONS RESEARCH MANAGEMENT SCIENCE OR DEVELOPMENT STUDIES OR PSYCHOLOGY MULTIDISCIPLINARY )

Timespan=All years.

Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI, CCR-EXPANDED, IC.

### **VOS Viewer software parameters.**

Select “Web of Science .txt files of absorptive capacity.”

Choose the type of data: Create a map based on text data.

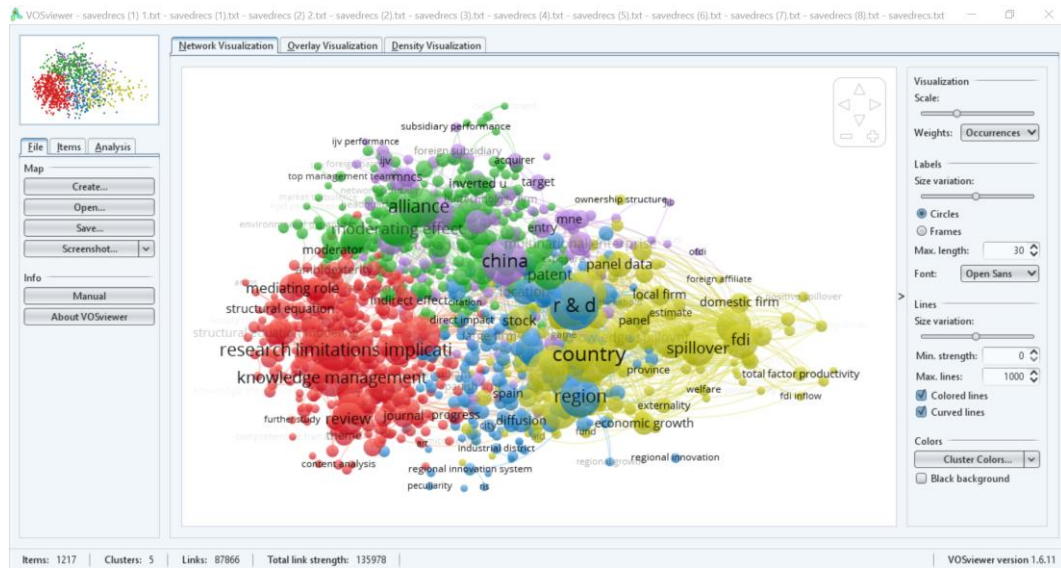
Choose data source: Read data from bibliographic database files.

Field form which terms will be extracted: Title and abstract only.

