

**Inter-Organizational Information Feedback Flows in Chains:
A Chain Case Study Theoretical Framework**

Work in Progress Presentation for:

2001 I.M.P. Conference

**9-11 September 2001
Oslo**

By:

Christine Storer
Agribusiness Lecturer
Muresk Institute of Agriculture
Curtin University of Technology
Northam, WA 6401
Australia
c.storer@curtin.edu.au

Abstract

A consumer perceived food contamination crisis in Japan was the catalyst for a focus on chain management in an Australian food chain. The results of case study research of the inter-organisational feedback systems of five organisations in the Australian food processor centred chain are presented.

Using a grounded theory approach, propositions of how the inter-organisational information feedback systems (IOIFS) in chains operate are presented. It is proposed that the nature of these IOIFS will be related to expected future outcomes as measured by chain objectives (organisational commitment to developing long-term relationships with suppliers and customers). In addition, the nature of the inter-organisational information feedback will be related to the current outcomes as measured by the strength of the relationship and perceived performance. Outside environmental factors that impact on the relationships may also have an effect such as the: nature of the product, competition and uncertainty in the market; power and dependency in the relationship; industry experience and duration of the relationship; as well as personal characteristics.

The Problem

It all started with a crisis. Japanese consumers in a popular family restaurant were complaining about finding pieces of plastic in their meals. The Japanese trading house and distributor of the food were alerted and an investigation started to track down the source of the food contamination. With the importance of food safety and integrity to Japanese consumers, it was perceived to be a top priority to determine the cause of the problem and ensure the contamination did not happen again. Tracing the food back to an Australian food processor it was determined that the “contaminate” was in fact the outer layers of onion that were harder than Japanese consumers were used to. Onion was a key ingredient in the food and therefore it was difficult to remove the source of the problem. A Japanese delegation was sent to Australia to find out more details and discuss the issue with the first stage vegetable processor and the onion primary producer (see figure 1).

Over a period of time many changes through the chain were instigated to improve the quality standards to meet the needs of the Japanese consumer from ensuring only the softest parts of the onion were used to reducing gristle and fat in the mince. However, perhaps the biggest breakthrough was when the onion producer & seed supplier product trials turned up with an onion like that grown in Japan that was better suited for the Japanese taste and texture preferences. All these changes were only possible because of the way the supply chain was managed and a key aspect was the development of an improved information feedback up and down the chain. This paper will describe results of case study research carried out on this chain in the form of a theoretical framework of how the inter-organisational information feedback system worked. As the first step in chain management is improving information flows through the chain (Fredendall & Hill 2001), it is hoped that the examples presented in this paper will provide the impetus for more chains to get into chain management based on the potential of opportunities before being faced with a major crisis.

Many authors support the idea that suppliers' efforts to facilitate communication increases customer satisfaction and relationship behaviour (eg Anonymous 1993, Anderson and Narus 1990, Ellinger et al. 1999, Keith et al. 1990, Leuthesser and Kohli 1995, Mohr and Nevin

1990, Mohr and Sohi 1995, Mohr et al. 1996, Trienekens 1999, Uzzi 1997). To date the majority of the focus in research has been to improve the efficiency of transactions and primary processes such as placing orders, scheduling production, filling orders and organising logistics through Enterprise Resource Planning (ERP), Electronic Data Interchange (EDI) and e-commerce due to the great efficiencies that improving high volume processes creates (Bowersox & Closs 1996). Mohr and Nevin (1990) built a theoretical model about channel information strategies and Mohr et al. (1996) and Mohr and Sohi (1995) have done some empirical testing based on computer dealers perceptions. Bensaou (1992; 1997; 1999) developed chain information system theories and empirically tested the transactional systems based on automobile manufacturers perceptions. Neither of these studies focussed in detail on the management feedback information systems in chains. In addition, it has been argued that food chains have different inherent product characteristics than non-perishable products and this may that affect the models. While the Supply Chain Partnerships Program (2000) web site provides guidance of general changes in information systems in chains over time based on food and other industries, it has not been tested empirically. Others such as Spekman, Kamauff & Myhr (1998) have conducted empirical studies on chains but not looked in detail at the information systems. Therefore it would seem that theory building as well as empirical testing work is needed on chain information systems. This research will focus on the management control and strategic information systems.

Procedures

The research will be conducted in two phases using a linked 'sequential mixed methods' approach with the first phase based on the 'interpretivist' paradigm (qualitative approach) that will be linked to the second phase based on the 'positivist' paradigm (quantitative approach) (Tashakkori & Teddlie 1998). The first phase (reported in this paper) was to explore the nature of inter-organisational information feedback systems in chains and develop a theoretical framework using a grounded theory approach (Denzin & Lincoln 1994). The first phase involved a literature review, informal in-depth interviews with experts internationally and a case study of an Australian food processor centred chain. As little detailed research on chain information feedback systems was found in the literature, a grounded theory approach was taken to develop an inductive derived theory that tied the literature in with what was observed in the case study (Glaser 1978, Glaser & Strauss 1967, Strauss 1987, Strauss & Corbin 1990). According to Urquhart (1997) grounded theory was particularly suited to information systems research due to it's adaptability for hybrid disciplines. With supply chain management being an amalgam of many organisational management philosophies through a chain of organisations (Fredendall & Hill 2001) it was seen to be well suited to the research problem. In the second phase the theoretical framework will be evaluated, tested and refined in a survey of food processors and further food processor centred chain case studies.

The food processor centred chain case study was carried out during 1999 and 2000. The chain consisted of a food processor and four of their suppliers - two vegetable primary producers, a primary stage vegetable processor and a secondary stage meat processor (figure 1). As suggested by Anderson, et al. (1994), suppliers were chosen by the food processor as being significantly important in terms of strategic positioning, volume and value. The food processor identified a strong relationship with the vegetable processor with information flows that had improved over time. By contrast, the food processor perceived there were problems with the volume and quality of information flows with the meat processor.

