Case study

Supply chain collaboration: capabilities for continuous innovation

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Abstract
Purpose – The purpose of this study is to investigate how collaborative relationships enhance continuous innovation in the supply chain using case studies.
Design/methodology/approach – The data were collected from semi-structured interviews with 23 managers in ten case studies. The main intention was to comprehend how these firms engaged in collaborative relationships and their importance for successful innovation. The study adopted a qualitative approach to investigating these factors.
Findings – The findings demonstrate how differing relationships can impact on the operation of firms and their capacities to innovate. The ability to work together with partners has enabled firms to integrate and link operations for increased effectiveness as well as embark on both radical and incremental innovation.
Research limitations/implications – The research into the initiatives and strategies for collaboration was essentially exploratory. A qualitative approach using case studies acknowledged that the responses from managers were difficult to quantify or gauge the extent of these factors.
Practical implications – The findings have shown various methods where firms integrated with customers and suppliers in the supply chain. This was evident in the views of managers across all the firms examined, supporting the importance of collaboration and efficient allocation of resources throughout the supply chain. They were able to set procedures in their dealings with partners, sharing knowledge and processes, and subsequently joint-planning and investing with them for better operations, systems and processes in the supply chain.
Originality/value – The case studies serve as examples for managers in logistics organisation who are contemplating strategies and issues on collaborative relationships. The study provides important lessons on how such relationships can impact on the operation of firms and their capability to innovate.

Keywords Supply chain management, Innovation, Relationship marketing

Paper type Case study

1. Introduction

As companies move towards increased global competitiveness, supply chains face new issues and challenges. These include increasing demands to reduce costs, increase quality, improve customer service and ensure continuity of supply (Goebel *et al.*, 2003; Pearson *et al.*, 1996). The supply chain environment is characterised by globalisation, increased customer responsiveness, channel integration and advances in information and communication technologies (ICT). Organisations in supply chains are compelled to restructure and re-engineer relentlessly to increase their effectiveness and satisfy customers. This realisation requires firms to look beyond their organisational boundaries and evaluate how the resources and capabilities of suppliers and customers can be utilised to create exceptional value.

Businesses with a supply chain strategy require integration, cooperation and collaboration, which in turn demand aligned objectives, open communication, sharing of resources, risks and rewards. Firms build capabilities by reflecting on the value of the work performed and applying integrative principles that allow multiple processes to be synchronised (Soosay and Sloan, 2005). Consequently, part of this process involves supplier evaluation and building relationships with suppliers, which changes financial performance (Carr and Pearson, 1999). Similarly, inter-organisational relationships have become increasingly important in ensuring business success and a competitive advantage. The antecedent of collaboration suggests that competencies are formed when there is leverage from the skills and expertise of each partner

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(Vlachopoulou *et al.*, 2002). Collaboration in supply chains is important for innovation as partners realise the various benefits of innovation such as high quality, lower costs, more timely delivery, efficient operations and effective coordination of activities.

The study examines the strategies adopted by ten logistics firms engaging in collaborative relationships as a means of developing innovative capabilities. It investigates the forms of collaboration evident in these firms, their strategies and how these have facilitated innovation. The findings show that the ability to work together with partners has enabled firms to both integrate and link operations for increased effectiveness.

2. Literature review

2.1 Importance of collaboration

Collaboration can best be described as an inter-organisational relationship type in which the participating parties agree to invest resources, mutually achieve goals, share information, (Ring and Van de Ven, 1994; Gray and Hay, 1986; Stank *et al.*, 1999; Barrat and Oliveira, 2001) resources, rewards (Phillips *et al.*, 2000) and responsibilities as well as jointly make decisions and solve problems (Spekman *et al.*, 1998). Collaboration is based on mutual trust, openness, shared risk and shared rewards that yield a competitive advantage, resulting in better performance than it would be without the collaboration (Hogarth-Scott, 1999). It implies cooperation and some form of alliance between two or more organisations. These are formed for sharing the costs of large investments, pooling and spreading of risk, and access to complementary resources. Similarly, firms establish close, long-term working relationships with suppliers and customers who depend on one another for much of their business, developing interactive relationships with partners who share information freely, work together when trying to solve common problems when designing new products, who jointly plan for the future, and who make their success inter-dependent (Spekman *et al.*, 1998). More and more companies are collaborating in the supply chain because of market diversity, competitive pricing and shorter product life cycles.

