Consequences of information technology usage on retailer-supplier relations

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Executive summary

1. Retailers and suppliers increasingly tend to form long-term co-operative relationships. In the literature, the use of information technology is an enabling factor behind this trend. Nevertheless, our understanding of how information technology influences retailer-supplier relationships is still limited. The purpose of this paper therefore is to study the consequences of information technology usage on retailer supplier relationships, focusing on inter-organisational systems.

2. The paper begins by discussing the nature of retailer-supplier relations, noting that whereas these relationships have traditionally been adversarial, retailers and suppliers are beginning to realise that they can benefit from co-operating. Further, developmental processes in co-operative inter-organisational relations are discussed and the important role of social exchange in inter-organisational relationships is stressed.

3. Then the usage of information technology in retailer-supplier relationships is discussed. A typology of inter-organisational information sharing systems based on various types of interdependencies between retailers and suppliers is presented. It is argued that retailers and suppliers use a variety of inter-organisational systems depending on the level of co-operation and interdependence.

4. Based on the discussions of the nature of retailer-supplier relationships and the uses of information technology in these relationships, six propositions regarding the consequences of information technology usage on retailer-supplier relationships are developed. Specifically, propositions are developed regarding the choice of governance mechanism, the relationship development process and the exchange of information and joint value creation activities.

5. The paper concludes with a discussion of managerial implications and areas for future research. Based on the propositions developed in the paper, it is stressed that managers need to carefully consider the consequences that the use of inter-organisational systems may have on inter-organisational relationship. Further, managers need to realise that the use of inter-organisational systems is becoming a strategic necessity and is not in itself a source of sustainable competitive advantage. Finally, it is pointed out that the propositions developed in this paper have been developed based on previous empirical and theoretical papers and need to be empirically validated.

1. INTRODUCTION

The structure of distribution channels is constantly evolving due to efforts to adapt to changes in consumer demand for service outputs and to changing surroundings (Bucklin 1966; 1972). An important development in the structure of distribution channels has been the growth of multiple retailers and the accompanying increase in retail concentration, with the result that retailers have become gatekeepers controlling suppliers' access to consumer markets. As a consequence of this growth, retailers have reached a size, where it has become economically sound for them to increasingly take control of a range of functions like physical distribution, advertising and product development that have traditionally been performed by manufacturers (Grant 1987). These changes in retail structure have improved the bargaining position of retailers relative to suppliers (Borghesani, de la Cruz & Berry 1997; Dawson & Shaw 1989; Grant 1987; Knox & White 1991). What may further improve retailers' bargaining position is their ready access to market information about consumer behaviour from their scanner data due to their proximity to consumers (Stern, El-Ansary & Coughlan 1996). This information is valuable to suppliers, who can use it to schedule production and adjust marketing efforts based on their knowledge of actual consumer behaviour. The relative bargaining position of retailers and food suppliers is important, because the more powerful partner will be in a position to impose terms of trade on the other party, including the use of information technology for the exchange of information (Holland, Lockett & Blackman 1992).

At the same time, there has been a change in the nature of retailer-supplier relationships, as intensifying competition in retailing has forced retailers to reconsider traditionally adversarial relations with suppliers. Instead of focusing primarily on the economic returns of individual transactions, retailers and suppliers increasingly form long-term co-operative relationships (Bowlby & Foord 1995; Buzzell & Ortmeyer 1994; Dawson & Shaw 1989; Kinsey, Senauer; King & Phumpiu 1996; Knox & White 1991).

In the literature, use of information technology is considered an enabling factor behind the increasing prevalence of long-term co-operative retailer-supplier relationships (Achabal & McIntyre 1987; Buzzell & Ortmeyer 1994; Ford 1991; Hogarth-Scott & Parkinson 1993; Holland, et al. 1992; Kinsey, et al. 1996). Information technology is important for the structure of distribution channels, including the nature of retailer-supplier relationships, because the supply chain can be viewed as a communication channel (Glazer 1991; Peterson, Balasubramanian & Bronnenberg 1997). Due to developments in information technology, this channel's capacity to store, process and transmit information has increased significantly over the last couple of decades (Glazer 1991). Fulk and DeSanctis (1995, p. 338) mention five features of new communication technologies of importance to organisational structuring: (1) there has been a dramatic increase in the speed of communication; (2) the costs of communicating have been dramatically reduced; (3) there has been a sharp rise in communication bandwidth; (4) the number of people and machines electronically linked has increased vastly; and (5) communication and computing technologies have been integrated. Developments in information technology create new opportunities for structuring value creation in the supply chain (Barley 1986; Fulk & DeSanctis 1995; Glazer 1991; Lucas & Baroudi 1994).

Despite the apparent importance of information technology, our understanding of the consequences of information technology usage on retailer-supplier relationships is still limited. Therefore, the purpose of this paper is to analyse how information technology usage affects retailer-supplier relations. Advances in the use of information technologies have been argued to be an important source of economic growth in the future (Jonscher 1983). However, there is a widening gap between the potential of information technology and its actual use (Doll & Torkzadeh 1998). Through increasing our understanding of how the use of information technology influences retailer-supplier relations, this paper may help bridge this gap. Its theoretical contribution will be to develop a set of empirically testable propositions regarding the consequences of information technology use on retailer-supplier relations. This is relevant because much of the literature is focused on discussing typically American examples of information technology usage or discussing the potential rather than the actual benefits derived from inter-organisation use of information technology.

This paper will focus on the consequences of using inter-organisational systems (IOS) for communication between retailers and suppliers. Inter-organisational systems are information and communication technology based information sharing systems that transcend organisational boundaries (Barrett & Konsynski 1982; Kumar & van Dissel 1996). This boundary-spanning element of IOS implies levels of co-operation and co-ordination beyond traditional relationships. IOS are thus planned and managed co-operative ventures (Kumar & van Dissel 1996).

