Capability Leverage in Informally Networked Supply Chains: A Conceptual Model

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Abstract

In highly dynamic situations, supply chain partners have only limited time to get and work together to respond to a market opportunity. This research introduces the concept of the "informally networked supply chain" (iNSC) to discuss collaborative, short-term relationships where partners coordinate their mutual capabilities to address a transitory, but important, business opportunity in order to achieve collectively beneficial outcomes. Through a literature review and exploratory interviews, the paper identifies factors for the development and deployment of informally networked supply chains, in particular network connectivity, supply chain relationship alignment, and rapid access and implementation. Based on this research, a conceptual framework is proposed that links capability leverage, supply chain relationship alignment, and time-to-capability leverage to the degree of informal supply chain networking and gain in operational effectiveness.

Further empirical validation and testing of this framework may reveal that informal coordination in networked supply chains is an important capability that impacts the operational effectiveness and competitive advantage of a firm.

1. Introduction

Nowadays collaboration between firms is a powerful source of competitive advantage, calling for efficient management of relationships in the supply chain, which includes the development and maintenance of capabilities to ensure an effective operating system. An operating system is said to be superior to that of a competitor if it responds better to the holistic structure of market opportunities, and as such secures the long-term viability of the firm. This paper develops a conceptual model for analysing how informal coordination of capabilities in networked supply chains can increase the operational effectiveness of a firm in highly dynamic markets. Highly dynamic markets are characterised by short lead-time requirements and a large variety of product and service components, thus posing unique requirements for operations and logistics. This research focuses on such short-term inter-firm supply chain relationships and the prerequisites for coordination between suppliers, customers, service providers and other partners that are involved in delivering products and services.

The proposition is made that the dynamics in short-term relationships are significantly different from the ones in long-term relationships. Supply chain partners typically build relationship traits such as commitment, trust, joint objectives, communication and the exchange of information over time. It is argued that in highly dynamic situations, supply chain partners have only limited time to get and work together to respond to a market opportunity. The resulting issues are relevant to practice and to the applicability of existing theoretical frameworks.

Based on a literature review and exploratory interviews with about 50 senior executives, initial findings suggest that supply chain theory does not sufficiently describe the basis for inter-firm coordination of capabilities in complex and unforeseen market demand situations. In this context, there also appears to be insufficient empirical knowledge about the prerequisites for informal supply chain relationships and their impact on sales, revenue and profitability at firm-, and indeed the whole supply chain- level.

Existing supply chain concepts do not sufficiently address all relevant aspects of the organisation of capabilities in supply chain networks. As such, opportunities for deploying the supply chain as a source for achieving quick response, operational effectiveness and, ultimately, competitive advantage may be lost. This research introduces the concept of the "informally networked supply chain" (iNSC) to discuss collaborative, short-term relationships where partners coordinate their mutual capabilities to address a transitory, but important, business opportunity in order to achieve collectively beneficial outcomes.

We turn next to a review of the literature on supply chain management in highly dynamic markets, followed by a summary review of supply chain relationships, and a discussion of relationships in informally networked supply chains. A conceptual framework is subsequently developed, based on capability leverage through network connectivity, supply chain relationship alignment, and rapid access and implementation. This is followed by conclusions.

1.1 Supply chain management in highly dynamic markets

Identifying, negotiating, and monitoring the specific terms and conditions of supply chain arrangements appears difficult in highly dynamic market situations. Highly dynamic market demands pose transient, but important, business opportunities for the different stage of the supply chain and the partners involved. Such opportunities cannot be taken up by one partner alone, and in the context of high time pressure, or limited window of opportunity, a collectively beneficial outcome can only be achieved by engaging in very ad hoc, or interimistic relationships [42].

Generally speaking, opportunities represent the number and types of markets and customers that a company has. The ability to respond to those opportunities influences current and future sales volume, cost structure, and margins. Short-term opportunities then represent a part of the total opportunity space to be covered by the existing value delivery system [24]. The efficient management of different types of relationships in the networked supply chain refers to the development and maintenance of capabilities to ensure the effectiveness of the total operating system to respond appropriately to all opportunities, and hence to secure the long-term viability of the firm. Flexibility of operations has become more important as product and service features are becoming relatively less significant to win sales, and the fulfilment aspect provided by the network of supply chain partners is deemed the order winner [24] [17].

