

FLEXIBILITY IN THE SUPPLY CHAIN: INTER-FIRM RELATIONSHIP COMPETENCES AND THEIR IMPACT ON COST PERFORMANCE

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ABSTRACT

Supply chain participants such as trucking firms are faced with ever escalating pressures to excel in their operations as they compete in world class supply chains. With the growing complexities and changing business environments prevalent today, these trucking firms are also compelled to adopt strategies of agility, especially in the areas of flexibility and speed. This requirement is often challenging given that many of these firms engage in arms' length relationships. One strategic approach is engaging in various inter-firm relationships. This study investigated the relationship between the combination of resources through sharing with supply chain partners for flexibility on cost effectiveness. The results depict that developing competences in sharing resources, assets and information lead to flexibility in the trucking industry. Similarly, these capabilities were also found to impact on cost effectiveness both organisation-wide as well as throughout the supply chain.

Key words: Supply chain relationships, capabilities, flexibility, sharing competences, road freight transport

1. INTRODUCTION

The effective management of supply chain and inter-firm relationships (IFRs) is a critical organisational capability to cope with fast and unforeseen changes. It is argued that supply chain agility incorporates both flexibility and speed. This combination of flexibility and speed can be a strategy in times of uncertainty and change (Zhang and Sharifi, 2000). Flexibility refers to the degree to which a firm can proactively adjust its supply chain speed, destinations and volume (Prater, Biehl and Smith, 2001; Naim, Potter, Mason and Bateman, 2006). Organisational capabilities are best described as integrated resources to which firms have access, that have been built up and improved over time (Gieskes and Langenberg, 2001). In the road freight transport industry, firms must be able to respond to compelling market conditions regardless of the source of these changes. Flexibility and speed are known to be dominant in large multi-national corporations and manufacturers; but they are equally applicable to transport businesses. According to Narain, Yadav, Sarkis and Cordeiro (2000), flexibility is necessary to deal with internal and external disruptions in the organisational environments; and it also serves as a proactive approach to establish competitive advantage by creating uncertainties for competitors (Gerwin, 1993). Supply chain flexibility requires various work arrangements and service opportunities that encompass collaboration and sharing. These in turn enhance existing capabilities. Increasingly changing market circumstances prompt organisations to consider that relationships and the arrangement of services offered do not need to be a "one size fits all", as this does not often lead to cost minimisation and fulfilment of customers (Bask, 2001; Naim et al., 2006). Similarly, firms that can respond with speed to changing market conditions also reap such advantages. As speed is increasingly becoming a key lever for a firm's competitive differentiation and increased profitability, lead time reduction has emerged as a dominant issue in supply chain competitiveness (Suri, 1998; Prater et al., 2001).

In Australia, supply chain participants such as road freight firms engage in a more arms' length, merely contractual approach to managing inter-firm relationships. These businesses' restrictive contracts hinder such firms from being flexible. Nevertheless, in more complex and long-term relationships, there are pressures of flexibility which are accomplished through goodwill trust and driven by higher degrees of resource sharing. As a company may belong to numerous supply chains, the management of their portfolio of relationships including cooperative, collaborative partnerships and alliances becomes imperative. These portfolios of relationships assist in the integration process (Lambert, Stock and Ellram, 1998). In addition, the discretionary selection of appropriate inter-firm relationships (Bensaou, 1999) can accomplish value-adding products or exceptional services with on-time delivery, cost effectiveness and high responsiveness. The supply chain literature has explored the impact of inter-firm linkages on operational performance and the strategic value that these arrangements can have (Salvador, Forza, Rungtusanatham and Choi, 2001; Rungtusanatham, Salvador, Forza and Choi, 2003). However, there has been little research on how sharing competences in different types of relationships: contractual, cooperative, collaborative, or alliance, can assist organisations in achieving both individual and joint cost performance objectives. This paper provides an insight into how freight transport inter-firm relationships influence the industry's capability with regards to flexibility. Thus, the key objective of this study is to explore the relationship between sharing competences for flexibility of trucking businesses' inter-firm relationships and the achievement of joint and individual cost reduction.