The remainder of this paper is structured as follows. In the following section, the nature of retailer-supplier relationships is discussed. In Section 3, the uses of information technology in retailer-supplier relationships are considered. In Section 4, propositions will be developed regarding the possible consequences that information technology usage may have on retailer-supplier relations. In this connection, emphasis will be on the consequences information technology usage has on the choice of governance mechanism, the exchange of information and value creation in retailer-supplier relations. Although many of the propositions developed will be of general applicability, they are being developed with relations between grocery retailers and food suppliers in mind. Food retailing is one of the sectors that has worked the most with the exploitation of information technology in connection with the co-ordination of value-creating activities in the supply chain. Finally, the paper concludes with a brief discussion of managerial implications and areas for future research in Section 5.

2. Retailer and supplier relations

The exchange of goods and information between retailers and suppliers can be co-ordinated using a variety of governance mechanisms, ranging from discrete transactions over relational exchange to corporate hierarchies (Dwyer, Schurr & Oh 1987; Williamson 1985)[1]. It has been the traditional notion that co-ordination between buyers and sellers was achieved by the market mechanism, ie through discrete transactions. *The idea of a discrete transaction is the foundation on which concepts of relationships are built"* (Dwyer, et al. 1987, p. 12).

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1 As this paper focuses on exchanges between companies under independent ownership, governance through corporate hierarchies will not be considered further.

> *Discreteness is the separating of a transaction from all else between the participants at the same time and before and after. Its ideal, never achieved in life, occurs when there is nothing else between the parties, never has been and never will be* (Macneil 1980, p. 60).

Discrete transactions are characterised by limited interpersonal involvement between the exchange partners; functional communication; narrow content; absence of joint efforts and a distinct beginning, short duration and sharp end (Dwyer, et al. 1987; Pelton, Strutton & Lumpkin 1997). Transactions between retailers and suppliers can rarely be characterised as discrete. An alternative and more realistic view is that exchange relationships between retailers and suppliers can be, but are not necessarily, more stable and include co-operation over time (Dawson & Shaw 1989), a phenomenon Arndt (1979) termed 'domestication of markets' because transactions are moved inside the company or inside the boundaries of a group of companies committed to long-term co-operation.

Exchange relations between retailers and suppliers have traditionally been adversarial, because each party has tried to gain at the expense of the other (Buzzell & Ortmeyer 1994). However, retailers and suppliers can often benefit from co-operating rather than focusing exclusively on the interests of their respective companies because *"opportunities for joint gains can be recognised and realised over time through enhanced information acquisition and exchange, along with the emergence of shared interests"* (Zajac & Olsen 1993, p. 133). Zajac and Olsen (1993) therefore argue that firms should move focus from a one-sided reduction in transaction costs to how the firm in co-operation with suppliers or customers can maximise the creation of joint value in the supply chain. Dwyer, et al. (1987) use the concept of relational exchange to describe this phenomenon. Relational exchange is an inter-organisational governance mechanism where two (or more) companies voluntarily engage in a co-operative relationship that is valuable to both partners (Dwyer, et al. 1987; Zajac and Olsen 1993). Retailers and suppliers form collaborative relationships because these are expected to yield superior value relative to alternative organisational forms in certain situations, offering potentially synergistic combinations of resources and capabilities (Madhok & Tallman 1998). For example, by engaging in close, vertical relationships in the supply chain it is possible for retailers and suppliers to make more fundamental modifications to merchandising and distribution processes than either could achieve on their own (Buzzell & Ortmeyer 1994).

Research has shown that a supplier's interest in long-term trading relations is one of the most important criteria that retail buyers use to choose between alternative products and suppliers (Skytte & Blunch 1998). In a study of the determinants of long-term orientation in retailer-supplier relationships, Ganesan (1994) found that interest in long-term co-operation is a function of mutual dependence and the extent to which retailers and suppliers trust each other. Kumar (1996) also views trust as important in retailer-supplier relations, because trust helps the parties realise the full potential of the relationship. If the parties trust each other they are more willing to exchange sensitive information or to adapt processes to each other, while at the same time a trusting partner will not feel the need to monitor its counterpart's behaviour (Kumar 1996).

Relationship development processes

Relationships between organisations may be conceptualised as evolving through five phases (Dwyer, et al. 1987): (1) awareness; (2) exploration; (3) expansion; (4) commitment and (5) dissolution. The first step in the retailer-supplier relationship development process is that either party recognises the other as a potential exchange partner. Once the potential exchange partners have become aware of each other, they explore the possibility of exchange and consider the associated obligations, benefits and burdens. Both retailer and supplier will review the potential value of doing business together and compare it to alternative organisational arrangements and/or exchange partners (Madhok & Tallman 1998). In the expansion phase, the retailer and supplier become increasingly interdependent as the benefits derived from the exchange increase. The initial trust and mutual satisfaction established during exploration now lead to increased risk taking within the retailer-supplier relationship. At their most advanced, retailer-supplier relationships provide the exchange partners with a level of satisfaction that virtually precludes other exchange partners. Exchange partners will in this phase implicitly or explicitly pledge relational continuity to show their commitment to the relationships. Throughout the evolution of a relationship, the possibility of disengagement is implicit. However, there have been only few empirical investigations of why relationships fail (for exceptions see Davies 1994a; 1994b).

By focusing on the developmental processes in co-operative inter-organisational relationships, Ring and Van de Ven (1994) elaborate on the relational development model proposed by Dwyer, et al. (1987).