Data was collected using thirty personal in-depth interviews and organisational interactive workshops. Interviews lasted from one to five hours. Workshops were for a half day. A multiple informant approach (Anderson, Hakansson & Johanson 1994) was used with key people at different hierarchical levels (operations, management and executive) in each organisation in the chain interviewed. The aim was to determine the current IOIFS and how it had developed over time as well as perceived problems and recommendations. The personal in-depth interview data was taped, transcribed and then collated using Nudist 4.0 software into broad themes and categories such as types of information (eg product & organisational performance, forecast supply & demand, opportunities & threats), parties involved, how information was communicated, frequency of communication, strength of relationship, problems and recommendations. The chain information systems were modelled using GRAI grids (Trienekens 1999). This data was augmented by interactive workshops run for each organisation where all participants were invited to contribute. The workshop allowed for perceptual agreement (Kumar, Stern & Anderson 1993) and further detail to be added on how the IOIFS operated. In addition, it facilitated action to resolve problems identified in the in-depth interviews by prioritising and categorising problems, translating problems into needs, prioritising needs and developing an action plan for the highest priority needs. Implementation, monitoring and review of the action plans for organisations were the responsibility of individual organisational Chief Executive Officers.

Results

Based on the literature review, expert interviews and analysis of the five organisation chain case study, the theoretical framework model developed is shown in Figure 2. The proposed theoretical framework of the chain inter-organisational information feedback systems was based on an extension of Silver, Markus & Beath's (1995) organisational "Information Technology Interaction Model", Mohr and Nevin's (1990) "Model of Communication for Marketing Channels", Hakansson's (1982) business-to-business relationship "Interaction Framework" and the British Deming Associations "Elements of Successful Customer/Supplier Relationships" (Anonymous 1993).

It is proposed that the nature of the inter-organisational information feedback systems in chains will be related to expected future outcomes as measured by chain objectives (organisational philosophy about developing long-term relationships with suppliers and customers). In addition, the nature of the inter-organisational information feedback system will be related to the current outcomes as measured by the strength of the relationship and perceived performance.

The inter-organisational information feedback system will be measured in terms of: what Content is exchanged and why as well as the when, how & who of the process (Frequency, Directionality, Formality & communication tools used, Organisational position in the chain, Department, Hierarchical level of the person).

Outside environmental factors that impact on the relationships may also have an effect such as the nature of the product, competition and uncertainty in the market, power and dependency in the relationship, industry experience and duration of the relationship as well as personal characteristics.

As recommended by Fredriksson & Vilgon (1996 p59), the model uses a dynamic approach to reflect the interaction of one factor on another where the effects depend on the total set of

factors. For example expected future outcomes affects information sharing which in turn affects perceived current outcomes and expected future outcomes. The dynamic nature of the process is consistent with comments by some respondents in the chain case study. While not tested empirically, Bensaou (1997 p118) found his fieldwork suggested a 'feedback loop', where cooperation and communication lead to appreciation of the benefits, norms of behaviours and new 'sharing' attitudes that developed and become institutionalised along with expectations of continuity of cooperation and communication in the future. Similarly, Spekman et al. (1998) in an empirical study found that sharing information and interdependence improved performance in terms of cost reduction and customer satisfaction. Uzzi (1997) in an ethnographic study found that close, long-term, 'embedded' relationships were associated with 'fine-grained' information transfer, trust and joint-problem solving.

Theoretical framework variables and their relationships are discussed below.

Expected Future Outcomes - Chain Objectives

The objectives of the organisations and their *commitment to developing long-term relationships with suppliers and customers* will be pivotal to the nature of the feedback information system adopted. In the case study the problem with concerns about tough onion pieces was the catalyst for the chain members to meet and discuss the importance of each other in delivering a product valued by the end consumer. In developing and adopting improvements, each in the chain clearly identified their objectives to continue to develop the relationships in the long term. Top management commitment and leadership at the food processor, vegetable processor and onion producer was reflected in employee comments like "we work together and help each other develop in the long term". As Biemans (1999) note, intense cooperation through the use of information communication technology to communicate more frequently, more efficiently and to improve coordination of actors in value chains will only be realistic when companies share the desire to cooperate. Others support the importance of shared goals in building cooperation (eg Anderson & Narus 1991, Bensaou 1997, Ellram 1991, Ellram 1995, Hines 1994, Hughes 1994, Mohr & Spekman 1996, PriceWaterhouseCoopers 1999). Hamel, Doz & Prahalad (1989) go further and agree as well as converging strategic goals, companies also need to have diverging competitive goals and a belief they can both learn from the other and limit access to proprietary skills. PriceWaterhouseCoopers (1999) argue shared goals are particularly important when parts of the supply chain are separated by distance, time zones and other factors such as language and culture.

Hughes (1994) suggests the goals should focus on meeting the needs of the end consumer and the long term objectives of the relationship. Similarly many authors suggest working toward adding value as defined by the ultimate consumer (eg Anderson, Britt & Favre 1999, Anonymous 1993, Ellram 1991, Hines 1994, PriceWaterhouseCoopers 1999, Schroder 1999, Womack & Jones 1996). Womack, Jones & Roos (1990) add the aim of ensuring all in the chain make reasonable profits.

Relationship literature also see shared values as being related to relationship commitment and trust (Gundlach, Achrol & Mentzer 1995, Morgan & Hunt 1994) as well as communication flows (Mohr & Sohi 1995). Morgan & Hunt (1994) define shared values as the extent to which partners have beliefs in common about what behaviours, goals and policies are important or unimportant, appropriate or inappropriate and right or wrong.

The British Deming Association suggest "good internal communication depends upon everyone knowing and understanding the corporate mission statement and how their actions are designed to help the organisation achieve it. The emphasis should be on outcomes and success criteria, rather than on fixed methods" (Anonymous 1993 p46-47). Anderson et al. (1999) also see setting explicit outcome targets such as revenue growth, asset utilisation and cost reduction as a critical step for the chain to meet end consumers' needs. As Spekman et al. (1998) found, the gap between the goals and concerns of senior management and buyers as well as the differences in beliefs about the merits of supply chain management between buyers and sellers in the chain would explain delays in implementing the concept of supply chain management.

It is proposed that an organisation's goals to develop relationships with chain members (measured by employee's perceptions of commitment to development of long-term relationships) will be related to the investments made in developing the inter-organisational information feedback system (figure 2). Where there is a high level commitment, more investments will be made. Where this is a low level of commitment, less investment will be made.

Inter-organisational Information Feedback System (IOIFS)

The inter-organisational information feedback system will be measured in terms of the hierarchical decision level, content, frequency, departments, organisations, directionality, formality and tools.

