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Understanding the Meaning of Collaboration in the Supply Chain

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Abstract

Despite its infancy, some authors are already suggesting that the writing may be on the wall for supply chain collaboration. It has been reported that supply chain collaboration has proved difficult to implement; there has been an over-reliance on technology in trying to implement it; a failure to understand when and with whom to collaborate; and fundamentally a lack of trust between trading partners. This paper proposes that a supply chain segmentation approach, based on customer buying behaviour and service needs, is the most appropriate context for collaboration. The paper also proposes the need for a greater understanding of the elements that make up supply chain collaboration, and in particular how the relevant cultural, strategic and implementation elements inter-relate with each other.

Keywords

Supply chain management, Channel relationships

Introduction

Collaboration, in the context of the supply chain, is still relatively embryonic, emerging in the mid-1990s in the most recognizable form of collaborative planning forecasting and replenishment (CPFR) (VICS, 1998)[1]. It has been suggested that prior to the emergence of CPFR organizations were practicing less advanced forms of collaboration in the form of vendor managed inventory (VMI) and continuous replenishment programmes (CRP) (Ireland and Bruce, 2000; Barratt, 2002).

With the widely heralded demise of e-business coupled with the current harsh economic climate, some authors are suggesting the end of the road has been reached for supply chain collaboration (Fawcett and Magnan, 2002; Sabath and Fontanella, 2002). It has been suggested that:

- supply chain collaboration has proved difficult to implement (Sabath and Fontanella, 2002);
- there has been an over-reliance on technology in trying to implement it (McCarthy and Golobic, 2002);
- a failure to differentiate between whom to collaborate with, i.e. a segmentation of customers and or suppliers (Sabath and Fontanella, 2002); and
- fundamentally a lack of trust between trading partners (Ireland and Bruce, 2000; Barratt, 2002).

Collaboration is a very broad and encompassing term and when it is put in the context of the supply chain it needs yet further clarification. Many authors when talking about collaboration cite mutuality of benefit, rewards and risk sharing together with the exchange of information as the foundation of the collaboration (Stank *et al.*, 1999a; Barratt and Oliveira, 2001). In order to maximize the success of such collaboration there is a need for a deeper understanding of a number of issues, such as, why do we need to collaborate? Where and with whom can we collaborate in the supply chain? Over what activities can we collaborate? And finally, what are the elements of collaboration? This paper identifies the major elements of supply chain collaboration, and points out that many of these elements are both barriers and enablers. The paper then concludes by suggesting a number of areas for further research.

Why do we need to collaborate in the supply chain?

Organisations have for many years strived to improve the efficiency of their internal supply chain activities, e.g. purchasing, manufacturing and logistics (Ellinger, 2002; Fawcett and Magnan, 2002). Whilst they have been very successful with these improvement initiatives, the results when seen from a supply chain wide perspective could be interpreted as the redistribution of costs and inventory both up and down the supply chain (Ireland and Bruce, 2000). Additionally and predominantly due to the functional focus of such activities, demand is disconnected from supply in the form of stockpiles of inventory both within and between organizations and their trading partners (Ireland and Bruce, 2000; Horvath, 2001). When this is combined with isolated forecasting and planning the organization is facing an uphill battle just to stand still. In the meantime competing supply chains that manage through collaboration to integrate supply and demand, deliver significantly improved performance, and benefit

yet further from closer relationships that themselves foster more opportunities for greater improvement.

On a more fundamental level, in respect of internal collaboration, some authors would suggest that very few organisations have achieved internal integration of their activities (Fawcett and Magnan, 2002). There are a number of issues that are likely to be relevant to most, if not all organisations. Such issues represent an opportunity whereby collaboration both internally and externally may provide some answers:

- Each organisation in a supply chain has its own plan for its activities, and within each organisation many more often unrelated plans exist, such as replenishment, forecasting, schedules for production, etc. Many organisations are heavily focussed on planning, yet seemingly oblivious to the fact that these plans are doomed to failure because they fail to take into account other internal plans and activities that will undoubtedly impact the outcome of a particular plan (Ireland and Bruce, 2000).
- Most organisations either run promotions to supposedly increase demand, or to dispose of excess inventory that has accumulated. If organisations do not run promotions, then they are likely to at least launch new products or services into the market. How successful are these promotions or new product launches? How often do organisations launch a promotion only to find that there is insufficient inventory in place, or that sufficient cannot be produced quickly enough to meet the huge uplift in demand the promotion has created? The question then often arises, with the benefit of hindsight “why do we run promotions or new product launches?”, “Why is our promotional forecasting so inaccurate?” and “Why can’t we ever seem to get them right?”
- How many organisations suffer from poor communication? How many of us know what is going on throughout all the parts of our organisations that deal with or impact the particular product or activity that we are involved with as it passes through our organisation? Functional barriers (or the “silo” mentality) still result in mediocre if not poor communication.
- How many organisations understand their own processes (Frankel *et al.*, 2002), let alone their customers or our supplier’s processes? If there are gaps in the understanding then how do organisations ever expect to improve their processes? These external processes impact an organisation’s internal processes, but often these are not taken into account, or at best only sporadically.
- Organisations are built on the foundation of delegation. Managers and employees often delegate or have delegated to them tasks or responsibilities, which involve activities which are impacted by other departments in the organisation over which they have no control or influence. It is hardly surprising then that these tasks are not performed satisfactorily or at best only as a result of the personal (informal) relationships that managers and employees have built up over time with other colleagues across the organisation.
- How many organisations in a supply chain have the same performance measures in place? If we consider just supply chain activities, then are there integrated performance measures across

purchasing, manufacturing and logistics? (Lengnick-Hall, 1998) Equally, does the organisation share the same performance measures with their suppliers and or customers? If not, then the performance measures in place are likely to produce conflicting behaviour, both internally and externally, and the supply chain will pull in conflicting directions.

- In today's "techno-culture" organisations often find themselves with too much information with which to make decisions. They are overloaded with information from the Internet, from the increasing reliance on e-mail, and the mass of internal organisational systems, which produce numerous management reports, which are often ignored in terms of the issues and problems that they highlight (Leidtka, 1996). The next question is what do we do with this information? Often the information is not trusted, in terms of its accuracy or reliability. The result of this manifests itself in poor decision making, in terms of relevance, or organisations rely on other internal information, which may or may not, itself, be accurate.
- How many "management" reports do organisations produce? How many of these reports are read and acted upon? How many times do organisations make the same mistakes more than once (Liedtka, 1996)?

In view of these issues, there are likely to be opportunities for collaboration, both internally and externally. However, before rushing into collaboration, there are also many other factors to be understood before any such collaborative initiatives are likely to be successful.

Where can we collaborate in the supply chain?

There are a variety of forms of potential supply chain collaboration, which can be divided into two main categories (see Figure 1): first, vertical: which could include collaboration with customers, internally (across functions) and with suppliers; and second, horizontal: which could include collaboration with competitors, internally and with non-competitors, e.g. sharing manufacturing capacity (see Simatupang and Sridharan, 2002, for a fuller description). This paper will subsequently, for the sake of brevity, consider only "vertical collaboration".

Initially, and perhaps most importantly is the issue of internal collaboration. Many organizations may have considered and even pursued external collaboration, but often to the detriment of their efforts at internal collaboration (Barratt and Green, 2001; Fawcett and Magnan, 2002). It could be argued that external collaboration has been seen by organisations as a tempting opportunity and a "fresh battlefield" in which to participate, one that is free of many of the longstanding internal disputes. Internal collaboration can overcome functional myopia, and has the potential to enable internal integration (Stevens, 1990; Khan and Mentzer, 1996; Stank *et al.*, 2001).

Whilst many organizations have integrated various internal interfaces, e.g. marketing and logistics (Ellinger, 2002); purchasing and manufacturing (Fawcett and Magnan, 2002); there are still few if any organizations that have achieved complete internal integration, i.e. purchasing-manufacturing-logistics-marketing (Fawcett and Magnan, 2002). Khan and Mentzer (1996) classify such early forms of integration as predominantly based on interaction, in the sense that functional departments hold meetings and attempt to share more information. What are missing from such initiatives are the joint

goals, shared resources, and common vision that is espoused by the “collaborative” approach, which Khan and Mentzer (1996) suggest is more “attitudinal” in its nature.