2. LITERATURE REVIEW

The Australian road freight transport industry has never been without challenges. It is an industry that is extraordinarily complex and vital to the economy, and has, on its own an enabling role in the supply chain. Achieving breakthrough improvements in supply chain performance requires a different approach to manage working arrangements. In today's freight industry, creating this different way of doing business may be, in some cases, a matter of survival. In other cases, different approaches to participate in relationships are adopted to build sustainable competitive advantage, maximise asset utilisation, and increase profitability amongst supply chain members.

Supply chain

Supply chain management has been defined as integrating firms' processes across the supply chain (Cooper, Lambert and Pagh, 1997). Supply chains exist on the basis that their participants actively engage in managing them rather than allowing external forces to direct their actions (Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia, 2001). Thus, organisations need to transcend their supply chain relationships and integration abilities. Inter-firm relationships are consequential for supply chain integration as they span upstream and downstream. Furthermore, the literature asserts that the supply chain management framework involves physical, technical and behavioural elements (Lambert and Cooper, 2000). Planning and controlling, work flow structure, organisational structure, product and information flow structure are components of the physical-technical element. The behavioural element encompasses the power and leadership schemes, trust- building process, risk and reward sharing structures and organisation culture. Risk, reward sharing and power influence organisational commitment to cooperate with other supply chain members, whereas corporate culture determines the compatibility between members of the different types of inter-firm relationships i.e. partnerships. Participants in the supply chain, such as road freight service providers, are prompted to realise that being flexible in inter-firm relationships is a critical organisational capability to deal with the behavioural elements of the supply chain and to cope with fast and unforeseen changes.

Capabilities in Supply Chain

Organisational capabilities are best described as integrated resources to which firms have access, and have been built up and improved over time (Gieskes and Langenberg, 2001). These resources

include tangible and intangible assets, ranging from behaviours and skills to information systems. An earlier work suggests that firm's capabilities are operationalised by its distinctive performed activities which are defined as competences (Teece, Pisano and Shuen, 1997). Competences are described by Karnoe (1995, p. 430) as a "repertoire of experiences, skills and beliefs" and by Drejer (2000, p. 206) as "a system of technology, human beings, organisational (formal) and cultural (informal) elements and the interactions of these elements".

The extant literature suggests that organisational capabilities relevant to integrate the supply chain encompasses knowledge and skills of employees (Gammelgaard and Larson, 2001), supply chain partner selection (Dyer and Singh, 1998; Das and Teng, 2000), collaboration with supply chain partners (Stank, Keller and Daugherty, 2001; Simatupang and Sridharan, 2002), accommodating resource requirements to support service provision and goods manufacturing cost effectively (Sanchez and Perez, 2005) and learning from supply chain partners (Levison and Asahi, 1995; Dyer and Singh, 1998). A business' inter-firm relationship competence involves the ability to find, develop and manage such work arrangements (Lambe and Spekman, 2002). The resource-based theory argues that firms seek worthy, unique, and expensive to copy inputs which account for quality resources that are rare, non-substitutable and unique, allowing for efficiencies and competitiveness (Rumelt, 1984; Barney, 1991; Conner and Prahalad, 1996). Firms can also compete by developing resources in conjunction with supply chain partners (Dyer, Cho and Chu, 1998; Dyer and Singh, 1998). These authors prescribe the benefits of complementary resource sharing through identifying the value of such a combination. The ability to select potential partners is influenced by previous partnership experiences, differences in internal searching and evaluation capabilities and differences in their ability to obtain networks-related information. Collaboration with partners is another capability that involves bringing supply chain partners into a new paradigm comprising commitment to working more closely and sharing a vision and goals (Kaltoft, 2006). Such relationships require comprehensive planning, seamless linkages (Krause and Ellram, 1997), united seeking of synergies and goals (Steendahl, Boer, Gertsen and Kaltoft, 2004) and well structured communication channels. The collaborative structure demands joint processes supported by a high degree of trust, commitment and sharing of resources as well as information. In addition, the capability of collaborating with supply chain partners implies developing measures of collaboration such as willingness of firms to build meaningful relationships, synergy sharing to achieve collective goals, sharing of strategic, operational and tactical information as well as resources and having mutual understanding (Stank et al., 2001). Furthermore, supply chain flexibility is a proactive capability that demands supply chain members adjust resources to respond to changing circumstance with little negative impact on time and costs (Sanchez and Perez, 2005). Finally, learning from supply chain partners is another capability which includes benchmarking, engaging in inter-firm knowledge and market needs scanning routines via close relationships with supply chain partners (Dyer and Singh, 1998; Soonhong and Mentzer, 2000). The former authors avow that supply chain partners are important sources of new ideas, knowledge and skills which can ensure competitiveness and operational effectiveness.