Hierarchical Decision Level

According to Trienekens (1999 p50) "many authors have underlined the importance of a hierarchically structured decision function (Anthony 1988, Bertrand, Wijngaard & Wortmann 1990, Burbidge 1990, Meal 1984, Slomp 1993, Wild 1979)." It reduces complexity and separates the short, medium and long term aspects of management (Slomp 1993). Keen & Scott-Morton (1978) suggest the characteristics of the information used by different decision level varies in terms of the accuracy, level of detail, time-horizon, frequency of use, source, scope, type and age of information. Three types of hierarchical decision levels have been adapted from Bowersox & Closs's (1996) functions of logistics information systems with management control and decision analysis combined to form management information to align with the more common categories of operational, tactical/management and strategic (Stevens 1989; Anthony 1988) (see figure 3).

Transaction data is generated principally by operational staff conducting day to day activities of filling customer orders, ordering materials from suppliers and production of goods and services. Data flows through all organisational departments and is exchanged with suppliers and customers more as the relationship develops. Large volumes of transactions are generated regularly allowing for formalised processes and procedures. Costs are high due to the high transaction volume, large number of system users with heavy communication demands and significant software complexity (different functional requirements). As the costs are relatively well defined and exhibit more certainty with respect to benefits and returns, the major emphasis is on information system efficiency to produce competitive advantage through reduced costs such as through electronic data interchange (EDI). Most of the literature on IOS and logistics to date have focused on technology and how to improve exchange of transactional data. Customer relationships can be developed further by provision of information about order status, product availability, delivery schedules, and invoices.

Supplier relationships can be developed further by provision of information about forecast demand, demand trends and new product developments. (Bowersox & Closs 1996)

Management control information systems focus on performance measurement and reporting of feedback. The emphasis is on intermediate-term, tactical, evaluation of past performance and identification of alternatives. Common performance measures include financial, customer service, productivity and quality indicators. Another important role is to identify exceptions as soon as possible to identify potential customer or order problems and enable corrective action to be taken eg predicted future inventory shortages, late delivery, quality issues. (Bowersox & Closs 1996)

Strategic knowledge systems focus on decision applications to assist managers and executives identify, evaluate, and compare strategic and tactical alternatives (Bowersox & Closs 1996). The information used tends to be older, aggregated, qualitative information from a wide range of sources that are often external to the firm (Keen & Scott-Morton 1978). The focus is on the future rather than the present (Keen & Scott-Morton 1978).

In the chain case study it was observed that increasing amounts of transactional data were exchanged by operational staff with strategically significant customers and suppliers such as product availability and delivery schedules. There was also more managerial information exchanged including quality performance exceptions, delivery performance exceptions, forecast supply and demand. In addition there was more executive information exchanged including suggestions for new product developments, future opportunities and threats. These findings were consistent with Ellram (1995) and Hughes (1994) suggestions that in establishing and maintaining chain relationships there needs to be communication and information sharing at different levels between the organisations.

Content

The range of information content being exchanged has been illustrated under the descriptions of the hierarchical decision levels.

In the chain case study there was a greater *General Chain Understanding* for the Japan chain than other chains that were being supplied. Visits by some staff from all organisations through the chain to each other's premises enhanced the understanding of the chain for all staff. Hughes (1994 p210) suggested general chain understanding was needed by all staff so that constraints of chain members would be recognised. Understanding customer requirements is also the basis for a customer orientation that has been shown to improve performance (Jaworski & Kohli 1993, Kohli, Jaworski & Kumar 1993, Narver & Slater 1990). A starting point for chain management is adding value to the chain as defined by customers and end consumers (Womack & Jones 1996).

In the chain case study notification of perceived failure in achieving expected *Product & Organisational Performance* was the norm even to the extent of reporting on items that recipients sometimes perceived were petty or not actionable. Bowersox & Closs (1996) suggest notification as soon as exceptions are identified is necessary so that corrective action can be taken prior to a customer service failure. If corrective action is not possible, customers can be notified in advance and offered alternatives to take the surprise out of the service failure. The Japanese automobile manufacturers take it a step further by determining the ultimate cause of the problem and devising a fix so it does not happen again and customer expectations will be met more consistently and costs are minimised (Womack et al. 1990). A continuous consumer feedback and response system also helps fine-tune and catch

embarrassing and dangerous errors in new products before massive and highly visible public recalls are needed (Womack et al. 1990).

Accurate and timely *Supply & Demand Forecasts* allow for just-in-time inventory management and efficient customer response so that inventory levels and associated costs such as obsolete stock and working capital are reduced (Andraski 1998, Bowersox & Closs 1996, Christopher 1997, Cunningham & Tynan 1993, Van Hoek 1998, Womack et al. 1990). Preferably complex fast changing goods are made to order to allow for customisation where it is valued by consumers eg cars, computers (Van Hoek 1998, Womack et al. 1990). While forecasts were exchanged through the chain case study, their accuracy was a major chain issue as was the order lead time of alterations.

Involvement of chain members in *New Product Development* allows for faster responses to changes in customer demands and ensures designs can be produced efficiently by all chain members as well as meeting the needs of the final consumer (Bowersox & Closs 1996, Christopher 1997, Van Hoek 1998, Womack et al. 1990). The involvement of all chain members in the evaluation of the new onion variety and new processing machinery were examples of greater levels of chain involvement in innovations in the chain case study.

Future Opportunities & Strategic Planning discussions allow chain members to respond in a timely manner to changes in end consumer demands as well as competitive pressures (Bowersox & Closs 1996, Christopher 1997, Hines, Rich & Hittmeyer 1998, Womack et al. 1990). In the chain case study one example of this was the notification of an expected pumpkin supply shortage and suggestion of advance purchases to reduce long term input costs.

Frequency

In the chain case study there was an increase in the frequency of information exchange in absolute frequency terms. In addition, the less frequent management performance and strategic information was seen to be exchanged as it was required. Ellinger, Daugherty & Plair (1999) found that frequency of communications were related to customer satisfaction and loyalty.

Organisations & Departments

Galbraith (1973, 1977) suggested that increasing lateral ties within organisations could increase information-processing capacity. This may explain the increase in inter-departmental and inter-organisational information links in chains found in the chain case study as well as by Womack et al. (1990) and Bensaou (1999) in markets where it was important to closely monitor rapid environmental changes (eg technology changes and perishable product availability/quality) and provide customised products. Carter & Ellram (1994) found that parallel communications between comparable functional departments was more suited to strategic alliances than single points such as purchasing departments.

Directionality

While products flow downstream between organisations in the chain, information flows both upstream as well as downstream (Borgen & Ohren 1999). In the chain case study information flowed in both directions eg product availability, forecast supply and demand, product and service feedback, future opportunities. There were seen to be some problems in the speed and depth of responses made by the meat processor to performance feedback that was related to poorer perceived performance. Ellram (1995) in an empirical study of USA purchasing partnerships found that one of the highest rating factors important in establishing and maintaining partnerships was two-way information sharing.

