An Integrated Framework for Assessing the Impact of Collaboration on Buyer-Supplier Relationships

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Abstract

Purpose of the paper and literature addressed – The purpose of this paper is to outline the construction and operationalization of an integrated framework to assess the key factors influencing the impact of collaboration in buyer-supplier relationships. The literature surveys a diverse range of fields to investigate the contributing factors for successful partnerships in inter-firm relationships. This review incorporates a wide perspective to consider the various constructs emanating from the literature areas of marketing channel relationships, supply chain management and collaboration studies.

Research method – The authors employed a field study methodology consisting of questionnaires complemented by observations and interviews during interim periods of a project facilitating trading partner collaboration. Two sets of questionnaires were designed to investigate the main contributing factors to the partnership based around constructs shown to be significant in previous studies and validated through a pilot study involving one group of network participants. The empirical testing involved three manufacturing organisations from the Netherlands, Italy and Denmark participating in an EC-Funded Fifth Framework Project. This project covered a three year period with all three manufacturing firms initiating collaboration with three or four existing first-tier suppliers.

Research findings – The results revealed a unique level of impact for every buyer-supplier relationship. A wide spectrum of impact was recorded, ranging from collaborative inertia to significant collaborative improvement. Notably, a diverse level of impact also became apparent within each supply network. The findings indicated that three interrelated components contributed to the achievement of collaborative improvement: *antecedent factors; implementation change;* and *collaboration enablers*. Specific antecedent conditions were associated with the total change achieved during the implementation phase. The level of impact achieved was related to three enablers (or disablers): commitment; involvement; and conflict resolution approach. Finally, the extent of communication behaviour change had a direct influence on the level of impact of collaboration.

Main contribution – A new framework was constructed based on an integration of the key success factors in buyer-supplier relationships identified from the diverse literature and empirically tested through a three year field study. Overall, the analysis illustrates the capability of the integrated framework to evaluate the impact of collaboration in buyer-supplier relationships. The key findings and proposed framework can assist supply chain managers and industry practitioners. In a practical context, the outcome of this research can provide assistance in designing collaborative projects through selection of appropriate supply chain partners and improvement initiatives. In particular, this research offers some insights into the key factors associated with implementing a successful collaborative improvement project.

Keywords: Collaboration, Buyer-Supplier Relationships, Impact, Framework

Introduction

In the drive for competitiveness, many manufacturing industries are pursuing coordination strategies through integration with selected supply chain members. In theory, the effective integration of the supply chain can create competitive advantages derived from improved responsiveness and cost reduction, ultimately leading to improved performance and profitability. In reality, few businesses, let alone entire supply chains, have developed working collaborative agendas (Ross 2003). Managers have continually struggled with the fine art of balancing cooperative relations with trading partners while at the same time trying to improve competitiveness. Certainly, Kanter (1994) highlights in her seminal article, that companies often fail to develop “Collaborative Advantage” due to the difficulties involved in acquiring and implementing the “art” of managing relationships. Trading partner collaboration poses significant challenges because of the uneven levels of competency and effectiveness of business processes found in the supply network (Ross 2003). Additionally, strategic partnerships involving collaboration are costly to develop, nurture and maintain as well as being risky given the specialised resources and investments they require (Bensaou 1999). Hence, it is imperative for decision makers to consider whether or not it is advantageous to instigate collaboration with trading partners. To this end, an evaluation of the successful factors in achieving collaboration is necessary (Mattesich et al. 2001).

In this article, we construct and evaluate an integrated framework to assess the key factors influencing the impact of collaboration in buyer-supplier relationships. Due to the fluidity of collaborative environments it is important to create a structured, yet flexible framework to assess the impact within an array of diverse buyer-supplier relationships. This exploratory programme was developed and tested in conjunction with an EU-funded Fifth Framework Initiative entitled *Collaborative Improvement Tool for the Extended Manufacturing Enterprise*.

Literature Review

A plethora of operations management and marketing literature has examined how different dimensions can contribute to buyer-supplier partnership success. However, very few studies specifically examine ‘collaboration’ between the participants more often the focus is on ‘cooperation’ in the partnership. The concept of collaboration in the supply chain highlights the recent trend towards increasing vertical cooperation rather than market exchange. Though frequently used interchangeably with terms 'cooperation' and 'coordination', collaboration is considered to subsume this more limited form of integration (see Figure 1). Cooperation, whereby firms exchange some essential information and engage some suppliers in longer-term contracts, represents the entry level of interaction (Womack et al. 1990). The next level of intensity is coordination whereby both workflow and information are exchanged in a manner that permits technical systems (e.g. EDI) and other integration mechanisms (e.g. Just-in-Time) that attempt to make seamless many of the traditional linkages between and among trading parties (Spekman et al. 1998). In many instances, trading partners have already achieved cooperation and coordination with key suppliers and customers. According to Spekman, et al. (1998) the movement from coordination to collaboration requires levels of trust and commitment that are beyond those typically found in both JIT and EDI relationships. In this context, collaboration can be viewed as the last step of a transition from open-market negotiation through cooperation to collaboration (Spekman et al. 1998).

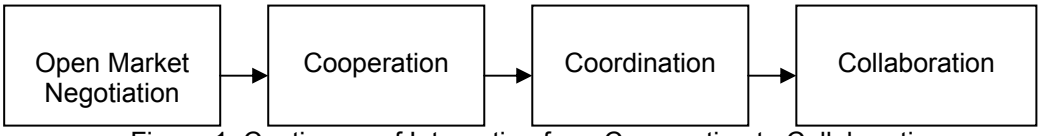

Figure 1: Continuum of Integration from Cooperation to Collaboration
(Source: Spekman et al., 1998)

However, this represents only one conceptual definition of collaboration. Since commencing this research, the authors noticed the lack of agreement and uniformity in the definitions pertaining to supply chain collaboration. Specifically, the literature reveals different characteristics and even has conflicting definitions. For instance, according to Simatupang and Sridharan (2002), a collaborative supply chain "means that two or more independent companies work jointly to plan and execute supply

chain operations with greater success than when acting in isolation" (p. 16). On the other hand, Lambert et al. (1996) suggest that a collaborative supply chain requires a particular degree of relationship among chain members. Additionally, Narus and Anderson (1996) define a collaborative supply chain as the cooperation among independent but related firms, sharing resources and capabilities, to meet their customers' most extraordinary needs.