Operational effectiveness and continuous innovation

According to Boer (2002) continuous innovation is the ongoing interaction between operations, incremental improvement, learning and radical innovation aimed at effectively combining operational effectiveness and strategic flexibility, exploitation and exploration. Bessant and Boer (2002) argue that organisations need to engage in continuous innovation to be both operationally effective in exploitation and strategically flexible in exploration. The recent developments in society, markets, technology and industry suggest that leading organisations need to find configurations of processes, procedures, people technologies and organisational arrangements that allow them to become continuously innovative. A culture of continuous innovation requires organisations to focus on renewing managerial competencies congruent with the changing business environment (Teece et al., 1997). There is a need for learning processes to build the

flexible capability to reconfigure and transform their assets. In dynamic and unstable environments, firms have to constantly scan their environment, assess government policies and develop agile behaviours to rapidly accomplish changes (Teece et al., 1997). Therefore supply chain managers can identify specific sets of organisational capabilities to transform and reconfigure competencies for more flexible and time-based operations. These capabilities are developed by bundling behaviours such as information sharing, asset utilisation and organisational change projects, continuous improvement and business process re-engineering. All reconfigurations and transformations continuously affect operational processes by the accumulation, selection and change of patterns of routines (March and Simon, 1993).

In the road freight and transport industry, these strategies are imperative for businesses that are operating in dynamic markets. They have to be able to reconfigure such competencies to be flexible and responsive. Speed and flexibility are regarded as important to large multi-national corporations and manufacturers but they are equally applicable to transport businesses. According to Narain et al. (2000), flexibility is necessary to deal with internal and external disruptions in organisational environments. External disturbances result from a range of factors including uncertainty that results in changes in nature of inputs caused by competition and environmental factors. Evans (1991) argues that flexibility is composed of a number of capabilities such as adaptability, agility, resilience, robustness, and versatility. He further suggests that these capabilities can be used in response to different forms of external environmental uncertainties or pressures. Flexibility is not only an ability to react to uncertainty, but also a proactive approach to establish competitive advantage by meeting the performance objectives that lead to competitive advantage (Bask, 2001) and creating uncertainties for competitors (Gerwin, 1993; Naim et al., 2006). The latter involves influencing what “customers have come to expect from a particular industry” (Gerwin, 1993, p. 397). For example, Honda, the Japanese motorbike manufacturer, used its flexibility to continuously introduce new motorcycle models. This competitive advantage prevented its rival, Yamaha from achieving the same capabilities as they could not cope with the rate of change (Stalk and Hout, 1990).

Granstrand (1998) prescribed two important capability categories for logistics and road transport companies in the supply chain, namely technological and managerial capabilities. While technological capabilities can be defined as sets of knowledge, competencies and skills referring to the fields of technology, managerial capability is more difficult to achieve. Managerial capabilities comprise knowledge, competencies and skills that support the execution of operational processes, and so make it possible to define new and better organisational processes. Organisational strategy requires developing managerial capabilities, which over time might combine different existing technological capabilities with specific capabilities from other areas such as flexibility (Clark, 1991; Henderson and Cockburn, 1994).

Flexibility

The notion of flexibility often involves multiple dimensions within both manufacturing and operations research literature (Sethi and Sethi, 1990; Gerwin, 1993; Vokurka and O’Leary-Kelly, 2000). A comprehensive list of fifteen types of manufacturing flexibility dimensions put forward by Vokurka and O’Leary-Kelly (2000) includes: machine, material handling, operation, automation, labour, process, routing, product, new design, delivery, volume, expansion, program, production and market flexibility. Although it has been asserted that each of these dimensions derived from manufacturing are applicable to supply chain based operations, each type may not be appropriate for every supply chain. Therefore, this study adopts the typology proposed by Beamon (1999) and Vickery, Calantone and Drogue (1999) which collapses the multiple dimensions proposed by the literature into four: volume, delivery, mix flexibility, and finally concentrates on logistics flexibility which are enabled by competences such as sharing resources, assets and information.

