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SHARED LEARNING IN SUPPLY NETWORKS: EVIDENCE FROM AN EMERGING MARKET SUPPLY NETWORK

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STRUCTURED ABSTRACT

Purpose: Firms face the challenge of developing learning capabilities that enable them to work as part of an effective business network. While an extensive literature examines learning capabilities within the firm little research examine the shared learning that occurs between networked firms. The paper explores how a manufacturer and businesses services provider learn to develop their supply network. Specifically, the paper investigates four areas of shared learning, central to supply network success and discusses the development of shared learning capabilities.

Methodology/Approach: An in-depth, longitudinal case study of a supply network which involves an engineering company and two business services suppliers.

Findings: The study suggests that developing shared learning capabilities in four key areas is imperative for network success: (i) business relationships, (ii) customers' desired values, (iii) firm boundaries, and (iv) network structures. Furthermore, there are three distinct types of shared learning that were common to all fours areas of shared learning identified. These are; strategic shared learning; operational shared learning and exchange shared learning.

Research limitations: The research findings are based on a single case study. Additional research across multiple case studies is needed in order to verify the findings reported.

Practical implications: The four learning areas have significant managerial implications for the way managers develop mechanisms to capture and share learning associated with developing supply networks.

Value of paper: This paper addresses a gap in the literature concerning the areas of learning capabilities for developing a supply network. The findings are important to research and practice with regard to how companies develop learning capabilities.

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INTRODUCTION

It is contended that the central factor in the success and survival of organizations is the effective management of supply networks (Gummesson 2002; Thorelli 1986). 'Supply networks' can be understood as a web of interdependent firms working together to supply services and products to a focal buyer (Möller et al. 2005; Möller and Törrönen 2003a). Today firms are increasingly unlikely to behave in isolation when developing customer and competitor oriented strategies. In doing so, firms are required to develop learning capabilities in order to improve their responsiveness to customers (Day 2002; Schultze and Boland 1997; Slater and Narver 1995). Learning capabilities have been examined within the marketing literature (Baker and Sinkula 2002; Schultze and Boland 1997; Slater and Narver 1995), management learning literature (Loasby 1999; Senge 1990) and international business literature (Minbaeva et al. 2003b; Zander 2003). For example, Nobeoka et al. (2002) found that suppliers were able to leverage their organizational learning through the development of strong inter-firm relationships with multiple customers. Such learning resulted in both new product development and process innovation. Similarly, Zahay and Handfield (2004) suggest that organizations most likely to innovate are those which posses the ability to learn and share information within inter-firm relationships. However, the majority of the extant literature focuses on learning *within* firms rather than on shared learning *between* firms. Such research emphasises that learning varies depending on the learning context (Lane et al. 2001) and that over time, the basic conditions for network success change. In this regard, members of the network need shared learning, over time, to adjust to the changing conditions that may affect the success of their network (Bessant et al. 2003).

Shared learning is essential because the competitive success of a value system (such as a supply network) depends upon the learning and development of the whole system, not just the core firm. Despite these observations the vast majority of studies have focused on understanding the key determinants of network success within a single firm. This study seeks to focus on learning capabilities between firms within the supply network. The purpose of this research is to explore *how a supply network learns to adjust to the changing conditions*

that affect network success. Network success is defined as the member's motivation to engage in future transactions between members of the network (Gallivan 2001a). The study contributes to our understanding of shared learning capabilities by identifying, describing and analysing four key shared learning capabilities that occur within a supply network regarding relationships, value, firm boundaries and network structure.

The remainder of this paper examines the links between network success and shared learning within a supply network that might facilitate this. A conceptual framework is presented and evidence from a leading supplier of power systems that engaged in developing an international supply network is analysed. The paper concludes by discussing the impact of four key areas of shared learning; 1) network relationships, 2) value, 3) firm boundaries and 4) network structure on network success. Finally, some theoretical and practical implications of the research are discussed.

SUPPLY NETWORKS

Recent years have witnessed unparalleled growth in firms seeking to develop their supply networks, through the exploration and expansion of different forms of collaborative and partnering agreements (Murray et al. 2005; Webster 1992). Two distinct streams of literature concerning the development of the supply network concepts have emerged (Lamming 2000). The first stream is the largely descriptive research on industrial networks and their conduct emerging from industrial marketing and purchasing (see for example, Möller et al. 2005; Möller and Törrönen 2003a). The second stream of literature on supply chain management is more prescriptive in nature and is grounded in the fields of strategic management, operations management and logistics (see for example, Nishiguchi 1994; Womack and Jones 1994). More recently, researchers have attempted to foster a more holistic approach. For example, the integration of the concepts of relationship management and value, traditionally associated with the industrial marketing and purchasing perspective, have increasingly been integrated with concepts of firm boundaries and network typologies and structures, more typically allied with the logistics and strategic management fields (Jűttner et al. 2006; Langabeer and Rose 2001).

In this way, the quality of relationships is thought to differentiate *"network organisations"* from *"networks of organisations"* (Alexsson and Easton 1992; Möller et al. 2005). Research in

this field has emphasised the importance of both effectiveness (emerging from the industrial marketing and purchasing tradition) and efficiency (more typically associated with the operations and logistics tradition) to networks of organizations. As Achrol (1997:59) explains, *"a network organisation is distinguished from a simple network…by the density, multiplicity and reciprocity of ties and a shared value-system defining membership roles and responsibilities".* While it is recognized that these networks come in many forms, such as supply, distribution, or R&D, this paper focuses on supply networks: That is, the network organisation formed by a buyer and its stable inter-organizational ties with strategically important suppliers. In that context, we seek to understand the learning created within such a supply network.

LEARNING IN SUPPLY NETWORKS

Learning can be understood as the improvement of practices and routines (see for example, Bångens and Araujo 2002; Brown and Duguid 1998; Cook and Brown 1999). As Zollo and Winter (2002: 340) explain, learning capabilities are manifest in:

> *"… learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness."*

Indeed, past research has shown that firms develop capabilities to learn by acquiring and utilizing external and internal knowledge (Minbaeva et al. 2003a). Similarly, studies of absorptive capacity provides substantial evidence that capacity significantly affects a firm's learning capability (Lane et al. 2001). In developing learning capabilities, it has been argued, firms should consider the level of prior knowledge, the organizational structure, and the motivational, coordination and socialization capabilities that affect a firm's ability to learn, absorb and reapply knowledge (Jansen et al. 2005).

Nonetheless, a firm's capacity to learn is not absolute but rather varies with the learning context (Lane et al. 2001). In this regard, international supply networks present a challenging case for both suppliers and buyers for the following reasons. First, the learning generated within a network is highly contextual, thus posing challenges to the parties involved to reapply learnt lessons in other contexts without engaging in significant knowledge reconfiguration

activities (Verona and Ravasi 2003). Second, the quality of the learning generated within a network depends on the value perceived by its members. In this regard, a buyer could benefit more from a larger network; however, a larger network may reduce control over the quality of learning, as the value perceived in learning by members of the network will be reduced (Morris et al., 2006). Lastly, a supply network that involves geographically dispersed suppliers offers fewer opportunities to create socialization capabilities that are thought to be imperative for generating learning between members of the network. In line with such observations about learning in supply network, the following section moves on to explore four emerging themes that may affect network success and therefore the learning around these theme is indeed imperative for the network.