> *From a developmental process perspective, co-operative [inter-organisational relationships] are socially contrived mechanisms for collective action, which are continually shaped and restructured by actions and symbolic interpretations of the parties involved. Thus, just as an initial structure of safeguards establishes a context for inter-party action, so do subsequent interactions reconstruct and embody new governance structures for the relationship* (Ring & Van de Ven 1994, p. 96).

Co-operative relationships develop from the awareness phase to the commitment phase through *"a repetitive sequence of negotiation, commitment*[2] *and execution stages, each of which is assessed in terms of efficiency and equity"* (Ring & Van de Ven 1994, p. 97)[3]. In the negotiation stage, retailers and suppliers develop joint expectations about their motivations, possible investments and

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2 An important terminological note is that Dwyer, et al. (1987) and Ring and Van de Ven (1994) use the term commitment differently. On the one hand, Dwyer, et al. (1987, p. 19), as mentioned earlier, use the term commitment to describe the *"most advanced phase of buyer-seller interdependence"*, where buyer and seller have *"achieved a level of satisfaction from the exchange process that virtually precludes other primary exchange partners"*. On the other hand, Ring and Van de Ven (1994, p. 98) use the term commitment to denote the stage, where the "the terms and governance structure of the relationship are established, and they are either codified in a formal relational contract or informally understood in a psychological contract among the parties". In this paper, when using the term commitment phase, it has the Dwyer, et al. (1987) meaning, when using the term commitments stage, it has the Ring and Van de Ven (1994) meaning.
3 Dwyer, et al. (1987) conceptualise the exploration and expansion phases in five subprocesses: (1) attraction; (2) communication and bargaining; (3) development and exercise of power; (4) norm development and (5) expectation development. These subprocesses do not form a logically consistent explanation of the processes involved in the exploration and expansion phases and are not able to explain the evolution of relationships from one phase to another. This deficiency is redressed by Ring and Van de Ven (1994), whose model focuses on the developmental processes in co-operative inter-organisational relationships and which is able to explain transitions from one stage to another.

perceived uncertainties. Focus in this stage is on formal bargaining processes and choice behaviour. In the commitment stage, the parties reach agreement on the obligations and rules for future exchange in the relationship. At this stage, the conditions of the relationship and its governance mechanism are determined and codified in either a formal contract or an informal understanding between parties. Finally, obligations and rules are enacted in the execution stage. The parties to an exchange continuously evaluate whether the relationship meets expectations in terms of efficiency and equity. Based on these assessments, exchange partners decide whether to continue the relationship, whether it should progress from one stage to another or whether it should be dissolved. As relationships can exist over time it will typically be necessary to renegotiate the conditions of the relation and this sequence of stages will be repeated.

Social processes in retailer-supplier relationships

Long-term co-operative relationships are made up of a series of exchange episodes in which four elements are exchanged (IMP Group 1982). These are the exchange of the product or service, the exchange of information, the exchange of money or financial exchange and finally social exchange. As implied by the last exchange element, relationships are formed not only between companies but also between individuals. Social exchange has an important function in reducing uncertainty. At least two individuals, one from both retailer and supplier, will be involved in a relationship (IMP Group 1982). However, often more than two individuals will be involved. These individuals exchange information, develop personal relations and tie strong social bonds, which affect the decisions each company makes as part of the business relationship (IMP Group 1982). Difference in personality, experience and motivation means that each individual will participate differently in social relations. An individual can have different roles in the relation (Ring & Van de Ven 1994). Roles are based on interactions that occur in the course of daily life and are hence *"intimately bound to a matrix of social relations"* (Barley 1990, p. 68). Work roles are partially defined by the task performed and therefore also subsumes an individual's use of technology and, hence, his or her skills (Barley 1990).

Nadel (1957) distinguishes between relational and non-relational roles. While relational roles cannot be played without an alter ego, non-relational roles do not require specific partners. Instead of dividing roles into these archetypes, Barley (1990) argues that it is more appropriate to think of roles as bundles of relational and non-relational elements that can be separated only analytically. Non-relational elements of a work role are the set of recurring activities normally performed by incumbents of a particular role, eg a retail buyer. Because non-relational elements of a work role include skills and tasks, Barley posits that use of technology is likely to have its most immediate impact on the non-relational elements of a role. However, since few tasks are truly independent, a person's work will influence with whom one interacts as well as how one relates to others. Therefore, changes in the non-relational elements of a role following the use of new technologies will most often also influence the relational elements of a role.

Barley (1986; 1990) emphasises that technology only influences organisational structure to the extent that the technology influences relations between two or

more persons. To the extent that information technologies are used for communication it differs from other technologies, because it will have an immediate effect on the relational elements of the role and consequently the structure of the organisation in which the role is embedded, if the use of information technology causes changes in the frequency or content of interactions between role inhabitants. Barley (1990, p. 70) summarises the influence of new technologies, including information and communication technologies, on organisational structure as follows:

> *When introduced into a work setting, new technologies initially modify tasks, skills, and other non-relational aspects of roles. These modifications, in turn, shape role relations. Altered role relations either transform or buttress the social networks that constitute occupational and organisational structures. Ultimately, shifting networks should either sustain or modify institutions, since the latter represent blueprints for ongoing action.*

3. INFORMATION TECHNOLOGY IN RETAILER-SUPPLIER RELATIONSHIPS

Co-operation across organisational boundaries indicates that some form of dependency exists between organisational units or businesses. Thompson (1967) distinguished between three types of interdependency: (1) *pooled dependency*, where organisational units share and use common resources but otherwise are independent; (2) *sequential dependency*, where units work in series as the output of one unit becomes the input of another; and (3) *reciprocal dependency*, where each unit receives input from and supplies output to others, often interactively. Sequential interdependency best describes the interdependencies that have traditionally existed between links in the supply chain, eg between retailers and suppliers. However, as exchange relationships between retailers and suppliers become increasingly co-operative, interdependency acquires reciprocal elements. A simple example of this is product development, as retailers sometimes approach suppliers with ideas for new products. The type of interdependence that exists between companies is likely to be reflected in the type of IOS used for exchanging information (Kumar & van Dissel 1996). Kumar and van Dissel (1996) therefore distinguish between: (1) *pooled information resource IOS*, which enable inter-organisational sharing of common IS/IT resources; (2) *supply chain IOS*, which support customer-supplier relationships and occur as a consequence of these relationships along the supply chain and (3) *networked IOS*, which operationalise and implement reciprocal interdependencies.