Volume flexibility is defined as an ability that allows the firm to effectively adjust output to increases or decreases in aggregate demand (Duclos, Vokurka and Lummus, 2003). Volume flexible organisations facing an increase in aggregate demand can maintain and possibly raise their market share. Likewise, they can quickly reduce their output levels to match a decrease in aggregate demand which minimises the risk of accumulating unnecessary inventory. A second type of flexibility discussed in the operations literature is delivery flexibility which is best described as the ability of the firm to modify the planned delivery schedule. The supply chain literature refers to this flexibility as access flexibility which is highly regarded and rewarded by customers as it makes goods and services extensively and easily reachable (Vickery et al., 1999; Paixaõ and Marlow, 2003; Naim et al., 2006). This flexibility is enhanced by closely synchronising activities downstream in the supply chain. Another critical supply chain flexibility is mix flexibility. This relates to the ability of a firm to produce an array of different products or services in a given time period (Slack, 1991). The extent of mix flexibility within a firm is evaluated under the actual production settings without considering any major facility modification or resource acquisition to match demand variations (Gupta and Somers, 1992). Furthermore, logistics flexibility can be then be best defined as the firm's ability to adapt the process of controlling the flow and storage of materials, finished goods, services, and related information from origin to destination in response to changing market conditions (Sethi and Sethi, 1990; Fawcet and Clinton, 1996; Kopczak, 1997).

Flexibility also involves the firm's speed in responding to customer demands. Speed is increasingly becoming a firm's key performance objective and lead time reduction has emerged as a dominant issue in manufacturing and supply chain strategy (Suri, 1998; Prater, Biehl and Smith, 2001). Lead time reductions result in higher profitability, lower costs, better inventory turnaround, efficient scheduling and better service delivery (Simchi-Levi, Kaminsky and Simchi-Levi, 2000). Firms are able to charge a premium price for quicker service. For instance, a road freight company could charge 30% more for a guaranteed next day 7 am delivery. Studies also indicate that reducing lead time has an impact on customer demand (Maltz and Maltz, 1998; Smith, Bayley and Brynjolfsson, 2000) such that in many cases a 24% drop in purchases by the existing customer base is the negative result of a 5% increase in delivery time (Ballou, 1998). Supply chain speed depicts the extent to which upstream and downstream members of the supply chain are able to respond quickly to demand challenges and environmental changes in the marketplace (Handfield and Nichols, 1999). The ability to quickly respond to short and medium term market changes can be used to offer customers added value. It is asserted that the changes can be due to variation in the product mix (mix responsiveness), the volumes required (volume responsiveness), or the delivery sequence or timing (delivery responsiveness). This can be achieved through sharing access to information, sharing resources to increase an individual firm's resource bases or to utilise information to improve on-time delivery. Firms may also bundle these competences with other competences to be responsive and flexible.

Sharing information, resources and assets

Christopher (2005) proposed for supply chain organisations to be interdependent in order to compete and survive. This characteristic depends on the ability to manage and share resources, costs and risks with suppliers and customers (Lambert and Cooper, 2000). Sharing information concerns the degree to which proprietary information is communicated between supply chain partners. Some of the benefits encompass increased responsiveness, reduced lead-time, better forecasts, reduced bullwhip effect, lower supply chain costs and improved customer service (Lee, So and Tang, 2000). Organisations can share information on several levels including strategic, operational and tactical, depending on the type of relationships in which they are participating (Mentzer, Min and Zacharia, 2000; Huang, Lau and Mak, 2003). Strategic information is expected to be shared in closer long-term orientated relationships such as collaboration or partnerships (Hyland, Ferrer and Bretherton, 2005). This type of information assists businesses in

making decisions about strategic issues such as supplier selection, product introduction and location of facility (Chopra and Meindl, 2001; Huang et al., 2003). Tactical information is usually shared in more cooperative work arrangements and helps firms in foreseeing demand. Tactical information includes operating costs, inventory costs and aggregate demand. Finally, sharing operational information encompasses communicating weekly production, delivery schedules and order replenishment (Chopra and Meindl, 2001) among supply chain members participating in cooperative or arm's length types of relationships (Hyland, Ferrer and Bretherton, 2005). Furthermore, organisations enter into relationships such as collaboration and alliances to share coordination costs (Dyer and Singh, 1998; Gulati and Singh, 1998; Baum, Calabrese and Silverman, 2000) and resources. The rationale for establishing relationships involves finding ways to make the relationship efficient, to the extent to which coordinating the costs offset the benefits of the relationship. For instance, an organisation with a just-in-time production process can be negatively impacted by a road freight service provider that decides to cut costs by decreasing the frequency of deliveries. The organisation needs to work with the trucking company to avoid an increase in the landed costs by transferring the expertise it has developed in its journey towards just-in-time and find potential improvements such as cost coordination for the freight company.

