The Effect of Relationship Characteristics on Relationship Quality and Performance

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Abstract

In this paper we develop a model of relationship characteristics (duration, presence of supplier awards, degree of product standardisation/customisation, tier position), supply chain (SC) relationship quality and SC performance. How relationship characteristics moderate the effect of SC relationship quality on performance provide useful insights into the question of *why* some relationships work and others do not. We use data from the electronics sector in Ireland to test our model. Our results provide mixed support for the model, with the effects of both duration and supplier awards being supported but degree of product standardisation/customisation and supply chain tier position not supported. We reflect on these findings and suggest a research agenda based on our results.

Keywords: Supply chain, relationships, performance, relationship characteristics.

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1. Introduction

The importance of managing inter-organisational relationships and their impact on performance is a topic which has attracted much management and academic interest. Global supply chains present managers with complex decisions which require competencies not only in the very tangible and fast-moving area of logistics management but also in areas requiring 'softer' competencies such as relationship management. In this context, both Naude and Buttle (2000) and Parsons (2002) have used the term supply chain (SC) relationship quality to describe the higher order construct which collectively incorporates relationship dimensions such as trust, adaptation, communication and co-operation. Building on this, Fynes et al. (2004; 2005) have used contingency frameworks to investigate if variables such as the competitive environment and uncertainty have an intervening effect on the SC relationship quality – SC performance relationship. These contributions provide useful insights into the question of *why* some relationships work and others do not. In this paper we extend this work by investigating if relationship characteristics moderate the effect of SC relationship quality on performance. More specifically we investigate the impact of factors such as the duration of the relationship, gaining supplier awards, product standardisation/customisation complexity and supply chain tier on the relationship between SC relationship quality and SC performance.

The remainder of this paper is structured as follows: firstly, we first review the theoretical context and outline our hypotheses; secondly, we describe our methodology: thirdly we develop and test a model of SC relationship quality, relationship characteristics and SC performance; fourthly, we reflect on the implications of our study and conclude with some suggestions for future research.

2. Theoretical Background and Hypotheses

2.1 Supply Chain Relationship Quality

A variety of theoretical frameworks have been used in order to explain the nature of SC relationships. These include transaction cost, political economy, economic sociology, social exchange and resource dependence theories (Robicheaux and Coleman, 1994). These theoretical frameworks have all contributed to the modelling of SC relationships in their identification of the underlying dimensions of relationships. Transaction cost economics view relationships as governance structures to reduce the hazards of uncertainty and asset specificity, political-economy regard dyadic channel relationships as dynamic processes based on the interplay of context and organizational forms; economic sociology regards the relationship as socially oriented structures formed by networks of individuals where trust plays a primary role; social exchange theory posits that relationships arise from the need to provide mutually satisfying rewards; and resource dependence views the organisation as seeking to exploit and recombine unique and inimitable resources that may be outside the realm of the organisation and where relationships lead to the appropriation of these resources. These frameworks are different in their selection of appropriate units of analysis (such as firm, dyad or network). While these theories were framed with varying perspectives, they indicate some common issues with respect to the management of business relationships. They provide some interesting indications concerning the interaction processes within relationships, how they develop and how they are managed.

This paper draws on contributions from the above theories. The predominant view from empirical studies in this domain suggests that practices in SC relationships have moved from the transaction cost economizing dyadic perspective where business relationships are seen as isolated phenomena, to the relationships perspective, which stresses interdependence, connectedness and intimate relations (Sako, 1992; Lamming, 1993; Ellram and Krause, 1994; Handfield, 1994; Harland, 1996; Fynes and Voss, 2002). The assessment of relationships has been considered in a number of ways employing a variety of different constructs ranging from relationship quality (Grönroos, 1984; Gummesson, 1987; Crosby et al., 1990), relationship

value (Wilson and Jantrania, 1996) and partnership success (Mohr and Spekman, 1994). These constructs are not always clearly defined or distinguished from each other. However, the major dimensions of relationship quality identified in the literature are remarkably consistent and include trust, adaptation, communication and co-operation (Naude and Buttle, 2000). The logic of aggregating these variable as relationship quality is supported by the empirical research conducted by the IMP Group who consider relationship quality as the relationship climate or atmosphere comprised of relational dimensions of trust, adaptation, communication and co-operation (Håkansson, 1982). This argument is supported by de Búrca (1999) who found that managers do not necessary delineate between elements of relationship quality such as trust, adaptation, communication and co-operation but instead treat them as an integrative entity.