In order to position the issue in relation to general supply chain theory, Gattorna's model [16] is used for illustrating different types of supply chain capabilities for different markets and customers. Gattorna's original model [17] is, in large part, a reaction against a 'one-size-fits-all' approach to delivering supply chain value, and highlights the associated inefficiencies and ineffectiveness of many operating strategies to serve customers appropriately. Hill [24] argues along the same lines and illustrates how to set up a value delivery system to respond to distinct demand scenarios, ranging from "more continuous and predictable" (i.e. consumable products) to "more volatile and unpredictable" (i.e. fashion products).

Figure 1 illustrates that firms generally have different capabilities to deal with different demand characteristics. They bundle existing in-house capabilities and other supply chain partners' capabilities to respond to market needs with the inherent capabilities and limitations of their operating system.

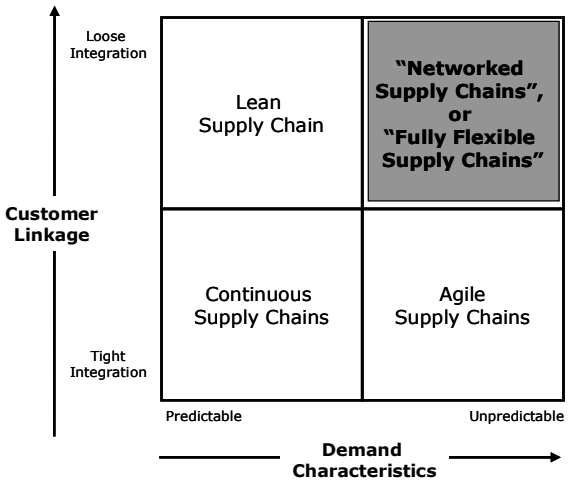

Figure 1: Demand characteristics determine supply chain responses (Adapted from Gattorna, 2003)

Some supply chain capabilities are more dynamic than others. For example, continuous, lean or agile market demands and the corresponding value delivery systems have been studied and discussed extensively [8] [6] [27] [32]. The assumption inherent in these models is the ability to plan demand and align the operating system accordingly. In highly dynamic situations demand is unanticipated, and therefore planning is not feasible. For example, an ocean freight firm may focus on maximising the utilisation of their assets (ocean freighters) and, due to limited operations flexibility, might not be able to offer customers any fast and flexible shipping services.

Supply chain capabilities include agile manufacturing, quick response, speed-to-market and time-based competition [36] [8]. Agile manufacturing describes the ability of a firm to thrive in a competitive environment of continuous and unanticipated change [8]. An agile manufacturing system can shift rapidly among product models or between product lines, ideally in real-time response to consumer demands. Agile manufacturing requires the adoption of new systems that make them more responsive to customer needs [8].

The assumption that supply chain capabilities can be developed based on predictable demand leads to the presumption that some stability does indeed exist, and hence long-term relationships based on trust earned over time, as well as mutual experiences and learning, can evolve. However, predictability is very limited in the scenario of highly complex and time-sensitive customer requirements. It is argued that existing paradigms do not provide a sufficient answer for such problems due to their over-emphasis on long-term relationships. This calls for new approaches for rapid coordination.

Dynamic capabilities thus become organisational and strategic success factors by which firms achieve advantages through ad hoc and near-instantaneous

resource configurations. Such dynamic response is a challenge for firms where supply chain relationships have predominantly been formalised, being robust and set for the medium or long-term. The focus of this research, however, is on identifying supply chain configurations that offer a high degree of operational responsiveness, and enable the instantaneous response to the presented opportunity across a range of supply chain partners.

1.2 Supply chain relationships in highly dynamic markets

This research investigates market prospects that are highly dynamic and complex to execute and hence require a rapid coordination capability. Such advanced capabilities often do not exist in firms, or are inhibited because of established norms and formal approaches to managing the arrangements between the supply chain partners.

Handling complex and time-sensitive customer requirements frequently extend beyond the capabilities of a single firm [26]. However, supply chain analysis not only needs to include the partners involved in core logistics and supply chain value adding activity, but also indirect partners, i.e. regulators, intermediaries, financial institutions, and research and government agencies. These partners influence power, risk and knowledge structures which in turn impact performance of supply chains. Swaminathan et al [46] define the supply chain as a network of autonomous or semi-autonomous business entities collectively responsible for procurement, manufacturing and distribution activities associated with one or more families of related products. Moeller and Halinen [33] interpret the supply chain as a network of entities where firms process information, so that they can better respond to linked partners and customers.