Formality & Communication Tools

The Supply Chain Partnerships Program (2000) suggested a move from formal and slow communications in conventional supply chain to fast and informal communications in supply chain partnerships. The chain case study findings were consistent where management and executive information was increasingly exchanged spontaneously either face to face or by telephone. Cunningham (1996) suggests flexible systems allow for learning and adaptation and are better suited to markets and customer needs that are rapidly changing. In addition, informal rich communication media provide instant feedback and cues and enable people to interpret and reach agreement about difficult, unanalysable, emotional and conflict-laden issues (Choo 1996).

In applying the theoretical framework the following propositions have been developed about the information feedback system:

It is proposed that an organisation's commitment to develop relationships with chain members will be related to an increase in the volume of transactional, managerial and strategic information exchanged with them (in absolute terms as well as when required) (Figure 4).

It is proposed that as commitment to developing long-term relationships increases, more organisational departments become involved in inter-organisational information exchange (B & C in figure 5). Traditionally information is only exchanged between the supplier sales and marketing department and the customer purchasing department (A in figure 5) with sporadic exchanges between executives.

Current Chain Outcomes – Performance & Relationship Strength

Customers in the chain case study were unanimous in their perceptions of improvements in supplier performance and that there were stronger relationships with those suppliers who had been more responsive and innovative (one supplier was not perceived to be very responsive). While customers were generally satisfied (further issues still needed to be addressed), there was little positive feedback given or received through the chain and therefore suppliers perceptions of satisfaction were based on a lack of complaints and an increase in orders. Many authors acknowledge the role of communication between firms to improve *performance and satisfaction* (eg Benedict & Margeridis 1999, Bowersox & Closs 1996, Stank, Emmelhainz & Daugherty 1996, Vijayasathy & Robey 1997) as well as develop the *strength of the relationship* in terms of mutual trust and commitment (eg Hughes 1994, Mohr & Nevin 1990, Vijayasathy & Robey 1997). It is proposed that investments in information systems will be related to satisfaction with performance, trust and commitment to developing long term relationships (figure 2).

Environmental Factors Affecting Inter-organisational Information Feedback Systems

The effects of environmental factors have been included in the model to overcome the criticism that behaviour research gives limited attention to contextual variables analysed by economics such as conditions under which particular power strategies are appropriate (Heide 1994).

Product & Market Characteristics (Uncertainty)

The demands of the task environment have been found to affect the required information processing capacity and frequency of information exchanged between teams and their environment (Ancona & Caldwell 1992). Bensaou (1999) suggest that the type of relationship needs to be appropriate to the type of product and market conditions (technological uncertainty). The food industry analysed in the case study has been well know

for its inherent uncertainty in terms of product quality, supply, end consumer demand, and production yield (Trienekens 1999).

It is proposed that the nature of the product and market characteristics will be a moderating variable for the framework. Commitments to develop long-term relationships and invest in information feedback systems are expected to occur in markets where there is uncertainty in terms of production yield, product quality, supply, end consumer demand quantity or preferences.

Relationship Power & Dependency Characteristics

Mohr & Nevin (1990) hypothesised that the impact of collaborative communication may be a function of the conditions under which it was used. In a subsequent study of computer dealers Mohr et al. (1996) found that governance strategy of integration and control affected the impact of collaborative communication on channel outcomes. When integration or control was low, the effect of collaborative communication was higher. All of the organisations in the chain case study were mutually dependent on each other with the arrangement based on low levels of control through agreement not by ownership. Suppliers dealing with adversarial customer purchasing staff did however express some doubt about the mutuality of the dependence with the customer that was not reflected in customer perceptions. Therefore perceived relationship power and mutual dependency may be a moderating variable in the framework. It is proposed that commitments to develop long-term relationships and invest in information feedback systems are expected to be higher with organisations where there is perceived mutual dependency and equal power.

Relationship & Industry Experience

All organisations in the chain case study had many years of experience in the industry and in working with each other. Kreps (1990 p32) suggests information exchanged can contain greater amounts of information and be 'richer' where you have a great deal of experience. Leuthesser & Kohli (1995) found that the age of the relationship affected satisfaction.

It is proposed that relationships need time to develop and over time a commitment to developing long term relationships will result in greater investments in developing inter-organisational information feedback systems and improved perceived performance. Therefore a moderating variable in the theoretical framework may be the experience organisations have in working with other members of the chain. The expected investments in the inter-organisational information feedback systems and improved perceived performance, trust and commitment may not show up if organisations have not been dealing with each other very much or only for a short period of time (less than a year or two).

Individuals also need experience in the industry and/or with the organisation to effectively exchange complex tacit information with others in the chain. Therefore a moderating variable in the theoretical framework may be the experience of people in the organisation that interact with others in the chain. The satisfaction with feedback through the chain may be affected if the people involved do not have much experience in the industry or the organisation.

Organisational Participants as Information Processors

Cunningham & Tynan (1993) point out that technology to link organisations was available (1970s) a long time before it generated much interest (mid 1980s) and suggest manager's beliefs and assumptions about the potential role of the technology affect adoption. Spekman et al. (1998) in empirical research found that buyers were less sensitive to information to link organisations in the chain. Therefore personal attitudes of individuals may affect attitudes to exchange of information and use of information technologies to do so efficiently.

In the chain case study purchasing staff had traditional adversarial attitudes about suppliers with a strong emphasis on cost minimisation and minimalist information exchange. These attitudes were not consistent with cooperative and relational building views of staff in other functions through the chain. Their suppliers tended to discount the inconsistent views of the purchasing staff and sought feedback about performance from staff in other functions (information system B in figure 5). They also exchanged information about future opportunities and threats with staff from other functions rather than with the more frequent contacts in purchasing. Therefore a moderating variable in the theoretical framework may be inconsistencies within an organisation of perceptions of the organisation's commitment to developing long-term relationships and the interdependence of the chain organisations. It is proposed that the expected investments in the inter-organisational information feedback systems and satisfaction with feedback systems may be affected by inconsistencies within an organisation of perceptions of the organisation's commitment to developing long-term relationships and the interdependence of the chain organisations.

Conclusions

In analysing this chain case study of five Australian organisations in the food industry, a theoretical framework has been developed of how the inter-organisational information feedback system operated.