Depending on the level of co-operation and interdependence, retailers and suppliers use a variety of IOS to exchange information. As interdependence between retailers and suppliers is primarily sequential, supply chain IOS are most prominent in retailer-supplier relationships. However, different forms of pooled information IOS and networked IOS are also used. The supply chain IOS used in retailer-supplier relationships has typically been electronic data interchange (EDI). EDI is *"the inter-company computer-to-computer communication of standard business transactions in a standard format that permits the receiver to perform the intended transaction"* (Sokol 1989, p. 12). Because the use of EDI standardises communication between retailer and supplier, transaction costs are reduced and the flow of goods and services trough the supply chain is improved. Adaptation of EDI depends on the expected efficiency advantage,

expected service advantage and expected system incompatibility (O'Callaghan, Kaufmann & Konsynski 1992). Supplier reliability improves, as use of EDI becomes routine and with the willingness of both buyer and supplier to share sensitive information (Walton & Marucheck 1997). Finally, use of EDI appears to have a stabilising effect on retailer-supplier relationships (Davies 1994b).

EDI is an example of an information technology that influences the relational elements of buyer and seller roles, because it changes the content and frequency of interactions between buyer and seller. Although EDI may be the most important type of IOS used in retailer-supplier relationships, other IOS types are also in use. Examples of pooled information resource IOS are networks, shared databases and electronic markets. In order for electronic communication to be possible between retailers and suppliers, the existence of some form of communication infrastructure is a prerequisite, either in the form of private or public networks. A shared database is an example of a shared information resource that can be accessed over the common communication infrastructure. To improve the overall efficiency of the supply chain, shared databases are used, eg enabling suppliers to improve the efficiency of operations by utilising information gathered at the retail level. Electronic markets are a final example of a pooled information resource IOS, as a common information resource is used to match buyers and sellers. Theoretically, it has been argued that electronic markets will become an increasingly important co-ordination mechanism between buyers and sellers as developments in information technology allow more information to be transmitted at the same time, while simultaneously decreasing the cost of this communication (Malone, Yates & Benjamin 1987). This point will be the subject of more detailed discussion later in this paper.

Besides EDI, voice mail and facsimile are examples of supply chain IOS used to communicate standard business documents in retailer-supplier relationship. With the advent of EDI, the importance of fax transmissions has decreased, as orders are no longer faxed but sent via EDI. Finally, primitive examples of networked IOS used in retail-food supplier dyads are e-mail, fax and voice communication to co-ordinate inter-organisational value creation activities (Kumar & van Dissel 1996). While e-mail is likely to be used frequently by participants in relationships, the use of more advanced types of networked IOS like the CAD/CASE data interchange and repositories is probably limited.

Holland, et al. (1992) have developed a strategic IOS model identifying factors that managers need to consider when using IOS between links in the supply chain[4]. The model was developed based on an analysis of 18 case studies of American companies using information systems on an inter-organisational basis. The factors identified in the model were[5]: relative bargaining position; type of product; nature of transaction; vertical integration; distribution chan-

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4 In their article, Holland, et al. (1992) discuss factors that companies should consider before embarking on 'electronic data interchange'. However, their definition of EDI as *"the exchange of information across organisational boundaries using information technology"* is similar to the definition of inter-organisational information sharing systems (IOS) used in this paper. For the sake of consistency and because the term EDI is used in a narrower sense in this paper, the term IOS will be used when discussing the model proposed by Holland, et al. (1992).

5 Because Holland, et al. (1992) take the perspective of a single firm, they distinguish between supplier and buyer power. To stress the dyadic perspective used in this paper, these factors have been combined under the heading of relative bargaining position. Similarly, Holland, et al. (1992) consider vertical (meaning backward) integration and forward integration. These factors are combined here under the heading of vertical integration.

nels; value added information; nature of market; market information; organisational structure and process; product life cycle and order cycle.

As mentioned in the introduction, the relative bargaining position of retailers and food suppliers is important, because the more powerful partner will be in a position to impose terms of trade on the weaker partner, including the use of an IOS (Holland, et al. 1992). The nature of transactions determines the importance of relevant, timely and accurate information exchange between retailer and supplier (Holland, et al. 1992). It depends on the type of product being traded and the level of interdependence between business processes of retailers and suppliers, as discussed at the beginning of this section. The nature of product being traded is important because it impacts on the volume and type of information that is or could be exchanged (Holland, et al. 1992). Food products have a short shelf life and are therefore delivered frequently to stores, sometimes on a daily basis. This necessitates frequent exchange of information in the form of orders, order acknowledgements, invoices, advance shipping notifications etc. At the same time, use of IOS can make shorter order cycles possible, because IOS use improves the quality and timeliness of information so orders can be placed more frequently and in smaller quantities (Holland, et al. 1992). Furthermore, the nature of markets affect the importance of using IOS to collect, store and transmit information. In markets characterised by high volatility, timely information is at a premium.