In order to define supply chain coordination capabilities the resource-based view (RBV) of the firm is used. According to the RBV, firms are bundles of resources [49]. Firm resources include all inputs that allow the firm to work and implement its strategies [35]. Firm resources can be tangible or intangible and they may be developed inside the firm or acquired in the market. These capabilities need to be coordinated by individual, group, and organisational routines and interactions.

Capabilities have to be highly flexible and adaptive, and they must be time-sensitive to respond to dynamic market needs. Dynamic capabilities are conditioned by the nature of market dynamics in the sense that capabilities rely upon existing practices to various degrees [12] [48]. Moderately dynamic markets, where the overall industry structure is clear, rely primarily on existing practices. But in high-velocity markets, where the industry structure is unclear and changes are non-linear and less predictable, dynamic capabilities must focus more on coordinating situation-specific resources.

Firms need to keep up with environmental changes when developing or enhancing their firm specific capabilities to prepare for present day and future competition. Olavarrieta [35] suggest a resource-based dynamic framework of competition that takes into consideration both organisational learning and evolutionary theory. This framework suggests that the firm's strategic resources (superior assets and distinctive capabilities) need to be updated by means of adaptation to new environmental demands and through innovation. These processes are facilitated by organisational learning, and allow a firm to maintain or enhance its sustainable competitive advantage. Monitoring the results of a firm and the environment provides information that serves as input for organisational learning processes.

The evolution of supply chain relationships is discussed using Gattorna's [16] supply chain capability/performance continuum, which categorises three different levels of supply chain capabilities. The model combines a process, technology, organisational and strategic view to explain the evolution, with a focus on operational excellence to achieving virtual supply chain capabilities. A logical extension of the concept is the analysis of relationships in this context, which is illustrated in Figure 2. This framework forms the basis for further analysis of supply chain relationships and the coordination of capabilities in the context of short-term opportunities.

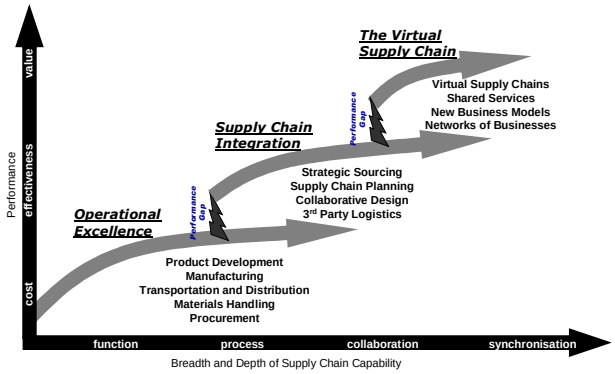

Figure 2: The supply chain capability/ performance continuum (Adapted from Gattorna, 2003)

The first curve depicts the operational and functional, and often internal, focus of coordinating supply chain capabilities with the objective to improve cost and efficiencies. Efficiencies are important, but any collaboration at this level is limited. Operational efficiency by itself is rarely sufficient to create competitive advantage in highly dynamic markets. By the same token, if firms don't have their own house in

order, they should not even attempt to engage in advanced supply chain activity with external partners. Efficiencies form an important prerequisite for collaborating in highly dynamic markets. For example, if IT processes and management practices are setup and maintained to industry or supply chain standards, a readiness for collaboration that adds to overall flexibility can be achieved.

The second curve shows the integration of supply chain capabilities. As market and customer demands evolve, supply chain managers are prompted to find innovative ways to integrate processes and technology across supply chain partners. Technology enables integrated supply chain capabilities and the process of integration creates better information, increased visibility, knowledge and learning. For example, firms may have widely applied cross-organisational business process re-engineering and implementation of ERP systems in place to achieve the benefits of integration. Some players like Walmart have introduced CPFR (Collaborative planning and forecasting) and significantly changed the consumer goods industry, globally. Hence, such technology availability, standards and ease of integration become an important enabler for short-term supply chain collaboration.

Technology and process integration across firms also leads to an increase in outsourcing, or contract logistics. These are structures where external firms perform logistics activities like warehousing, scheduling and transportation, usually based on long-term contracts and service level agreements. The integration of information flows gives the principal firm control and visibility for managing the entire process, even though the activities and the ownership of capabilities is decentralised. Gattorna et al [18] confirm that more than half of large Australian corporations use such services, and significant and growing ratios are quoted for the Europe, the U.S. and other regions [37] [39] [30]. Process integration, however, has failed to provide the capability to adequately respond to highly dynamic market requirements due to inherently rigid structures [40].