To investigate these discrepancies, the authors undertook a review of some relevant definitions relating to the supply chain (refer to Appendix 1). Collaboration has been loosely defined as “any situation in which people are working across organisational boundaries towards some positive end” (Huxham and Vangen 2004) Or more narrowly described as a process of decision making among independent organisations involving “joint ownership of decisions and collective responsibility for outcomes” (Gray 1991). Alternatively, Nooteboom (2004) defines collaboration for what it entails, inter-organisational relations and mutual adjustment which is needed for utilisation of complementary resources from different organisations. Other authors have based collaboration around unique attributes. For instance, Schrage (1990) emphasises that the key components of collaboration involve mutually sharing processes, mutual understanding, common vision, sharing resources and achieving collective goals. Incorporating an inter-organisational dimension is one common element as the success of collaboration depends upon the ability and willingness of managers to build meaningful relationships and create trust (Schrage 1990).

Applying this concept to supply chains, Macbeth (1994) argues that this is premised upon the creation of long-term relationships, the development of complementary capabilities and engagement in joint planning. The ideal goal in terms of collaborative supply chains, is co-identification, where each party considers the other party’s objective as its own (Chopra and Meindl 2004). Hence, for the purposes of this study, a further important dimension concerns the co-identification aspects of interactions which demonstrate commitment and willingness to working together toward achieving collectively agreed upon aims.

Overall, there is a gap in the literature for a definition specifically tailored to the buyer-supplier relationship context. Hence, the author integrates different dimensions from previous studies, in terms of the concept and context, to propose the following revised definition of buyer-supplier collaboration:

> “A form of integration among independent (legal definition) organisations, operating in similar or related activities, involving joint ownership of decisions and responsibility for outcomes, which through cooperative actions demonstrate commitment to work together toward achieving goals.”

Collaboration

Some authors (e.g. Huxham and Vangen 2004; e.g. Zineldin and Torbjorn 2003) have concluded that problems and failures in collaborative ventures are more common than successes. Zineldin and Torbjorn (2003) found that over a third of strategic alliances end in failure. In a review of the extant literature in collaborative failures, Parung *et al.* (2004) conclude that most of the problems and failures seem to occur during the implementation stage. These authors identify three main reasons causes of failures: *inter-personal relationship; outcome performance;* and *organisational or structural.*

The most commonly cited reason for failed inter-firm collaboration is problems in the relationship between the participants (Parung et al. 2004). Many problems in the inter-organisational relationship have been identified such as: lack of trust (Child 2001; Child and Faulkner 1998); lack of commitment (Huxham and Vangen 2004); ineffective communication between partners (Mintzberg et al. 1996); differences in organisational culture (Bruner and Spekman 1998); and little attention to nurturing the working relationship (Das and Teng 1998). A second main reason for inter-firm collaboration failure is due to the lack of participant satisfaction with the performance outcomes of the collaboration (Parung et al. 2004). For example, Zineldin and Torbjorn (2003) found that the demise of the GM and Daewoo alliance was caused by the lack of productivity and not achieving financial benefits. The third main reason cited was based on the lack of participant satisfaction with the organisational structures, systems and procedures (Parung et al. 2004). Often a weakness in the structures and management supporting collaborative causes inertia (Huxham and Vangen 2004). Furthermore, Kanter (1994) suggests improving the collaborative systems can help eliminate problems with these alliances.

Some authors (e.g. Mattesich et al. 2001) have attempted to provide a comprehensive, multi-dimensional coverage of the factors that influence the chances that the collaboration will perform well or badly. Alternatively, other researchers (e.g. Lane and Bachmann 1998) have focused on in-depth investigations of the role of one particular factor in achieving successful collaboration. Overall, there are a lot of similarities in the constructs identified to facilitate successful collaboration in the extant literature. The most commonly cited attributes identified as influencing collaboration have been compiled from these studies, these include: shared vision/goals; mutual trust; distribution of power; conflict resolution; open communication/ information sharing; involvement of stakeholders/ commitment; and leadership and facilitation. However, there lacks a consensus on a set of critical success factors that enable collaboration in trading partner relationships.

Frameworks for Evaluating Cooperative Buyer-Supplier Relationships

The authors reviewed many frameworks which examine the factors influencing cooperative buyer-supplier relationships. This research expands on Fontenot and Wilson's (1997) comparison of the key success variables found in four different marketing frameworks (Anderson and Narus 1990; Dwyer et al. 1987; Mohr and Spekman 1994; Morgan and Hunt 1994) for evaluating buyer-supplier partnerships. Seven additional studies (Bensaou 1999; Bessant et al. 1994; Kanter 1994; Kumar 1996; LaLonde 2001; Monczka et al. 1998; Wilson 1995) were included since they offer a comprehensive evaluation and have been heavily cited from the supply chain management and/or marketing literature over the last ten years. In essence, each framework proposes how a unique combination of different factors can contribute to long-term buyer-supplier partnership success. A comparison of the factors proposed and/or tested in the eleven studies is displayed in Table 1.

Overall, twelve different overlapping constructs have been identified from the frameworks. Interestingly, each framework has a unique profile in terms of its linkages between the different factors. However, there are certain constructs that appear frequently across the studies. Overall, the most common construct is *information sharing* which appears in all the frameworks. This is closely followed by: *trust* in nine frameworks; *goals / coordination* in eight frameworks.