Malhotra *et al.* (2005) maintain that supply chain partners are engaging in interlinked processes that enable rich information sharing and building information technology infrastructures that allow the processing of information obtained from their partners to create new knowledge. Their study showed how various inter-organisational relationships contributed to knowledge creation capabilities in firms (Malhotra *et al.*, 2005). Similarly, Bowersox (1990) also argues that the benefits of collaboration include revenue enhancements, cost reductions and increased operational flexibility to cope with high demand uncertainties (Fisher, 1997). Both practitioners and academics are increasingly interested in supply chain collaboration (Horvath, 2001).

Collaboration implies working more closely with a shared vision and trust (Lee and Billington, 1992). Furthermore, sharing information, joint planning, joint problem solving and joint decision-making are some of the components of collaboration discussed in the literature. Soonhong *et al.* (2005) revealed that sharing periodical information either formally or informally is regarded as the essential ingredient for collaborative partners to ease the flow of products, services and feedback from customers. Likewise, joint planning which is related to sharing information is needed to co-align processes and capacities of participants in collaborative efforts. It is carried out by cross-functional and cross-organisational groups who come together regularly to address different operational issues. This was found to reduce and overcome inter-company barriers.

2.2 Types of collaboration

Various authors refer to inter-organisational collaboration as joint ventures (Doz and Hamel, 1998), networks (Jones *et al.*, 1997) inter-organisational alliances (Dickson and Weaver, 1997), strategic alliances (Vyas *et al.*, 1995), consortia (Aldrich and Sasaki, 1995), partnerships and inter-firm cooperation. For firms seeking to innovate within their supply chain it is important that in entering into relationships, the firms that need to innovate ensure the relationship allows them to acquire additional knowledge and build capabilities that add to their innovative capacity.

2.2.1 Strategic alliances

Although there is a large and growing volume of literature on strategic alliances, the research is fragmented and the definitions vary (Vyas *et al.*, 1995). Strategic alliances are broadly viewed as a particular mode of inter-firm relationships intended to be long-term, in which two or more partners share resources, knowledge and capabilities with the objective of enhancing the competitive position of each partner (Spekman and Sawhney, 1990). Lorange and Roos (1991) assert that strategic alliances can be used to quickly disseminate new technologies, to penetrate new markets, avoid governmental controls, and to quickly gain knowledge from industry's leaders.

2.2.2 Joint ventures

Joint ventures are traditionally used to develop new market opportunities (Collins and Doorley, 1991) in which the firm, looking for a new market often provides goods or services, marketing strategies and financial capability whilst the local party contributes with market knowledge, labour and access to public and private sector networks. Nevertheless, participants in joint ventures are increasingly entering into this type of arrangement to collaborate at a single point in the supply chain to ensure economies of scale in manufacturing or distribution (Hennart, 1988).

2.2.3 Cooperative arrangements

Many organisations seek cooperative arrangements with other organisations in response to fast changing technology, a competitive environment, a widening of sourcing capabilities and organisational strategies (Ring and Van De Ven, 1992). The rationale behind these cooperative efforts is focused on the collaboration and sharing of resources, either tangible or intangible as well as in pursuit of business goals (i.e. competitive advantage, survival and efficiency) through redesigning of process and products (Cousins, 2002). The objective of cooperative efforts is to shift from merely contractual arrangements to more trusting relationships with parties (Kumar, 1996). This shift encourages the parties (i.e. manufacturers and suppliers) to rely on each other to be helpful and build trust by taking a long-term view of the relationships and dealing constructively with the possible conflicts that arise (Hines, 1995). The complexity sometimes makes it difficult to distinguish the characteristics, features and limitations of each of the forms of inter-firm cooperation. Therefore, it is important to gain an understanding of the significant differences among the cooperative relationships

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and the conditions, where they can be formed to ensure effectiveness.

2.2.4 Virtual collaboration
Virtual integration refers to a temporary tightly coupled collaboration effort between independent entities (suppliers, customers, competitors) that are linked by telecommunication technology. This technology facilitates the sharing of costs, skills and access to global markets (Byrne, 1993). Some of the attributes discussed in the literature on virtual collaboration include the use of information networks to maintain firstly the connectivity of the participants during the relationship, and secondly dissolution of the network once the companies have met the specific market opportunity. Trust is an important factor that allows participants to rely on each other and achieve excellence as parties contribute with the best of their capabilities and boundary-less communication (Byrne, 1993; Nikolenko and Kleiner, 1996). Malhotra *et al.* (2001) highlighted how a unique type of virtual team deploying a computer-mediated collaborative technology was able to develop a radical new product.