A potential danger of internal collaboration is that organisations could achieve internal integration, and have simply created a larger albeit organisational silo (Barratt and Green, 2001). Internal collaboration must be married with external collaboration, in terms of developing closer relationships, integrating processes and sharing information with customers and suppliers. In other words internal integration must be aligned with the drivers and constraints of the rest of the supply chain (Barratt, 2002).

In terms of external collaboration Figure 2, presents a number of potential opportunities for vertical supply chain collaboration which include on the downstream side of the supply chain: customer relationship management (CRM); collaborative demand planning (which includes collaborative forecasting, CPFR, etc.); demand replenishment; and shared distribution.

And on the upstream side of the supply chain: supplier relationship management (also referred to as supplier development, e.g. VMI, CRP); supplier planning and production scheduling; collaborative design (which could include new product introduction); and collaborative transportation.

With whom should we collaborate?

Following on from the preceding section, it is necessary to appreciate that internally, collaboration is not just about developing closer relationships, or integrating processes between supply chain-related functions (e.g. purchasing, manufacturing, logistics) but also needs to include: marketing-commercial (for promotions/new product service introductions) (Ireland and Bruce, 2000) and R&D activities (Ellinger, 2002).

Further, collaboration is not just about developing close information exchange based relationships at an operational level of activity, but also needs to be implemented at tactical and strategic levels in the organizations across the supply chain (see Figure 3). Organisations can integrate their processes at an operational level (Khan and Mentzer, 1996), however, if processes at tactical and strategic levels are not integrated, then the performance benefits of integration will be limited (Barratt, 2002). Integration at an operational and tactical level can deliver significant benefits, although it is not clear as to the impact of gaps in the strategic levels of integration (Barratt, 2002).

When talking about collaboration, many authors suggest that there is a need for “scalability” (Sherman, 1998; Accenture, 2002; Sabath and Fontanella, 2002). What is not clear in the literature is whether we can collaborate with everybody. The answer is probably “no”, but it is not as disappointing as it may sound. Organisations need to realise that the resource intensive nature of collaboration means that they need to focus their attention on a small number of close relationships rather than trying to collaborate with everyone. But why would organisations want to collaborate with everyone; some relationships may well be “optimal” in the sense that they are most suited to an arm’s-length, purely cost based type of relationship, i.e. collaboration would not create any further added value or benefit (Lambert and Burduroglu, 2000; Horvath, 2001).

One suggestion is that, externally, we probably only need to collaborate with a small number of strategically important customers and suppliers. This “segmentation” approach is gaining a lot of attention and is a likely context for successful collaboration (Tang and Gattorna, 2003). Supply chain

segmentation works on the assumption that customers buy products in different ways, have different expectations of service and are prepared to pay different prices based on their service requirements. A single supply chain, it is argued, cannot meet all the customer expectations in an efficient and effective manner (Christopher and Towill, 2002). Indeed, it is likely that a single supply chain is undercharging customers that require specialized services, and overcharging customers who require a simple more commodity type service (Fuller *et al.*, 1993).

If customers can be segmented by way of their buying behaviour and service needs, then separate supply chains can be designed to meet the specific needs of the various customer segments (see Figure 4). One of these segments may be appropriate for a more arm's-length approach, whereas at the other extreme, one may be most appropriate for a collaborative approach. Each supply chain will require a different strategy and a different culture to support that strategy. To drive the culture and the supply chain, it will be necessary to have a separate distinct leadership style. An example of such segmentation is Coca-Cola in Japan which has segmented its customers in terms of their logistics needs (Fuller *et al.*, 1993).

It is then theoretically and logically possible to take this approach one step further and segment suppliers according to their abilities and requirements to service the segmented supply chain. Again distinct supply chain strategies, cultures and leadership styles may be required (see Figure 4).

It should be realized that some customers and suppliers would appear in more than one particular segment, but that this simply reflects that customers buy products in different ways with different expectations. Similarly suppliers are able to supply materials in different ways, with different service levels and corresponding costs.