Each study proposes a distinct combination of different variables that contribute to successful long-term buyer-supplier relationships. The early frameworks mainly focus on information sharing, commitment, coordination, mutual dependence and trust as important attributes to success. For example, two studies (Anderson and Narus 1990; Morgan and Hunt 1994) on marketing channel relationships argued that trust encourages participants to work at cooperation and through iterative cycles can ultimately achieve it. While Mohr and Spekman (1994) confirmed the aforementioned characteristics, they also stressed the importance of conflict resolution but concluded that mutual dependence was not significant. Similarly, Monczka, Petersen et al. (1998) who investigated industrial purchasing alliances found the same core findings with the inclusion of mutual dependence. However, they concluded that commitment was not a significant predictor of partnership success.

Kumar (1996) studied dealer-manufacturer relationships and proposed that collaboration based on trust, rather than power and fear, coupled with mutual dependence are likely to produce greater benefits for both parties. Expanding the range of dimensions, LaLonde (2001) hypothesized that successful collaborative relationships should also contain the elements of: sharing knowledge; long planning horizon; multiple-level relationships; and process for sharing benefits and burdens.

Extending the scope of relationships evaluated, Bensaou (1999) studied the profiles of automotive OEM and first tier suppliers and categorised four different types of relationships. In contrast to the other frameworks, this article evaluated the common variables from the best performers in each type of relationship. Bensaou (1999) found that successful relationships within *strategic partnerships* exhibit a high level of mutual trust, early supplier involvement, extensive cooperation, and a high level of information exchange.

Table 1: Factors Contributing to Buyer-Supplier Relationship Success

Author	Goals / Cooperation	Trust	Commit-ment	Mutual Depend-ency	Power	Conflict	Shared Values	Information / Knowledge Sharing	Top management support	Uncertainty	Relationship Outcome (Expected Value)	Satisfaction
Dwyer et al. 1987		P	P	P	P	P	P	P			P	P
Anderson and Narus 1990	√	√		√	√	√		√	√		√	√
Bessant et al. 1994	√			√				√				
Kanter 1994	√						√	√	√			
Mohr and Spekman 1994	√	√	√	√		√		√			√	√
Morgan and Hunt 1994	√	√	√		P	√	√	√		√		
Wilson 1995	√	√	√		√			√			√	
Kumar 1996	√	√	√	√	√	√		√			√	
Monczka et al. 1998		√	√	√		√		√		√		
Bensaou 1999	√	√		√	√			√			√	
LaLonde 2001		√						√			√	

'P' indicates proposed but not empirically tested *(Source: Adapted from Fontenot and Wilson, 1997)*

In summary, each framework reviewed has proposed a unique combination of different factors that contribute to long-term buyer-supplier partnership success. At times, the conclusions are somewhat contradictory with one another. Hence, there lacks one universally accepted framework, or indeed, set of critical success factors (bar information sharing) where there is consensus. Furthermore, these studies are lacking in a number of respects.

(1.) Five of the frameworks (Anderson and Narus 1990; Dwyer et al. 1987; Kumar 1996; Mohr and Spekman 1994; Morgan and Hunt 1994) investigated consumer marketing channels as opposed to industrial purchasing buyer-supplier relationships. Whereas industrial purchasing relationships are often more complex than consumer market channels and involve joint sharing of new technology, cost savings, supplier development and other characteristics (Handfield et al. 2000).

(2.) The studies employed a variety of constructs that are not always clearly defined. A similar critique was drawn by Naude and Buttle (2000). Moreover, the vast majority of the reviewed studies did not differentiate the type of relationship as a critical dimension. Correspondingly, Fynes and Voss (2002) observed a major weakness of existing studies is the limited conceptualisation of the nature of the buyer-supplier relationships.

(3.) Many of the reviewed studies (Anderson and Narus 1990; Dwyer et al. 1987; Mohr and Spekman 1994; Morgan and Hunt 1994) only specified *one* measure of success which was based on the 'satisfaction' (or success) of the 'cooperation' (or 'partnership'). These assessments failed to include measures of cost reduction, quality, technology use, lead-time or new product development. Furthermore, the operationalisation of the success measure is often limited to a few questions based on perceived satisfaction with the relationship. In their meta-analysis of satisfaction, Geyskens *et al.* (1999) concluded that a distinction needs to be drawn between economic and non-economic satisfaction.

(4.) A majority of these frameworks examined buyer-supplier relationships in a single industry, potentially limiting their applicability to other contexts.

(5.) Finally, all the reviewed frameworks (except Kumar 1996) use data from static, wide-scale surveys to test their models. This approach has limitations in terms of: the depth of constructs; temporal analysis of the relationships; and scope for triangulation that field study methodologies can accommodate.

Table 2: Synthesis of Contributing Factors from the Literature

Characteristics of Buyer-Supplier Relationships	Key Success Factors for Collaboration	Antecedent Condition	Change during implementation
Goals / Cooperation	Shared vision / goals	√	√
Trust	Mutual trust	√	√
Dependence	Mutual interdependence	√	√
Power	Appropriate distribution of power	√	√
Shared Values	Sharing common beliefs		√
Top Management Support	Senior management commitment	√	√
Uncertainty	-	√	√
Quality of Communication	Open communication		√
Information Sharing	Open information sharing		√
Behaviour Change / Participation	Involvement of stakeholders		√
Commitment	Commitment to action		√
Conflict	Conflict resolution		√
-	Skilled leadership & Facilitator		√
Relationship Outcomes	-		√
Satisfaction	Attainment of collaboration goals		√

Synthesis of Success Factors from Buyer-Supplier and Collaboration Literatures

This section integrates the factors that have been associated with the success of cooperative trading partner relationships from the extant literature. Interestingly, the authors discovered similar key attributes across both sets of literature - buyer-supplier and collaboration. As displayed in Table 2, the buyer-supplier literature considered all the attributes except *leadership & facilitation*.