The third level suggests the emergence of virtual supply chains, i.e. the virtual networking of supply chain capabilities enabled by new technologies like the Internet. The activities are integrated and synchronised in real-time using open and closed platforms with associated standards. A range of vertical and horizontal e-marketplaces are examples of formalised virtual supply chain structures. These virtual supply chains promise new value creation and efficiency opportunities, but often fail to deliver the benefits due to complexities of contracting, coordination, and monitoring of agreements. Dell and Cisco are often quoted as examples of the effectiveness of such models.

In view of these limitations and weaknesses it seems that the supply chain concept in its 'traditional' form does not sufficiently address all relevant aspects of the organisation of capabilities in supply chain networks. As such, opportunities for deploying the supply chain as a source for achieving quick response, operational effectiveness and, ultimately, competitive advantage may be lost.

We now turn to the relationship dimensions of informally networked supply chains.

1.3 Relationships in informally networked supply chains

It is argued that expertise in coordinating activities across different firms will become an important supply chain capability in itself. This leads to the informally networked supply chain, a concept distinctly different from a more […] simplistic, linear and unidirectional representation of flows of materials and associated information […] [31]. This part of the research paper identifies the key relationship attributes for coordinating supply chain capabilities in highly unpredictable market environments.

A paradigm shift is underway in supply chain management from a focus on explaining only dyadic relationships, i.e. transactions and relationships towards the investigation of multidimensional relations and networked views of supply chain interaction. This is accelerated by the notion that existing categorisations of [supply chain] networks offer limited operational assistance [23] for firms in understanding the full spectrum of how to leverage their capabilities in highly dynamic demand situations. It is proposed that networked supply chains represent differentiated coordination approaches depending on form and content of the inter-organisational relationships among the firms involved in an exchange situation. It is further argued that coordination in networks supply chains in highly dynamic market situations is more responsive to dynamic relationships, time, information and other non-linear success factors in the exchange of inputs and outputs [9]. Figure 3 illustrates the spectrum of supply chain relationships and exemplifies the argument.

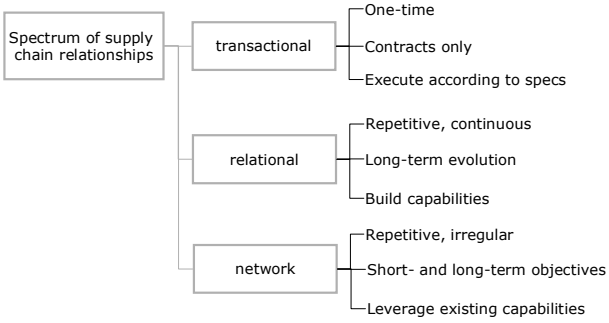

Figure 3: The supply chain relationship spectrum

The scope of exchange activities in the supply chain has been described by [20], and spans transactional (arms-length, contractual), relational and networked structures. It is argued that rapid relational and networked arrangements can be critical when flexibility and responsiveness is required, as it poses an opportunity to replace cumbersome and time consuming contract negotiations and specifications for the parties involved.

Since firm-specific resources are often based on tacit knowledge, and subject to considerable uncertainty concerning their characteristics and performance, it is more difficult to draft simple market transaction contracts governing the exchange of such capabilities [48]. It can be argued that the renegotiation costs of market transactions, compared to other transaction modes, are likely to significantly increase when conditions of market contracts for resource exchanges are subject to frequent, important, and complex changes. This results in collaborative relationships where collaboration replaces rigid contracts.

Network collaboration allows that each partner has its own (but compatible) objectives, and that a certain degree of autonomy is given up in favour of a mutual success [34]. Collaboration may be reflected through various activities between firms. These activities become interdependent as firms realise that they are part of a mutually beneficial exchange relationship. Interdependence may be described through various elements of the supply chain process such as a supplier offering special packaging, or manufacturing to distributor's specifications. Mutual recognition of interdependence is indicated when each partner believes that terminating an established relationship would be difficult for them, and costly for their partner. When partners believe that exit barriers are high for both sides, they are likely to collaborate as a way to manage the flow of resources between their firms [42]. Since there is very limited time to build the foundation for long-term collaboration, the relevant fundamentals that allow firms to collaborate ad hoc need to be established, which is the focal point of our research.

Networked supply chains are not consistently defined in the literature and vary depending on the research objective and the choice of dimensions. For our research, a classification of different supply chain network models is proposed in relation to varying network exchange relationships, as is illustrated in Figure 4.