Retailers and suppliers may use IOS to achieve the benefits of vertical integration without common ownership (Buzzell & Ortmeyer 1994; Konsynski & McFarlan 1990), as they may shift decision making between them (Holland, et al. 1992). For example, as part of category management agreements, retailers may shift decision-making power over product categories to selected suppliers, known as category captains. This requires the retailer to give the category captain access to all relevant information about the category, which will often mean using IOS.

Establishing an IOS in a retailer-food supplier dyad affects the nature of the business relationship. As discussed earlier, individual roles and tasks associated with managing customer and supplier relationships therefore change (Barley 1990; Holland, et al. 1992). The EDI example mentioned above is an illustration of this.

4. CONSEQUENCES OF INFORMATION TECHNOLOGY USAGE ON RETAILER-SUPPLIER RELATIONSHIPS

Organisational structure can be seen as a set of mechanisms for processing information (Galbraith 1977; Scott 1990; Tushman & Nadler 1978). The use of information technology should be of potentially large importance to the structure of organisations and to the structuring of inter-organisational co-operation in the value chain because it influences how they store, process and transmit information.

In the previous sections the nature of retailer-supplier relationships and the uses of information technology in these relationships have been considered. Based on this conceptual framework, propositions regarding the consequences

of information technology uses on retailer-supplier relationships will be developed in this section. Specifically, propositions will be developed regarding the choice of governance mechanism, the relationship development process, the exchange of information between retailer and supplier and joint value creation activities.

Governance mechanism

There has been considerable discussion in the literature concerning how the use of information technology influences the choice of governance mechanism used between buyers and sellers. Overall, the use of information technology has been argued to influence the choice of governance mechanism between buyers and sellers in one of two directions (Malone, et al. 1987; Steinfield, Kraut & Plummer 1995). On the one hand, by connecting large numbers of buyers and sellers and reducing transaction costs, information technology usage can increase the use of discrete transactions as governance mechanisms by creating electronic markets (Malone, et al. 1987; Bakos 1991). On the other hand, by enabling two parties to change and align processes that create and use information, information technology usage can foster relational exchange between retailers and suppliers (Clemons & Row 1992; Steinfield, et al. 1995). These two counteracting forces have been dubbed *the electronic brokerage effect* and *the electronic integration effect*, respectively (Malone, et al. 1987). In a refinement of this argument, Anselmi (1997) posited that the choice of governance mechanism between grocery manufacturers and distributors follows an inverted U-shape from discrete transactions; to relation exchange; to discrete transactions, depending on the information technology competence of the companies involved. Information technology competence being defined as *"the technological ability to produce knowledge and integrate it into decision-making"* (Anselmi 1997, p. 57). The influence of information technology competence on the choice of governance mechanism is moderated by relationship interdependence (Anselmi 1997).

As previously mentioned, Thompson (1967) distinguished between pooled, sequential and reciprocal interdependence. The type of interdependence that exists between exchange partners has implications for the governance mechanisms that are suited for co-ordinating value creation activities between retailers and food suppliers and the types of IOS that are viable for exchanging information between exchange partners.

Although interdependence between food suppliers and retailers fundamentally can be characterised as sequential, as the output of one is the input of the other, all three types of interdependence can exist between retailers and food suppliers. At the one extreme, pooled interdependence can be said to exist between retailers and suppliers when either party can choose between a large number of potential exchange partners, eg when a retailer can choose between a large number of suppliers of generic fruits and vegetables. At the other extreme, exchange relations between food suppliers and retailers can be characterised as reciprocal when collaborative relationships involve joint value creation activities, eg joint product development. As interdependency between retailer and supplier increases from pooled to reciprocal, the governance mechanism used is likely to change from discrete transactions to relational exchange. As retailers and suppliers move away from focusing on one-sided reductions in transaction

costs to how they can maximise joint value creation in the supply chain, a need for more explicit co-ordination of value creation activities arises. Explicit co-ordination can be defined as the extent to which decisions regarding economic activities are co-ordinated to reflect processes and information that are specific to a exchange relationship (Clemons & Row 1992).

As mentioned earlier, the use of information technology is considered an enabling factor behind the increasing prevalence of long-term co-operative retailer-supplier relationships. Thus, if the literature on information technology and retailer-supplier relations is to be believed, retailers have so far mainly used information technology to create long-term exchange relations with suppliers (Anselmi 1997; Bowlby & Foord 1995; Buzzell & Ortmeyer 1994; Kinsey, et al. 1996; Steinfield, et al. 1995). However, information technology has also been used for creating electronic markets between retailers and suppliers. Because of the different degrees of interdependence, this implies that different types of IOS are used for communicating between retailers and suppliers depending on the need for explicit co-ordination.

> *Proposition 1: As retailers and suppliers move their focus away from one-sided reductions in transaction costs to maximising joint value creation, the need for explicit co-ordination between retailer and supplier increases, and the IOS used for communication will move from pooled information resource IOS over supply chain IOS to networked IOS.*

From this proposition it follows that as the need for explicit co-ordination between retailers and food suppliers increases, they will use information technology to support relational exchange rather than electronic markets.

Managing value creation in close and collaborative relationships is a resource-intensive activity, which limits the number of partners with which retailers and suppliers can co-operate closely. Furthermore, interdependencies between retailers and suppliers are likely to vary and exchange relations will therefore differ with regards to the level of explicit co-ordination needed. Retailers and suppliers are therefore unlikely to have equally close or collaborative relationships with all partners. From the retailers' (or suppliers') point of view, the choice of governance mechanism should therefore not be viewed as a question of either discrete transactions or relational exchange. Rather, the retailer (supplier) has to decide when to deal with some suppliers (retailers) using discrete transactions and when to use relational exchange with other suppliers (retailers). Consequently, retailers and suppliers will use different types of IOS at the same time, depending on the degree of interdependence with exchange partners. Electronic markets and electronic hierarchies should be seen as complementary, as retailers and suppliers will use a combination of electronic markets and information technology enabled collaborative inter-organisational relationships when dealing with each other.