2.2.5 Vertical, horizontal and lateral integration
Barratt (2004) and Simatupang and Sridharan (2002) proposed horizontal, vertical and lateral integration as forms of supply chain collaboration strategies. Horizontal integration occurs when two or more unrelated or competing organisations (at the same level of the supply chain) producing similar products or different components of one product, form a cooperative association to share resources such as warehouse space and manufacturing capacity (Simatupang and Sridharan, 2002). These have resulted in:

- reduced logistics and administration costs for individual organisations;
- improved procurement terms through group purchasing power;
- lowering of the fixed costs of indirect labour (e.g. marketing, quality assurance, technical, sales and financial departments); and
- improved access to markets because continuity of supply can be assured.

Horizontal integration may overcome financial barriers to trade (Manning and Baines, 2004).

Vertical integration takes place at different levels of the supply chain. The integration between producer and the distributor enables better physical and information flows, improvements in the trade-off between level of service and average stock, more economical inventory management control and better transportation systems (Caputo and Mininno, 1996). Lateral collaboration combines the benefits and sharing capabilities of both vertical and horizontal integration. Integrated logistics and inter-modal transport are examples of an application of lateral integration that aims at synchronising carriers and shippers of multifirms in a seamless effective freight transport network (Simatupang and Sridharan, 2002).

2.3 Collaboration and innovation

Collaborations are useful if the parties want to pursue innovation. Strategic alliances are beneficial to those seeking technological innovation by complementing resources of members who are at the same level of the value chain (horizontal integration) or gaining knowledge from key sources either upstream or downstream of the supply chain (vertical integration) (Lamming, 1993; Spekman *et al.*, 1998). However, organisations pursuing discontinuous innovation (which take place when a new or existing player in an industry changes the rules in an unusual way) might consider participating in collaborative dalliances (Phillips *et al.*, 2006). In collaborative dalliances, supply chain partners test radical ideas outside their normal relationships.

The literature supports that collaboration has links to innovations in the supply chain. Corsten and Felde (2005) posit that supplier collaboration has positive effects on buyer performance. Suppliers may contribute to firm innovation by performing R&D of its own and thus absorbing some of the R&D costs the buying firm would have to normally incur. Moreover, suppliers often have valuable knowledge of production and fulfilment processes that influence a firm's performance. Finally, suppliers can transfer ideas for better products and features that could enable the buying firm to enhance products (Corsten and Felde, 2005). Supplier collaboration facilitates the sharing of tacit and explicit knowledge and enhances knowledge creation and innovation spillovers from the supplier (Inkpen, 1996). Collaboration reduces purchasing costs by lowering contracting costs, frequent communication, improved coordination, and acts as a joint approach to operational problem-solving (Cannon and Homburg, 2001).

Another study by Simatupang and Sridharan (2005) found that supply chain members who had higher levels of collaboration practices were able to achieve better operational performance and innovation activities. Similarly, Sahay (2003) also argued that collaboration enables value creation in supply chain activities. Some of these activities are cited in Lapide (1999), where there are three types of collaboration in the supply chain that can enhance innovation. The capacity to innovate can be enhanced through incremental and radical innovations. These innovations can be in various logistics activities such as new product development, process improvements, service delivery, inventory management, technology transfer and capacity planning. As Swink (2006, p. 37) argues, "the organisation's ability to collaborate is key to its innovative success" and upon recognising this, many firms are implementing new organisational structures, communication technologies and incentive systems in order to grow their collaborative potential in important areas. The key to successful supply chain management is seeking improved inter-organisational relationships that can enhance innovation. The literature clearly demonstrates the complexity and importance of relationships and this paper investigates the collaboration activities of ten firms in Australia and Singapore, and how they contribute to continuous innovation activities.