In comparison, the collaboration studies contained all the constructs except *uncertainty* and certain components of *measures of success*. Often the collaboration literature extends or modifies the concepts in line with the idiosyncratic environs of collaboration. Overall, these different perspectives revealed significant overlapping constructs which highlights the need to employ an integrated approach. Such an approach can facilitate a deeper understanding of the complexities involved when dealing with collaboration in buyer-supplier relationships. For the purpose of this study, all the constructs were considered to be dynamic and can alter during the implementation of the collaborative project.

The extant literature and initial pilot study findings created the foundation for the propositions of the study. Readiness refers to the level of aptitude within the organisation to adopt and implement collaborative practices with this supply chain partner. This construct is based upon the current circumstances of each organisation as indicated by: *levels of ICT interaction with the supply chain partner; frequency of meetings; existence of shared goals; top management support; existence of a project champion; history of joint projects* and *ICT for competitiveness*. Although these multiple indicators are considered on their own merit, the collective group allows for a more comprehensive picture of the state of readiness. Hence, the purpose of this analysis is to determine if the initial levels of readiness had any effect on the eventual impact of collaboration.

Proposition 1: Relationships with greater impact, compared to relationships with lesser impact, will exhibit higher levels of readiness.

The capability construct assesses an organisation's ability to assemble, integrate, and deploy valued resources (Russo and Fouts 1997). This capability level is a combination of *organisational size, willingness to commit financial resources* and *IT sophistication*. At the beginning of the project, each variable was positioned according to a combination of company information and questionnaire responses. Similar to the readiness construct the different variables were compiled to obtain a collective measure to determine any effect on the eventual impact of collaboration. The following framework proposition is investigated below:

Proposition 2: Relationships with greater impact, compared to relationships with lesser impact, will exhibit higher levels of capabilities.

Expected benefits refers to the "level of recognition of the relative advantage" (Iacovou et al. 1995) that the collaborative project can provide the organisation. This construct encompasses two types of benefits: Operational Benefits – day to day operational improvements in terms of efficiency and effectiveness; Strategic Benefits – longer-term strategic objectives extending beyond immediate improvements. Both types of expected benefits were ascertained from the pre-implementation questionnaire. These responses provided evidence to examine the following proposition:

Proposition 3: Relationships with greater impact, compared to relationships with lesser impact, will exhibit higher levels of expected benefits.

Supplier dependency was assessed based on percentage of sales volume and their perception of dependency in relation to the buying firm. Similarly, buyer dependency is characterised by their percentage of purchase volume as well as their perception of dependency on this supplier. The following proposition is investigated below.

Proposition 4a: Relationships with greater impact, compared to relationships with lesser impact, will exhibit higher mutual dependency (tighter coupling).

Another consideration in trading partner relationships is the ‘trust’ dimension. Trust is defined as “the ability to reliably predict the actions of the other party in the relationship and the belief that the other party will not act opportunistically if given the chance to do so” (Jap 2001). The initial questionnaire instrument measured each participant’s perception of trust in their trading partner in terms of: *adherence to business agreements; delivering on promises and meeting deadlines;* and *consistent in business dealings.* Integrating these elements together produced a composite trust level which was compared with the post-implementation results to examine the framework proposition below.

Proposition 4b: Relationships with greater impact, compared to relationships with lesser impact, will exhibit a higher degree of trust.

For this study, the power balance is ascertained by comparing each partner's organisational size and the level of influence. The difference is used as an indicator of the power level in the relationship. Further evidence was collected on the existence of pressure from each trading partner. A more powerful firm can exert pressure on the partner to adopt (or at least conform) to project initiatives. However, Inkpen and Beamish (1997) argue that perceptions of power imbalance inevitably lead to feelings of mistrust and collaborative relationships work more easily when there are no major disparities of power. The following framework proposition is examined below:

Propositions 4c: Relationships with greater impact, compared to relationships with lesser impact, will exhibit a higher degree of power (in both partners).

Environmental uncertainty is a construct that captures the variability and risk in material and information flows in different processes along the supply chain (Davis 1993). Two variables were assessed in the initial questionnaire: *the level of uncertainty in the trading environment* and *uncertainty in the trading partner's forecasting (or production capabilities)*. The proposition below is based on the assumption that firms displaying uncertainty in the environment will move towards more integrated transactions thereby offering increased potential for collaboration with their trading partner.

Proposition 5a: Relationships with greater impact, compared to relationships with lesser impact, will exhibit higher levels of environmental uncertainty.

Partnership uncertainty is a construct based on the uncertainty a firm perceives about its relationship with a business partner (Bensaou and Venkatraman 1996). In contrast to all the other propositions, a *lower level* of partnership uncertainty (in the initial phase) should facilitate a greater amount of change overall. Hence, the following proposition is tested below:

Proposition 5b: Relationships with greater impact, compared to relationships with lesser impact, will exhibit lower levels of partnership uncertainty.

One way to measure the success of the implementation process is based on the amount of behavioural change. To achieve collaboration between trading partners requires a change in behaviour involving joint ownership of decisions and collective responsibility for outcomes (Gray 1991). Accordingly, the evidence below tests the following proposition:

Proposition 6a: Higher behavioural change during implementation will lead to greater impact on collaboration within buyer-supplier relationships.

The supply chain literature stresses the importance of effective and sustained communications in improvement processes. Hence, the framework prescribes the importance of improving the quality of communication to achieve collaboration practices between trading partners. Accordingly, the following proposition is investigated:

Proposition 6b: Higher change in quality of communication during implementation will lead to greater impact on collaboration within buyer-supplier relationships.

A central premise of collaboration is the extent to which companies are willing to share information and give up their individualism in favour of more collaborative partnerships (Reekers and Smithson 1994). Hence, this framework puts forward the importance of information sharing in the relationship to achieve impact from collaboration. Thus the following proposition is tested:

Proposition 6c: Higher change in information sharing during implementation will lead to greater impact on collaboration within buyer-supplier relationships.