Understanding the elements of collaboration

There are many elements of collaboration that have been identified in the various literatures in and around supply chain management. One of the major supporting elements of collaboration is a "collaborative" culture (see Figure 5), which is made up of a number of elements: trust, mutuality, information exchange, and openness and communication.

- *A collaborative culture*: Most existing corporate cultures are not capable of supporting collaboration either internally or externally (Ireland and Bruce, 2000; Barratt and Green, 2001). Currently, functional thinking is rife, and is supported by organisational structures and performance measures that are aligned to functional activities, rather than supply chain processes (Barratt and Green, 2001).
- *External and internal trust*: In the field of inter-organisational relationships, trust has been extensively studied, however, not so in the context of the supply chain (Smeltzer, 1997). The consensus in the literature is that trust can contribute significantly to the long-term stability of an organisation (Heide and John, 1990), and Lee and Billington (1992) expand on this argument by suggesting that effective co-ordination of the supply chain is built on a foundation of trust and commitment. However, the implementation of such a holistic view of the supply chain requires a degree of trust between all players, hence the link with partnership/relationship

initiatives (Mason-Jones and Towill, 1997; Nesheim, 2001). Internal trust is equally important, and can be harder to develop (Ireland and Bruce, 2000).

- *Mutuality*: There have to be mutual benefits arising from the collaboration (Sparks, 1994; Ellram and Edis, 1996), it cannot be a case of “I win/ you go and figure out how to win” (Ireland and Bruce, 2000). There must also be mutual risk sharing and respect for the other trading partner (Crewe and Davenport, 1992; Boddy *et al.*, 1998; Mclvor and McHugh, 2000).
- *Information exchange in the supply chain*: A number of authors have highlighted the fundamental need for information sharing if supply chains are to improve their performance (Stank *et al.*, 1999a; Lambert and Cooper, 2000; Lau and Lee, 2000). Lee and Whang (2000) highlight the almost total lack of empirical research into information sharing in the supply chain. Apart from Barrett and Konsynski’s (1982) study of information sharing in the general context, Lee and Whang (2000) suggest that most work has been conceptual in its nature, and has not focused on information sharing in a supply chain context. Information, particularly the transparency and quality of information flows, plays an important part in many accounts of supply chain developments and both of the following assumptions: first, intermediation is a potential barrier to greater transparency in supply chain because it acts as a source of information asymmetry and impactness; and second, that intermediation necessarily raises costs and frequently constitutes a non value adding activity (Popp, 2000). Mason-Jones and Towill (1997) argue that “information enrichment”, i.e. immediate sharing of marketplace data throughout the chain is not merely desirable, but obligatory. This must be achieved in a process integration scenario as we move towards the “seamless” supply chain (SSC) in which all “players” think and act as one (Towill 1997).

The breakthroughs of the last decade in the form of efficient consumer response (ECR) and the use of information technology to capture data on demand direct from the point of sale are now transforming the organisation’s ability to hear the voice of the market and to respond to it directly (Christopher, 1998). The ability to base replenishment decisions on real demand clearly contributes to supply chain agility (Mason-Jones and Towill, 1999).

The use of information technology to share data between buyers and suppliers is, in effect, creating a virtual supply chain. Virtual supply chains are information based rather than inventory based. A major problem in most supply chains is their limited visibility of real demand (Christopher and Towill, 2000). Shared information between supply chain partners can only be fully leveraged through process integration. By process integration is meant collaborative working between buyers and suppliers, joint product development, common systems and shared information. This form of collaboration in the supply chain is becoming ever more prevalent as companies focus on managing their core competencies and outsource all other activities (Christopher and Towill, 2000).