3. Conceptual framework

This paper forms part of a larger study on continuous innovation in logistics. Continuous innovation is a process of successively applying new ideas and methods of improvement in the organisation, requiring a methodical, programmed, incremental or radical approach throughout the company involving all employees in the organisation. It is the capacity for "timely responsiveness and rapid product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competencies" (Teece and Pisano, 1994; cited in Bessant,

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2003, p. 2). Others see that continuous innovation requires that organisations have the capabilities to innovate both radically and incrementally while at the same time focusing on operational effectiveness (Boer, 2001). It involves ongoing interactions between operations, incremental improvement, learning and radical innovation aimed at effectively combining operational effectiveness and strategic flexibility, exploitation and exploration of resources (Soosay, 2005). In developing a continuous innovation model for logistics services (see Figure 1), it was reasoned that firm capabilities would be a key requirement for innovation. According to Bowersox *et al.* (1999), logistics firm capabilities reflect the value in applying integrative principles that allow multiple processes to be synchronised.

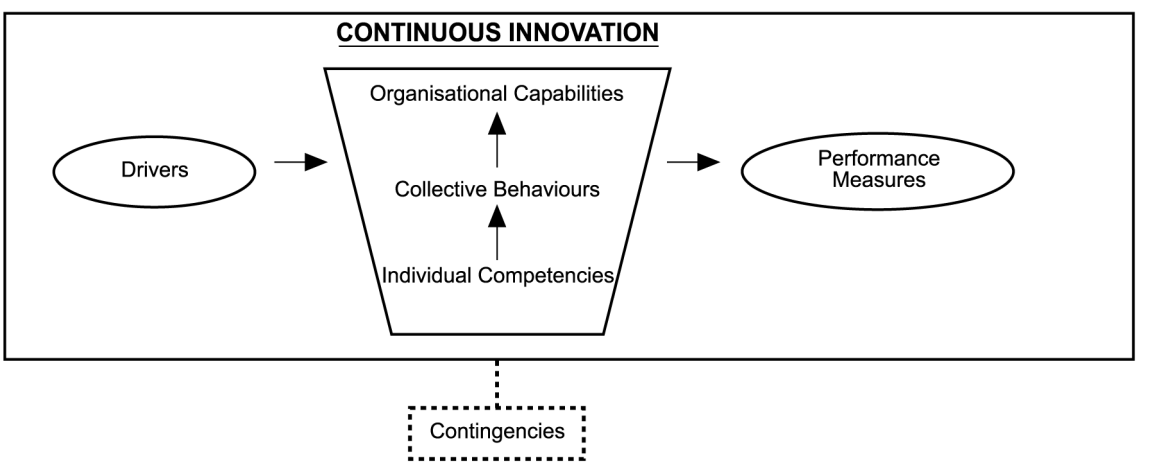
The variables are pertinent in identifying actions that foster and sustain innovative activities. These variables are applied to varying extents in the processes for warehousing and distribution. The broader study has focused on individual competencies that lead to collective behaviours, which in turn lead to firm-based capabilities. It also looked at drivers enabling firms to improve and innovate. Contingencies can be considered as both external and internal variables to the company. External variables are related to the environment in which the company is operating, whilst the internal variables relate to the company's characteristics. They also affect innovative efforts of the company and have been investigated. In the larger study, the model has identified capabilities such as customer satisfaction, operational integration, supply chain collaboration, technology management, change management and performance measurement as important for continuous innovation in logistic firms. However this paper only focuses on one aspect of the capabilities, i.e. supply chain collaboration. The research questions addressed in this paper are:

- What forms of collaboration were evident in the firms studied?
- What outcomes are delivered through collaboration?
- What capabilities support continuous innovation?

4. Research methodology

The research consisted of multiple qualitative case studies, given that little research has been done on the effects of collaboration in continuous innovation in logistics. Case study research is an empirical inquiry that allows for a contemporary phenomenon to be investigated within its real life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2003). Research conducted within the qualitative paradigm is characterised by its commitment to collecting data from the context in which social phenomena naturally occur and generate an understanding that is grounded in the perspectives of research participants (Bryman, 1988; Lofland, 1971; Marshall and Rossman, 1995; Miles and Huberman, 1984). This research aims to build an understanding of the factors and examined the relationships using cross-case analysis. This aligns with Eisenhardt's (1989) description of the recursive analysis and theory building process. As part of the cross-case analysis, a comparison with the literature occurs and as Eisenhardt (1989) noted, the purpose of this process is to build confidence in the findings by providing explanations from the literature and where relevant, identify and discuss conflicting literature in order to refine theory. A qualitative approach according to Bygrave (1989) encourages the development of practical and theoretical understanding, as well as the generation of new and alternative theories or concepts. In this case, the data were collected from participants in their working environment using semi-structured interviews. This method allowed the capture of data rich in detail about the research problem, and gave the researchers the flexibility to explore additional issues raised by participants. The use of multiple cases also contributed to the reliability and consequent generalisability of the findings (Brannick and Roche, 1997). Apart from their exploratory value, case studies provide a platform for theory building (Eisenhardt, 1989) and are useful for identifying key events and actors, linking them to a causal chain. Deciding the number of cases depends on the research aims and the point at which theoretical saturations is reached. According to Miles and Huberman (1984), a multiple case study provides greater explanatory power than a single case study, since by comparing sites or cases, one can establish the range of generality of a finding or explanation, and, at the same time, pin down the conditions under which that finding will occur. Yin (2003) also favours the use of multiple cases with the argument that the evidence from multiple cases is often