3. METHODOLOGY

This exploratory study seeks to address the inter-firm relationships among freight businesses as there is little previous empirical research in the area. Sekaran (2003) supports the exploratory approach where there is a lack of understanding of the problem which leads to an unstructured problem design. Qualitative data were gathered through interviews while quantitative data were collected through a self-administered mail questionnaire of inter-organisational relationships operating in the Australian road freight transport industry. Analysis of quantitative data will enable the researchers to examine the nature of the relationship between different independent variables and the dependent variable of interest. The research was carried out in two phases via a combination of convergent interviews and a mail questionnaire of road freight service managers. The interviews were analysed via a detailed content analysis, the results of the interviews being used to refine a mail survey. The second phase of this research involved a mail survey targeting freight businesses involved in different types of relationships with the members of their supply chain such as warehouse service providers; distribution centres; and other road freight operators. A survey questionnaire was mailed to 1000 road transport companies in Australia, involved in different types of inter-firm relationships, for which contact information could be found. The purpose of the questionnaire was primarily to gather data on issues relating to the relational factors and benefits that characterise engaging in inter-firm relationships between Australian road freight businesses and their supply chain partners. Inter-firm arrangements such as arms' length, cooperation, collaboration and alliances were the focus of this research. The analysis was based on 120 questionnaires derived mainly from heavy goods and chemical carriers and container and furniture carriers. The respondents ranged from operations managers, to managing directors and chief executive officers.

Respondents were asked to respond to a series of questions related to factors that promote sharing in supply chain relationships. Sharing has been conceptualised as reciprocity, or a mutual exchange between parties. The convergent interviews with participants in the road freight transport industry prompted this study to identify four dimensions of sharing in the trucking industry: sharing information (three levels were differentiated - operational, tactical and strategic) (Mentzer et al., 2000; Huang et al., 2003), sharing resources, sharing risk, and sharing cost (Das and Teng, 1998; Dyer et al., 1998; Baum et al., 2000). Statements adapted from previous studies were made in which respondents indicated the relative importance of each scale using a five-point Likert-like scale ranging from very important to not very important. For instance, road freight managers were asked if their organisations considered it important to share valuable strategic, tactical or operational information with their supply chain partners. Trucking firms' managers

rated the importance of sharing assets such as depots and warehouses that help supply chain partners to improve their service. Likewise, freight businesses' decision makers were asked if their businesses perform joint cost-reduction programs with their supply chain partners. Cross-tabulations of sharing and cost related statements were used to examine relationship and Pearson coefficients were computed to determine the strength and direction of the relationship.

Thus, this research aims to provide insights into the following research questions:

1. Is there any relationship between sharing competences and joint or individual firm's cost performance within a supply chain?
2. Which sharing competences have the most influence on joint cost reduction?
3. Which sharing competences have the greatest influence on individual businesses' cost reduction?

4. FINDINGS

The cross tabulation presented in Table 1 shows the number of respondents that rated the importance of sharing resources, assets and information as a percentage of the total number of those who rated the importance of joint cost reduction or individual cost reduction. For example, a total of 77 respondents who have rated the importance on sharing technological capabilities rated that joint cost reduction could be achieved. Thus, the 35 firms who rated it very important, 15 firms who rated it not very important, and 27 firms who rated it neither very important nor not very important, represent 45.5%, 19.5% and 35.1% respectively. Likewise, a total of 99 respondents who have rated the importance of sharing technological capabilities rated that product individual cost reduction could be achieved. The 41 firms who rated very important, 28 firms who rated not very important, and 30 firms who rated neither very important nor not very important, represent 41.4%, 28.3% and 30.3% of the respondents who rated their level of importance on individual cost reduction. These results indicate that Australian trucking firms consider that sharing technology is equally important to achieve individual cost reduction as attaining joint cost reduction.