Trust has been defined as "the firm's belief that that another company will perform actions that will result in positive actions for the firm, as well as not take unexpected actions that would result in negative outcomes for the firm" (Anderson and Narus, 1990, p.45). Adaptation occurs when buyers and suppliers invest in transaction-specific investments (Heide and John, 1988). Communication is "the formal as well as informal sharing of meaningful and timely information between firms" (Anderson and Narus, 1990, p. 44). Frequent and timely communication is important because it assists in resolving disputes and aligning perceptions and expectations (Morgan and Hunt, 1994). Co-operation refers to situations in which firms work together to achieve mutual goals (Anderson and Narus, 1990). Because conflicting behaviours can co-exist temporarily with co-operative actions, co-operation is not simply the absence of conflict (Frazier and Rody, 1991). Co-operation in exchanging information on production schedules, new products/processes and value analysis can both reduce product costs and improve product/process innovations (Landeros and Monczka, 1989). These dimensions reinforce each other in terms of enhanced relationships. In an existing relationship all of these dimensions will be positively correlated and are indicators of SC relationship quality. We therefore define SC relationship quality as the degree to which both parties in a relationship are engaged in an active, long-term working relationship and operationalise the construct using indicators of trust, adaptation, communication and co-operation. We acknowledge that there may be some other

constructs which could possibly be included in SC relationship quality but posit that our conceptualisation is balanced in terms of parsimony and comprehensiveness.

2.2 SC Performance

The impact of SC linkages on operational and business performance has been the subject of a number of empirical studies. These studies have encompassed a variety of SC definitions, performance measures and methodologies. For example, Narasimhan and Jayaram (1998) found that relationship quality led to superior operational performance. They examined the relationship between sourcing decisions, manufacturing goals, customer responsiveness and manufacturing performance using structural equation modelling. They found that integrating SC activities involves aligning sourcing decisions achieves manufacturing goals in terms of dependability, flexibility, cost and quality. Additionally, Krause et al. (1998) in their study of reactive and strategic supplier development found that not only did the strategic focus on supplier development bring operational benefits such as shorter order cycle times, higher quality levels and increased delivery reliability but also was important as a source of competitive advantage to firms with more certainty and continuity within the supply base. This idea of certainty and continuity is echoed by McEvily et al. (2000) who contend that knowledge is more readily diffused between buyers and sellers when firm-specific investments are made signalling credible commitments of continuation for the relationship.

The link between relationship quality and performance is very apparent in Uzzi's (1997) work which focuses on the apparel industry in New York. Relationships within this industry are characterised by trust and personal ties, rather than contracts, which makes expectations more predictable. Furthermore, embedded relationships (characterised by trust, fine-grained information sharing and joint problem-solving attributes) lead to many advantages over contractual relationships including the ability to adapt to unforeseen changes, identifying and producing coordinated solutions to organisational problems, reducing monitoring costs and better economic outcomes. The recurring theme in all of these studies is the role of SC management in improving SC performance. However, the underlying dimensions of SC

relationship quality have received limited treatment in these studies. For instance, Tan et al. (2002) only include information sharing (communication) and customer service management (co-operation) in their study. Thus while SC dimensions such as trust, and adaptation have been widely tested in the marketing literature in terms of their impact on marketing performance (Heide and John, 1990; Morgan and Hunt, 1994), their impact on SC performance has received less attention in the operations and supply chain management literature with the exception of Fynes et al. (2004; 2005). Accordingly, we now posit:

H1: SC relationship quality has a positive effect on SC performance.

2.3 Relationship Characteristics as Moderators

New relationships involve new roles which have to be learned and the process of learning and developing these roles and structuring the associated rewards and sanctions have high costs in terms of time, worry, and temporary inefficiency. New relationships may rely heavily on social interaction amongst strangers where trust has not yet been established. On the other hand, well-established relationships of longer durations are based on stable ties. Exchange partners have developed social systems, are familiar with each others' operational procedures and understand performance expectations (Fichman and Levinthal, 1991). Uzzi (1997) found that solidly embedded relationships facilitated the continuous exchange of 'fine-grained' information, that in turn benefited each firm's ability to anticipate market changes and respond to unforeseen circumstances. This suggests that the benefits of exchanges may increase with link duration. Technology transfer requires diverse functions of the supplier and the buyer to interact over multiple issues simultaneously. Thus the benefits of having had the time to develop more relationship-specific assets become all the more important, as the resulting shared understanding facilitates the transfer of complex technological knowledge (Kotabe et al., 2003). Thus we posit:

H2: The relationship between SC relationship quality and performance will be stronger for relationships of a longer duration than for relationships of a shorter duration.