Relationships, Value, Firm Boundaries and Network Structure

The literature highlights four areas that may affect the network success; (i) relationship, (ii) value, (iii) firm boundaries, and (iv) network structure (Figure 1). We examine these themes in the context of a supply network.

Relationships and Supply Networks

The industrial marketing and purchasing literature has focused considerable attention on the importance of relationships between individuals and firms, both on a local (Paniccia 1998) and a corporate level (Welsh and Wilkinson, 2005). Indeed, much of this literature acknowledges and examines issues relating to relationship-building, such as trust, commitment and co-operation, which arise within inter-firm and network relationship development (Farrelly and Quester 2003; Kwon and Suh 2004; Lanfield-Smith and Smith 2003; Sánchez and Pérez 2003). In this way, the development of supply networks requires managers to appropriately select and invest valuable resources in supply network members. Gadde and Snehota (2000) recognize the substantial participation and cost involved in building relationships within networks, but they argue that such costs must be more than offset by relationship benefits. However, developing and maintaining good relationships can be challenging. Vaaland and Håkannsson (2003), for example, recognize the potential for conflict but suggest the use of governance mechanisms as a method of using conflict to strengthen business relationships. Similarly, Håkannsson and Ford (2002a) explore three paradoxes associated with networks:

opportunities and restrictions of networks; influencing and being influenced within networks; and controlling (and being controlled) within networks. In their view, networks should interact by using tools to help decision-makers understand their context. Specifically, they argue that no one relationship can be understood without reference to the wider network. Håkannsson and Ford (2002a) explain:

> *"the development of any one relationship between two companies will depend on a number of factors: on what has happened in the past in the relationship; on what each of the two parties has previously learned in its other relationships; on what currently happens between the companies in the relationship and in others in which they are involved; on the expectations of both companies of their future interactions; on what happens in the wider network of relationships in which they are not directly involved."*

In this regard, the recognition that firms and networks learn from their own and others' experiences related to the specific context within which they operate, suggests that the assimilation and reapplication of this knowledge is likely to be of importance to the continuation of the network (Gallivan 2001a). Therefore, shared learning from the specific context within which the network relationships reside may result in a higher perceived success of the network by its members.

Value and Supply Networks

Maintaining strategic importance through a value proposition which is attractive to the network is a key issue for suppliers. As customers seek to make key decisions on whether to invest in new supplier relationships, to maintain and develop important relationships or to divest from low-value relationships, suppliers may seek to focus on strengthening their customer value strategies. These involve anticipating and responding to changes in customers' desired values. That is, suppliers continuously seek to identify and understand the changes in value customers wish to see being offered (Flint and Mentzer 2000). In this sense, it seems likely that firms need to share ideas and learning regarding what value is and how such value might be created at both the network and the firm level.

While some progress has been made in understanding how value is perceived by customers, much of this work has been carried out in a consumer context (for example, Holbrook 1994; Lai 1995) rather than in a business-to-business environment (notable exception being, Fredriksson and Araujoq 2003; Gassenheimer et al. 1998; Ulaga 2003). Further, such research has largely focused on current perceived value by customers rather than customers' desired value *change*. However, as Flint *et al*. (2002) observe, although the literature makes little direct reference to customers' value changes, several papers comment on the dynamic nature of value (for example, Richins 1994).

According to Flint and Mentzer (2000) there are five aspects of value change; (i) the value hierarchy levels (where customers may change the attributes they desire from suppliers), (ii) the form the desired value change takes, (iii) the rate of the desired value change, (iv) the magnitude of the change and (v) the volatility of customer value change. While these observations are key to understanding the dynamic nature of value, they are limited to dyadic relationships and adopt a network perspective (also see Flint *et al.,* 2002; Ulaga, 2003). Although Fredriksson and Araujo (2003) explore value through a different lens, namely the performance measurement of suppliers, their findings provide additional support to the above observation that value can be seen as dynamic, complex, multi-dimensional, and cross-functional.

The network perspective of value considers the notion of value as a dynamic concept; however, this literature understands value as a system (Parolini 1999) rather than purely from the customer perspective. For example, Möller, Rajala and Svahn (2005) argue that the different value platforms that firms perceive and share within a network affect the type of network that develops. They suggest that *core value* production drives an efficient production and delivery system, that *relational value* production drives a product innovation supply network focused on creating new solutions supporting the customers' business, and that *future-oriented value* production drives a radical innovation for new business opportunities. Furthermore, Möller *et al*. (2005) hold that these value platforms are, broadly speaking, hierarchical, and that firms must achieve one as a foundation for the next. This progression requires firms to learn to build capabilities to enable them to achieve the goals set for each value platform. In this way, the dynamic nature of desired customer value is likely to be

affected by the way in which the suppliers evolve, and *vice versa*. In this regard, the development of a sensing mechanism for changes in value perception is more likely to lead to continued success of the network. Thus developing shared learning capabilities with regard to the changes in value perceptions of network members is likely to leverage perceived network success.

Firm Boundaries and Capabilities

Traditionally, the marketing and strategy literatures have sought to identify firm boundaries from an ownership perspective (Coase 1937; Holmstrom and Roberts 1998; Williamson 1975). However, recent research has argued that the boundaries of the firm are determined by the capabilities necessary to undertake productive activities. The capabilities approach to the firm sets out to find integration mechanisms that sustain the division of labour among agents with incomplete, dispersed and disparate knowledge and learning, as well as to help the process of creating and testing knowledge (Kogut 2000; Loasby 1998; Piore 1992). Furthermore, a second category of activities is increasingly becoming accepted as central to the identification and management of firm boundaries (Araujo et al. 2003). This second group of activities, often referred to as indirect or ancillary capabilities (Langlois and Robertson 1995; Loasby 1998) is concerned with the capabilities of firms to interact with customers, suppliers and other external agents. This literature observes an important shift in the way firms define their operations and presents the firm with a greater degree of fluidity and flexibility. Mahoney (1992) examined the isomorphic nature of ownership and long-term relationships within supply chains. In this sense, it is not the ownership of physical assets that determines the way firms create and offer added value for customers, but rather, it is what capabilities reside within the network and how they are utilised. The objective then for firms is to develop shared learning leverage value from disparate capabilities.

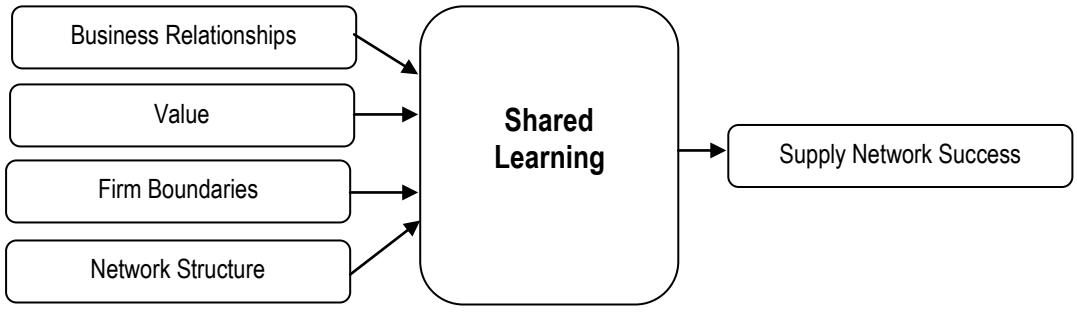
Thus, value creation capabilities cross firm boundaries and create bridges for the development of supply networks (Araujo et al. 2003; Möller and Törrönen 2003a). This observation calls for further understanding of firm boundaries in the context of networks. Dyer and Singh (1998), for example, discuss the phenomenon of critical resources spanning firm boundaries. Pettigrew, Thomas and Whittington (2002) identify the rising interest of strategy scholars in networks as repositories of resources. In line with these studies, the

resource pool is seen as the network and is not restricted to the traditional ownership boundaries associated with a single firm. We argue that most effective and efficient utilisation of network resources can be achieved only if firms learn together how to capture resource and capability information and utilise it to their best advantage. Further, when firms are able to do this, their perception of the network's success is positively affected.