Research Methods

Many previous studies evaluating buyer-supplier relationships deploy large-scale surveys using a static cross-sectional approach. This method often excludes the process involved in implementation, which is of paramount importance in relationships nurturing collaboration. Furthermore, many political and environmental aspects are not captured by these static rational models (Grover 1993). By taking a process-based approach, the researcher can obtain more insight into the dynamics of the operationalisation, which distinguishes "collaborative technologies" from those based around coercion.

A process-based approach can examine the affects in various stages of implementation and impact of all the participants. In order to investigate the dual perspectives of the dyadic relationship, this study examines the supply network participants of both buyers and suppliers.

The design of this study combined multiple forms of investigations including literature analysis; empirical studies and observations through a field study methodology. This field study approach consisted of deploying two questionnaires complemented by observations and interviews during interim periods of the initiation and implementation process of a collaboration project. These questionnaires were designed to investigate the main contributing factors to the partnership based around constructs shown to be significant in previous studies and validated through a pilot study involving one group of supply network participants. All the participants were grouped according to their dyadic relationship and categorized based upon the level of contributing factors. This provided the empirical data to revise an earlier literature-based, conceptual model. Finally, a focus group forum was held to discuss the preliminary results with the participants in order to validate the questionnaire results and contextualize the findings. By incorporating multiple sources of evidence, this study allows the data to converge in a triangulating fashion (Stoecker 1991).

The empirical data consists of three supply networks, each comprising a systems integrator and three or four suppliers. A system integrator (SI) is defined as a manufacturing organisation that integrates components provided by suppliers. The suppliers ranged from small enterprises (50) to medium enterprises (up to 250) and were pre-selected due to their strategic significance. All these firms participated in an EC-funded project called *Collaborative Improvement Tool for the Extended Manufacturing Enterprise* (Co-Improve). This academic-industry research project spanned the period 2001 to 2004 and consisted of Dutch, Danish and Italian supply networks. This Co-Improve project was initiated by the three manufacturing firms to promote collaboration with certain existing first-tier suppliers. Overall a total of 10 dyads were examined, for consistency the same field study procedure was deployed for each participant involved in the project.

Research Findings

The main purpose of the analytical framework is to evaluate the antecedent conditions and implementation dimensions that influence the impact of collaboration in buyer-supplier relationships. To this end, the author produced a 'case predictor-outcome matrix' (Miles and Huberman 2004) to arrange the cases according to the impact of collaboration. This matrix provides data from each case based on the main antecedent constructs, enablers and implementation variables identified as important contributors to the impact of collaboration.

In total, sixteen separate indicators were combined to assess the perceived level of change from each participant. Measurement of each change dimension was based on a five-point Likert scale ranging from '-1' (decrease) to '+3' (significant increase). Interestingly, once the author compiled the total amount of perceived changes across all the variables, the respondents naturally fell into three distinct categories: *high change; medium change; and low change*. The first category (high change respondents) reported the greatest improvement during the project with an increase across all the change variables from 20 to 30. Next, the moderate change group indicated a medium increase in total change between 10 and 20. Finally, the low change respondents reported only limited changes (if any) from 0 to 10.

As illustrated in Table 3, the antecedent conditions provide evidence of the importance of higher *readiness*, *capability* and *expected benefits* for achieving impact from the collaborative project. This is most apparent when comparing the high/ moderate impact dyads to the low impact dyads. To test the trends, Miles and Huberman (2004) suggest a non-parametric analysis based on a cumulative score of associated variables by comparing the medians between two sub-groups. A Mann-Whitney U test was deemed suitable for a comparison of the two independent samples with no assumptions about the normal distribution of the data (Siegel and Castellan 1988). The test results found that there is a difference between the high change and low change groups based on their total readiness scores ($z = -1.97$, $p = 0.05$). This finding indicates that the median level of readiness for the high change dyads is greater than the low change dyads. Repeating this non-parametric procedure, the Mann-Whitney U test results indicate there is a difference between the high change and low change groups on the total capabilities scores ($z = -2.03$, $p = 0.04$). This result indicates that the median level of capabilities for

the high change dyads is greater than the low change dyads. The Mann-Whitney U results indicate there is a difference between the high change and low change groups on their expected benefits scores ($z = -1.9$, $p = 0.06$). Although not as significant as the readiness and capabilities results, this finding does offer some support that the median level of capabilities for the high change dyads is greater than the low change dyads. However, the absence of a high degree of variability in the antecedent conditions suggests the presence of 'intervening variables' (Miles and Huberman 2004).

The importance of *communication behaviour* in achieving a successful collaboration has been stressed by many previous IOR studies (Mintzberg et al. 1996; Mohr and Spekman 1994; Monczka et al. 1998). This study proposes that the level of impact achieved during the project is directly related to the extent of change in communication behaviour, namely *quality of communication*, *information sharing* and *behaviour change*. To this end, the authors performed a nonparametric test to measure the correlation between behavioural change and the five impact variables. A summary of the Spearman R correlation coefficient results (Siegel and Castellan 1988) show correlation is significant at the 0.01 level between behaviour change and four variables: *trust change*, *relationship change*, *knowledge sharing* and *process change.* A strong correlation (significant at the 0.01 level) between quality of communication change and *relationship change* and *goal sharing change*. Further results reveal correlation at the 0.05 significance level between quality of communication change and *trust change* as well as *process change*. Further correlation tests examined the relationship between information sharing and the impact variables. The strongest relationship correlation (significant at the 0.01 level) was found with *trust change*, *knowledge sharing*, and *process change*. There was also a correlation (significant at the 0.05 level) with *relationship change*, and *goal sharing change*.

By far the strongest indicator of the level of impact is found in the three enablers (or disablers): *commitment*; *involvement* and *conflict resolution approach.* A strengthening of commitment and high level of involvement is associated with a moderate (or high) relationship change, trust change and process change. This implies that the cooperation element (as expressed through commitment and involvement) leads to trust change, relationship change and process improvement. Furthermore, the 'functional' conflict resolution approaches of problem solving and persuasion were more apparent in the dyads achieving the highest impact. In contrast, the avoidance of conflict resolution was exclusively consigned to the low impact dyads.