The propositions developed to date in applying the theoretical framework include:

1. It is proposed that an organisation's goals (commitment) to develop relationships with chain members will be related to the investments made in developing the inter-organisational information feedback system (figure 2).
2. It is proposed that an organisation's commitment to develop relationships with chain members will be related to an increase in the volume of transactional, managerial and strategic information exchanged with them (figure 4).
3. It is proposed that as commitment to developing long-term relationships increases, more organisational departments become involved in inter-organisational information exchange (B & C in figure 5). Traditionally information is only exchanged between the supplier sales and marketing department and the customer purchasing department (A in figure 5) with sporadic exchanges between executives.
4. It is proposed that investments in information systems will be related to satisfaction with performance, trust, and commitment to developing long term relationships (figure 2).
5. It is proposed that commitments to develop long-term relationships and invest in information feedback systems are expected to be higher with organisations where there is perceived mutual dependency and equal power.
6. Commitments to develop long-term relationships and invest in information feedback systems are expected to occur in markets where there is uncertainty in terms of production yield, product quality, supply, end consumer demand quantity or preferences.
7. The expected investments in the inter-organisational information feedback systems and improved perceived performance, trust and commitment may not show up if organisations have not been dealing with each other very much or only for a short period of time.
8. Satisfaction with feedback through the chain may be affected if the people involved do not have much experience in the industry or the organisation.
9. The expected investments in the inter-organisational information feedback systems and satisfaction with feedback systems may be affected by inconsistencies within an

organisation of perceptions of the organisation's commitment to developing long-term relationships and the interdependence of the chain organisations.

The next stage of the research is to evaluate, test and refine key aspects of it to see if the propositions made are valid in other chains. This will be based on a survey of Australian food processors and further food processor centred chain case studies. The author would be very interested to hear from anyone who may have some suggestions on the theoretical framework.

References:

- Ancona, D. G. & Caldwell, D. F. (1992) "Bridging the Boundary: External Activity and Performance in Organizational Teams," *Administrative Science Quarterly*, Vol. 37, Iss. 4, pp. 634-665.
- Anderson, D. L., Britt, F. E. & Favre, D. J. (1999) *The Seven Principles of Supply Chain Management*, Vol. 1999 .
- Anderson, J. C., Hakansson, H. & Johanson, J. (1994) "Dyadic Business Relationships within a Business Network Context," *Journal of Marketing*, Vol. 58, Iss. 4, pp. 1-15.
- Anderson, J. C. & Narus, J. (1990) "A Model of Distributor Firm and Manufacturer Firm Working Partnerships," *Journal of Marketing*, Vol. 54, Iss. January, pp. 42-58.
- Anderson, J. C. & Narus, J. A. (1991) "Partnering as a Focused Market Strategy," *California Management Review*, Vol. 33, Iss. 3, pp. 95-113.
- Andraski, J. C. (1998) "Leadership and the Realization of Supply Chain Collaboration," *Journal of Business Logistics*, Vol. 19, Iss. 2, pp. 9-11.
- Anonymous (1993) "Winners all Round," *TQM Magazine*, Vol. 5, Iss. 5, pp. 45-50.
- Anthony, R. N. (1988) *The Management Control Function*, Harvard Business School Press, Boston, Mass. USA
- Benedict, C. & Margeridis, H. (1999) "Chain Reaction," *Charter*, Vol. March, pp. 46-49.
- Bensaou, M. (1992) *Interorganizational Coordination: Structure, Process, Information Technology: An Empirical Study of Buyer-Seller Relationships in the US and Japanese Auto Industries*, MIT, Cambridge, MA, USA.
- Bensaou, M. (1997) "Interorganizational Cooperation: The Role of Information Technology. An Empirical Comparison of U.S. and Japanese Supplier Relations," *Information Systems Research*, Vol. 8, Iss. 2, pp. 107-124.
- Bensaou, M. (1999) "Portfolios of Buyer-Supplier Relationships," *Sloan Management Review*, Vol. 40, Iss. 4 Summer, pp. 35-.
- Bensaou, M. & Venkatraman, N. (1996) "Inter-Organizational Relationships and Information Technology: A Conceptual Synthesis and a Research Framework," *European Journal of Information Systems*, Special issue on Information Technology and Interorganizational Networks September, pp. 84-91.
- Bertrand, J. W. M., Wijngaard, J. & Wortmann, J. C. (1990) *Production Control: A Structural and Design-Oriented Approach*, Elsevier, Amsterdam, The Netherlands
- Biemans, F. P. M. (1999) *Major Issues When Applying ICT to Improve the Performance of Value Chains*, In *World Food & Agribusiness Congress*, International Agribusiness Management Association (IAMA), Florence, Italy.
- Borgen, K. & Ohren, O. (1999) *The Logistics of Information in Collaborative Organisations*, In *11th NOFOMA - Annual International Conference on Nordic Logistics Research*, Lund, Sweden.
- Bowersox, D. J. & Closs, D. J. (1996) *Logistical Management: The Integrated Supply Chain Process*, McGraw-Hill, New York, NY, USA