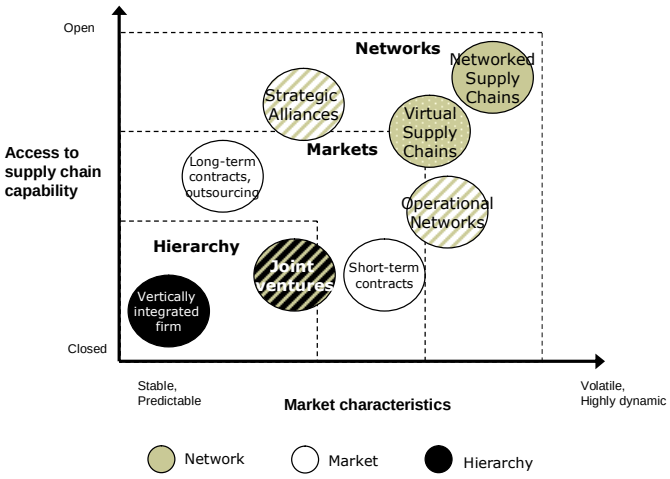

Figure 4: Landscape of supply chain networks

Joint ventures and long-term-outsourcing contracts [47][25] are types of networks that are highly formalised and often strategically guided by one core firm, i.e. a retailer or manufacturer close to the final customer. Such networks are relatively stable and oriented towards the joint achievement of long-term strategic advantages. The member firms are usually closely linked through contracts and service level agreements. Joint ventures, long-term outsourcing agreements and the vertically integrated firm are characterised by network-specific investments. Well-known examples are supply networks in the automotive industry and examples such as the Italian apparel manufacturer Benetton. The production of the small Smart-car in France or the assembly of trucks in the Volkswagen factory in Brasil are additional examples.

Formal coordination in either vertically integrated firms (internalising the coordination into the hierarchy of the own firm), through joint ventures and strategic alliances, or through long-term market contracts with 3rd party supply chain partners (using markets as the coordination mechanism) work in stable markets, while there is a risk that resources are not used efficiently in dynamic environments and stay idle for much of the time. This leads to unnecessary costs and decreases operational efficiencies. Examples of such rigid arrangement can be observed in the downstream mineral oil industry which runs idle capacity for unpredictable or peak demands, or supply shortages. More flexible ways need to be introduced to cater for highly unpredictable demand.

The concept of outsourcing supply chain activities has often not produced the expected results for supply chain partners. Formalised relationships through contracts and service level agreements often increase complexities, and related efforts of coordination. Rigidity of such relationships inherent to contract specification, setup and monitoring, prevents firms to achieve competitive advantages. In particular, various ambitious new business models in the supply chain

have not taken off as expected, i.e. the concept of a 4PL and e-marketplaces. Findings from a recent study on characteristics, strategies and trends for 3PL and 4PL in Australia [18] show that the benefits of inter-firm relationships have not yet materialised, although respondents confirmed the importance such relationships for achieving better performance.

Networked supply chains display characteristics of the virtual enterprise [21] [47]. The relationship is temporary and project-like. Firms have specific capabilities, which they combine synergistically in the supply chain. The process is accompanied by an intensive use of information and communication technologies, and other network-specific coordination factors. In highly dynamic market situations, supply chain capabilities leverage depends on two important factors. First, generally accepted standards and methods in an industry or supply chain provide leverage for rapid collaboration through network connectivity. Secondly, relational capability enables the rapid creation of a supply chain network for the opportunity at hand, and allows the partner to perform supply chain activities and serve the customer in highly dynamic markets. Our research now turns to the clarification of various dimensions that leverage capabilities in an informally networked supply chain, in particular network connectivity, supply chain relationship alignment, and rapid access and implementation.

2. The informally networked supply chain - a conceptual framework

Operational effectiveness describes the outcome from activities in the supply chain, and represents an aggregated measure for the effectiveness of processes, technologies and skills of firms and supply chains [24] [17] [8]. As such, the attributes of operational effectiveness add to the competitive advantage of a firm and of the supply chain as a whole by generating sales, revenue and profits through the efficient utilisation of all tangible and intangible resources in the supply chain [22].