In summary, the two categories of impact are evaluated below.

Performance Impact:

- *Efficiency improvement* was often associated with sustaining or increasing involvement coupled with an improvement in all the communication behaviour indicators.
- P*rocess change* is related to levels of involvement, strength of commitment and all the communication behaviour change indicators.

Relationship Impact:

- *Relationship change* is linked to trust change, improvement in quality of communication and active involvement in the project.
- *Knowledge sharing* is closely associated with information sharing, trust change and behavioural change.
- *Trust change* is associated with higher levels of involvement, change in all three communication behaviours and strengthening commitment.
- *Goals sharing change* was low in most cases, however the two dyads reported the most change had 'problem solving' conflict resolution approach and a substantial quality of communication increase.

Table 3**:** Case Ordered Matrix: Antecedents, Enablers & Communication Behaviours Related to Impact of Collaborative Project

	Antecedent Conditions			***Enablers (or Disablers)***			***Communication Behaviours***			***Impact of Collaborative Project***					
Dyads / Scope of Impact	Readiness	Capability	Expected Benefits	Commitment *(Change)*	Involvement *(Change)*	Conflict Resolution Approach	Information Sharing	Behaviour Change	Quality of Communication Change	Performance Improvement	Process Change	Relationship Change	Trust Change	Knowledge Sharing	Goal Sharing Change
High Impact															
Danish 1	high	mod/ high	mod	strengthen	high ⇨ high	problem solving	mod/ high	mod.	mod.	mod/ high	mod/high	mod	mod.	mod/ high	low
Danish 3	mod.	low	low/ mod	strengthen	mod ⇨ high	persuasion / problem solving	mod.	high	mod/high	mod.	mod.	mod/ high	high	low/ mod	low
Moderate Impact															
Italian 2	mod.	high	mod/ high	strengthen	high ⇨ mod/high	persuasion	low/ mod	low/mod	mod/high	low	mod.	mod.	low/ mod	low	low/ mod
Italian 3	mod/ high	low	low/ mod	strengthen	high ⇨ high	persuasion	low	low/mod	mod.	low	low/mod	mod.	mod.	low/ mod	none/ low
Italian 1	mod.	high	mod/ high	status quo	high ⇨ high	persuasion	mod/ high	mod.	low/mod	mod.	mod.	none/ low	low	mod./ high	low
Italian 4	mod.	low/ mod	low/ mod	status quo	high⇨ mod/high	persuasion	low/ mod	low/mod	mod.	low/ mod	none/low	mod.	mod.	low	low
Low Impact															
Danish 2	low	low/ mod	low	status quo	mod ⇨ mod	persuasion	none	none/low	mod/high	low/ mod	low/mod	low/ mod	none	none	low/ mod
Dutch 1	mod.	mod	mod	reduction	high ⇨ mod	avoidance	low	low	low/mod	low	low	none /low	none	none	none
Dutch 2	mod.	low	low	status quo	low ⇨ low	avoidance	low	none	none/low	low	low	none	none	none/ low	none
Dutch 3	low	low	low	reduction	low ⇨ low	avoidance	low	none/low	decrease/ low	none	low	none	none/ low	none/ low	none

Discussion

Findings from the empirical study highlight the importance of the contextual situation in each dyadic relationship prior to commencing a collaborative venture. In support of the majority of the literature, antecedent conditions were found to be important in three areas: (1.) organisational conditions; (2.) inter-organisational factors; (3.) individual expectations.

1.) The importance of a priori organisational elements concurs with Ring and Van de Ven (1994) that "prior interactions led to the creation of high level of trust between the parties, they may be able to negotiate, make commitments and begin to rapidly execute a cooperative relationship" (p. 1994). As a result, cooperative relationships among parties who have had prior relationships tend to develop far more quickly and efficiently than parties who were strangers. In disagreement with many authors (e.g. Whipple and Frankel 2000), the perception of top management support was not verified by the findings. However, the change of support during the project was significant, suggesting that garnering top management support as the project progresses may be important. Top management involvement should be maintained throughout the relationship (Kanter 1994).

In partial agreement with many authors (e.g. Das and Teng 1998), the existence of prior shared goals was a factor for successful relationships, albeit some relationships achieved collaborative improvement in their absence. This suggests that some level of collaborative improvement can be achieved despite the lack of overarching goals with the relationship. In essence, the empirical evidence points toward shared values as being more important. Shared values, the extent to which partners have common beliefs as to the importance and appropriateness of certain behaviours, goals and policies in the partnership (Fontenot and Wilson 1997; Morgan and Hunt 1994).

2.) In agreement with many authors (e.g. Handfield et al. 2000; Kumar 1996), trust was necessary to harness collaborative inter-organisational efforts. Furthermore, a significant indicator of relationship improvement was the level of trust change occurring during the project (refer to next section). However, in contrast to the bulk of the literature (e.g. Heide 1994) the level of dependency was not a significant factor in the most successful relationships. Although one reviewed study, Mohr and Spekman (1994) concluded that mutual dependence was not related to any measure of partnership success.

3.) The study revealed that participants with higher expected benefits were more actively involved in the initial project phase. This result is neglected in most of the reviewed buyer-supplier frameworks examining successful cooperative partnerships. This implies that expectations in terms of operational and strategic benefits are both important ingredients in successful collaborative projects.

Implementation

This study adds substance to the notion that communication problems are associated with a lack of success in strategic partnerships (Mohr and Spekman 1994; Monczka et al. 1998). The findings imply that without communication behaviour change from both participants during the project, collaborative improvement does not materialise and inertia sets in. In agreement with Wilson and Jantrania (1995) the implementation of relationships requires a reinforcement of behaviours that generate trust, mutual goals and adaptation, and other critical variables in the creation of a strong relationship. This offers further support for the correlation of collaborative success with a high level of perceived change in relationship and trust change. The significance of trust change during the project, corresponds to Huxham and Vangen's (2004) notion of a 'trust building loop', in which trust can be built incrementally via successful implementation of modest collaborative initiatives.