- Burbridge, J. L. (1990) "Production Control: A Universal Conceptual Framework," *Production Planning and Control*, Vol. 1, Iss. 1.
- Carter, J. R. & Ellram, L. M. (1994) "The Impact of Interorganizational Alliances in Improving Supplier Quality," *International Journal of Physical Distribution & Logistics Management*, Vol. 24, Iss. 5, pp. 15-24.
- Choo, C. W. (1996) "Towards an Information Model of Organizations," In *Managing Information for the Competitive Edge*, Eds. Auster, E. and Choo, C. W., Neal-Schuman Publishers, New York, USA, pp. 7-40.
- Christopher, M. (1997) *Marketing Logistics*, Butterworth-Heinemann, Oxford, UK
- Cunningham, C. & Tynan, C. (1993) "Electronic Trading, Inter-Organizational Systems and the Nature of Buyer-Seller Relationships: The Need for a Network Perspective," *International Journal of Information Management*, Vol. 13, Iss. 1, pp. 3-28.
- Cunningham, J. B. (1996) "Designing Flexible Logistics Systems: A Review of Some Singaporean Examples," *Logistics Information Management*, Vol. 9, Iss. 2.
- Denzin, N. K. & Lincoln, Y. S. (Eds.) (1994) *Handbook of Qualitative Research*, Sage Publications, Thousand Oaks, California, USA.
- Ellinger, A. E., Daugherty, P. J. & Plair, Q. J. (1999) "Customer Satisfaction and Loyalty in Supply Chain: the Role of Communication," *Transportation Research Part E-Logistics & Transportation Review*, Vol. 35, Iss. 2, pp. 121-134.
- Ellram, L. M. (1991) "Key Success Factors and Barriers in Internal Purchasing Partnerships," *Management Decision*, Vol. 29, Iss. 7, pp. 38-44.
- Ellram, L. M. (1995) "Partnering Pitfalls and Success Factors," *International Journal of Purchasing and Materials Management*, Vol. Spring.
- Fredendall, L. D. & Hill, E. (2001) *Basics of Supply Chain Management*, St Lucie Press, CRC Press LLC, Boca Raton, Florida, USA
- Fredriksson, O. & Vilgon, M. (1996) "Evolution of Inter-organizational Information Systems in Industrial Distribution: The Cases of Luna and Pappersgruppen," *European Journal of Information Systems*, Vol. 5, Iss. 1, pp. 47-61.
- Glaser, B. G. (1978) *Theoretical Sensitivity: Advances in the Methodology of Grounded Theory*, Sociology Press, San Francisco, California, USA
- Glaser, B. G. & Strauss, A. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Albine Publishing Co., Chicago, USA
- Gundlach, G. T., Achrol, R. S. & Mentzer, J. T. (1995) "The Structure of Commitment in Exchange," *Journal of Marketing*, Vol. 59, Iss. 1 January, pp. 78-92.
- Hakansson, H. (Ed.) (1982) *International Marketing and Purchasing of Industrial Goods: an Interaction Approach*, Wiley, New York, New York, USA.
- Hamel, G., Doz, Y. L. & Prahalad, C. K. (1989) "Collaborate with Your Competitors and Win," *Harvard Business Review*, Vol. 67, Iss. 1, pp. 133-139.
- Heide, J. B. (1994) "Interorganizational Governance in Marketing Channels," *Journal of Marketing*, Vol. 58, Iss. January, pp. 71-85.
- Hines, P. (1994) "Can You Create Your Own World Class Supply Chain?," *Purchasing and Supply Chain Management*, Vol. September, pp. 30-32.
- Hines, P., Rich, N. & Hittmeyer, M. (1998) "Competing Against Ignorance: Advantage Through Knowledge," *International Journal of Physical Distribution & Logistics Management*, Vol. 28, Iss. 1, pp. 18-43.
- Hughes, D. (1994) *Breaking with Traditions: Building Partnerships and Alliances in the European Food Industry*, Wye College Press, Wye, Kent, United Kingdom
- Jaworski, B. J. & Kohli, A. K. (1993) "Market orientation: Antecedents and Consequences," *Journal of Marketing*, Vol. 57, Iss. 3, pp. 53-70.

- Keen, P. G. W. & Scott-Morton, M. S. (1978) *Decision Support Systems: An Organizational Perspective*, Addison-Wesley, Reading, Mass. , USA
- Keith, J., Jackson, D. J. & Crosby, L. (1990) "Effects of Alternative Types of Influence Strategies Under Different Channel Dependence Structures," *Journal of Marketing*, Vol. 54, Iss. 3 July, pp. 30-41.
- Kohli, A. K., Jaworski, B. J. & Kumar, A. (1993) "MARKOR: A measure of market orientation," *Journal of Marketing Research*, Vol. 30, Iss. 4, pp. 467-477.
- Kreps, G. L. (1990) *Organizational Communication*, Longman Cheshire Pty Ltd, Melbourne, Australia
- Kumar, N., Stern, L. W. & Anderson, J. C. (1993) "Conducting Interorganizational Research Using Key Informants," *Academy of Management Journal*, Vol. 36, Iss. 6, pp. 1633-1651.
- Leuthesser, L. & Kohli, A. K. (1995) "Rational Behavior in Business Markets: Implications for Relationship Management," *Journal of Business Research*, Vol. 34, Iss. 3, pp. 221-233.
- Meal, H. C. (1984) "Putting Production Decisions Where They Belong," *Harvard Business Review*, Vol. 62, Iss. March-April.
- Mohr, J. & Nevin, J. R. (1990) "Communication Strategies in Marketing Channels: A Theoretical Perspective," *Journal of Marketing*, Vol. 54, Iss. 4 October, pp. 36-51.
- Mohr, J. J., Fisher, R. J. & Nevin, J. R. (1996) "Collaborative Communication in Interfirm Relationships: Moderating Effects of Integration and Control," *Journal of Marketing*, Vol. 60, Iss. 3 July, pp. 103-115.
- Mohr, J. J. & Sohi, R. S. (1995) "Communication Flows in Distribution Channels: Impact on Assessments of Communication Quality and Satisfaction," *Journal of Retailing*, Vol. 71, Iss. 4, pp. 393-416.
- Mohr, J. J. & Spekman, R. E. (1996) "Perfecting Partnerships," *Marketing Management*, Vol. 4, Iss. 4, pp. 34-43.
- Morgan, R. M. & Hunt, S. D. (1994) "The Commitment-Trust Theory of Relationship Marketing," *Journal of Marketing*, Vol. 58, Iss. 3 July, pp. 20-38.
- Narver, J. C. & Slater, S. F. (1990) "The Effect of a Market Orientation on Business Profitability," *Journal of Marketing*, Vol. 20, Iss. 4 October, pp. 20-36.
- PriceWaterhouseCoopers (1999) *Information and Technology in the Supply Chain: Making Technology Pay*, Euromoney Publications PLC, London, United Kingdom
- Schroder, W. (1999) "Building Strategies Based on Trust: Research & Experience", In *1999 World Food & Agribusiness Congress*, International Agribusiness Management Association, Florence, Italy.
- Silver, M. S., Markus, M. L. & Beath, C. M. (1995) "The Information Technology Model: A Foundation for the MBA Core Course," *MIS Quarterly*, Iss. September, pp. 361-390.
- Slomp, J. (1993) *Production Control for Flexible Manufacturing Systems: An Application Oriented Approach*, Enschede, the Netherlands.
- Spekman, R. E., Kamauff, J. W. J. & Myhr, N. (1998) "An Empirical Investigation Into Supply Chain Management: A Perspective on Partnerships," *International Journal of Physical Distribution & Logistics Management*, Vol. 28, Iss. 8.
- Stank, T. P., Emmelhainz, M. A. & Daugherty, P. J. (1996) "The Impact of Information on Supplier Performance," *Journal of Marketing Theory & Practice*, Vol. 4, Iss. 4 Fall, pp. 94-105.
- Stevens, G. C. (1989) "Integration of the Supply Chain," *International Journal of Physical Distribution and Logistics Management*, Vol. 19, Iss. 8, pp. 3-8.
- Strauss, A. (1987) *Qualitative Research for Social Scientists*, Cambridge University Press, Cambridge, England