A multitude of supplier awards exist where firms are assessed in terms of their performance. However their emergence has generated considerable debate as to their worth (Kalwani and Narayandas, 1995). Empirical evidence shows that winners of corporate supplier awards and independent quality awards on average do garner measurable, statistically significant gains. Hendricks and Singhal (1996) found that in a four-year period after achieving an award, prize-winning companies clearly outperformed a control group of non-winners in a number of accounting measures. Winners of supplier awards managed to grow operating income 33 percentage points higher than companies that did not win awards. Sales also grew 23 percentage points faster for supplier award winners compared to the control group. In essence, the fact that a supplier is getting feedback motivates them to do better. Accordingly we posit:

H3: The relationship between SC chain relationship quality and SC peformance will be stronger for firms that have won a supplier award than for firms who have not won a supplier award.

The characteristics of a product can also impact on buyer-supplier relationships. Christopher and Towill (2001) argue that it is important to match appropriate supply chain strategies (lean versus agile) with the product/market. Another classification used in the literature is based on suppliers producing standardised products versus customized products (Saeed et al., 2005). Product characteristics are likely to play a role in how relationships are managed. Kumar (2001) contends that customised products are demand-driven and in such circumstances temporary supply chains emerge, operate for the lifespan of the market opportunity, and then dissolve. As such, suppliers producing standardised products in stable market conditions are less exposed to turbulent market conditions and have more stable relationships. On the other hand, suppliers producing customised products are subject to rapidly fluctuating, turbulent market conditions based on more temporary relationships. Accordingly we posit:

H4: The relationship between SC relationship quality and SC performance will be stronger for standardised products than for customised products.

The locus/tier of a supplier in a supply chain may also impact on performance. For example, the bullwhip effect is a practical demonstration of how various types of decisions made at the retail level in a supply chain can lead to distortion and amplification of demand at lower echelons in the chain thus sub-optimising the use of capacity and generating swings in inventory. The main reasons for this are demand forecast updating, order batching, price fluctuations and rationing. As such, suppliers that are more distantly removed from the final customer may experience poorer levels of performance. In addition, many supply chains are now designed on the Japanese concept of keiretsu. This is one in which suppliers close to the final industrial customer play a strategic role, marshalling the efforts of their own suppliers who are seldom in touch with the eventual customer (Lamming, 1993). Thus in the automotive industry, original equipment manufacturers (OEMs) such as Renault, Ford, Toyota, and Honda actively manage first-tier suppliers to improve the suppliers' performance and capabilities (Hartley and Choi, 1996). However, empirical evidence suggests that relationship management practices may not be transferred further upstream in the supply chain (Forker et al., 1997). Accordingly, we argue that there is a greater possibility of relationship 'disconnect', the further upstream a supplier is located in the supply chain. This gives:**H5**: The relationship between SC chain relationship quality and SC peformance will be stronger for first tier suppliers than for lower tier suppliers.

We synthesise our hypotheses as a conceptual model in Figure 1.

[Insert Figure 1 here]

3. Methodology

3.1 Survey Instrument

The instrument used to test the stated hypotheses was a mail survey. A draft questionnaire based on existing measurement scales for the research constructs (see Appendix A) was initially developed. This draft questionnaire was pre-tested to check its content validity and terminology. A group of fifteen academics and managers were interviewed were at this pre-test stage. As a result, a number of modifications were made to the questionnaire. These included clarifying and simplifying some of the language and adding extra response categories and scale items. The layout was also modified to ensure user friendliness and ease of completion. The modified questionnaire was then pilot tested to check its suitability and appropriateness for the target population. It was posted to thirty practitioners in the electronics sector and ten complete responses were returned and no problems were encountered at this stage. The questionnaire was then mailed to the target population. To encourage completion, respondents were promised, and received, a summary of the research findings. Two repeat mailings of the instrument were carried out to improve the overall response rate. For the purposes of this study, we adopted the approach used by Sako et al. (1994), where respondents were asked to reply to questions with respect to the basis of the most important or *focal* customer-product relationship.