Network Structure

Many researchers in the field of supply networks have commented on the need for them to develop and operate in accordance with their specific context (Gadde and Håkansson 2001; Harland et al. 2001; Holmen et al. 2003). As Holmen, Håkansson and Pedersen (2003) observe, both macro and micro contexts are likely to impact the of network structure adopted. Holmen *et al.'s* (2003) network structure taxonomy suggests how managers might benefit from adopting a mix of different supply structures dependent on context and need. In this regard, it is suggested that executives need to manage and develop relationships with suppliers, as well as conceptualise and foster appropriate relationships *between* groups of suppliers (Bessant et al. 2003). This has implications for the way firms select their partners (Gadde and Håkansson 2001) and for the level of involvement network members have in shaping and managing micro-nets, within the greater network structure. As Dubois and Gadde (2000) explain, the experience (and learning) that network members develop from prior network involvement is likely to influence the way they behave and contribute to the development of new supply networks. In line with this argument, we claim that if firms are jointly able to develop mechanisms and procedures to capture learning about network structure and context, they may be in a stronger position to correctly apply this knowledge in future network development.

FIGURE 1. Types of Shared Learning that Influence Supply Network Success



Contemporary communications and co-ordination technologies have changed the way firms organise, structure and manage their business networks. As Mills *et al.* (2004) observe, entrepreneurs starting businesses today can rapidly create a supply network that less than ten years ago could not have been attempted. Im and Rai (2008) suggest that firms that are able to develop shared learning capabilities are more flexible and more likely to create successful supply networks. However, despite the numerous references in the literature to the need for shared learning, very little research has focused on what learning should be shared and how that might benefit the network. Further, what literature there is, discusses shared learning from a multi-site learning and knowledge transfer perspective (Belderbos et al. 2008; Bond et al. 2008; Mesquita et al. 2008) or a shared learning in supplier development programmes and supplier associations perspective (Morris et al. 2006; Spekman et al. 2002). Much of this literature adopts a teacher/learner approach. Bearing in mind the themes identified in the preceding literature review as pertinent to supply network success, perhaps a more germane approach might be to explore how shared learning about relationships, value, firm boundaries and network structure might facilitate network success (see Figure 1). We examine these areas in the following sections, in which the research design, empirical data and analysis are presented and discussed.

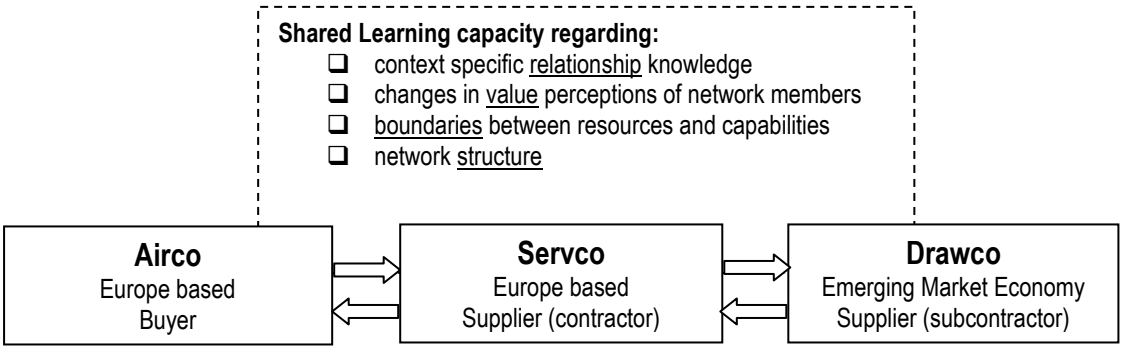
RESEARCH DESIGN AND METHODS

This longitudinal study follows an the development of a supply network (Figure 2) through the first eighteen months of its existence and explores four principle areas of shared learning that were identified as drivers of the supply network's success; 1) business relationships, 2) value, 3) firm boundaries and 4) network structure. The study focuses on a single supply network being developed between three firms in the aerospace industry. Using the method of a single case study (Easton 2003; Flyvberg 2007; Halinen and Tornroos 2005), the exploration of a supply network is likely to generate in-depth insights into how firms create and use shared learning to develop their network.

Empirical data were collected between October 2004 and May 2006 from the three firms forming supply network relationships with each other for the first time. The three firms Airco

(the core firm), Servco (the Europe based supplier) and Drawco (the Asian based supplier) have been renamed to protect their identity. This triadic supply network provided an appropriate setting to examine shared learning as each firm had to learn about the network's relationships, value creation, boundaries and structure at the same time, in order to make the network a success (Figure 2). This provided a setting where shared learning was likely to occur. Further, at an early stage each firm had expressed an interest in learning how to develop the network '*together*'.

Figure 2: Case Companies and Main Themes



The collected data included personal interviews, contracts, minutes of meetings, quarterly reports and various procedure and review documents that represented the shared learning emerging from interactions between all three firms. Other sources of data included detailed field notes that recorded our impressions from each visit and archive materials. It was a key requirement of the research design to discover who was responsible for developing and managing the relationships between firms and their activities. Key informants included the heads of each of the key functions involved in the supply network, the managers and the heads of each work stream from both Airco and Servco. Thus, directors, middle managers and executives and front-line workers were identified as the most relevant sources as their day-to-day involvement with strategic development and operations cast them in this role (Table 1).

Table 1: Interviews

Company	Seniority of interviewees	0-6 months	6-12 months	12-18 months
Airco	Senior Buyer	3	3	2
	Director	2	2	-
	Senior Manager	3	3	2
	Director	2	2	2
	Work Stream A Head	1	1	1
	Work Stream B Head	1	1	1
	Work Stream C Head	1	1	1
Servco	Director	2	2	2
	Senior Manager	not yet employed	2	2
	Work Stream Head	2	2	-
Total no. of interviews				**49**

As our objective was to generate in-depth insight, more weight was placed on the repeated semi-structured, personal interviews with the above key informants (Yin 1994). A total of forty-nine interviews were carried out. We developed a guide for conducting the semi-structured interviews based on the four areas of shared learning we were interested in (Figure 1.). The guide helped us explore the shared learning that developed through different joint problem solving activities. We consider the companies' objective of *'supply network success'* as a shared learning process in which actors identify and solve problems in a way that makes the continuation of the network feasible and beneficial to each firm (Gallivan 2001b). In this way, evidence of shared learning is manifested in changes of practices, for example, changes in structures and activities that affect more than one firm in the network. At the beginning of each interview, respondents were asked to describe and explain their business relationships with each of the firms in the study, where and how value was created in the network and the network structure adopted. The remainder of the interview consisted of open questions based around the changes made to business practice and why, how, when and with which actors the changes were developed. The interviews covered the same broad issues with each respondent. Respondents were re-interviewed approximately every three months through the period of the study (subject to availability). The geographic distance between Drawco (Asia), and the researchers, made it impossible to secure face-to-face

interviews. This meant that we had to rely on second hand reports from Airco and Servco respondents and minutes from meetings and procedural documents.