Another issue to consider is the “information” decoupling point (Mason-Jones and Towill, 1999). This is in effect the furthest point to which information on real final demand penetrates (Christopher and Towill, 2000). Collaboration offers the potential to push this as far as possible upstream in the supply chain (Christopher and Towill, 2000):

- *Communication and understanding*: It is important to open and develop clear and broad lines of communication (Mohr and Spekman, 1994; Frankel *et al.*, 2002), to foster information sharing and to create a shared understanding (Stank *et al.*, 1999a, b; Ireland and Bruce, 2000). Rather than single points of contact there is a need to develop broad interfaces between organisations, potentially to overcome the lack of internal communication, to create an atmosphere whereby innovative thinking is encouraged and supported (Barratt and Green, 2001), and to avoid the situation whereby with single points of contact, and one person leaves, the whole relationship between the two organisations could be jeopardised (Frankel *et al.*, 2002).
- *Openness and honesty*: From both an internal and external viewpoint, a culture of openness and honesty is needed (Spekman *et al.*, 1998; Hogarth-Scott, 1999; Stank *et al.*, 1999b). For example, if a delivery is going to be late, the sender should not wait until such time as the promised delivery date has passed, instead the recipient should be informed as early as possible, in order that the recipient can implement contingency plans. Such openness and honesty can develop trust, respect and commitment, as a result of improved certainty and reliability (Hoyt and Huq, 2000; Popp, 2000; Whipple and Frankel, 2000).

In terms of the collaboration itself, managing change is implicit in terms of moving from the current status quo to a collaborative culture. Figure 5 also sets out the some of the key elements in terms of what has to happen if collaboration is to succeed: cross-functional activities, process alignment, joint decision-making, and true supply chain metrics:

- *Managing change*: Developing collaborative relationships require massive change both internally and externally (Ireland and Bruce, 2000). Programmes to support collaborative initiatives must be in place otherwise the internal resistance could easily prevent collaboration from developing and/or flourishing. Many employees will be asked to change their way of working and collaboration will feel alien for many of them who are not used to sharing information with colleagues, customers and suppliers, or even making joint decisions (Ireland and Bruce, 2000; Barratt and Green, 2001).
- *Cross-functional activities*: Boundaries within or between organisations have been shown to restrict the flow of information and development of trust between collaborating partners (Forrester and Drexler, 1999; Lee and Whang, 2000; Ellinger, 2001).
- *Process alignment*: Collaborative initiatives require senior management support and commitment if they are to succeed (Ireland and Bruce, 2000). Because supply chain collaboration necessitates adopting a process focus this will involve crossing many functional boundaries, and subsequently senior management support will be necessary to overcome functional “friction” (Barratt and Green, 2001).
- *Joint decision making*: One example of the need for joint decision making is in the area of forecasting. Currently most organisations forecast in “isolation”, in other words they develop forecasts based on orders they receive from customers and upon historical data (McCarthy and Golocic, 2002). Such forecasts tend to be predominantly statistical in their nature. If the reality of the situation across the supply chain is considered, i.e. there are multiple forecasts, each with a small (but sometimes large) degree of error, the combination of these forecasts

contributes to the dramatic and volatile swings in demand that occurs in functionally oriented supply chains (Ireland and Bruce, 2000; Sabath and Fontanella, 2002).

- *Supply chain metrics*: The vast majority of supply chain metrics are in fact measures of internal logistics performance (Lambert and Pohlen, 2001), and can be considered inappropriate for the supply chain as a whole (Simatupang and Sridharan, 2002). By sharing performance metrics with customers and suppliers, bottlenecks in the supply chain (in the form of inventory stockpiles and process gaps) can be identified and overall performance improved (Lummus and Vokurka, 1999; Stank *et al.*, 1999b; Ireland and Bruce, 2000). The major barriers to developing such “supply chain” measures are the complexity of overlapping supply chains and the sharing of information between organisations (Lambert and Pohlen, 2001). Unless real “supply chain” metrics can be developed, then the various constituent parts of the supply chain will continue to operate in different directions and will not be aligned.