The results from Table 1 suggest that sharing operational information is a significant means to achieve joint cost reductions which lead to flexibility attainment. This is supported by 71.4% of trucking firms' managers who indicated that joint reduction is important and is very important to achieve it via sharing operational information. Likewise, 67.7% of those trucking organisations who claimed that individual business cost reduction is very important considered that sharing operational information is essential to achieve such an objective.

		Joint cost reduction		Reduce business' costs	
		Very Important	Not Very important	Very Important	Not Very important
		%	%	%	%
Sharing technology	Very important	45.5	14.0	41.4	0.0
	Not Very important	19.5	69.8	28.3	81.0
	Neither Very important nor Not Very important	35.1	16.3	30.3	19.0
Sharing personnel	Very important	48.1	27.9	47.5	9.5
	Not Very important	20.8	55.8	23.2	81.0
	Neither Very important nor Not Very important	31.2	16.3	29.3	9.5
Do not share personnel	Very important	31.2	11.6	27.3	9.5
	Not Very important	49.4	72.1	52.5	81.0
	Neither Very important nor Not Very important	19.5	16.3	20.2	9.5
Sharing fleet capacity	Very important	37.7	23.3	33.3	28.6
	Not Very important	42.9	67.4	47.5	71.4
	Neither Very important nor Not Very important	19.5	9.3	19.2	0.0
Sharing depot capacity	Very important	50.6	25.6	44.4	28.6
	Not Very important	33.8	65.1	40.4	66.7
	Neither Very important nor Not Very important	15.6	9.3	15.2	4.8
Sharing warehousing capacity	Very important	55.8	18.6	47.5	19.0
	Not Very important	28.6	67.4	37.4	66.7
	Neither Very important nor Not Very important	15.6	14.0	15.2	14.3
Sharing strategic information	Very important	48.1	20.9	46.5	0.0
	Not Very important	27.3	58.1	27.3	90.5
	Neither Very important nor Not Very important	24.7	20.9	26.3	9.5
Sharing tactical information	Very important	46.8	7.0	37.4	9.5
	Not Very important	44.2	93.0	55.6	90.5
	Neither Very important nor Not Very important	9.1	0.0	7.1	0.0
Sharing operational information	Very important	71.4	41.9	67.7	28.6
	Not Very important	5.2	44.2	12.1	52.4
	Neither Very important nor Not Very important	23.4	14.0	20.2	19.0

Table 1 Sharing competences and cost reductions

In examining Table 2, it can be seen that the most of the values for the Chi-square coefficient are well below the alpha level of 0.05 and are therefore significant. That is, there are significant differences in the level of importance that freight managers place on joint cost reductions and individual businesses' cost reductions via sharing. Furthermore, the correlation coefficients indicate that there is a significant relationship between the importance of joint cost reduction and sharing warehousing capacity $R = 0.24$, $p < 0.05$. Equally, there is a significant relationship between the importance of joint cost reduction and sharing tactical information $R = 0.26$, $p < 0.1$. In addition, Table 2 shows that there is a significant relationship between the importance of individual business' cost reduction and sharing operational information.

	Joint Cost reductions				Individual business' cost reduction			
	Pearson Chi-Square	Asymp. Sig. (2-sided)	Pearson's R	Approx. Sig.	Pearson Chi-Square	Asymp. Sig. (2-sided)	Pearson's R	Approx. Sig.
Sharing technology	30.06	0.00	0.08	0.40	22.28	0.00	0.01	0.11
Sharing personnel	15.27	0.00	0.03	0.73	26.05	0.00	0.09	0.35
Do not share personnel	6.99	0.03	0.12	0.19	5.77	0.06	0.04	0.65
Sharing fleet capacity	6.80	0.03	0.03	0.75	6.08	0.05	-0.08	0.38
Sharing depot capacity	11.00	0.00	0.13	0.15	5.11	0.08	0.03	0.74
Sharing warehousing capacity	18.86	0.00	0.24	0.01	6.80	0.03	0.15	0.11
Sharing strategic information	12.31	0.00	0.15	0.11	29.89	0.00	0.15	0.11
Sharing tactical information	28.02	0.00	0.26	0.00	9.05	0.01	0.14	0.12
Sharing operational information	27.08	0.00	0.12	0.19	19.01	0.00	0.18	0.05