Figure 1 The theoretical model adopted for the study



considered more compelling, and the overall study is therefore regarded as being more robust.

A total of 23 interviews were conducted in ten logistics organisations with senior and middle managers. The organisations were selected using purposive sampling. A summary of the ten firms is provided in Table I. Purposive or theoretical sampling offers researchers a degree of control rather than being at the mercy of any selection bias inherent in pre-existing groups (Mays and Pope, 1995). This was then followed by a cross-site analysis. The cross-site analysis consisted of the analysis of each single question such that the results obtained from the interviews of each of the organisations can be compared and contrasted. Interviews were taped, transcribed and emerging themes were clustered together using Nvivo software. Data analysis involving data reduction, display and verification was ongoing throughout the analysis and the objective was to reduce the information without significant loss of meaning (Punch, 1998). The main intention was to comprehend how these firms engaged in collaborative relationships and their importance for successful innovation. The ten firms have been identified as Firms A-J. The interviewees in all organisations confirmed analyses derived from the data. This provides a reasonable degree of internal validity. However, the external validity of the findings is relatively low since only ten organisations were studied.

5. Findings

The findings can be classified into six initiatives evident in the firms studied. These are illustrated as follows.

5.1 Maintaining standardised operations

The firms studied practised standardised operations with most customers and suppliers. The managers maintained these through documentation or standard operating procedures (SOP). Regular meetings were held with suppliers and customers to update or reflect changes in the documentation on environmental or technological

Table I Overview of firms studied

Firm	No. of employees	Organisation structure	Sales (A$ millions)	Age of firm (years)	Main functions	Main products	Managers interviewed
A	36	Part of a large company group	80	25	Warehousing and distribution (of finished goods)	Hardware, PCs and appliances	General Manager, Administration Manager, Human Resource Manager
B	200	Part of a large company group	30	5	Assembling, warehousing and distribution (of finished goods)	Automobiles	Regional Manager, Human Resource Manager, Quality Assessor
C	470	Subsidiary of a multinational corporation	350	50	Warehousing, distribution, import, export (of raw materials and finished goods)	Refrigerated foods	Director of Operations, Australasia; Regional Manager, Australia; Director of IT, Australasia
D	11	Single privately owned business	4.2 (est.)	0.5	Warehousing, distribution, import, export (of raw materials and finished goods)	Varied	General Manager
E	100	Single privately owned business	230	6	Warehousing and distribution (of finished goods)	Refrigerated foods	Operations Manager, Human Resource Manager, Warehouse Manager
F	150	Subsidiary of a multinational corporation	234	5	Assembling, warehousing and distribution (of finished goods)	Varied	Managing Director, Operations Manager, Human Resource Manager
G	250	Single company in public ownership	25	23	Manufacturing, assembling, warehousing and distribution (of raw materials)	Electrical, fibre optic and computer peripherals	Logistics and Warehouse Manager, Production Manager
H	200	Subsidiary of a multinational corporation	158	24	Warehousing and distribution (of raw materials and finished goods)	Varied	General Manager
I	320	Single privately owned business	320	6	Warehousing and distribution (of raw materials and finished goods)	Varied	Assistant Manager, Regional Operations – IT Manager
J	115	Subsidiary of a multinational corporation	68.9	27	Warehousing and distribution (of finished goods)	Rolling bearings and seals	Managing Director, Logistics Manager

improvements. Firms F and H faced problems with the smaller customers who needed modifications regularly, depending on their production type. These smaller customers have difficulty interfacing with their operating systems. There was variation for reporting, invoicing, closing of accounts, and special personnel involved. The warehouse manager in Firm E expressed concern that smaller customers' agreements were mainly verbal and inconsistent over time.