- Strauss, A. & Corbin, J. (1990) *Basics of Qualitative Research*, Sage Publications, Newbury Park, California, USA
- Supply Chain Partnerships Program (2000) *Improving Your Supply Chain Partnership Shelf-Help Manual 7: Features of Supply Chains*, www.business.gov.au/supplychain, Department of Industry, Science and Resources.
- Tashakkori, A. & Teddlie, C. (1998) *Mixed Methodology: Combining Qualitative and Quantitative Approaches*, Sage Publications, Thousand Oaks, California, USA
- Trienekens, J. (1999) *Management of Processes in Chains: A Research Framework*, CIP-Data Koninklijke Bibliotheek, Den Haag, The Netherlands
- Urquhart, C. (1997) "Exploring Analysis-Client Communication: Using Grounded Theory Techniques to Investigate Interaction in Informal Requirements Gathering", In *Information Systems and Qualitative Research: IFIP TC8 WG 8.2 International Conference on Information Systems and Qualitative Research*, Eds. Lee, A. S., Liebenau, J. and DeGross, J. I., Chapman & Hall on behalf of the International Federation for Information Processing (IFIP), Philadelphia, Pennsylvania, USA, pp. 149-181.
- Uzzi, B. (1997) "Social Structure and Competition in Interfirm Networks: the Paradox of Embeddedness," *Administrative Science Quarterly*, Vol. 42, pp. 35-67.
- Van Hoek, R. I. (1998) "Logistics and Virtual Integration Postponement, Outsourcing and the Flow of Information," *International Journal of Physical Distribution & Logistics Management*, Vol. 28, Iss. 7.
- Vijayasarathy, L. R. & Robey, D. (1997) "The Effect of EDI on Market Channel Relationships in Retailing," *Information and Management*, Vol. 33, Iss. 2 Dec 5, pp. 73-86.
- Wild, R. (1979) *Production and Operations Management*, Holt, Rinehart & Winston, London, UK
- Womack, J. & Jones, D. (1996) *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*, Simon & Schuster, New York, USA
- Womack, J. P., Jones, D. T. & Roos, D. (1990) *The Machine That Changed the World: Based on the Massachusetts Institute of Technology 5-million Dollar 5-Year Study of the Future of the Automobile*, Rawson Associates, New York

Figure 1 Chain Case Study Participant Information Linkages

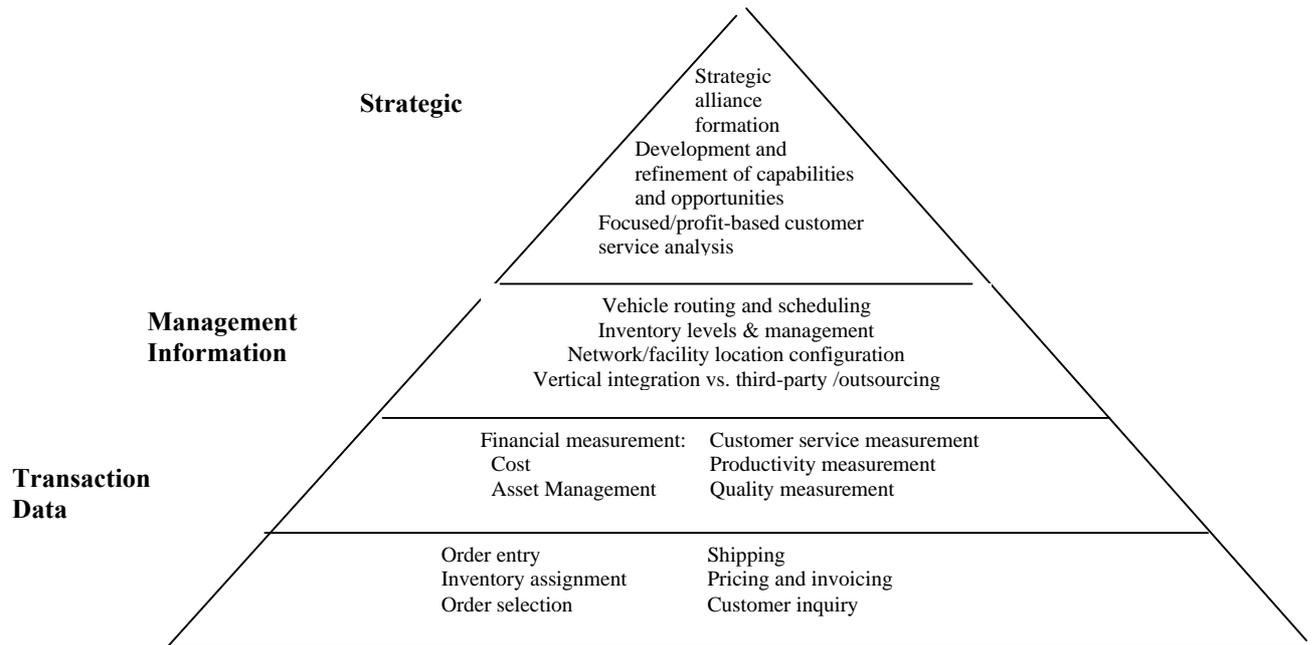
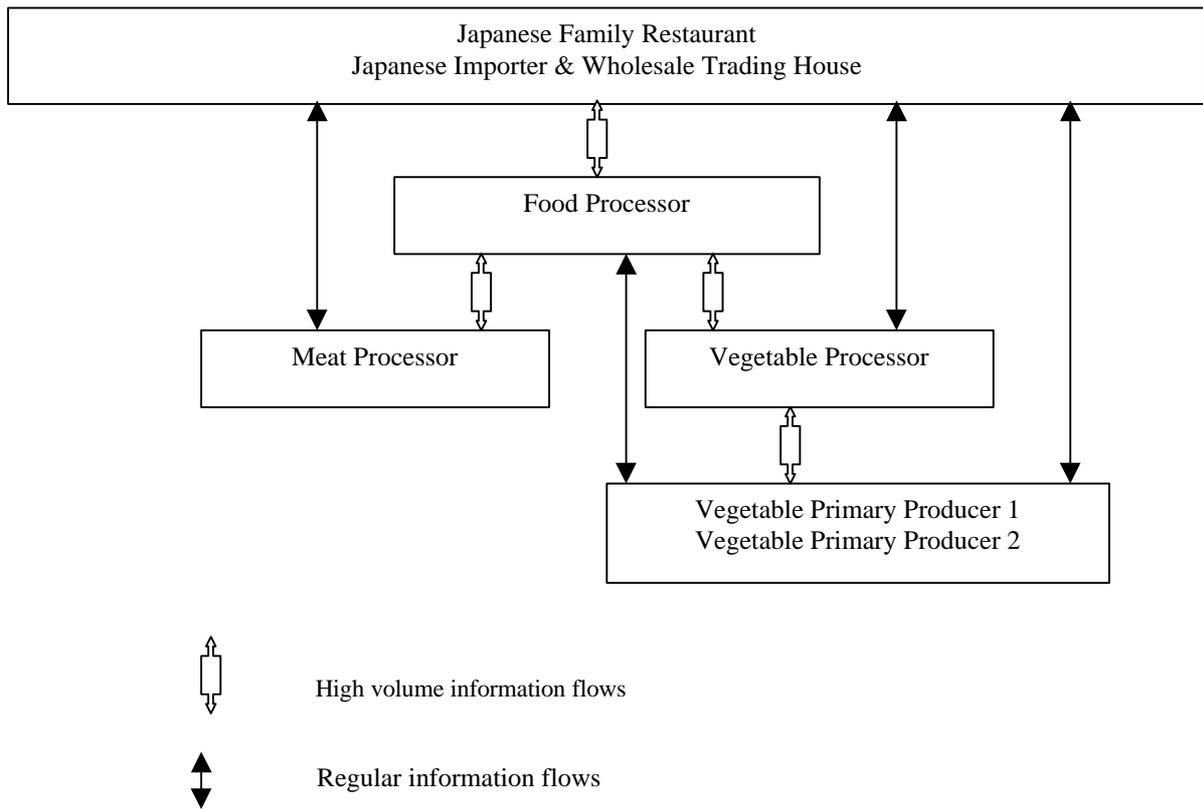