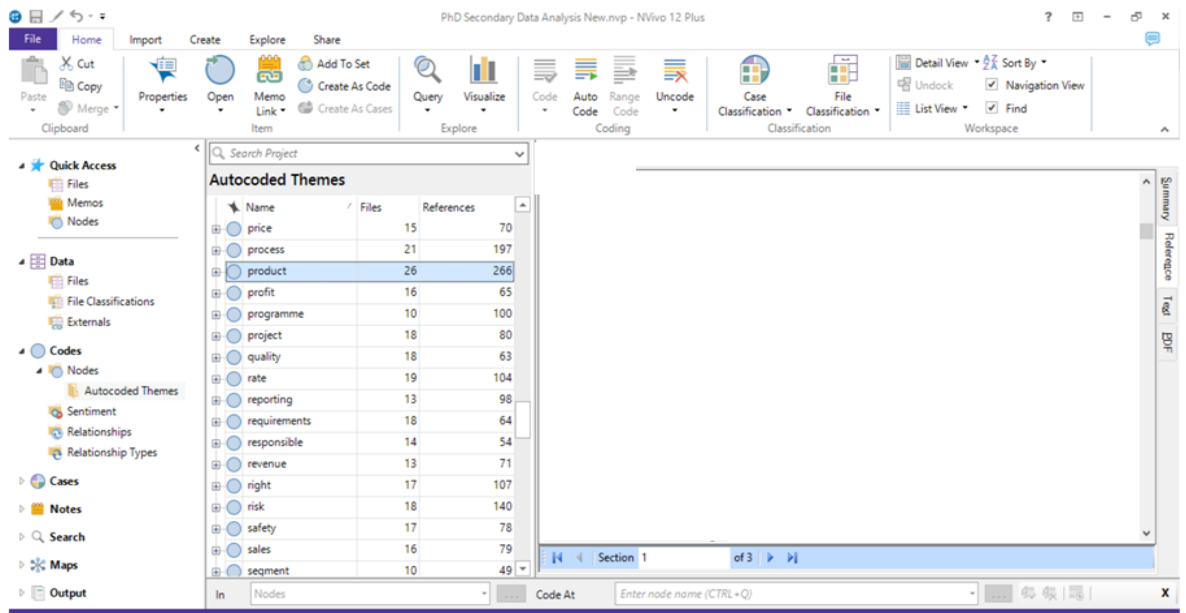
Counting method: Binary counting

Minimum number of occurrences of a term: 10

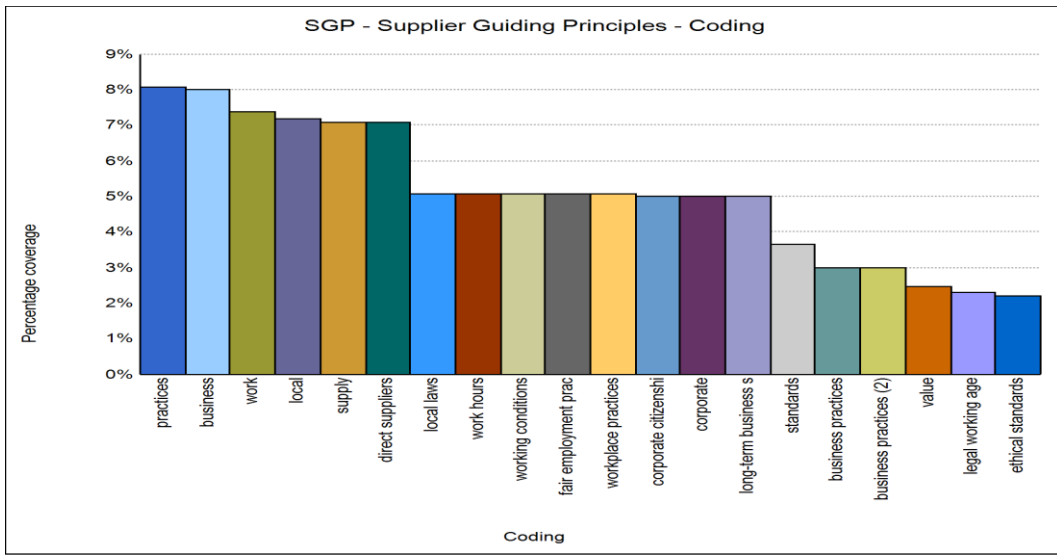
## VOS Viewer network visualization diagram



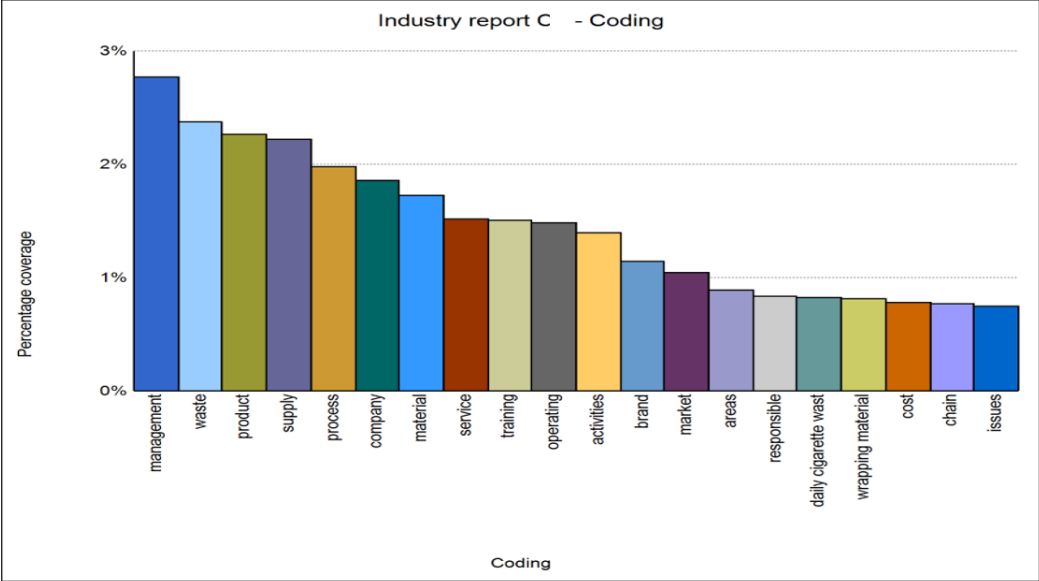
## 8.8 Appendix 8: Secondary data analysis using NVivo 12 PLUS software