Interviews typically lasted around two hours. They were conducted individually, and were audio-recorded and transcribed. Data analysis placed a significant emphasis on verbatim quotations from informants. All recorded interviews were analyzed via methods of inductive reasoning and comparative methods. Following the procedure recommended by Strauss and Corbin (1998), three types of coding were adopted to analyze the data. First, '*open coding'* was used to discover and identify the properties and dimensions of concepts in the data. Second, '*axial coding'* was employed to link the core categories together at the level of properties and dimensions. Third, *'selective coding'* was used as a process of integrating and refining theory. To organize this process, a systematic approach to the analysis of transcripts was adopted in a procedure akin to that of Turner (1981). Analysis was carried out simultaneously with data collection creating an iterative process between interviews, literature reviews and analysis. The case analysis that follows illustrates both successful and unsuccessful shared learning and its effect on network success.

DISCUSSION OF THE CASE AND ITS FINDINGS

Case Background

The core firm, Airco, is a global company in the aerospace sector. A world-wide network of offices, manufacturing and service facilities supports their global market. They have a broad customer base including airlines, corporate and utility aircraft operators.

Process innovations are being sought through investment in, and development of, an emerging-market supply network, which represents a significant evolution of Airco's current supply network. Airco has identified a number of design tasks that, can be carried out by the proposed, new supply network. Airco have contracted with a Europe-based service provider 'Servco'. Servco will carry out complex tasks in-house and will subcontracted simpler tasks to the Airco-approved, second-tier supplier 'Drawco' in the Far East. This situation provides an appropriate context within which to explore shared learning as the new supply network members learn to work with each other and the core firm, Airco. Using the analytical framework presented in Figure 1.0 we first examine the shared learning that was achieved.

For each area of shared learning we explore how this shared learning influenced network success. Finally we consider how the shared learning capabilities were developed.

Shared Learning within a Supply Network

Shared Learning about Business Relationships

While we subscribe to the suggestion that the success of a particular network is, in some way, determined by the degree of learning developed by members of this network (Gadde and Snehota, 2000; Vaaland and Håkansson, 2003), we seek to further explore this proposition from a relationship management perspective, attempting to identify the shared learning that took place between the three actors in our network (Figure 2) and the influence of that shared learning on network success.

The supply network relationships between Airco, Servco and Drawco represented a new business relationship context for the three companies. An important part of the shared learning that took place was between Airco and Servco during the 'Suppliers' Conference' and tendering process. This later had an impact on the shared learning between Airco and Drawco and Servco and Drawco.

At the time of the Suppliers' Conference, Airco were exploring their opportunities; the services they could buy. Servco were learning about the needs of their potential customer. Drawco were also present at the conference but for our purposes, we begin by focusing on the shared learning between Servco and Airco. Shared learning was a central component in working out the complexities of what was to be traded.

The three firms spent a long time talking to each other at the supplier conference, trying to understand each others needs and capabilities and the economic, geographic and relational environment within which they would potentially trade. Another important shared learning point which was perhaps more surprising, was that relating to what Turnbull *et al.* (1996) call relationship atmosphere. That is, Airco, Servco and Drawco sought to create shared learning regarding the anticipated commitment, trust and co-operation that would be necessary for the supply network to be deemed successful. Airco began the Suppliers' Conference with a presentation describing what they were looking for. An interviewee recalled:

"what we did was we overlaid the final slide… with something like, 'our reputation in your hands'…I wanted to make it clear to everybody in the room, that this was not just another supply arrangement".

Indeed, the consequences of failure were described by Airco as "*dire*". An interviewee explained that the message was, *"not just about cost, [but] also about management of risk."* Airco were insistent that potential suppliers needed to understand and *'buy-in to the spirit of the business model.'*

After the Suppliers' Conference, Airco sought bids from six suppliers. The purchasing manager from Airco explained that the invitation to tender captured shared learning in the form of four key criteria that had been developed through discussions with suppliers. This strategic approach resulted in the specification for a future supplier to offer: (i) the potential for developing a supply network; (ii) direct experience of sourcing routine engineering from emerging market economies, (iii) previous local experience and expertise in more sophisticated design engineering, and (iv) expertise to manage multiple work streams as a single package. As an Airco representative explained:

"I want to be able to package it [the work] and let them [the supplier] manage it…."

Servco was awarded the contract, because they were viewed as the only company that understood what Airco was trying to achieve and the way they thought they might best achieve it. The Airco representatives felt that the majority of the suppliers at the conference did not fundamentally understand the supply network concept. One interviewee commented:

"I couldn't close the gap…I couldn't get them [the other suppliers] to grasp the issue of the business model being new and not business as usual."

In this way, the Suppliers' Conference and the Invitation to Tender (and the subsequent Tender Document) represented the tools that enabled the decision-makers to interact and create shared understanding of their context and proposed business relationship (Håkansson and Ford 2002b). What is new here is the emphasis on the *'shared learning'* and shared understanding; shared strategic learning of what the network might be and shared operational learning about how the supply network can be developed. In this sense, developing shared learning about the business relationship and its context resulted in the first

successful developments in establishing the supply network at two levels. 1) Airco asked Servco and Drawco for help in understanding and developing a strategic approach to what the network look like; 2) Servco and Drawco worked with Airco to develop a shared operational understanding of *how* the network would work (which was presented to Airco in the Tender document).

At the formative stages of the network's operations, respondents spoke about fostering an atmosphere of trust. Communications appeared to be frequent, with multiple face-to-face meetings, telephone conversations and emails between Airco and Servco, and Servco and Drawco senior managers and directors. However, as the relationship evolved, differences from the forecast work streams (upon which the contract was based) emerged, and forced a change at the economic level; the parties had to renegotiate terms. At this time, interviews revealed that, despite the understandable tensions associated with the need to renegotiate, significant trust had developed between certain individuals at Airco and Servco in particular. This is in keeping with Vaaland and Håkanssons' (2003) observations that conflict can sometimes strengthen business relationships. But again, our findings emphasises the it is the shared learning of individual employees, between people from different firms within the network, that facilitated the high degree of openness that allowed the firms to develop a deeper understanding of each other's difficulties. In this sense, shared learning may mark the difference between firm experiencing conflict that damages the supply network, and firms experiencing conflict that results in improvements to the network.

Shared learning about the relationship context included learning how to foster and build trust, whom to share commercially sensitive information with, how and when to share it, and how to reach new agreements that satisfied the needs of all parties (Blois 1999; Kwon and Suh 2004). One employee commented:

> *"…we'll keep ploughing a furrow… because we said that this was something that was a foundation for organic growth, we're looking to find things to add into it and that is starting to happen…we are trying to grow it and it's not easy. There're tensions between ourselves and Servco and there's tension between various parts of Airco but I think we'll work it through and we'll work it through better than we would have done because there's a relationship to maintain…."*

Shared Learning about Value

When customer value changes or evolves, suppliers are tasked with identifying and reacting to changing customer needs and wants. In this regard, we set out to explore (i) how these changes in values might be identified and captured, (ii) how firms are able to learn about such changes in value perceptions, and (iii) how this impacted on perceived network success.