Firm A maintained simple processes for their customers. However, they were pressured to stay abreast of large suppliers in terms of technology. Firm B, on the other hand, being in the automotive industry, maintained standardised operations with all of its customers and suppliers through computerised systems. Firm E was in the refrigeration business and adopted a different set of accredited operations known as Hazardous Analysis of Critical and Control Points (HACCP). The operations manager stated that having HACCP certification assures and retains customers. All operations are computer-coded and these would indicate if their products were working within a specific temperature range (i.e. -20 to -10°C). The HACCP certification also allowed the firm to export to various countries.

5.2 Joint planning with customers and suppliers

All firms (except Firm E) had some form of joint planning with their customers and suppliers in marketing and inventory management. They were able to gauge sales forecasts, plan on new product launches and ensure appropriate stock levels. Firms G and J, which were involved in manufacturing, planned for production schedules and forecasts. The production managers in these firms mentioned that they joint planned with suppliers in using material requirements planning (MRP), vendor managed inventory (VMI) and with customers on the marketing of new products and just-in-time (JIT) delivery. By joint planning with customers, firms could design ways to carry out operations with minimum interference, and effectively manage inventory at the distribution centre by making provisions for huge volumes or excess capacity storage. There were joint plans in Firms B, C and D with suppliers in setting benchmarks and key performance indicators (KPI). The operations manager in Firm F described plans with suppliers on interfacing with each other and how to increase efficiencies.

Nine out of the ten firms conducted joint planning with partners in the supply chain, and the managers supported this with examples. The literature also viewed that cooperative planning between partners facilitated better matching of supply and demand, and inventory levels. The estimated level of stock planned can be used to guide business operations and prevent the cost of holding too much inventory (Stank *et al.*, 1999). The companies need to identify problem areas, or areas where they seek improvements, and clearly map out what they want to achieve through collaborative planning (White, 1999).

5.3 Sharing knowledge with customers and suppliers

All the firms except for Firm H shared knowledge with their suppliers and customers to various extents. In Firm A, the exchange of knowledge was with selected key suppliers only. They included aspects of promotional events, buying group seminars and conferences. Firm A was also able to access supplier databases. In turn, they shared strategic information with suppliers on customer orders, to let them know how much stock to produce. Firm B exchanged information on their documented processes, which included installation notes, rates chargeable for fitting accessories to vehicles (such as installing a CD player, various models of stereo system, or an aerial on the vehicle). Firm C adopted a Balanced Scorecard approach and shared knowledge, which entailed information from the company vision, strategies, critical success factors and measures on how to achieve them.

Firm E provided smaller customers with advice and assistance in transportation, despatch issues and technology application. The operations manager in Firm F stated that information was made available only to subscribed customers and suppliers with special access to their website. The website contained information relating to their distribution centre management system, inventory system, and operations. Strategic and financial information was limited to published material in annual reports, press conferences, magazines and newsletters. The managing director at Firm J reported that certain strategic information was shared only at annual conventions, conferences, and seminars, where they were invited to present and impart their experiences with other organisations.

The findings show that some firms were more protective of their knowledge based on how much they shared. Each had its own strategies and reasons for the exchange of information. Frankel *et al.* (2002) state that the keys to collaboration are enhancing communication and sharing information. However, readily sharing information is not an easy proposition for most people or firms. Traditionally, knowledge has been a source of power in the supply chain and as such, it is often guarded and protected (Frankel *et al.*, 2002). As a result, a high degree of trust is required in sharing knowledge. Nonetheless, sharing knowledge and information builds innovation capabilities by increasing the capacity of firms to learn from one another.

5.4 Sharing processes with customers and suppliers

The findings showed that only Firms A, C, E, I shared processes, but only to a small extent. Firm A provided training for its customers to enable them to gain a better understanding of what their requirements are, and to use the right terminology in future orders. Firm C shared processes on purchasing and some management aspects, while Firm E engaged in quality management process and HACCP with their suppliers. Firm I, alternatively, collaborated with partners on recycling. The IT manager explained the incentives where customers obtain discounts on the future service charges for pallet returns. Other incentives were given to customers in reverse logistics such as the refurbishment and minor rework of damaged products. This was to get them back into saleable condition. These schemes enabled customers to be more proactive in observing policies and procedures that they have set, as explained by the managers.