If the collaboration is to be sustainable then there are a number of strategic elements, which must be present (see Figure 5). These include resources and commitment, intra-organisational support, the corporate focus, demonstrating the business case, and the role of technology:

- *Resources and commitment*: Participants in collaboration must be prepared to commit resources as any initiatives in this area are likely to be resource intensive in the early stages of their development and over the longer terms as collaboration is rolled out across relevant suppliers and customers (Stank *et al.*, 1999a, b; Ireland and Bruce, 2000; Lee and Whang, 2000).
- *Intra-organisational support*: Bearing in mind the need for a process focus for collaboration (Ireland and Bruce, 2000), intra-organisational support is required in two distinct forms. First, in the shape of initial and ongoing senior management support, and second, in terms of gaining the support of other parts of the organisation, e.g. purchasing and manufacturing (Monczka *et al.*, 1998; Ellinger, 2002). The degree of intra-organisational support is likely to determine the degree of process alignment and ultimately how successful the supply chain collaboration is likely to be (Hogarth-Scott, 1999; Ireland and Bruce, 2000).
- *The corporate focus*: For many organisations their focus is not on the supply chain (Ireland and Bruce, 2000; Sabath and Fontanella, 2002). With distractions such as shareholders, the supply chain and any collaborative initiatives are likely to be seen as unnecessary expenditure (Sabath and Fontanella, 2002). The partial solution arises from the early delivery of promised, but possibly limited benefits (Ireland and Bruce, 2000), as a way of gaining momentum and fostering greater levels of organisational support.
- *Demonstrating the business case*: It is imperative that the business case for collaboration is developed, to build support and commitment from senior management (Ireland and Bruce, 2000; Horvath, 2001).
- *The role of technology*: Supply chain collaboration does not need to be based on technology; in fact a major criticism is that an obsession with it is one of the largest barriers to collaboration (Ireland and Bruce, 2000; McCarthy and Golocic, 2002). In the initial stages of collaboration, use of simplistic technologies (such as email) are likely to be more effective and significantly less

expensive than the current raft of collaboration tools being offered by software vendors (Ireland and Bruce, 2000; Barratt and Green, 2001). The key is for there to be a shared understanding of what supply chain partners are collaborating over, clearly defined processes, and a clear understanding of the information required to populate such processes. It is only then in terms of growing volumes of information that technology can move collaboration on to a closer to real-time basis for exchanging and utilizing shared information (Ireland and Bruce, 2000; Barratt and Green, 2001). Technology can easily become technology for technology's sake (Sabath and Fontanella, 2002). Organisations having gone through lengthy and "painful" implementations of the latest enterprise resource planning (ERP) systems are unlikely to want to rush into investing in further collaborative tools that are currently proliferating in the market (Ireland and Bruce, 2000).

Finally, Figure 6 puts the elements of collaboration into the context of the supply chain. Such collaboration is likely to be onerous, and the task of extending collaboration to a third tier organisation (i.e. Organisation C in Figure 6) significantly more onerous. This difficulty lends itself to the proposed concept of segmented supply chain, with an organisation only looking to collaborate with a small number of key customers and suppliers.

Conclusions

Collaboration is an amorphous meta-concept that has been interpreted in many different ways by both organizations and individuals. Within this concept, supply chain collaboration has proven difficult to implement although still has the potential to offer significantly improved performance (Ireland and Bruce, 2000). It is suggested that many of the problems related to supply chain collaboration are due to a lack of understanding of what collaboration actually implies, for example, Barratt and Oliveira (2001) found that a major barrier to the development of CPFR (collaborative planning, forecasting and replenishment) initiatives was a lack of attention to developing front end agreements as to specifically what organisations were going to collaborate over. This poor understanding is further increased due to the association of collaboration with the hype surrounding e-business whereby technology has been promoted as the key to enabling wide-scale inter-organizational collaboration (Sabath and Fontanella, 2002).

Another major barrier would appear to be the context for collaboration, in terms of when to collaborate and with whom. Some of the confusion surrounding this issue would appear to come from a number of sources, including the implication that collaboration must be scaleable to a large number of customers and suppliers. This in itself is not a major barrier, but it does serve to confuse organisations in terms of the value that may be derived from collaboration. Supply chain collaboration requires the commitment of significant resources to implement it, and organisations that try to collaborate with a large number of their customers and suppliers will not succeed. The cost of such wide-scale implementation would simply outweigh the value derived from such an effort.

It is proposed that a segmented supply chain approach limiting collaboration to a small but potentially critical number of customers and suppliers is a more appropriate context for such collaboration. Whilst there are only one or two examples of the very early stages of a segmentation approach (Tang and

Gattorna, 2003), it would be appropriate at this stage of the development of collaboration to examine supply chain collaboration in as many contexts as possible.