At the beginning of the contract, interviewees were asked to describe the value they thought the contract would deliver, and specifically on the value they thought they required presently, compared with that which they might require in future. Responses regarding current value largely concurred with Möller *et al.'s* (2005) core value platform, whereby Airco's focus appeared to be on efficient productivity and delivery systems. This perspective was reflected in the responses of interviewees throughout the network. The observation is also consistent with Möller *et al.'s* (2005) argument of value as a hierarchical system; *core value* to *relational value* to *future-oriented value*. Hence, at the beginning of the relationship, according to Möller *et al.* (2005), it would be expected that core values would prevail. In this sense, the shared learning that took place at the Suppliers Conference and in the subsequent, intensive negotiation period seems likely to have resulted in the firms developing a shared view of the network's core value - efficiency.

When asked about value three months, six months and then twelve months into the contract, interviewees throughout the network still found it difficult to identify possible changes in value. Table 2 presents statements from interviewees reflecting on changes in perceived value over time. Despite the strong tendency for respondents to claim that value had not changed in any significant way, we argue that such changes are observable. In particular, as time moved on interviewees tended to associate perceived value with the development of the network and with their motivation to further invest in the network.

Furthermore, we argue that the respondents' reaction to changes in value over time appears to concur with Möller *et al.'s* (2005) recognition of a shift towards the relational platform whereby firms begin to value innovation and the supply network begins to focus on creating new solutions to support the customer business (Table 2; cells shaded grey).

Table 2. Interviewees' observations reflecting changes in perceived value over the first twelve months of the contract

Interviewee	Contract Signing	Three Months Later	Six Months Later	Twelve Months Later
A	"it's the low value stuff…routine engineering"	"it's just the routine work really"	"we're growing faster than expected"	"we've far exceeded the forecast head count and they're asking us to do much more added value work than we'd anticipated"
B	"the added value comes from us managing work streams"	"we'll provide value by handling packages of work"	"there's a learning curve…but we're actually now doing jobs that were never in the initial contract"	"now there are one or two other types of engineering support that we're providing them, that they're rolling into the model"
C	"the scope review suggests 50% will go offshore"		"they've dealt with more of the higher skilled stuff than we'd imagined"	"…that will be part of the organic growth we're aiming for"
D	"this is new, we are pioneers…we're trying to understand what they want and show them what we can offer"	"the head count here is growing…we're recruiting hard to deliver …"	"…and that is completely off spec…it's new"	"I'm working on the basis that it will just run and run, that way we'll have to not perform for us to loose"

Our explanation is that the difficulties interviewees had in identifying this fundamental change in value could be due to the perspective and discussions that developed during the bidding period, and it could be argued that, right from the outset, *relational value* was envisaged. Our analysis suggests that this appears to have always been part of the *'long game'*. In this sense, a shared understanding of 'the long game' appears to be evidence of shared strategic learning regarding the strategic direction of the supply network's development.

The initial focus, as the network emerged, was to establish a successful core value platform, from which a relational platform could be more clearly conceived and developed. This observation has important implications for shared learning capabilities on two levels. First, it seems to suggest that as a result of previous experiences and their knowledge of one another, the supply network firms, even at the point of signing the contract, had already shared learning about how to develop the network. The continuous sharing of learning in their step-by-step approach to the evaluation of their new supply network is reflected in an earlier quote from Airco, *"…this was something that was a foundation for organic growth, we're*

looking to find things to add into it …we are trying to grow it" Documentary evidence of procedures support this view.

Second, this observation suggests that the network was aware of the need for capturing ongoing information regarding how the second platform of relational value might be achieved. In this regard, the mechanisms created to capture this information (framed as dimensions of value by Flint and Mentzer (2000)), appeared strongly associated with procedures developed to track network success. Specifically, fortnightly meetings with frontline network managers on different work streams and quarterly reviews involving senior managers from network members, incorporated network success measures, including work stream allocation and completion rates, satisfaction with work in progress and work completed, delivery time scales and job transparency.

This phenomenon was illustrated by the attention that centred on Servco when their merger was agreed with a significant player in their industry. Within days of the merger, Servco was presenting to senior managers within Airco (incorporating the Airco team and their seniors), their increased capabilities and resources that had materialized as a result of the merger. As the network members attempted to anticipate future changes in value and future needs for services, the repositioning of both parties' value propositions were clear, conscious and visible. The presentation developed into round table discussions as the conference progressed. In this way, attempts by the supply network to develop shared learning about the changing value perceptions appear closely associated with the perceptions of network success. This suggests that perceived network success is increased when the shared learning of changing perceived value is high.

Shared Learning about Boundaries between Resources and Capabilities

The effective development of the supply network from a relational platform (Möller *et al.*2005) requires firms to develop a shared understanding of the dispersed resources and capabilities available to them. Shared learning regarding which firms hold which capabilities and resources and how these might be access and utilised by other networked firms, is likely to lead to innovative combinations and new solutions to support the customer business (Araujo et al. 2003; Möller and Törrönen 2003).

For Airco, developing the supply network meant that capabilities would reside in parallel within their suppliers' firms. For example, Airco's, objective was to have Servco and Drawco with proficient teams of experts to use specialist CAD technologies that paralleled the capabilities of their own CAD teams (see Langlois and Robertson 1995; Loasby, 1998). This setup was designed to offer greater flexibility and fluidity of task allocation across firm boundaries. At this level, such learning might be considered as shared strategic learning as it focuses on what the strategic direction of the network might be.

While the CAD capabilities already existed within Airco and Servco, they needed to be developed and within Drawco. Further, these specialist skills are not stand alone. Airco have, as one respondent put it *'ways of working'* that needed to be adopted by both Servco and Drawco. Consequently, the management and development of these boundary spanning resources and capabilities requires shared learning between the network firms (Amin 2003; Koza and Lewin 1998). The aim of the shared learning was to ensure a current and dynamic understanding of where this expertise resided, what was being utilized and when, and how it might be better utilized and managed between the firms. In this way, some capabilities are developed externally but reside within the network rather than within the traditional boundaries of the core firm, Airco (Araujo et al. 2003).

Shared learning associated with resource utilization and the management of capabilities that have moved beyond the traditional boundaries of the firm presented some challenges for the supply network. As Servco had agreed a flat hour rate of pay for all jobs given to them regardless of complexity, the objective was to task more highly skilled jobs to Servco employees situated on-site at Airco, where they could be managed by Servco as part of an on-site team. Servco would make a loss, as the hourly rate they paid the more highly-skilled engineers was greater than that covered by the flat rate being paid by Airco to Servco. The losses were to be compensated for by the difference in the significantly lower offshore rate Servco paid Drawco. This offered Airco the benefit of increased stability in cost management and Servco the ability to leverage profitability by good resource utilization and management and the potential to develop capabilities offshore through their relationship with Drawco. Thus, less highly-skilled design engineering work (considered to be low risk) would then be completed offshore using the capabilities developed by Drawco (see Figure 3).