Table 2 Chi-Square and Correlation statistics

5. DISCUSSION AND CONCLUSIONS

This research provides insights into the capabilities that can be developed in an important but under-researched context: the Australian trucking industry. As this is an exploratory research, its preliminary results should be interpreted with much caution. Nevertheless, some conclusions can be drawn from this study. As reported in Table 1, there are some indications that respondents' perceptions on the importance of developing competences in sharing resources, assets and information lead to flexibility in the trucking industry. Interviews with trucking managers revealed that work arrangements between road freight service providers are price driven and still adversarial (91.6% of the respondents engage in relationships at arm's-length while 65% participate in collaborative arrangements). In a price-driven environment there is high expectation for being flexible and responsive to unexpected delivery requests which according to Naim et al (2006) has traditionally commoditised freight service. This type of pressure placed upon partners prompts the development of an unwanted reactive flexibility which does not enable the relationship nor the individual businesses to meet performance objectives such as cost minimisation in the long run and delivery of quality service (Bask, 2001).

It was expected that Australian trucking organisations do not place importance on developing sharing competences as they are engaging in work arrangements that are influenced by relational factors that characterise less close and complex relationships. Nevertheless, in order to understand which sharing competences have the most influence on joint cost reduction, it is important to indicate that although rivalry is still a characteristic of Australian road freight transport inter-firm relationships, the participants are increasingly considering the importance of the development of competences in sharing assets for example sharing warehouse capacity (50.6%) and sharing information (i.e., sharing operational information 71.4%). It is important to remember that in this industry vehicle fleets are one of the main assets, but there is no clear indication that trucking firms are willing to maximise the utilisation of their main assets. It appears then, that they are more interested in sharing warehouse and depot space to expand their geographical coverage by developing access flexibility (Paixaõ and Marlow, 2003). The importance that road freight managers place on the development of these sharing competences suggests that they are critical for individual businesses' cost reductions but also for joint cost reductions. Sharing assets to jointly minimise cost is an indication that trucking businesses see the importance of acting as members of the supply chain. Finally, it can be argued that sharing operational information increases trucking firms' responsiveness as the parties increase their visibility throughout the chain which enables them to serve customers in changing circumstances.

The study, in addressing the question 'Is there any relationship between sharing competences and joint or individual firm's cost performance within a supply chain?', found that the relationship between sharing competences and cost reduction is important for more globalised supply chains that rely on the enabling role of and flexibility of road freight transport. Positive Pearson's R

coefficients related with the sharing warehousing capacity and tactical information suggest that there is a direct relationship between sharing warehousing and joint cost reduction ($R = 0.24$) as well as between sharing tactical information and joint cost reduction ($R = 0.26$) such that the more freight managers consider joint cost reduction important, the more they will place importance on sharing warehousing and tactical information. This is critical because freight service and warehousing are asserted to be the most important elements in supply chain logistical costs for most organisations and they typically account for almost half of these costs (Coyle, Bardi and Langley, 2003). Similarly, in examining the relationship between sharing competences and an individual firm's cost performance within a supply chain this study reveals that it is important for trucking firms to develop competences that innovatively enhance proactive flexibility such as sharing tactical information and warehouse capacity as the members of global supply chains. For example, shippers are seeking more efficient routes, timely delivery of raw materials, ready supply of inexpensive goods, all with little or no disruption of product flows (Morash and Clinton, 1998). Furthermore, the relationship between sharing competences and individual business reduction was shown to be significant when trucking businesses exchange operational information $R = 0.18$, $p < 0.05$. This relationship is positive such that the more trucking firm managers perceive individual cost reduction as important the more their businesses will tend to share operational information. Sharing operational level information primarily characterises arm's length or cooperative relationships (Ferrer, Hyland and Bretherton, 2007).

The variety of sharing competences developed by trucking firms supports different ways to enhance flexibility. Organisations need to determine what type of work arrangement would be influenced by competences that are most beneficial for their current capabilities and more importantly enable them to always act as members of supply chains in the attainment of performance objectives. The research findings also contribute to the direction of future research into inter-firm relationships in the supply chain. The evidence of the trade-off between joint cost reductions and individual businesses' cost reductions through the development of different competences suggests that supply chain research needs to address and incorporate these elements into future studies. As this is ongoing research, additional quantitative analysis will be carried out to assess the direct influence of sharing competences on responsiveness and qualitative analysis to confirm that these competences are perceived by these trucking firms' partners as important to enhance flexibility capabilities.

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