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TRUST, TRANSACTIONS, AND RELATIONAL EXCHANGE: VIRTUAL INTEGRATION AND AGILE SUPPLY CHAIN MANAGEMENT

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Abstract

Modern channel exchange relationships are substantially mediated by the deployment of information technology resources in support of virtual organizational forms, and the supply chain partnership practice known as agile supply chain management has evolved into a technological relationship between channel partners. The technologically facilitated virtual integration of partner firms requires high degrees of trust and intimacy between partners, since the technological linkages that facilitate the relationship are extensive and rich. A framework is developed to describe the development of trust in the use of shared information resources in such virtual organization relationships.

Introduction

Supply Chain Management – the close coordination and integration of distribution and manufacturing – is one of the most popular management concepts in logistics (Keifer and Novack 1999). The speed with which companies must bring products, supplies and services to customers and markets in the modern economy has increased to the point that supply chain organizations possessing similar interests and sharing common customers and business goals must array themselves in partnership arrangements, enhanced by information technology deployed in support of common production, distribution and customer service requirements. In such cases, innovations in interorganizational systems allow information to replace inventories in the supply chain (Ballou 1999; Grover and Malhotra 1999), which greatly enhances efficiency across the board.

Technologically mediated inter-firm *virtual organizations* bring together the interests and benefits of all parties in a supply channel, from the production point, through distribution, to final end customer sales, in a way that results in significant efficiencies and market advantages throughout the channel (Mabert Venkataraman 1998; Raghunathan 1999). This technological cohesion of relational partners in supply chains is an important route to business success, since the modern practice is for whole channels to combine, via shared information systems and resources, to operate as coherent organizational forms in competition with other entire channels (cf., Porter 1985; Turban, Lee, Chung and King 1999).

The degree of integration required for agile operations in modern supply chains does not come without costs or commitments. Specifically, this paper advances the point that partners which virtually integrate in supply chains for purposes of building competitive advantages accruing from agile channel operations must share high degrees of trust in order to facilitate the sort of relational exchange that is required to offset the fundamental and ever-present transaction costs that exist in turbulent and fast-moving economic environments.

The organization of the paper is as follows: first, the concept of agile supply chain management (SCM) will be introduced and defined in the context of virtual integration. Then, theoretical perspectives of relational exchange arising from transaction cost analysis will be examined so that comparisons may be made between the situations which support agile SCM operations and the economic costs and organizational structures that might tend to be implied in such scenarios.

Finally, the role of trust as a facilitator of relational exchange in virtually integrated channels will be introduced in conjunction with the *clan* organizational model of structured transactions. The paper concludes with an integrative discussion that provides

a perspective in which trust can serve to facilitate new organizational exchange relationships necessary to facilitate the operation of virtually integrated supply chain partnerships that lead to agile operations.

The Nature of Agility

The New Economy has arisen from the productivity provided by information technology, applied to production, marketing and distribution practices of firms. Recent events may give investors cause to be concerned about the “dot-com” sector, which primarily serves the consumer marketplace. However, in the economic markets that are evolving from technology-engendered efficiencies in the business-to-business channels and in supply chains that underpin the consumer markets, agility has become very important (Mabert and Venkatraman 1998). The ability of companies to quickly change practices, outputs and strategies is the essence of agility, but this remains an area that is both poorly understood and under-researched (Narisimhan and Das 1999).

If a company is able to survive – even thrive – in a competitive environment of unanticipated and rapid change, it is considered to be *agile* (Kasarda and Rondinelli 1998), which is not the same as saying the company is *lean* (Christopher 2000); in fact, the organizational approach of lean operation involves a certain consistency and levelness of scheduling, as opposed to dealing with fluctuating demand (Naylor, Naim and Berry 1999). Agility also implies the specific use of technology-enabled extra-organizational linkages to enable quick and effective response in the channel. This is specifically interpreted as:

...using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace (Mason-Jones and Towill 1999).