This paper has identified a significant number of elements of collaboration, however, it is yet unclear how these elements inter-relate with one another. Many of these elements, such as culture, trust, information exchange and supply chain wide performance measures have been to a large extent ignored due to their complexity, and deserve significant attention individually in terms of further research. Further research is also required to develop a deeper understanding of the relationships between these elements of collaboration.

Note

1 CPFR was originally known as collaborative forecasting and replenishment (CFaR).

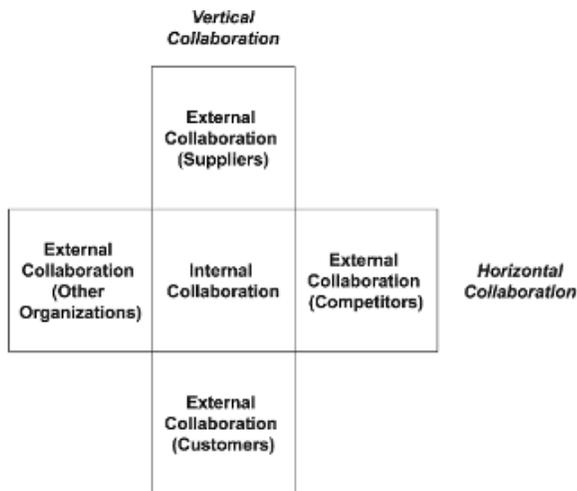


Figure 1 The scope of collaboration: generally



Figure 2 The scope of vertical collaboration

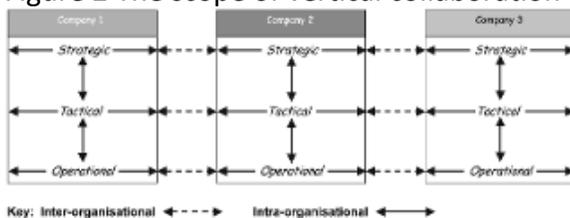


Figure 3 Levels of inter- intra- organisational integration



Source: A. Reed-Brown, *Supply Chain* (2002)

Figure 4 Collaborative relationships based on customer- led supply chain segmentation

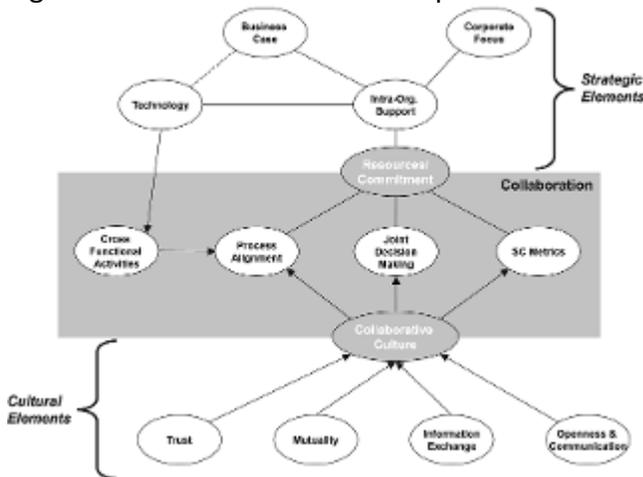


Figure 5 The “cultural” elements of supply chain collaboration

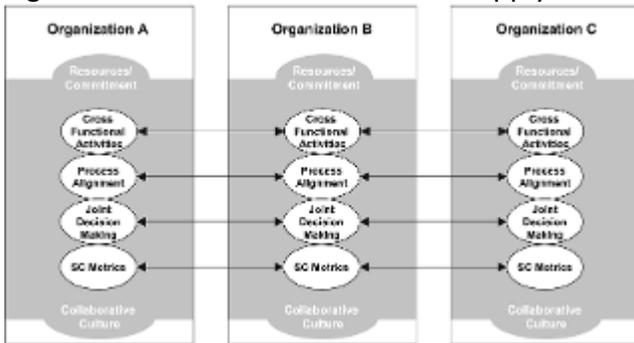


Figure 6 The “strategic” elements of supply chain collaboration

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