Three important enablers surfaced during the project implementation: involvement; commitment; and conflict resolution approach. The level of involvement was found to be an important enabler with a correlation to the level of perceived behavioural change during the project implementation phase. Concurring with Madhok et al. (1998) repeated interaction implies increasing amounts of time and effort devoted to the relationship. The importance of a strengthening degree of commitment, as evidenced from the process data, surpasses the survey results from other studies (e.g. Mohr and Spekman 1994; Morgan and Hunt 1994). These authors identified that the more successful relationships showed a stronger degree of commitment towards the partners, thus increasing the firms' willingness to continue their cooperative exchange. In contrast, this study discovered a strengthening

(as opposed to a strong) degree of commitment during the project was a better indicator of the impact of collaboration achieved. This concurs with Kwon and Suh's (2004) notion that accomplishing commitment is a key success factor in achieving supply chain integration.

These findings generally agree with other studies (e.g. Mohr and Spekman 1994; Monczka et al. 1998) that a higher use of constructive conflict resolution techniques including persuasion and joint problem solving, as opposed to 'smoothing over' or 'avoiding' issues, leads to successful partnerships. However, an additional discovery revealed that the most extraordinary change within each type of relationship had a constructive conflict resolution coupled with an appropriate level of intervention to match the requirements of the relationship (i.e. project coordination and information sharing). This evidence supports Bensaou's (1999) assertion for the need to match the management of resources deployed to the relationship requirements in order to move towards a successful buyer-supplier partnership.

Impact

The literature provides little guidance in terms of methods for evaluating the impact of collaboration in supply chain initiatives. Contrary to some collaborative studies (Huxham and Vangen 2005; Kanter 1994), who classify the attainment of all benefits as collaborative advantage, the empirical findings suggest the existence of interim categories of collaborative improvements. Specifically, collaborative initiatives can lead to different levels and types of improvement without necessarily attaining a collaborative advantage. Overall, three patterns emerged that characterised the impact from collaborative initiative projects – *inertia, improvement or strategic advantage*. Interestingly, the findings revealed no significant differences in the pattern of impact among the four types of relationships categories (as outlined in Figure 1). Notably, each category of relationship contained 'inertia' and 'improvement' levels with no evidence of any relationships progressing to the 'strategic advantage' stage. This supports Bensaou's (1999) findings who concluded that there was not one single category of buyer-supplier relationships who outperformed the others.

Firstly, the low change group (four dyads) revealed collaborative inertia since they were found to be relatively unproductive with minimal impact during the project. Their results suggest that the project did not achieve a level of operational advantages or impact from collaboration within their relationship commensurate with the resources expended. Of the four dyads, three were found in the Dutch network and one in the Danish group. Notably, all these dyads were also characterised as having a stable (or decreasing) degree of commitment and stagnant (or weakening) participation levels in the project. This provides support for Huxham and Vangen (2005) argument that 'collaborative inertia' is often the outcome from collaborative situations.

Secondly, the medium and high change groups (six dyads) achieved slight, moderate or significant levels of outcomes resulting in varying degrees of *collaborative improvement*. This indicates that the project had an impact on the trading relationships in terms of operational efficiency and possibly relationship improvement, however not necessarily a strategic gain. In the Danish 3 case, a purchasing agreement was signed for the first time providing some evidence of the relationship progressing towards attaining a strategic advantage. A strategic advantage entails obtaining a sustainable collaborative advantage over competitors (Kanter 1994). However, it is not surprising that this level of strategic advantage was not attained, given the limited timeframe of the project study.

The empirical findings largely support the integrated framework as developed from the extant literature for evaluating the impact of collaboration in buyer-supplier relationships. However, the findings revealed three significant issues that could be usefully incorporated into an integrated framework (see Figure 2). Firstly, the impact of the antecedent conditions was not as significant as the factors during the implementation stage. Secondly, the evaluation of the implementation process highlighted the significance of certain enablers (or disablers) namely, *involvement*, *commitment* and *conflict resolution*. These enablers (or disablers) influence the level of communication behaviour change. In addition, the importance of trust change acting as an intervening variable was supported. Finally, the incremental nature of building collaboration emphasised the necessity of incorporating an interim phase based on the outcome of collaborative initiatives during the implementation of the project cycle. The dynamic process of collaboration building is represented by the three arrows which illustrate the cyclical influence between the enablers, implementation dimensions and outcomes of collaborative initiatives.

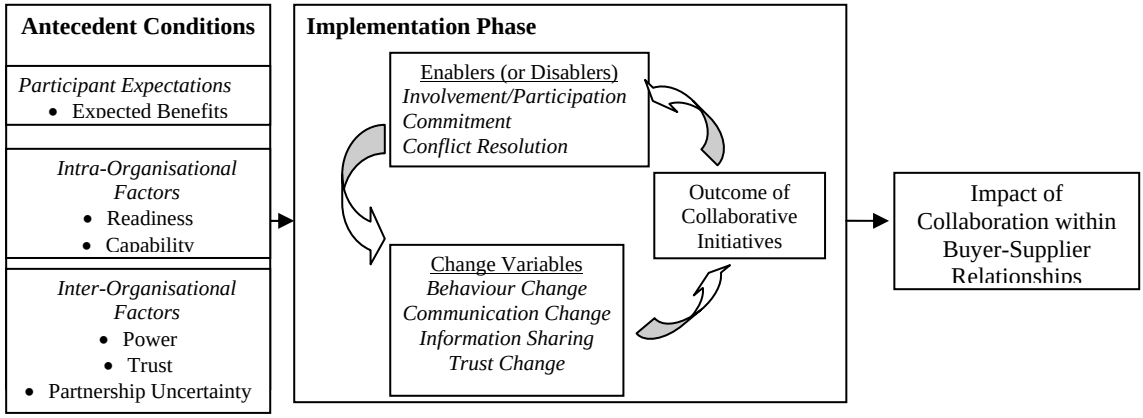

Figure 2: Framework for Assessing the Impact of Collaboration on Buyer-Supplier Relationships