The other six firms did not share processes because all the operations and functions were clearly defined. Processes were clear-cut and contractually agreed at the beginning such that there was no overlap of responsibilities. These managers gave other instances where they shared costs such as in Firm H, and sharing information on how to process stock orders and run operations as in Firm J. The findings show that there was little sharing of processes in these firms. This is also stated by McAdam and McCormack (2001) in their study. They

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discovered that there is little evidence of organisations actually exploiting the integration of business processes in their supply chains. They contend that even other authors did not write much about this issue. Business process management techniques were applied to a single firm, although the concept was not bound by company limits, while supply chain research tended to focus on the relationships between organisations (McAdam and McCormack, 2001). They further concluded that to have process integration throughout the supply chain, there cannot be a fixed boundary between partners. The supply chain must be managed as a single organisation for barriers to inter-organisational learning and innovation to be broken down.

5.5 Joint investing with customers and suppliers

The findings show that half the firms studied joint invested with suppliers and customers. The types of investments are illustrated in Table II. The highest areas of investments with suppliers and customers were in technology and capital investment. Some firms saw the need to keep abreast with technology for better communication, and coordination of processes. Interfacing with partners in the supply chain maximised efficiency and sped up processes. Firm A had jointly invested with some suppliers in the installation of an electronic data interchange (EDI). Other firms maintained the importance of technology and expertise in ICT. Firm I invested in their customers by financing the installation of new software (SAP) and then amortising it over the contractual period, so that customers could pay back in instalments. Capital investment was evident in Firms B, C and I, and included long-term projects, equipment and storage facilities.

Firm A jointly invested in marketing projects. They rendered assistance to suppliers for advertising building materials and new product introduction. Only Firms G and J, which dealt with production and manufacturing, had some joint investment in R&D. In both these firms, the managers mentioned the benefits of sharing costs with some customers on innovation projects, new product development and production methods. Firm G invested with some customers on VMI. This method offered many benefits including substantial cost savings due to more efficient control of inventory. In addition, it provides extensive screen enquiry and reporting functions to give the detailed, current information about quantities, prices, item movements and sales history that are crucial for effective inventory management. Many firms share costs in the area of ICT for improving processes and communication between firms. Westervelt (2002) even states that in the logistics industry, there has been massive joint investment in the area of IT over the past few years. However the findings show that even in a small sample, innovative collaboration is poorly developed, with only 20 percent of firms investing in R&D. All the firms studied generally appeared to be risk averse and this will reduce the level of radical innovations.

Table II Areas of joint investment by selected firms

Areas of investment	Percentage of firms
Technology	30
Capital investment	30
Research and development	20
Vendor management inventory	10
Marketing	10

5.6 Synchronising and interfacing with customers and suppliers

All firms (except Firm D) had some form of operational synchronisation and interface with their suppliers and customers. Firm D still maintained the traditional method of receiving orders through telephone and facsimile and administered paperwork. The other nine firms linked through ICT to operate and communicate via web-based intranet, internet, or EDI. However not all customers or suppliers were able to interface this way. The information for those smaller firms had to be keyed in manually. Managers in Firm J explained the need to use two different software packages for different processes. For instance, customer service operations deployed an in-house system. It was different for the distribution system, warehouse management system, factory manufacturing planning system and transportation system, which used another system and was linked to supply chain partners. The logistics manager expressed the view that a few of their international customers adopted different and incompatible systems. As a result they had to rely on other forms of data exchange such as facsimiles. Apparently, this was manageable and not considered a big issue, as the number was small. Again synchronising and improving the interfaces between partners in supply chains removes barriers to communication and learning, and enhances the opportunity to innovate either individually or jointly.

6. Discussion and conclusion

The findings in this study show that there was collaboration in the ten firms in the supply chain. The managers gave examples and explanations of how their firms integrated with suppliers and customers. They were able to set procedures in their dealings with partners, shared knowledge and processes, and subsequently joint-planned and invested with them for better operations, systems and processes in the supply chain. Further analyses were also conducted showing how the various initiatives and strategies in collaboration enhanced continuous innovation in the case studies. This is summarised in Table III.