innovative technologies	packaging innovation	industry in...	work...	sup...	sup...	sm...	pre...
product innovations	innovative waste wat...	paced inno...	innova...	innov...	innova...	innov...	innov...
	innovative product p...	marketing f...	innov...	innova...	innova...	innov...	innov...
innovative solutions	innovative surface	key innova...	innovative ...	innovative...	inno...	inn...	ener...
	innovative premium ...	innovative ...	innovations...	innovations...	design f...	brand de...	



training									
training establish...	training cant...	comprehe...	average tr...	vig...	trai...	trai...	trai...	trai...	trai...
training course	online training	training ...	refr...	recei...	prov...	prof...	on-...	offe...	
leadership traini...	internal traini...	training ...	key train...	gra...		gen...	fac...	ex...	
training opportu...	human rights ...	training...	key talent ...						
training experience	external trai...	targeted ...	introduc...		ethics tr...			cla...	
training days	employee tr...	relevant ...	industrial..		employe...		busines...		
		regular ...	in-house ...		driver tra...		awarene...		



### Analysis of types of training of Dyad One

<b>Features/Types of training of Dyad One</b>	<b>Organization A</b>	<b>Organization B</b>	<b>Joint training</b>
Aid training	Yes	Yes	Yes
Annual training requirements	Yes	Yes	Yes
Average training hours	Yes	Yes	Yes
Awareness training	Yes	Yes	Yes
Business conduct training	Yes	Yes	Yes
Classroom training sessions	Yes	Yes	Yes
Commercial compliance training	Yes	Yes	Yes
Compliance training	Yes	Yes	Yes
Driver training programs	Yes	Yes	Yes
Employee training	Yes	Yes	Yes
Employee training employees	Yes	Yes	Yes
Ethics training	Yes	Yes	Yes
Extensive training	Yes	Yes	Yes
External training	Yes	Yes	Yes
Face-to-face training	Yes	Yes	Yes
Graduate training programme	Yes (Own University)	Yes	Yes
Human rights training	Yes	Yes	Yes
Induction training	Yes	Yes	Yes
Industrial training location	Yes	Yes	Yes
In-house training schemes	Yes	Yes	Yes
Internal training	Yes	Yes	Yes
Key talent training	Yes	Yes	Yes
Key training programmes	Yes	Yes	Yes
Leadership training programme	Yes	Yes	Yes
Offered training	Yes	Yes	Yes
Online training	Yes	Yes	Yes
Professional training programs	Yes	Yes	Yes
Safety training	Yes	Yes	Yes
Refresher training	Yes	Yes	Yes
Regular training	Yes	Yes	Yes
Relevant training	Yes	Yes	Yes

### Analysis of features of training of Dyad One

<b>Features/Types of training of Dyad One</b>	<b>Organization A</b>	<b>Organization B</b>	<b>Joint training</b>
Training transport	Yes	Yes	Yes
Training course	Yes	Yes	Yes
Training criteria requirements	Yes	Yes	Yes
Training division	Yes	Yes	Yes
Training establishment	Yes	Yes	Yes
Training experience	Yes	Yes	Yes
Training opportunities	Yes	Yes	Yes
Training programs	Yes	Yes	Yes
Training requirements	Yes	Yes	Yes
Training session	Yes	Yes	Yes
Training solutions	Yes	Yes	Yes
Training updates (On-line and records)	Yes	Yes	Yes