3.2 Sample

The population chosen for this study were manufacturing companies in the electronics sector in the Republic of Ireland. The reasons for focussing on this sector are twofold. Firstly, electronics has emerged as a leading sector in the Republic of Ireland in terms of adopting SC management and is not subject to the same level of regulation as other comparable sectors such as pharmaceuticals and chemicals (Dicken, 1998). As such the sector is predominantly influenced by competitive rather than regulatory forces. Secondly the sector is heterogeneous in terms of sub-sectors and product/process complexity. Thus the external validity of the results is not as severely compromised by our single-industry focus as it would be for a more homogenous industry group. In addition, while it may be argued that the electronics sector in Ireland represents a relatively narrow sampling frame, we would contend strongly that Ireland is a particularly appropriate location for our study given the (a) the percentage of international/global firms and (b) the percentage of international markets served by these firms in our sample. As such, the focus of our study is on a sector which operates in highly competitive global markets.

In order to establish the size of the survey population, databases from the Irish Trade Board, the National Standards Association of Ireland, the Industrial Development Authority and Kompass Ireland were consulted. This produced an initial listing of 821 companies. Telephone contact was established with each of these companies and the key informant was also identified at this stage. The key informant was identified by enquiring as to which single individual was responsible and capable of responding to questions on SC relationship quality and performance. This step was taken in order to improve the quality and quantity of responses as well as to reduce the impact of potential inaccurate recall, hindsight bias and subconscious attempts to maintain self-esteem that can occur from using a single informant (Kumar et al., 1993). From the initial frame of 821 companies, 283 were removed from the sample as they had either gone into liquidation or were service rather than manufacturing plants. Each of the remaining 538 companies was then sent a copy of the questionnaire. A total of 202 questionnaires were returned, of which 200 were usable giving an overall response rate of 38%.

4. Analysis

4.1 Descriptive Statistics

The degree to which the sample is representative of the population was addressed by carrying out a series of standard chi-square goodness-of-fit tests with respect to employee numbers, plant ownership and plant age (see Table 1). For each of the characteristics, we found no significant difference between the population percentages and the sample percentages. This suggests that the sample response profile is not significantly different from the population profile and that the sample is broadly representative on key variables.

[Insert Table 1 here]

The descriptive data collected (plant size, ownership) confirmed much of what is already known about the electronics sector in Ireland in terms of industry structure. On the one hand, the majority of companies are relatively small, independently owned indigenous operations, and, on the other, there are a smaller number of larger plants that are subsidiaries of overseas companies.

4.2 Confirmatory factor analysis

Following Anderson and Gerbing (1988) we used AMOS 4 to conduct a two-stage analysis of the measurement and structural models to test our hypotheses. Firstly, confirmatory factor analysis (CFA) was performed to evaluate the measurement properties of the model constructs. The measures used for SC relationship quality (trust, communication, co-operation and adaptation) and SC performance (cost, quality, flexibility, delivery dependability) and the associated covariance matrix are shown in Appendix B.

The factor loadings (λ), standard errors, t-Values and Cronbach α values are shown in Table 2. All of the items have high (λ > 0.60) and significant (t > 1.96) loadings (Chin, 1998). The goodness-of-fit statistics for each CFA also show an acceptable level of fit. In addition, the reliability of each scale was satisfactory with Cronbach α values of at least 0.70 achieved in all cases (Nunally, 1978).

[Insert Table 2 here]

The second stage of analysis was to calculate the standardized path estimates (γ), standard errors and t-values for the path (structural) model. In order to do so, we aggregated the trust, communication, cooperation and adaptation constructs to calculate SC relationship quality and the cost, quality, flexibility and delivery dependability to calculate the SC performance construct. While we acknowledge that this approach limits our analysis of individual causal paths between these constructs, we do so as to facilitate a parsimonious analysis of the moderator effects in the next stage of analysis (Byrne, 2001). Table 3 shows the path estimates are both high (γ > 0.20) and significant (t > 1.96) (Chin, 1998). The results thus provide empirical support for the hypothesis that SC relationship quality has a positive impact on SC performance.