What emerges from the integrated framework is the tight interconnection between the antecedent factors, which provide the contextual conditions, and the implementation dimensions. This implies that separating the study of antecedent factors from a concurrent study of the implementation process may provide a view of the impact that is partial and insufficient. Moreover, the influence of enablers during the implementation process also contributes to the impact of collaboration, particularly in the areas of *involvement*, *commitment* and *conflict resolution* approach. In practice, interplay between these enablers and the implementation change elements occurs repeatedly throughout the implementation process. As such, a cyclical process transpires in which the positive or negative outcome of each initiative in turn affects the enablers and implementation change variables. At the culmination of the project, the outcome of this iterative phase determines the impact of collaboration on the buyer-supplier relationships. This is similar to Vangen and Huxham (2003) who argue that trust (and commitment) can be "built incrementally via successful implementation of modest collaborative initiatives." (p. 25) Ultimately constructing a 'small-wins' approach (Bryson 1988), in which collaborative advantage can be built through mutual experience of improvements gained via successful implementation of initiatives.

Contribution

This research has constructed a new framework based on an integration of the key success factors in buyer-supplier relationships identified from the diverse literature and empirically tested through a three year field study. Overall, the comparative case analysis illustrates the capability of the integrated framework to evaluate the impact of collaboration in buyer-supplier relationships. The key findings and framework can assist supply chain managers and industry practitioners. In a practical context, the outcome of this research can provide assistance in designing collaborative projects through selection of appropriate supply chain partners and improvement initiatives. In particular, this research offers some insights into implementing a successful collaborative improvement project. A manager seeking to deploy a collaborative improvement programme needs to be aware of the criticality of the implementation process in order to encourage cooperation and trust through interactions. To achieve a successful impact from collaborative improvement requires facilitation to support the launch and progression of process and relationship initiatives. Problems arise when communication between the two parties is weak and the mutual benefit of the project is not reiterated at regular intervals. In particular, the management approach needs to:

- Establish an intervention programme that facilitates behavioural change amongst the participants;
- Promote active participation and involvement in both buyer and supplier participants;
- Maintain or build commitment in the project and partnership;
- Intervene with a conflict resolution approach suitable to each relationship context.

Managers need to be cognizant of the intervention programme which involves coordination and conflict resolution, information and knowledge exchange, and dedicated resource allocation. To appropriately manage a collaborative improvement project, the intervention level required varies according to the complexity of the relationship. Table 4 can be used for managers to identify the level of intervention necessary to match each relationship. Following Bensaou (1999), who suggests that

there are two paths to relationship failure: *under-designed* and *over-designed* relationships. For instance, in a market-oriented relationship only minor intervention is required to match the lower complexity but the potential collaborative improvement is limited. Any further intervention is over-resourced when compared to potential value. In contrast, a collaborative partnership requires intensive management intervention although it offers the potential to achieve a significant level of behavioural improvement. However, if the collaborative objectives are not achieved, the high intervention requirements can lead to a diminished return on investment.

Table 4: Matching Intervention Requirements with Complexity of Relationship

Complexity Of Buyer-Supplier Relationship ↑			
Collaboration	Under-designed	Under-designed	Match
Coordination		Match	Match
Cooperation		Match	Over-designed
Market-Oriented	Match	Over-designed	
	Low (Laissez-faire)	Medium (Top Down)	High (Immersive)

Management Intervention Requirements

After matching the intervention requirements, managers should select the most appropriate type of improvement initiatives based on the positioning of each relationship. Lower category relationships (market-oriented & cooperation) are advised to focus on incremental, process-based initiatives. The higher categories (coordination & collaboration) can strive for behavioural change through strategic collaborative initiatives. By limiting the project to the most appropriately chosen partners and initiatives, managers can reduce the risk of failure as often occurs during the implementation process of collaborative projects.

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Appendix

Definitions of Collaboration as Related to the Supply Chain

Author (s)	Definition elements	Focus	Level of Context	Significance to Buyer-Supplier Relationships
Gray (1991)	A process of decision making among independent organisations involving joint ownership of decisions and collective responsibility for outcomes.	Decision-making	Organisational	Medium
Huxham and Vangen (2004, 2005)	working across organisational boundaries towards some positive end	Collaborative Advantage	IOR	Medium
Kanter (1994)	information sharing and combines multiple stakeholders, mutual benefits and the creation of value.	Collaborative Advantage	IOR	Medium
Lambert et al. (1996)	requires a particular degree of relationship among chain members	Relationship intensity	Supply Chain Relationships	High
Macbeth (1994)	creation of long-term relationships, the development of complementary capabilities and engagement in joint planning.	Cooperation and joint actions	Supply Chain Relationships	High
Mattesich et al. (2001)	a mutually beneficial and well-defined relationship entered into by two or more organisations to achieve common goals	Collaborative Advantage	IOR	Medium-High
Narus and Anderson (1996)	cooperation among independent but related firms, sharing resources and capabilities, to meet their customers' most extraordinary needs.	Cooperation towards customer needs	Supply Chain Relationships	High
Nooteboom (2004)	inter-organisational relations; mutual adjustment which is needed for utilisation of complementary resources from different organisations.	Cooperation and joint actions	IOR	Medium
Schrage (1990)	key components involve mutually sharing processes, mutual understanding common vision, sharing resources and achieving collective goals.	Collaborative actions	Individual activities	Medium
Simatupang and Sridharan (2002)	two or more *independent* companies work jointly to plan and execute supply chain operations with greater success than when acting in isolation	Joint actions	Supply chain operations	High
Spekman, Kofman and Mohr (1998)	the last step of a transition in interactions from open-market negotiation through cooperation to collaboration	Relationship intensity	Supply chain operations	High