In perhaps the most succinct definition to be found, agility can simply be characterized as *change proficiency* (Dove 1996). This is a parsimonious view of agility in the channel, since the ability to “roll with the punches” seems very much a part of what various authors seem to imply when they write about agile practices. While agility is defined here specifically for purposes of a discussion of supply chain management practices, it is an organizational and operational concept that is used in manufacturing as well as in distribution. In fact, it may be that a firm’s internal practices of agile manufacturing and operations orient it quite well for practicing similar qualities in the channel (Erenguc, Simpson and Vakharia 1999; Kasarda and Rondinelli 1999). The important competency that appears to span both internal and external applications of agile practices is expertise with information technology; IT is simply the enabler of faster, more efficient operations (Shaw, Seidmann and Whinston 1997).

The Role of Information Technology in Agile Channels

There is no doubt that channels have become more complex, nor that new organizational forms must be devised to deal with growing uncertainty and the increasing pace of transactions; not everyone realizes that data and the information resources are the key to managing this growing uncertainty in the supply chain (Bal, Wilding and Gundry 1999). As organizations attempt to deal with growing uncertainty, increased complexity and shorter cycle times in channels, the application of technology will lead to advantages that derive from *information enrichment*, since information about the channel and its quickly-changing activities is the necessary solution to uncertainty and the business risks that come with it (Mason-Jones and Towill 1999).

The Role of Relationships in Agility

An important point to consider is that agility is a quality that arises out of *integration* (Naylor, Naim and Berry 1999), whether it is integration between a firm and its supply chain, or the integration that takes place among supply chain exchange partners. In either case, integration is very much a *people process*. Technology aids integration by making communication and the sharing of important resources more immediate, as is the case in the virtual organizational form. However, the relational bonds that must exist in order to facilitate the sort of extra-organizational interchanges that such technological links imply arise out of interpersonal relationships and characteristics inherent to these relationships. It is said that the biggest challenge in channel integration is the human element (Anon 1996), and it seems quite clear that a high degree of cooperation is required to facilitate integrated supply chain partnerships of the type and degree necessary for agile operations (Valenzuela and Villacorta 1999).

Organizational Structures and Market Efficiencies

The economics and organizational theory literature has two major conceptualizations of exchange: markets and hierarchies. This view arises from early theorization on the nature of firm (e.g., Coase 1937) as specifically interpreted and adapted by Williamson

(1975) in the explication of transaction cost frameworks for diagnosing the organization and performance of firms. On the one hand, there are free markets formed of amorphous collections of momentarily salient buyers, sellers and goods; these economic groupings serve the very valuable purpose of determining prices, by determining what the market will bear. These markets are formed of aggregated transactional interchanges between buyers and sellers who meet for singular and self-interested transactions, and the market is formed on a moment-to-moment basis by the members present to engage in transactions. The information age analog would be Web-based buyers' exchange.

On the other hand, there can be structured exchange relationships between business entities. These structured exchanges are called hierarchies, and represent organized transactions relationships that are formed as alternatives to the economic anarchy of the market-based transaction structure. Firms that do not care for the unpredictable nature of markets will generally organize into structured and formalized relationships, to achieve some predictability and continuity in exchange processes. Some of these relationships evolve into companies, or firms; other forms of organized transaction frameworks that give regularity and structure to business, outside of actual firms, include contracts and alliances.

While structured transactions avoid the unpredictability and lack of continuity of market transactions, they do bear costs (Malmgren 1961), and these costs are usually accepted as the tradeoff for avoiding the uncertainty inherent in market-based transaction frameworks (e.g., Williamson 1975). The important point to consider, when applying the transaction costs perspective to channel transaction structures is that markets can only signal prices, and can not find buyers or organize negotiations with them (cf., Malmgren 1961). Building relationships, then, requires a dedication to structured transaction frameworks, rather than unstructured market-regulated transactions. Hence, a Web-based buyers exchange (i.e., a market transactional form) can be very attractive for the momentary purpose of finding very good prices, but when time pressure or environmental uncertainty lend immediacy to the need to find quick and effective solutions in channels, partners that can be trusted and relied upon for non-economic reasons become very much more important. These sorts of relationships are far from market-based, and are eminently structured.

E-Markets: The Network Effect

There has been a move in the past decade toward market-based regulation of exchange, arising out of the popularity of the Internet. The Internet has greatly increased the availability of information about marketplaces, which has served to reduce risks involved in transactions, essentially arising from reduced risks related to lack of knowledge about comparable prices or comparable product offerings in a given market segment (cf., Malone, Yates and Benjamin 1987; 1989). Hence, the effect of electronic commerce at a market level has been to drive down prices by reducing the risks of transactions.