Figure 3 Types of Information

Adapted from Bowersox & Closs 1996

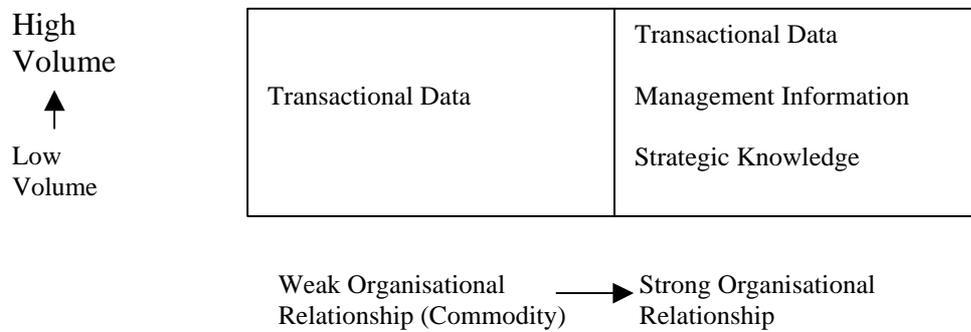


Figure 4 Volume and Types of Inter-Organisational Information Flows in Chains

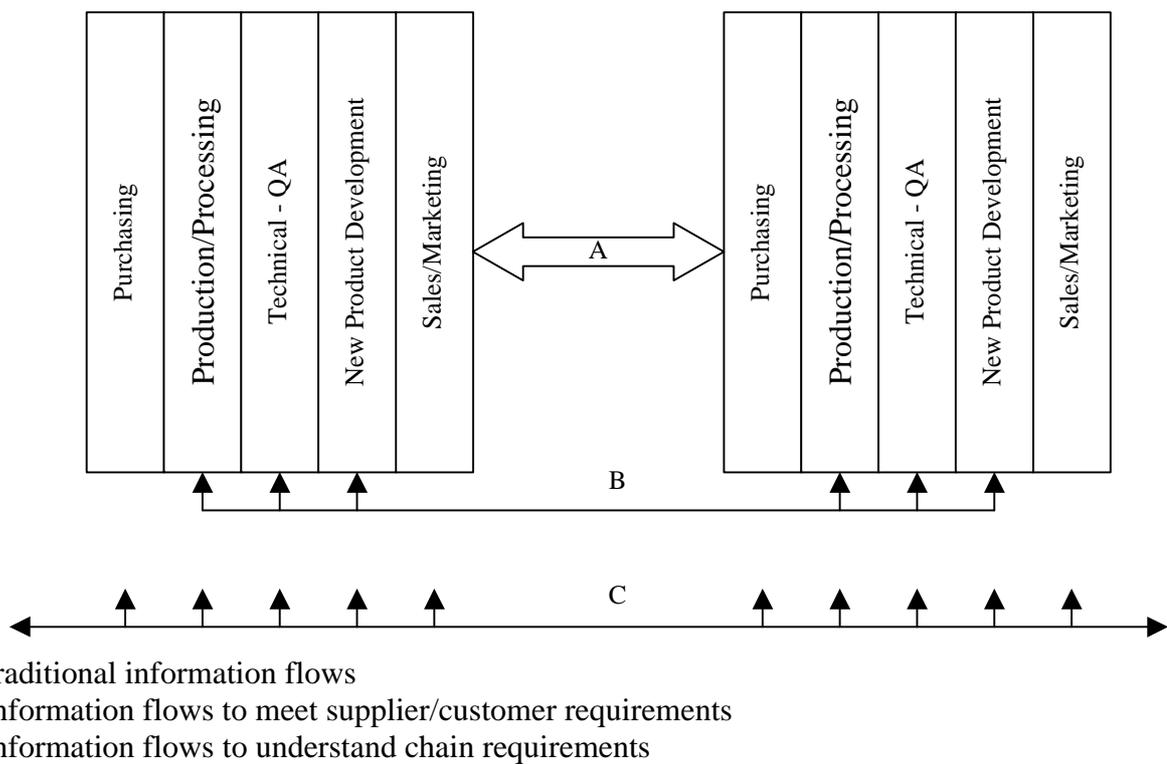


Figure 5 Inter-Organisational Information Flows Between Departments

Figure 2 Theoretical Framework – Chain Inter-Organisational Information Feedback System

Effect of Chain Environmental Factors:

- Product & market characteristics (uncertainty)
- Relationship dependency/power
- Relationship & industry experience
- Personal characteristics