Despite the detailed procedures and requirements communicated to Drawco personnel and the training paid for and executed by Airco and Servco, instances of frontline workers from Drawco being unable to complete basic re-engineering CAD tasks presented initial difficulties for the network. This required two types of shared learning, about the specific exchange – individuals tasked with specific jobs at a specific time; about the broader operational implications for the network regarding how such a problem could be avoided in the future. Understanding and managing the offshore resources created, *"a headache"* for the Servco team. This, to a large extent, was not visible to the Airco team but represented a steep *shared learning* curve for Airco, Servco and Drawco. It was only when the respective teams from each firm began to share their learning of the level of development of capabilities at each site, the time and resources needed to leverage CAD capabilities and the specific CAD capabilities that need developing, that the network began to operate effectively. As one interviewee pointed out, while these offshore tasks were relatively low-skilled, they still represented a critical resource (see Dyer and Singh, 1998) and, in this regard, the ability of the network to deliver on these capabilities (both from a technical and commercial perspective) was central to the success of the network. Our findings illustrate that this type of shared operational learning, regarding the resources and capabilities of the network, can greatly increase the chances of network success. That is effective and efficient exploitation of network resources can only be realized when firms capture, share and utilize resource and capability information. One Servco interviewee observed:

> *"…as we do more of this, we'll get better at it. The way I see it is, that we'll add value but managing the resources. As we are able to do this the network will grow and the added value that comes from managing the process increases and increases as the network does."*

This quote represents a firm centric view of managing network resources typically adopted in the literature (see for example, Kogut 2000; Dyer and Singh, 1998). However our findings show that when forced to pursue a shared learning agenda with other networked firms, each firm was able to act in a way that greatly enhanced the successful utilization of resources and capabilities across firm boundaries. Perceived network success increased when firms share learning relating to the state and type of network resources and capabilities (Morris et al.

2006). As the capacity of the network to manage the different work streams developed, so too did the perceived success of the network. When questioned on this topic, interviewees' responses included, *"it's working well", "I'm pretty satisfied with it on the whole"* and *"I think there's great potential".*

Shared Learning about Network Structure

When Airco originally envisaged a supply network that incorporated an offshore supplier they explored the viability of two different network structures. The first would require Airco to source and manage the offshore relationship themselves, while the second would be to use an intermediary who would manage the work flows to the offshore supplier and offer a stable, single flat rate for routine reengineering work. Airco selected the latter. One interviewee explained:

> *"we had seven [companies] selected for this last [supplier selection] stage. We gave the suppliers half a day each to come and tell us how they were going to do this, how they were going to execute the task, what's the transition plan, what risks did they perceive, how they were going to make it happen I think there were seven left on the deck […] we sat and listened and we asked questions […] it became clear that Servco and [one other] were the only two that would meet the commercial criteria as well as the technical ones and then we sat down and we worked through structured negotiation with each. We couldn't get the others to understand the difference between risk and price."*

It was at this stage that the structure of the network, the responsibilities and the likely communication and work flows were explored. The resulting network is represented in Figure 3. In accordance with the traditional supply chain perspective (see Figure 2.), the majority of the communications flows are between Airco and Servco and Servco and Drawco. The structure incorporates an embedded supplier. That is, Servco has been integrated into the mechanisms and procedures of Airco. This draws Drawco into a web-like structure of communication flows. Hence communication links exist, directly between the embedded Airco/Servco teams and Drawco (represented by a solid, two-way arrow in Figure 3), and occasional, infrequent contact directly between Drawco and Airco (represented by a lighter,

dotted line). The boldness of the arrows indicates the direction, strength and frequency of communications within the network. These network communications have developed as the network evolved through its various problem-solving activities. An Airco interviewee explained:

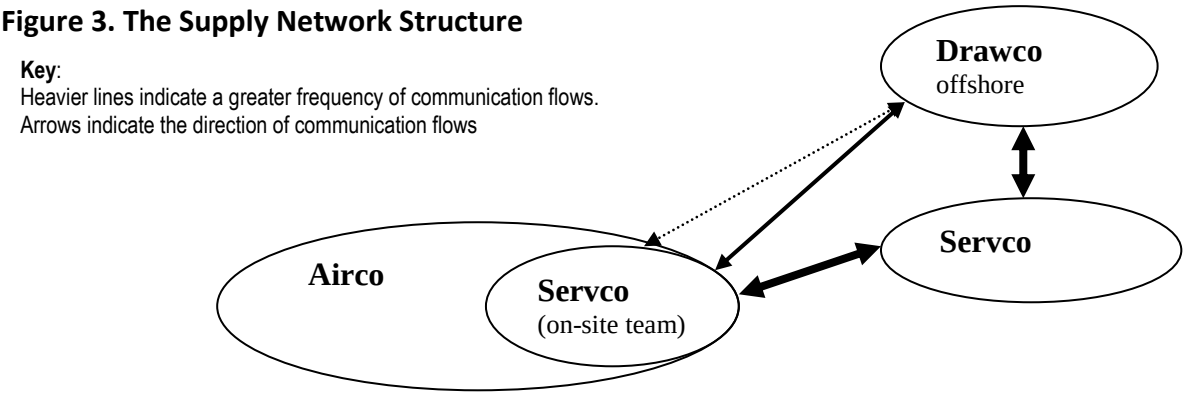
> *"If we're putting this work out, we can't just expect them to pick it up. There has to be a learning curve. And we can help them in that… it's in our interest."*

A Servco interviewee echoed this point:

> "*We've discussed the learning curve [with Airco], and in principle they understand this… they're directly involved with the training and getting our people and where we've needed it, the Drawco people, up to speed…and that's great."*

In this example, the structure of the network is seen to directly impact on the shared learning that is likely to take place. At an operational level, the structure acts as an important part of the mechanism that is likely to facilitate shared learning (Bångens and Araujo 2002; Bessant et al. 2003). In this way, strategic choices about the network structure directly influence the way the network is likely to operate.

Figure 3. The Supply Network Structure



Similarly, the establishment of authority and hierarchy within the network seems to set important boundaries for participants. While the communications web that exists appears to increase the learning capacity of the network, the responsibility for the management of work flows and revenues is clear. As one participant indicated:

"we each have a commercial interest to protect…it's only when we are successful in creating shared objectives that this can work… so we can't just throw all caution to the wind."

This said, the overwhelming consensus among interviewees was one of sharing learning to facilitate the achievement of the shared objectives, and this in turn increases perceived supply network success. This was particularly evident where interviewees had benefited directly from the successful training of network members, through increased satisfaction with the work carried out for them by their supplier. As one interviewee observed:

"You can't just take anybody and sit them at a terminal and say right, go away and use it. You've got to train them in what the system is […] we've done the training in a couple of ways. We've actually taken Servco people and put them on our training courses, we've had people help, actual Airco people in the working environment help, so on the job type training. […] Servco […] then trained their own people, so essentially we've got some key people trained by Airco and then Servco are then training up their own people."

The training programme is akin to Airco taking the role of 'educator' (Morris et al. 2006; Zhao et al. 2004). However, an opportunity for shared learning is created by bringing people together for the training programme. Such incidental learning may cast any individual, from any networked firm, in the role of educator, at any point. In this sense, shared learning is recognised as a dynamic and continuous process that includes both deliberate and accidental learning (Araujo and Novello 2004).