A certain level of information technology competence is a prerequisite for co-operation between retailer and supplier. Whether information technology use will influence relationships between retailers and suppliers in the direction of either electronic markets or relational exchange depends on the information technology competence of retailers and suppliers and their ability to combine this competence with complementary skills and resources. Increasingly, the use

of information technology has become a strategic necessity, because information technology creates value for the firm by increasing internal and external co-ordination. Companies that do not invest in information technologies will have higher cost structures and will therefore be at a competitive disadvantage (Powell & Dent-Micallef 1997). However, despite the benefits of using information technology, information technology in itself is not enough to create sustainable competitive advantages because competitors have access to the same hardware and software (Ford 1991; Powell & Dent-Micallef 1997). Powell and Dent-Micallef (1997) provide empirical evidence to support this 'strategic necessity hypothesis' of information technology. To create sustainable competitive advantage based on information technology usage, retailers and suppliers must combine their information technology competence with other complementary skills and resources.

The overall level of information technology competence is likely to grow in the future, as the use of information technology becomes more widespread and experience is accumulated. Anselmi (1997) argues that increases in information technology competence will lead to increasing reliance of discrete transactions. However, there are reasons to doubt that an increase in information technology competence will automatically lead to a move away from relational exchange to discrete transactions as the governance mechanism, at least between retailers and food suppliers. First, food manufacturing is often as concentrated as food retailing, meaning that retailers face a limited number of potential suppliers. Second, as retailers have grown, it has to an increasing degree become a concern for retailers to secure quantities sufficient for all stores in their chains (Skytte & Blunch 1998), again narrowing the number of possible suppliers. Third, electronic markets are an example of an IOS, which is easy to imitate because electronic markets are based on the diffusion of certain information technology competencies among the participants of the market. In contrast, when using IOS in the context of co-operative retailer-supplier relationships it is possible for retailers and suppliers to combine their information technology competence with the skills and resources necessary to manage a collaborative exchange relationship. The information technology competence of the firms thus becomes embedded in the context of the relationship, which leads to causal ambiguity and makes competitive imitation difficult (Powell & Dent-Micallef 1997). Based on this reasoning, the following proposition is suggested.

Proposition 2: Embedding information technology competence in the context of collaborative exchange relationships supports the attainment of sustainable competitive advantages for the retailer-supplier dyad.

Because it has been argued that sustainable competitive advantages may accrue to retailers and suppliers who use information technology in the shape of IOS together with other complementary skills and resources in the context of collaborative relationships, we will now consider how information technology influences relational development.

Relational development

Despite the recognised importance of information technology usage as an enabler of collaborative retailer-supplier exchange relationships, there has been

little research or theory developed regarding the consequences of inter-organisational systems (IOS) on relational development. In an effort to rectify this deficiency, some preliminary propositions are developed below.

Dwyer, et al. (1987) suggested that relationships between companies develop through five phases. Because of the different nature and content of these phases, IOS are likely to impact differently on them. As relations evolve, inter-dependence between retailer and supplier will change from pooled inter-dependency and attain elements of sequential and reciprocal interdependence. Therefore, as relations evolve from the awareness to the commitment phase, so too, will the nature of IOS used in the relationship change. In the awareness phases, the potential partners will only use IOS to a limited extent, although they may use some form of shared information resource IOS. Once a retailer and a supplier have become aware of each other and explore the possibility of exchange, IOS are likely to feature prominently in the considerations of the potential exchange partners. With the use of information technology becoming a strategic necessity (Powell & Dent-Micallef 1997), willingness to use IOS will increasingly be a necessary but not sufficient prerequisite for relationships to evolve beyond exploration. In the exploration phase the information technology competence of potential partners will be an important element in considerations regarding whether or not to develop the relationship further. Because combining information technology competence with complementary skills and resources in the context of relationships is a possible source of sustainable competitive advantage, it has a significant impact on the future value that can be expected to accrue from the relationship (Madhok & Tallman 1998; Zajac & Olsen 1993). Actual use of IOS will still be limited in the exploration phase, although shared information resource IOS and supply chain IOS may be used on a limited scale in connection with trial purchases. As the relationship expands, retailers and suppliers will use both shared information resource and supply chain IOS, possibly even networked IOS. Finally, in fully evolved relationships, where retailer and supplier have committed themselves to relational continuity, supply-chain IOS like EDI become essential for connecting the partners. Retailers and suppliers may also use networked IOS to bind together value creation activities, eg to iron out problems or in connection with joint product development. These thoughts are summed up in the following proposition.

> *Proposition 3: As relationships evolve from the awareness to the commitment phase and interdependence increases, the IOS used become increasingly complex, moving from shared information resource IOS over supply-chain IOS to networked IOS.*

As relationships evolve over time, relational norms are developed, reinforced and adjusted. Norms can be defined as "*expectations about behaviour that are at least partially shared by a group of decision makers*" (Heide & John 1992, p. 34). By adopting norms and establishing standards of conduct, exchange partners set the ground for future exchange (Dwyer, et al. 1987). Heide and John (1992) have shown empirically that norms play an important role in connection with the structuring of economic relations between independent companies. As relationships between retailers and suppliers evolve, norms will be developed regarding the use of information technology within the exchange relationship and regarding the exchange of information.