[Insert Table 3 here]

In order to test for moderator effects, we first conducted chi-square tests to confirm that the moderator variables were statistically independent. We then used multiple-group structural equation modelling (MSEM) to conduct the test. MSEM is flexible and avoids the multicollinearity and distributional problems associated with other techniques (Rigdon et al., 1998). MSEM deals with moderators indirectly i.e. the empirical criterion is whether or not there are different values for structural parameters at different values of a moderator (Bollen, 1989). For each of the four moderating variables, two groups were formed. For duration and product standardisation, firms

scoring below the mean score were classified as low while those above the mean score were classified as high; for supplier awards and tier we split the sample on the basis of award/no award and first tier/non first tier. We then analysed the two-group structural equation model for each of the variables separately. For each subgroup, a covariance matrix was calculated and the γ parameter estimated for the SC relationship quality → SC performance path. Each sub-group's fit adequacy was also evaluated. Following Bollen (1989), we then compared chi-squared differences between the two models. In one model, we constrained the path co-efficient to be equal across both subgroups (an equality constraint model in which the influence of SC relationship quality on SC performance is constrained to be equal) and in the other we left the path co-efficient to covary (i.e. a free model in which the influence of SC relationship quality on SC performance is allowed to be different). The difference between the two models' statistical significance is then used as a test for equal path co-efficients (i.e. whether or not the equality constraint model produces a better fit than the free model). The results of this analysis are shown in Table 4. This reveals that significant differences among the groups were found in respect of age and supplier awards (H2 and H3) but not in the case of degree of product standardisation and supply chain tier (H4 and H5). We consider these findings in the following section.

[Insert Table 4 here]

We also tested our model for the control variables of size (number of employees) and markets served (domestic or foreign). These variables did not have a significant effect on the path co-efficients.

5. Discussion and Conclusion

Our study adds to the existing body of knowledge in SC relationships. Firstly, our findings indicate SC relationship quality has a positive impact on SC performance (H1). This suggests that by engaging in deep partnership types of supply chain relationships, suppliers can improve

SC performance. As Fynes et al. (2005) have previously argued “the implications for managers is that they need to acknowledge that SC relationship quality demands a different style of management and adjustments need to made to the business culture between all the parties to the relationship. Mutual trust and adaptation are central to a more enlightened approach to managing SC quality relationships. Likewise, interdependent relationships are essential in moving away from the traditional adversarial model which is grounded in power-based bargaining. This requires frequent communication and co-operation on issues such as product and process design, quality and scheduling, all of which is evidenced by increased adaptation on the part of both buyer and supplier (p. 3312).”

Turning now to the moderator effects, our analysis shows that the relationship between SC relationship quality and SC performance is contingent upon the duration of the relationship (H1). This finding is similar to those of Kotabe et al. (2003) who found that technology transfer becomes beneficial if the buyer and supplier have interacted long enough. Firms with longer established relationships are better able to share their technology and harness that of their partner. It can take some time for social bonds to grow and to develop the familiarity and expertise required for each partner to know when and how to draw on the other's resources and when and how to contribute resources. Ultimately this can lead to improved interorganisational learning and increased investment in relation-specific assets (Ford, 1984). This is consistent with the findings of Fynes et al. (2005) who investigated a relationship development process incorporating the sequential phases of awareness, exploration, expansion and commitment. They found empirical support for the hypothesis that as communication grows in terms of frequency and intensity, trust begins to develop which in turn leads to increased co-operation and adaptation. The managerial implications in respect of SC relationship dynamics are that firms need to identify at what stage from a temporal perspective they are at in terms of relationship development and act accordingly.

Our analysis also supports the moderating effect of supplier awards on the relationship between SC relationship quality and SC performance (H3). Firms that have won a supplier award will demonstrate enhanced relational capabilities which in turn will impact on

performance. Our findings are contrary to those of both Terziovski et al. (1997) and Voss and Blackmon (1993) who found that awards such as ISO 9000 certification did not have a positive effect on overall quality performance. Rather our findings are consistent with those of Hendricks and Singhal (2001) who found that award winners outperformed non-award winners. In terms of managerial implications firms are faced with an array of choices such as basic quality certification such as ISO 9000, or supplier awards given by customers, or independent awards at the state or national levels.

Our findings in respect of degree of product standardisation (H4) are not supported. A possible explanation is that suppliers manufacturing standardised products operate in a market place where there is little change in customers' needs and demand is stable. As such, the management of SC relationships requires less attention (Reed et al., 1996). Indeed, the opposite of what we hypothesised may be the case. It is interesting to compare our findings with those of Koufteros et al. (2005) with regard to the concept of equivocality. Equivocality is the presence of multiple and conflicting interpretations about a phenomenon. They point out that high equivocality leads to confusion and a lack of understanding which frequently stems from the higher levels of product complexity (as in the case of customised products). They found that such equivocality has a strong moderating effect in markets where product and process complexity is greater such as those for customised products. Likewise, Fisher (1997) argues that firms typically produce either functional products or innovative products and that innovative products (where there is a greater degree of equivocality) requires a more sophisticated approach to the management of relationships.