Understanding and developing shared learning about the characteristics of the network and the way it is structured, helps network members to create shared understandings of the processes and mechanisms through which communications and work must flow. This is concordant with earlier findings that suggest that shared operational learning, relating to the relationship context, is necessary for the networked members to perceive and develop a suitable network structure (and vice versa).

Table 3: Examples of 3 Types of Shared Learning across Four Key Areas

Shared Learning Areas	Shared Learning Types		
	Strategic	**Operational**	**Exchange**
Business Relationship	Intention to build long-term relationship	Escalation procedure	Individual working relationships; identification of problem solvers
Value	Relational value: from work packaging & managing work streams	Efficiency; cost saving	On time delivery Quality of work
Boundaries	Identification of the resources the network needs & where they reside	Identification & development of capabilities to access the resources with in the network	Identification of 'opposite number' – inter-firm problem solving,
Network Structure	Shared learning architecture for firms and departments	Knowledge and Information sharing architecture for each work stream	Identification of who works with whom; inter-firm collaborative teams Geographic considerations

In sum, we found evidence of shared learning in each of the four areas identified in the literature; business relationships, value, the boundaries of resources and capabilities and network structure. The findings also revealed three types of shared learning that were evidenced in each of the four areas; shared strategic learning, shared operational learning and shared exchange learning. *Shared strategic learning* enables firms to developing a shared picture of what the network will look like as it develops over time. The second type is *shared operational learning*, where improvement to how things are done through inter-firm routines. This type of shared learning relates joint problem solving (and what needs to be changed) to the identification of who has the authority to effect change. The third type is the *shared exchange learning*, where firms need to share learning regarding how to re-evaluate or renegotiate particular exchanges; how to renegotiate, with whom and when (see Table 3). These three types of shared learning appear to allow the firms to be both reactive and proactive in developing the network. Our findings suggest that different firms in the network are likely to lead these different types of shared learning at different points in time. The question remains as to how firms build shared learning capabilities to capture and react to network learning of different types.

Developing Shared Learning Capabilities

In order for shared learning to take place, it seems logical to argue that learning capabilities must reside within each firm within the network (Cohen and Levinthal 1990). However, this in itself is likely to be insufficient. Our findings suggest that the relationship atmosphere needs to be such that the objective of shared learning between firms is explicit and unequivocal for each of the network members. In the supply network that formed the focus of this study, the objective of shared learning was explicated by the core firm, right from the beginning of their dealings with potential suppliers at the Suppliers' Conference. Interviewees from Servco commented on the shared learning that took place during the set-up of the network, as well as on their motivation to engage in additional shared learning activities (such as training days, when representatives from all firms were present). Interviewees six months into the contract noted the outcomes of the shared learning,

> *"We've achieved…a better understanding of the customer community [within the network]".*

An Airco participant observed how, as their relationships had developed and they had learnt how to overcome difficulties, the network's operation had become *"self-smoothing".* They explained,

> *"it just takes a lot of the hurly-burly out of it and it has worked well from my perception and so we're trying to grow it."*

This is an important observation as it reflects the intra and inter-firm mechanisms that had been put in place as a result of and to facilitate future joint problem solving and shared learning. A further interviewee described the shared learning process, explaining,

> *"it takes a bit of sort of sinking in, and that's in essence what we're doing…and on the whole I think it's working…we'll get better as we do more."*

The evidence suggests that shared experiences generate a sense of positive shared learning within the network, contributing to members' motivation to continue the development of the relationships within the network. The development of the network necessarily involves the leveraging of shared learning capabilities (see Figure 4.).

Mechanisms put in place to capture and manage evolving relationship factors were largely team-based (sometimes intra-firm and sometimes inter-firm) and dependent on the day-to-day communications between individuals. One interviewee explained that the need to develop an open culture between the two firms had resulted in an agreement to offer Servco space on-site at Airco (Figure 3). This principle was taken further as the relationship developed. Within a few days of the start of the contract, the senior line managers from Airco and Servco were physically sitting next to each other in an open-plan office so that they could continuously communicate with each other, face-to-face, and address issues as they arose; providing a mechanism for continuous shared learning. One interviewee observed:

> *"George [Airco] and Bert [Servco] are sitting next to each other and talking each day and there's this self-levelling mechanism going on day-by- day."*

This observation is consistent with two key themes in the literature regarding learning. First, that geography (the physical space) between individuals involved in inter-firm relationship affects how the relationship develops and by implication the shared learning that can take place (Amin 2003; Koza and Lewin 1998). Second, developing both hard mechanisms such as physical location of employees and procedures and routines for information sharing as well as soft 'social' mechanisms facilitates shared learning (Mason and Leek 2008).

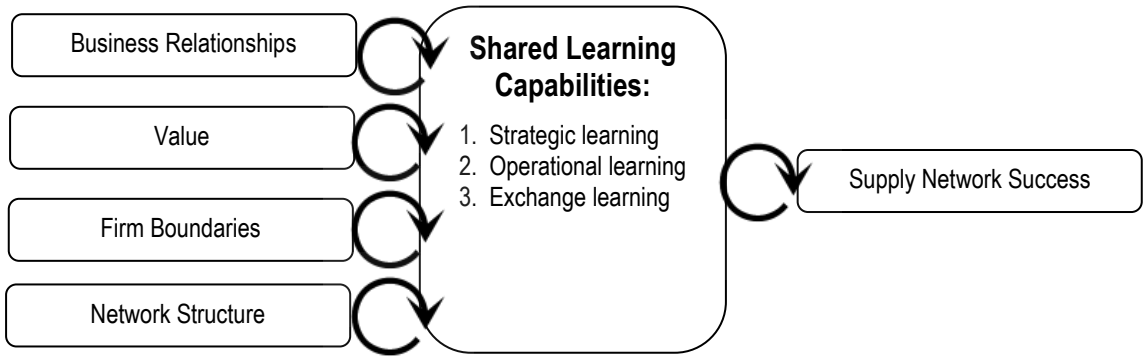
An example of a hard mechanism can be seen in the escalation procedure introduced by the , each organisation in the network. The escalation procedure allowed managers to seek advice easily and instantaneously, escalating the problem up the organisation to their seniors. Escalation usually resulted in changes to routine procedures relating to the specific problem being escalated. Thes changes where focused around the collection and dissemination information at the right time, in the right format, to front-line managers and workers in the supply network to generate streams of continuous shared learning. One interviewee explained:

> *"...There was one incident where we got the delivery dates wrong. We've now developed a standard procedure and supporting documentations to provide everyone working on that job with the transparency they need…."*

There were understandable teething problems with directing and completing work streams, with interviewees observing that the process of establishing such procedures often facilitated

frank exchanges of views. However, there was also a consensus amongst participants that such procedures had come to represent the openness and trust that the parties had endeavoured to create. In this sense, the inter-firm routines that facilitate communication and knowledge sharing provide the means for shared learning. This is consistent with Howard-Grenville's (2005) discussion of flexible routines but additionally, recognises that such routines spread across firm boundaries (also see, Araujo et al. 2003; Araujo and Novello 2004). Shared learning results in improvements to such routines that support the development of the network. Our findings differs from previous work on shared learning in that it emphasises the development of shared learning capabilities through the inter-firm problem solving mechanisms rather than through teacher/learner environments where the core firm is framed as the 'educator' of suppliers (see for example, Morris et al. 2006; Spekman et al. 2002; Zhao et al. 2004).