In developing the concept of the iNSC, the identification of critical success factors as a basis for determining the impact on operational effectiveness, is paramount. Critical success factors define the capability areas where things must go right for the operations to deliver the value propositions. This subsequently leads to the following research question: “How do informally networked supply chain capabilities increase the effectiveness of a firm’s operating strategy in highly dynamic market situations?”. It is postulated in this research that this question is operationalised in five constructs, each one representing a factor that drives a firm’s effectiveness in highly dynamic situations:

- ⇨ capability connectivity
- ⇨ supply chain relationship alignment
- ⇨ time-to-capability leverage
- ⇨ degree of informal supply chain networking
- ⇨ operational effectiveness gain

Capability connectivity relates to the contextual and enabling structures for informal coordination of supply chain capabilities. These enablers are assumed to be beyond the short-term control of the supply chain partners, but have a significant effect on possible outcomes. “Supply chain relationship alignment” and “time to capability leverage” are related to processes of coordinating capabilities for short-lived demand requirements. Finally, the dependent variables “degree of informal supply chain networking” and “incremental operational effectiveness gain” postulate the outcome measures.

This is summarized in Figure 5.

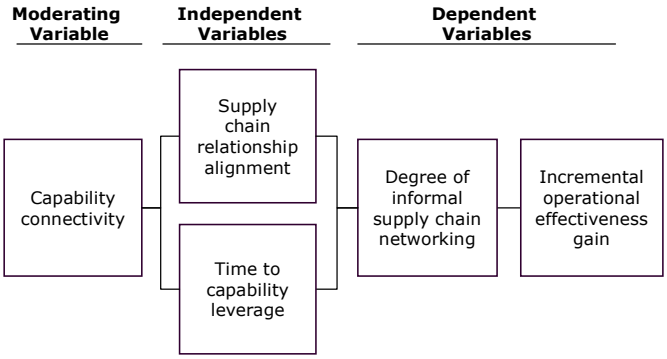

Figure 5: Research Constructs

Exploratory interviews have indicated that numerous firms have started to coordinate their supply chain capabilities without formal agreements across a range of partners. Many firms have in fact indicated that they do not have any contractual relationships with their customers and suppliers for exactly the reason that their responses to market demand need to be highly adaptive, both in terms of response time and in terms of the breadth of solution delivered. These firms use their own as well as their partners’ adaptable capabilities; including people, processes and assets to respond to highly time-sensitive and complex customer requirements.

Furthermore, firms are reducing their assets and shift their attention to managing and controlling the access to information. This in particular seems to favour smaller players that can make an impact on supply chain effectiveness without involvement of substantial assets. Another example is found in the electronics and automotive industries, where component suppliers are transforming into module suppliers, offering not only a narrow manufacturing expertise but a holistic service

solution. This means that supply chain partners not only sell the product, but provide services such as financing, maintenance, and replenishment [52], and can do this flexibly.

From our exploratory interviews, senior executives across a range of industries, i.e. chemicals, telecom equipment manufacturers, and fast moving consumer goods confirmed the importance of informal coordination of supply chain capabilities to either enhance the efficiencies of operations, or to increase the effectiveness of serving the market with the 'best' combination of supply chain capabilities.

2.1 Capability leverage through network connectivity

It is postulated that an important prerequisite for informal ad hoc collaboration among supply chain partners includes process methodologies, technology standards and management rules that form the foundation for connectivity and allow supply chains to expand their management focus from an operational efficiency and in-house focus, to one of process integration and new business relationships across businesses. Hence, connectivity becomes the basis for networking in an industry. The better established such standards and rules are, the easier it is to informally communicate, share information, and make decisions in the supply chain.

Sufficient connectivity is vital for informal coordination in networked supply chain. Advances in information and communication technology increase the connectivity, i.e. visibility and integration of activities performed in supply chains across organisational boundaries. For example, Evans and Wurster [13] explain the effects of technology on information flows and how this enables better capability and asset deployment. Evans and Wurster [13] also suggest that the spread of connectivity and common standards that technology and in particular the Internet provides, can 'blow businesses to bits'. A characteristic of networked supply chains is the reach and richness of the information exchanged [3][13]. Along the line of Evans and Wurster [13], 'reach' is defined as how many supply chain partners a business can connect with and how many products it can offer to those customers. Open standards and unified technology platforms greatly reduce barriers and transaction costs of establishing such linkages. However other issues, such as integrity and confidentiality of information, particularly personal and financial information, must however be assured.

For example, in networked supply chains, the internet and open technology standards greatly reduce transaction costs of information. For instance, travel agencies that have the ability to tap into a broader range of relevant information quickly, through suites of freely available and contracted online services (i.e. Gallileo and Amandeus, country and tourist information web sites and accommodation information), can serve more customers, provide greater selection and more complete services.