Relative positioning in terms of supply chain tier does not impact on the relationship between SC relationship quality and SC performance (H5). This may seem surprising given that lower tier suppliers are more remote from the final customer and that much of the empirical literature in marketing and quality management exhorts suppliers to get closer to the customer (Hines, 1994; Kotabe et al., 2002). The increasing prevalence of supplier parks and vendor hubs where lower tier suppliers are clustered geographically closer to first-tier suppliers provides a possible insight into why this hypothesis not supported. Likewise, the-ever

increasing sophistication of inter-organisational information and communication technologies can reduce the geographical , social and perceived psychic distance between lower-tier suppliers and end-user: final customers can be just 'a click away' in a web-enabled supply chain. In terms of managerial implications, there is considerable opportunity then for lower-tier suppliers given that that new product development is more and more becoming a boundary spanning process involving many companies (Kanter, 1989).

This study also has some limitations. We recognise that the issue of common methods/source variance is of particular concern for survey research wherein a single organizational informant provides answers to both independent and dependent variables using the same data collection approach such as a questionnaire. When data for independent variables and dependent variables have been collected using the same single source, the potential for inflated empirical relationships to occur is increased (Rungtusanatham et al., 2003). However, collecting data from several sources significantly increases the time and cost of data collection. Accordingly we have used the most knowledgeable/ or key informant to provide data to maximize the chance of highly reliable data (Kumar et al., 1993).

It can also be argued that the perceptions of relationships in our study are somewhat uni-dimensional in that they represent the views of just one party and ignore the views of customers. This limitation implicitly suggests a significantly different research design based on the relationship dyad (in itself, not without difficulties in terms of sample size, dyad access, confidentiality and accuracy of response).

In conclusion, our findings provide mixed support for the proposed model. Future research could focus on the impact of other moderator variables on the SC relationship quality - SC performance linkage. These include variables such as inter-organisational information and communication technologies, product life cycle effects and managerial attitudes.

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Appendix A

Construct Measures and sources (anchored by a strongly agree/disagree 5 point scale)

Quality Performance (Customer Satisfaction) (Voss and Blackmon, 1994)

Q1 Frequency of customer complaints.

Q2 Adequacy of customer complaint tracking/feedback systems.

Delivery Performance (Choi and Eboch, 1998)

D1 Speed of delivery relative to competitors.

D2 Percentage of orders delivered on-time.

Cost Performance (Fynes and Voss, 2001)

C1 Unit cost of product relative to competitors.

C2 Unit cost of product over life cycle.

Flexibility Performance (Dixon, 1992)

F1 Volume flexibility.

F2 Variety (product line) flexibility.

Communication (Heide and John, 1992)

CM1 Exchange of information in this relationship takes place frequently and informally, and not only according to a pre-specified agreement.

CM2 In this relationship, any information that might help the other party will be provided for them.

CM3 Both parties in the relationship will provide proprietary information if it can help the other party.

CM4 Both parties keep each other informed about events or changes that may affect the other party.

Co-operation (Morgan and Hunt, 1994)

CL1 We co-operate extensively with this customer with respect to product design.

CL2 We co-operate extensively with this customer with respect to process design.

CL3 We co-operate extensively with this customer with respect to forecasting and production planning.

CL4 We co-operate extensively with this customer with respect to quality practices.

Adaptation (Heide and John, 1992)

A1 Gearing up to deal with this customer requires highly specialised tools and equipment.

A2 Our production system has been tailored to meet the requirement of this customer.

A3 We have made significant investments in tooling and equipment that are dedicated to our relationship with this customer.

A4 Our production system has been tailored to produce the items supplied to this customer.

Trust (Larzelere and Huston, 1980)

T1 Based on your past and present experience, how would you characterise the level of trust your firm has in its working relationship with this customer.

T2 We feel that this customer can be counted on to help us.

T3 We feel that we can trust this customer completely.

T4 This customer has a high level of integrity.