Figure 4. Shared Learning Loops in Supply Network



Further, findings suggest that the inter-firm learning loops (c.f. Argyris 1977) associated with the four areas of shared learning discussed in the present paper, feedback to help develop the shared learning capabilities of the networked firms. In other words, as the amount of shared learning increases, so the mechanisms and the shared learning capabilities of the networked firms improve. The networked firms learn more, together, about the best ways to do things (see Figure 4).

Strategic, Operational and Exchange Shared Learning Capabilities

Based on the evidence presented above, we argue that three types of shared learning are identified in across the four areas of learning discussed above; shared strategic learning, shared operational learning and shared exchange learning. S*hared strategic learning* was found to facilitate the development of a shared understanding between networked firms regarding the members and their roles within the supply network. In this way, as each firm evolves within the network (as because of the network), shared strategic learning can be used to create and revised shared objectives of the network. Indeed, as Möller et al. (2003) explain, shared or overlapping visions of the network (Möller et al. 2005; Möller and Törrönen 2003b) will influence the type strategic business network or *value net* that evolves. By making firms aware of the importance of the strategic direction of the network, firms can develop routines to capture shared learning what that strategic direction might be and how it might be realised.

S*hared operational learning* is concerned with how improvements are made to the way things are done. In this regard shared operational learning can help firms identify and develop intra and inter-firm routines that facilitate network success (Bessant et al. 2003; Gallivan 2001b). This is concordant with the findings of Howard-Grenville (2005) and Zollo and Winters (2002) who suggest that intra-firm flexible routines are manifestations of organisational learning. Additionally, the research findings presented in this paper suggest that inter-firm routines developed from shared operational learning are likely to lead to perceived network success. This has implications for the way firms identify and understand their network relationships in terms of joint problem solving across firm boundaries. Shared operational learning integrates joint problem solving (and what needs to be changed) with the identification of individuals that have the authority to effect change.

The third type of shared learning identified in this study is *shared exchange learning*, where firms develop shared learning regarding how to re-evaluate or renegotiate particular exchanges; how to renegotiate, with whom and when. This third type of shared learning emphasises the importance of 'context' to learning (Lane et al. 2001); emphasising the link between the immediate value net and the wider business network within which the value net

is embedded. The data show that a shared understanding of what environmental factors have changed and how these might affect the agreement or practices of the value net as it currently stands, will affect the openness of the networked firms to change. In this way, shared exchange learning impacts directly on perceived network success (Alexsson and Easton 1992; Gallivan 2001b; Möller and Halinen 1999).

CONCLUSIONS

Before concluding this study, it is important to note that our findings are based on a single case study and therefore, by definition, meet the criteria of credibility (a measure of the degree to which findings across cases fit the data) and transferability (the extent to which the findings can be replicated across cases) to some extent. Additional research, across multiple case studies is needed in order to verify the interpretive approach applied in this paper.

Indeed, the key objectives of this paper were threefold; to examine the types of shared learning that occurred between three firms working together to develop a new supply network; to explore the impact of shared learning on network success and to examine how firms developed shared learning capabilities. The analytical framework (Figure 1) that emerged from the literature review was used to interrogate the data for evidence of shared learning in four key areas: (i) the business relationship, ii) the value, (iii) the firm's ability to effectively utilize resources and capabilities distributed across firm boundaries but within the network and, (iv) its ability to shape the network structure to use this structure to create a shared understanding of how the network works. Patterns emerged from the data that suggested three distinct types of shared learning that were common to all fours areas of shared learning identified; strategic shared learning; operational shared learning and exchange shared learning. In the following section, the individual areas of shared learning and their influence on perceived network success are discussed. Next the three types of shared learning explicated. Finally, the discussion focuses on how firms might develop their shared learning capabilities in ways that are likely to leverage network success. The section concludes with considerations for future research.

First, the research findings presented in this paper suggest that shared learning about business relationships and specifically about the relationship atmosphere (trust, commitment

and co-operation) plays an important role in perceived network success (Gallivan 2001b). This is in keeping with other research in the field that suggests that relationships atmosphere affects the way business relationships develop and prosper (Sánchez and Pérez 2003). However, this research presents some of the first empirical findings to show how shared learning about the nature and expectations of the different relationship atmosphere dimensions (trust, commitment, co-operation) may influence supply network success. That is, when firms are explicit about the need for shared learning, trust, co-operation and commitment are more easily developed (Koput et al. 1996; Kwon and Suh 2004; Morgan and Hunt 1994). In a cyclical process, the co-operation and commitment that is then incorporated in to practices and inter-firm routines, in turn develops each firm's shared learning capabilities.

Second, the research findings suggest that the network can only react to changes in value over time if shared learning occurs. In line with the observations of Möller et al. (2005), the Airco case illustrates how a core firm's focus on value shifts from efficiency value to relational value, over time. To facilitate this, Airco had to make explicit the objective to develop shared learning in ways which were likely to result in a shift in value over time, at the beginning of the network development process. This, in conjunction with the shared learning about the relationship atmosphere, paved the way for further share learning regarding exactly what those changes might be – whether strategic, operational or regarding specific business exchanges. In this sense, our findings are consistent with the observations of Flint and Mentzer (2000) who claim that firms continuously seek to identify and understand the changes in value customers wish to see being offered. However, our findings also suggest that shared learning is likely to have a significant impact on the ability of the networked firms to do this. In this regard, shared learning allows customers to better understand what they want, and suppliers to better understand the capabilities needed to satisfy customers. Similarly, shared learning also allows firms to work out ways of putting value changes into practice (*c.f.* Flint et al., 2002; Richins, 1994).

Third, the findings suggest that the shared learning that creates visibility and a shared understanding within the network regarding where resources and capabilities are located, how they might be accessed, by whom and to what effect, creates opportunities for new and

novel ways of utilizing the resources to maximise the effectiveness of the network. In this way, shared learning about the boundaries between resources (and how they might be crossed) allows firms to think flexibly and innovatively about how they might best facilitate value creation across firm boundaries, creating bridges for the development of the network (Araujo et al. 2003; Möller and Törrönen 2003b).

Fourth, the findings suggest that shared learning about network structure allows firms to develop an appropriate architecture to support the mechanisms, process and routines that allow inter-firm and inter-functional co-ordination for a particular network development effort. In this way, as firms learn more about how to manage and access geographically distributed capabilities and resources, they can then use shared learning to adapt network structures to support effective networks in a specific context. This finding is concurrent with Lane *et al.'s* (2001) observation that learning varies depending on the learning context and suggest that shared learning presents a new context that allows for the adaptation and application of multiple knowledge bases.

In line with these theoretical contributions, we also argue that developing three types of shared learning, strategic, operational and exchange, would allow firms to be both reactive and proactive in developing their supply network. Indeed, the findings of this study suggest that different firms in the network are likely to lead these different types of shared learning at different points in time. Similarly, firms involved the development and the management of supply networks should consider investing in shared learning based on the changing nature of the network around these three areas. While it is important to develop shared strategic learning capabilities when the network is formed, it is no less imperative to ensure that members of network develop shared exchange learning capabilities in the beginning in order to re-negotiate the changing nature of value created within the network as context and conditions change. Furthermore, as context changes, network partners required highly developed shared operational learning capabilities to jointly carry out problem solving activities to re-align network goals and objectives with the expected value of the network.

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