In their "Report of the freight transport logistics industry, Action agenda Workshop" from 31 July 2001, the Australian Government, Department of Transport and Regional Services [1], define connectivity as a key factor for competitive advantage. It quotes that supply chain partners will increasingly rely on ICT [information and communication technology] as the basis for connectivity between partners in the chain, and urges the industry to work on overcoming the hurdles of 'proprietary systems', open up their systems, and collaborate to resolve connectivity issues.

Hence, the responsibility of establishing standards and infrastructures is not confined to supply chain partners alone. Exploratory interviews with about fifty senior executives in Australia brought up the role regulators play in the scope and speed of uptake of supply chain standards. There is a belief that regulators still favour competitive behaviours over collaborative behaviours. Policies therefore remain one of the major impediments in partner selection and collaboration.

Technology services providers drive connectivity as well. Technology infrastructure standards, such as the Internet and EDI, information and data standards (i.e. EAN), and process standards (i.e. methodologies, SCOR) may be significant enabler or barriers.

2.2 Capability leverage through supply chain relationship alignment

Historically, supply chain collaboration extended only to the closest partners, and in many cases second-, third- and nth-tier suppliers and customers were not even considered. The ability to leverage relationships in a dynamic environment assumes finding ways to overcome the limitations of rigid arrangements between the network of partners (i.e. contracts, long-term agreements). This needs to be achieved without leading to chaos and loss off managerial control [50]. It is argued that a better understanding of relationships variables, such as trust, power, commitment, information sharing, communication, and the management of risk and intellectual property lead to effective operating strategies.

Networked supply chains are characterised by short-term interaction between firms involving very few, but content rich transactions. Compared to long-term relationships, often referred to as value-added partnerships or strategic alliances, informally networked supply chain do not include long-term purchasing, agreements, joint marketing programs, shared research and development programs, and equity-based relationships. Without contracts or formal agreements there must be other attributes that drive coordination.

They include surrogates for variables defined in the literature for collaboration, interdependence, commitment, trust, opportunistic behaviours, communication and conflict resolution, power, shared values, and relationship outcome (expected value).

Informal coordination between firms in the supply chain is a necessity, rather than an option, to solve complex and time-sensitive market demands. Informal networked supply chain management approaches can increase the effectiveness of coordinating capabilities by aligning relationship variables with the entire networked supply chain. This may ultimately lead to increased sales, revenues and profits.

Trust is a firm's belief that their counterpart in the relationship will perform actions resulting in positive outcomes. Related to trust is uncertainty in decision making, which relates to the extent to which consequences from decisions are predictable [2]. Commitment is essential and builds on trust. It is implicit in gaining agreement to short-term objectives [43]. Commitment is the willingness of a partner firm to extend effort and resources, such as the development of new product or service programs, for the continuation of the relationship. The more committed partners are to the relationship, the greater the chance for each firm to achieve their individual and mutual goals without the overshadowing risk of engaging in opportunistic behaviour. Opportunistic behaviours are negatively associated with trust and commitment. Trust and commitment in a relationship allow supply chain partners to view potentially high-risk actions (i.e., using a single-source supplier) as being sensible because of the belief that their partners will not act opportunistically [34].

Trust also applies to ad hoc supply chain relationships. The development of trust in a networked business is a continuous process involving initial trust formation, and continuous trust development based on repeated trials, until a firm loyalty is formed or participants drop out due to distrust.

Power is the ability to influence the decisions or actions of others. Power is generally not found to be unilateral, but rather exists in a state of interdependence. For example, power can be beneficial, if it is applied to set mutually beneficial standards and rules [20].

If supply chain partners contribute significant capabilities to the differentiation of a product or service offering, there are costs of switching to alternative partners. Partners anticipating high switching costs are more likely to seek ways to remain in the current relationship until the costs of remaining in the relationship exceed those of switching. Relevant to the costs of switching is the negotiating power of each party. If one party has a greater number of alternatives, they are likely to have a greater amount of power in the relationship. While firms may have the opportunity to leave the relationship, the costs may be high. Costs include the obvious financial costs, losses due to customizations, costs of finding alternatives, but also include psychological, emotional, and physical stress to individuals involved[10].