Table III shows the various outcomes in the firms as a result of collaboration with partners in the supply chain. There were both incremental innovations (such as enhanced processes, more efficient operations, better quality, lower costs, etc.) and radical innovations (such as new technology implementation and a change in strategy). However the majority of the improvements are incremental as a result of better, more efficient processes. These firms were able to develop and improve their capabilities for continuous innovation as a result. Similarly, the literature supports the strategies and objectives shared by the firms interviewed. La Londe and Powers (1993, p. 11) propose that "the logistics executive of the future will require both horizontal (cross-functional) and vertical (supply chain) information capability to effectively contribute to the competitiveness of the firm". The managers interviewed reported significantly better performance with respect to improved customer service (Firms F, H, E and A), productivity improvements (Firms B and E), reduced costs (Firms C and I), improved strategic

Table III Continuous Innovation outcomes from collaboration

Strategy	Types of collaboration enhanced	Continuous innovation supported	Evidence in firms
Maintaining standardised operations	Strategic alliance	Improved documentation	All
	Vertical integration	Better quality and productivity management	B, E
		More systemised operations with smaller customers	F, H
		Effective implementation of technological requirements	A
Joint planning	Strategic alliance	More efficient sales forecast	All except E
	Joint venture	Effective product development and launch	All except E
	Vertical integration	More efficient marketing of new products	G, J
		Effective materials management for production	G, J
		Efficient inventory management	G, J, F
		Better performance measurement	B, C, D
Sharing knowledge and information	Virtual integration	More efficient inventory forecast and production planning	A
	Strategic alliances	More effective strategic management through the Balanced Scorecard system	C
	Horizontal integration		
	Vertical integration	Enhanced customer relations	E
		Cost and service delivery efficiency	All
		Better communications with suppliers and customers	All except H
Sharing processes	Strategic alliances	More efficient knowledge exploitation and smoother transactions with customers	A
	Joint venture		
	Vertical integration	Cost efficiency in procurement	C
		Better quality management	E
		Cost effectiveness in reverse logistics	I
Joint investing	Joint ventures	More efficient technology implementation and management	A, B, I
	Strategic alliances	Better marketing of products and services	A
	Virtual integration	Improved R&D	A, G, J
	Vertical integration	More effective vendor managed inventory (VMI)	G
		Enhanced infrastructure and facilities for operations	B, C, I
Synchronising and interfacing	Virtual integration	Better control and integration of information flow	All except D
	Vertical integration	Effective coordination of logistics activities	All except D
		Efficient manufacturing processes	G

focus (Firm C), cycle time reductions and quality improvements (Firm E). In a partnership, the customer and supplier commit to continuous improvement and shared benefits by exchanging relevant information and by working together to resolve problems (SMMT/DTI, 1994). It can be concluded that a collaborative strategy enhances a firm's position and can lead to competitive advantage (Bommer *et al.*, 2001) as well as innovative outcomes (Lapide, 1999; Corsten and Felde, 2005; Swink, 2006). The capabilities and initiatives for collaboration discussed in the paper provide management with an increased capacity for future decisions and to establish and develop relationships that engage with different suppliers and customers. They may work on the basis of contractual agreements (e.g. in Firm F), cooperative partnerships (sharing inventory, processes or information), entering into alliances (e.g. joint strategic planning and joint investing) or through virtual, horizontal or vertical integration. Innovative outcomes furthermore add value to products and processes in the supply chain network and in the marketplace.

It is acknowledged that there are limitations to the study. The research into the initiatives, strategies and innovative outcomes for collaboration was essentially exploratory. Examples were given to illustrate their application. The responses from managers were difficult to quantify or gauge the extent of these factors. They tended to give an optimistic and possibly biased view most of the time, portraying their firms to be successful and innovative. It was also difficult to compare across organisations in some aspects because the scope of a particular collaboration was not well known and it was difficult to assess which firms were more innovative or successful as a result. The challenge facing distribution centres is strategically integrating their operations such that they are able to meet the demands of this dynamic industry. Management was conscious of the need to determine and prioritise efforts to save costs and satisfy customers and at the same time collaborate for efficient allocation of resources throughout the supply chain. This study nevertheless provides additional information for both academics and practitioners in industry. The case studies also serve as examples for managers in logistics organisation who are contemplating strategies and issues on collaborative relationships. The study demonstrates how such relationships can positively impact on the operation of firms and their capability to innovate.

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