Ring and Van de Ven (1994) see co-operative inter-organisational relationships as developing from awareness to commitment through a repetitive sequence of negotiation, commitment and execution stages, each of which is assessed in terms of efficiency and equity. In this sequence, the use of IOS is continually shaped and restructured by actions and symbolic interpretations of the parties involved. These actions and interpretations determine the impact that IOS can have on the relationship in terms of the value that can be derived from enhanced information acquisition and exchange (Zajac & Olsen 1993). In the negotiation stage retailer and supplier will discuss how to use IOS in their exchange relationship, as well as the kind and amount of information to be exchanged using IOS. In the commitment stage, retailer and supplier reach agreement on how to use IOS. This agreement is codified in either a formal contract or informally understood in a psychological contract among the parties (Ring & Van de Ven 1994). Finally, in the execution stage the parties use IOS as agreed. Both retailer and supplier continuously assess the use of IOS in terms of how efficiently they perform intended tasks and how equitable benefits and obligations deriving from IOS are shared.

As mentioned earlier, relational exchange is made up of a series of exchange episodes, as part of which four elements are exchanged, ie, product or service exchange; exchange of information; money or financial exchange and social exchange (IMP Group 1982). The use of IOS in a relationship has consequences for all four exchange elements. The impact of IOS usage on the first three elements is fairly straightforward and will only be considered briefly here, although information exchange will be considered in greater detail below in connection with a discussion of its importance for joint value creation. Because developments in information technology has expanded the capacity to store, process and transmit information (Glazer 1991), IOS usage has perhaps its most obvious effect on the exchange of information. The use of IOS can make the exchange of products more efficient by providing suppliers with relevant, timely and accurate information about retailer demands for products (Holland, et al. 1992), enabling suppliers to shorten lead times from receiving orders to delivering products to retailers. With regard to the financial exchange, IOS enable the electronic transfer of funds between retailer and supplier.

Of particular interest here is the influence of information technology usage on the social exchange element of co-operative relationships. Social exchange reduces uncertainty between the parties as trust is built over time based on personal experience dealing with the counterpart and the successful execution of the other three elements of exchange (IMP Group 1982). Ring and Van de Ven (1994, p. 93) support a view of trust that *"emphasises faith in the moral integrity or goodwill of others, which is produced through interpersonal interactions that lead to social-psychological bonds of mutual norms, sentiments and friendship [...] in dealing with uncertainty"*. Using IOS to communicate between retailers and suppliers changes the relational aspects of buyer and seller roles in the retailer-supplier relationship to the extent that it changes the frequency and content of interactions between buyers and sellers (Barley 1990). If IOS are used at the expense of personal interaction for the exchange of information in retailer-supplier relationships, that is if IOS usage results in less frequent personal communication, it may undermine the social element of exchange relationships. Ring and Van de Ven (1994) argue that informal understandings and commitments will be formalised if inter-organisational relationships are expect-

ed to exceed the tenure of designated organisational agents, eg the buyers or sellers negotiating the terms of the relationship. Similarly, as IOS may undermine the development of informal understandings between parties to an exchange relationship, the conditions of the relationship and its governance mechanism must be formalised because of IOS usage.

> *Proposition 4: As information is increasingly exchanged using IOS rather than through personal interaction, retailers and suppliers wanting to maintain collaborative exchange relationships because they are expected to yield greater value than alternative organisational forms, have to rely more on formal relational contracts than informally understood psychological contracts between parties because IOS usage undermines the development of informal understandings.*

The exchange of information between retailer and supplier and the joint creation of value have been recurring themes in the discussion so far. Attention will now turn to a discussion of how information exchange influences joint value creation in the retailer-supplier dyad.

Information exchange and value creation

Information is exchanged between companies in order to co-ordinate activities across organisational boundaries. Information is valuable because it facilitates exchange between parties in the supply chain (Glazer 1991). There are three ways the exchange of information can create value for retailers and suppliers (Glazer 1991). First, information can increase the revenue from future transactions. Second, information can reduce the costs of future transactions. Finally, the information itself can be marketed. This last value component of information will not be considered here, as it is not directly related to the creation of value in the supply chain.

From this concept of the value of information follows that the exchange of information across organisational boundaries with the help of information technology is important for value creation in the supply chain as it can reduce costs and/or increase joint value creation.

Because of developments in information technology, the capacity of retailers and suppliers to store, process and transmit information has increased dramatically. The exchange of information is an important element of co-operative relationships between retailers and suppliers (Glazer 1991; IMP Group 1982) because it is necessary for achieving explicit co-ordination between actors in the supply chain. In an empirical investigation of relationship dissolution, Davies (1994b) found that failed relationships were not considered as co-operative, could not be described as a partnership and did not have a social dimension. Furthermore, failed relationships were characterised by limited exchange of information between partners. This last point is of course especially interesting in the context of this paper, because the use of information technology can facilitate the exchange of information. On the other hand, reliance on information technology for communication can have a negative impact on the social dimension of the exchange relationship as was discussed in the previous section.

Both retailer and supplier possess information or knowledge that is valuable to the other, either because it can reduce the costs of transactions or because opportunities for joint gains can be recognised (Zajac & Olsen 1993). On the one hand, retailers have ready access to information about consumer behaviour. On the other hand, suppliers over time have accumulated in-depth knowledge of the products they themselves and their competitors sell. Furthermore, because most retail buyers buy a large number of different products and operate in a pressured work environment (Shaw, Dawson & Blair 1992), suppliers will often have a better overview over product categories than do retailers.