Product standardisation (Saeed et al., 2005)

S1 Standard product with no options $\leftrightarrow$ customised product manufactured to customer specification

Appendix B

Sample Covariances - Estimates

	C1	C2	F1	F2	D1	D2	Q1	Q2	CM1	CM2	CM3	CM4	A1	A2	A3	A4	T1	T2
C1	0.91																	
C2	0.48	1.06																
F1	0.19	0.12	0.98															
F2	0.08	0.12	0.36	0.77														
D1	0.08	0.05	0.07	0.11	0.41													
D2	0.12	0.07	0.08	0.16	0.41	0.59												
Q1	0.25	0.51	0.13	0.05	0.02	0.04	0.97											
Q2	0.46	0.52	0.06	0.11	-0.02	0.05	0.58	1.35										
CM1	0.19	0.22	0.23	0.13	0.07	0.09	0.09	0.14	0.73									
CM2	0.11	0.14	0.16	0.1	0.06	0.03	0.05	0.09	0.22	0.46								
CM3	0.24	0.3	0.26	0.12	0.01	0	0.15	0.25	0.35	0.29	0.63							
CM4	0.13	0.22	0.17	0.1	0.08	0.06	0.15	0.07	0.23	0.17	0.27	0.49						
A1	0.23	0.21	0.28	0.21	0.1	0.1	0.15	0.19	0.27	0.16	0.22	0.09	1.07					
A2	0.19	0.28	0.14	0.15	0.05	0.06	0.32	0.31	0.1	0.15	0.23	0.12	0.36	0.99				
A3	0.25	0.36	0.16	0.07	-0.02	0.01	0.36	0.35	0.16	0.09	0.25	0.1	0.49	0.51	1.11			
A4	0.12	0.27	0.11	0.15	0.04	0.06	0.33	0.38	0.08	0.12	0.21	0.09	0.36	0.75	0.48	1.05		
T1	0.07	0.14	0.23	0.15	0.11	0.1	-0.01	0.03	0.19	0.17	0.22	0.18	0.18	0.11	0.11	0.12	0.66	
T2	0.18	0.27	0.26	0.13	0.01	0.03	0.14	0.16	0.23	0.18	0.3	0.2	0.26	0.18	0.3	0.16	0.24	0.
T3	0.09	0.21	0.3	0.2	0.06	0.08	0.12	0.17	0.27	0.23	0.3	0.25	0.22	0.18	0.24	0.2	0.43	0.
T4	0.12	0.2	0.21	0.12	0.06	0.08	0.14	0.19	0.23	0.23	0.29	0.2	0.23	0.18	0.17	0.21	0.31	0.
CL1	0.12	0.18	0.29	0.27	0.06	0.08	0.05	0.12	0.28	0.15	0.26	0.23	0.39	0.24	0.25	0.18	0.25	0.
CL2	0.06	0.18	0.21	0.13	-0.04	-0.03	0.09	0.12	0.28	0.23	0.29	0.3	0.26	0.35	0.32	0.21	0.14	0.
CL3	0.22	0.33	0.36	0.28	-0.05	-0.02	0.19	0.2	0.3	0.2	0.35	0.25	0.3	0.34	0.27	0.24	0.14	0.
CL4	0.26	0.26	0.23	0.19	-0.03	-0.03	0.17	0.19	0.24	0.12	0.16	0.26	0.23	0.29	0.19	0.12	0.23	0.