The potential loss of control from formal collaboration, i.e. through outsourcing contracts refers to the risks of losing both assets and skills as a result of outsourcing of supply chain operations. The fifty interviewed executives in the exploratory research phase of this research quoted that they are often concerned about loosing competitive advantage through collaboration as a result of a commoditisation of specific routines, processes, or knowledge. However, they also acknowledge that networked business models justify using innovative coordination mechanisms. For example, data sharing enabled by the internet, routines and incentives can be used to align the objectives and expectations of the firms involved. Research by Ford et al [14] states that all relationships in the supply chain have an implied risk/return trade-off that must be understood. This includes decision-making in complex situations such as investments into hardware and software, outsourcing of logistic services, and collaboration on firm or industry level.

Knowledge represents a key economic resource. It can be argued that the importance of traditional production factors such as land, labour, and capital are have been superseded by knowledge and information. Technology, competence, and capability are manifestations of a firm's knowledge assets operating at different levels of the organisation [5]. This new primacy of knowledge requires managers to rethink fundamental management practices. Managers must not only invest in the necessary information tools to support and enhance productivity, but must also nurture partnering relationships. According to Gummesson [19], knowledge is the core driver for competitiveness in highly dynamic environments. Thus firms should seek the expertise of new knowledge through the effective use of extended networks of relationships. Communication is described as the willingness to negotiate to reach a position where each party is able to achieve benefits which exceed the burden and obligation to remain a party to the relationship [10]. Communication includes the ways in which information is exchanged and shared between partners, as well as the openness between partners in their exchanges of information.

2.3 Capability leverage through rapid access and implementation

There are limitations for quickly assembling all necessary capabilities to respond to unexpected demands. The effectiveness of supply chain relationships depends on the 'time to capability leverage', measured by the time it takes to establish an effective working arrangement between the partners and the time it takes to turnaround the opportunity into a

concrete outcome. In light of informal and ad hoc relationships, the issue of building enough alignment in a very short time is also a required factor to enable the supply chain to capitalize on the unexpected opportunity. As such, both factors are interdependent.

Informal networks in the supply chain allow firms to arrange non-commercial transactions that bypass significant portions of traditional business transactions, and hence reduce time delays typically incurred at various stages of value chain activities. Such processes require information integration and coordination capabilities, and increase efficiencies at various stages in the supply chain for becoming a critical source of competitive advantages. This is the case if only a few firms possess these capabilities and they are very difficult to imitate [4]. Informally networked capabilities often become enablers to later on reduce the time and cost of commercial transactions and vehicles that initiate new products and services. Additional information and the capability to provide it in a timely manner become critical sources of competitive and collaborative advantage.

Stalk et al [46] point out that firms seek to gain competitive advantage by providing their products in a timelier and more affordable manner in relation to their competitors. Response time reduction, both in the product development phase and in the delivery cycle is a key priority.

Shapiro [42] examines how quick access to information leads to new business strategies. Gattorna [16] also supports the point that technology has been a key enabler for tighter co-ordination of activities and improved information flows in the supply chain, and goes further by saying that achieving performance in supply chain has shifted from an operational focus on cost and efficiencies to one that includes aspects of integration, collaboration and virtualisation [16].

Perry and Sohal [36] state that a key component of agile supply chains is the development of supply chain partnerships. He highlights their importance in view of the fact that firms of all sizes are developing strategic partnerships because so many different critical technologies are required to create today's sophisticated products that no one firm can maintain leadership in all of them. They further conclude that in an era of rapid, unanticipated change, the most competitive firms will be those that respond quickly and efficiently. Their success will not depend on intra-organisational improvements, but on external logistical and infrastructure support systems. An example of this is exemplified in TV broadcasting firms creating rapid access to cross television network journalist resources for reporting unanticipated, but highly time-sensitive news.

Other network effects are those which refer to positive externalities in which participants' utility increases with the number of other network participants [13]. A good example is Microsoft and ebay.com. As the number of users (either sellers or buyers) increases, users can more easily sell or buy items. These network effects may also result from inter-firm activities. As leading firms introduce a novel way of "doing things," more market participants adopt it [3].

3. Conclusion

The concept of the iNSC describes the ability to quickly integrate participating people and processes, expertise and physical resources, regardless of their location, within a firm or across the end-to-end supply chain. This type of networked supply chain, a collaborative coordination without centralisation, is partly facilitated by standards that link communication and information systems, as well as operations processes, and more importantly by relationship management processes.

The postulated constructs, as well as their interrelated relationships, need to be further defined and empirically validated and tested. In particular, the attributes of iNSC and the management of connectivity standards, relationships and time aspects, must be tested to what extend these lead to improved responses with respect to highly time-sensitive and complex sales opportunities. This part of the empirical research is currently in progress, and may eventually reveal the industry and performance impact of informally networked supply chains.

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