Two basic forms of information are exchanged between retailers and suppliers: cost information and value information. Cost information is information that can be used to reduce costs in the retailer-supplier dyad and is of a technical and/or commercial nature, eg information about standard business transactions that can be used to improve the flow of products through the supply chain. Value information is information that is exchanged to enhance the value supplied to consumers by the retailer-supplier dyad. This is both information exchanged between partners to develop joint expectations about motivations, possible investments and perceived uncertainties and information exchanged to reach agreement on the obligations and rules for future exchange in the relationship. Examples of value information exchanged between retailers and suppliers are ideas for new product development or new marketing activities. Cost information is typically more structured than value information and is exchanged frequently as part of the ongoing relationship between retailer and supplier. Value information is exchanged at the beginning of the relationship to lay the foundation for future exchange and on an irregular basis throughout the duration of the relationship.

In the literature, there is a tendency to focus on the ability of information technology to reduce costs rather than create value, although it is acknowledged that information technology may also enhance value creation. This is probably due to the fact that cost information lends itself more readily to electronic transfer because it is more structured, while value information is 'softer' and has traditionally been exchanged using personal channels (IMP Group 1982). Higher levels of information technology competence are needed to exchange value information than cost information using IOS.

> Proposition 5: The potential for joint value creation is exploited to the extent that retailers and suppliers exchange both cost and value information using IOS because this enables explicit co-ordination of value creation activities.

Possession of the information technology competence needed to exchange cost and/or value information between retailer and supplier is a necessary but not sufficient condition for the exchange of information in retailer-supplier dyads. Also important are the relational norms towards sharing information and using IOS that have developed within the retailer-supplier dyad, because they determine the extent of information sharing and use of IOS. The norms developed in the dyad are dependent on the attitudes towards sharing information possessed by individual actors in the relationship. However, it is not sufficient to consider only the individual actor. It is also necessary to consider the social relations and contexts in which the individual participates (Fulk 1993; Fulk, Steinfield, Schmitz & Power 1987; Rice & Aydin 1991)[6]. The individuals performing the buyer and seller work roles in a retailer-supplier dyad will influence each

other's attitudes towards sharing information and using IOS. Similarly, attitudes and policies towards sharing information and using IOS within their respective companies influence the attitudes of both buyer and seller.

> *Proposition 6: Beyond a certain minimum level, IOS usage for exchanging information in retailer-supplier relationships is dependent on relational norms that are positive towards information sharing and IOS usage.*

5. MANAGERIAL IMPLICATIONS AND AREAS FOR FUTURE RESEARCH

The purpose of this paper has been to theoretically investigate the consequences of information technology usage on retailer-supplier relationships. First, the nature of retailer-supplier relationships was considered. Specifically, it was discussed how relationships can create value. Also considered were developmental and social processes in retailer-supplier relationships. Then information technology usage in retailer-supplier relationships was discussed. In this context a typology of inter-organisational information-sharing systems (IOS) was presented and it was discussed how different types of IOS are used by retailers and suppliers. Based on this conceptual framework, six propositions regarding the consequences of IOS usage were developed. Specifically, propositions were developed concerning the consequences of IOS usage on the choice of governance mechanism between retailer and supplier, relational development and the exchange of information and joint value creation between retailers and suppliers.

Managerial implications

The use of information technology for the exchange of information between retailers and suppliers is increasing. Managers therefore must carefully consider the consequences that the use of IOS can have on inter-organisational relationships.

First, managers need to realise that the use of IOS is increasingly becoming a strategic necessity and is not a source of sustainable competitive advantages in itself, as competitors have access to the same or similar hardware and software (Powell & Dent-Micallef 1997). To achieve sustainable competitive advantages based on information technology usage, retailers and suppliers must combine use of information technology with other, complementary skills and resources. One possible way to do so is to embed information technology usage in the context of retailer-supplier relationships because this can lead to causal ambiguity and make competitive imitation difficult. Retailers and suppliers operate in information-intensive environments in which it is important to be able to store, process and exchange large amounts of information (Glazer 1991). Both have access to information that is valuable to the other party. By focusing on maximising joint value creation rather than on one-sided reductions in transaction costs retailers and suppliers can realise opportunities for joint gains through enhanced information acquisition and exchange (Zajac & Olsen 1993). By using IOS for exchanging information, retailers and suppliers can improve the coordination of their joint value creation activities.

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6 A detailed discussion of this 'social information processing view of information technology' is beyond the scope of this paper. The interested reader is referred to the cited references.

At the same time, retailers and suppliers must be aware of potential problems related to the exchange of information using IOS. First of all, maximisation of joint value creation demands the exchange of sensitive information that can be abused by the counterpart. Retailer and supplier therefore have to have faith in the integrity of the other party to be willing to disclose sensitive information. It is important that retailer and supplier can trust each other and find exchange partners with compatible norms regarding the use of information technology and the exchange of information. Trust and norms regarding the use of information technology are built through social exchange between retailer and supplier. Social exchange reduces uncertainty between parties as trust is built over time based on personal experience dealing with the counterpart (IMP Group 1982). However, another potential problem with IOS usage is that it may undermine the creation of trust and informal understandings between retailer and supplier to the extent that it changes the frequency and content of interaction between buyers and sellers. Retailers and suppliers wishing to use IOS in close collaborative relationships have to ensure that trust and informal understandings are built between buyer and seller despite the use of IOS for the exchange of information.

Areas for future research

In this paper six propositions have been developed regarding the consequences of information technology usage on retailer-supplier relationships. The propositions have been derived from previous empirical and theoretical papers and must be empirically validated. Furthermore, the propositions presented in this paper are only examples of possible consequences of information technology usage on retailer-supplier relationships. The impact of information technology usage on other aspects of retailer-supplier relationships also needs to be considered. Finally, this paper has focused on inter-organisational uses of information technology. In future the consequences of intra-organisational uses of information technology and the interaction between intra- and inter-organisational uses also have to be considered.

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