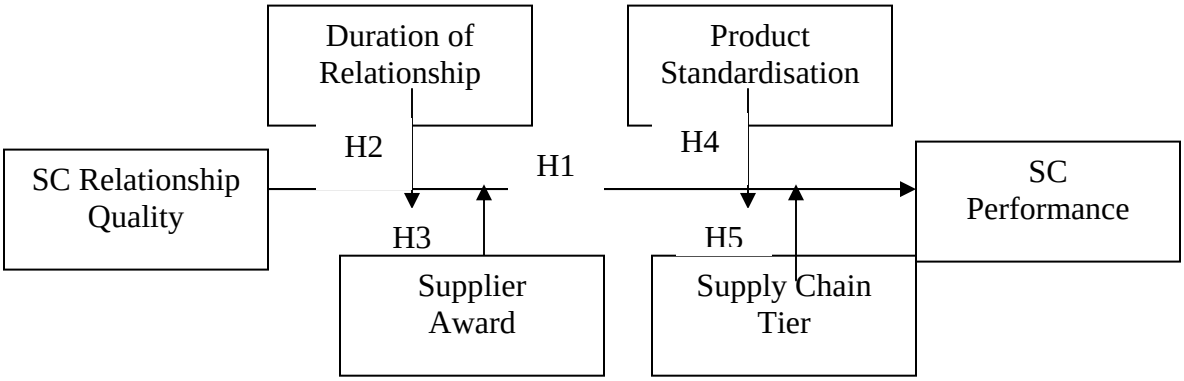

Figure 1: Conceptual Framework

Table 1: Population and sample profiles

Characteristic	Population (%)	Sample (%)	χ^2

No. of Employees			
Less than 20	21.9	16.5	
20 but less than 50	41.2	40.0	
50 but less than 100	15.6	20.5	
100 but less than 200	11.0	11.5	
200 or more	10.3	11.5	NS
Plant Ownership			
Irish	55.0	52.0	
United Kingdom	5.0	2.5	
Other European	14.0	14.5	
USA	20.5	25.0	
Japan	2.0	3.5	
Other	3.5	2.5	NS
Plant Age			
Less than 5 years	10.8	14.0	
6 but less than 11 years	18.5	22.0	
11 but less than 20 years	47.1	42.0	
20 but less than 50 years	21.2	19.0	
50 years or more	2.4	3.0	NS

NS: Not significant

Table 2: Confirmatory factor analysis and reliabilities

Construct	Standardised Loading λ	Standard error	t-Value	α	Construct	Standardised Loading λ	Standard error	t-Value	α
Trust				0.82	Adaptation				0.78
T1*	0.69				A1*	0.61			
T2	0.63	0.10	8.11		A2	0.88	0.32	5.83	
T3	0.92	0.13	9.96		A3	0.62	0.26	5.10	
T4	R	0.10	8.80		A4	0.83	0.33	5.84	
χ^2=3.11, df=2, p=0.21, NFI=0.98, GFI=0.99, AGFI=0.96, RMSEA=0.05					χ^2=17.762, df=2, p=0.00, NFI=0.80, GFI=0.96, AGFI=0.80,RMSEA=0.04				
Communication				0.76	Co-operation				0.76
CM1*	0.62				CL1*	0.60			
CM2	0.63	0.11	6.88		CL2	0.72	0.16	7.03	
CM3	0.83	0.16	7.49		CL3	0.78	0.16	7.15	
CM4	0.60	0.11	6.56		CL4	0.60	0.14	6.20	
χ^2=0.31, df=2, p=0.85, NFI=0.99, GFI=0.99, AGFI=0.99, RMSEA=0.00					χ^2=14.11, df=2, p=0.001, NFI=0.93, GFI=0.96, AGFI=0.84, RMSEA=0.06				

Table 2 *continued*

Construct	Standardised Loading λ	Standard error	t-Value	α	Construct	Standardised Loading λ	Standard error	t-Value	α
SC Performance				0.79					
Q1*	0.64				C1	0.69	0.23	5.63	
Q2	0.61	0.24	5.42		C2	0.74	0.27	5.80	
D1	0.62	0.21	5.14		F1	0.66	0.24	5.22	
D2	0.70	0.25	5.64		F2	0.67	0.22	5.33	
χ^2					χ^2=69.14, df=9, p=0.00, NFI=0.82, GFI=0.88, AGFI=0.81, RMSEA=0.06				

*The corresponding parameter is set to 1 (unstandardised) to fix the scale of measurement

Table 3: Structural Model Coefficients

	Path	Standardized Path Estimate γ	Standard error	t-Value	Result
H1	SC Relationship Quality→SC performance	0.28	0.07	3.42*	Supported

* significant at 1% level

Table 4: χ^2 difference test for moderator effects

Hypothesis	Moderator	Equality Constraint Model	Free Model	χ^2 Difference	p
H2	Duration	χ^2 = 256.66 (d.f. = 52)	χ^2 = 53.81 (d.f. = 51)	χ^2 = 202.85 (d.f. = 1)	p <0 .001
H3	Award	χ^2 = 53.82 (d.f. = 52)	χ^2 = 58.41 (d.f. = 51)	χ^2 = 4.59 (d.f. = 1)	p < 0.05
H4	Standardisation	χ^2 = 53.83 (d.f. = 52)	χ^2 = 53.81 (d.f. = 51)	χ^2 = 0.02 (d.f. = 1)	p > 0.75
H5	Tier	χ^2 = 53.85 (d.f. = 52)	χ^2 = 53.81 (d.f. = 51)	χ^2 = 0.04 (d.f. = 1)	p > 0.75

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