E-Hierarchies

Despite the compelling pricing dynamics of network-enabled markets, there has been a recent shift away from market-based exchange, particularly in terms of the formation of cooperative interorganizational relationships, as might best be conceptualized in the supply chain (Bensaou 1997). If sole supplier relationships and JIT modes of channel governance can be counted as hierarchical (e.g., Malone et al. 1987), then organized exchange relationships necessary to agile SCM have advantages that free markets do not, when conditions are dynamic and uncertain.

Relationships tend to form in response to, and as a solution to, dynamic and uncertain environment (cf., Williamson 1975, Williamson and Ouchi 1981). It is information that reduces uncertainty in the transaction costs perspective (Malmgren 1961) and the IT linkages that virtually integrated relational forms bring to channels serve to greatly reduce uncertainty through rapid and extensive information transfer, hence fostering strategic and hierarchical forms of relational exchange substantially based on the shared technological linkages between firms (Bensaou 1977).

Trust and Supply Chain Relationships

Relationships reduce uncertainty in transactions, and are often valued as non-economic rewards or assets in cooperative organizational arrangements (Bensaou 1977; Ouchi 1980). However, even technologically mediated relationships require human interaction, since human qualities serve as the foundation for the interaction. Chief of these human relational qualities is trust.

Trust is an expectation for regular and honest cooperative behavior based on shared norms (e.g., Fukuyama 1995), and is considered essential to all sorts of e-business initiatives (Wilkins, Morris and Masseria 2000).

Trust is a fundamentally social construct (Cassell and Bickmore 2000; Gefen 2000; Friedman, Kahn and Howe 2000; Olson and Olson 2000; Schneiderman 2000). Trust exists between individuals, so one does not *trust* technology, specifically, even though technology is an important part of the evolving nature of trust-based relationships underpinning modern supply chain management relationships (Jeffries and Reed 2000). In other words, technology is not a substitute for trust (Friedman et al. 2000; Olson and Olson 2000).

However, trust is essential to the development of channel efficiency initiatives (Gonzalez-Benito, Suarez-Gonzalez and Spring 2000), and seems to be the key factor acting to reduce transaction costs in technology-mediated relationships (Schoder and Yin 2000). Essentially, transaction costs accruing to market uncertainties motivate the formation of hierarchical exchange relationships, analogous to the partnerships underpinning agile SCM, and technology is a key factor in facilitating these agile relationships.

Preconditions for Trust in Channels

Trust requires vulnerability to be displayed by one partner to another, on the assumption that a trusted partner will not behave opportunistically when confronted by a partner's vulnerabilities (Cassell and Bickmore 2000; Dwyer and Oh 1987; Friedman et al. 2000). The use of technology can enhance a trust-based channel relationship several ways. It can enhance the quality of the social relationship in supply chain partnerships (Olson and Olson 2000), essentially building a greater sense of community (Urban, Sultan and Qualls 2000).

Technology can also be the key to *developing* trust, through the demonstration of vulnerability, since shared databases are the very heart of electronic hierarchy relationships (Malone et al. 1989). Basically, proving a partner with access to one's information technology resources is evidence of a high degree of trust in the quality of the relationship, given the significance implied by the potential vulnerability of sharing a sensitive information resource. Hence, these shared technological resources are essential to both efficiency and relational exchange in channels.

Hierarchies Are Not Enough

As noted by Ouchi (Ouchi 1980; Williamson and Ouchi 1981), it may be that relationships arising from hierarchy-based structures do not necessarily evolve into trust-based relational exchanges. Hierarchies are organized structures, granted; but, they are organized to reduce uncertainty and are often specifically structured to ensure that uncertainty does not impede operations. Hence, prototypes of hierarchies are often expressed in the bureaucratic organizational form (e.g., Ouchi 1980). These forms are quite structured, and tend to enforce (or try to enforce) compliance with some hierarchically determined goal.

The regularity of highly structured bureaucratic forms implies a lack of ambiguity in expectations for performance. This means that in dynamic and uncertain environments, highly structured organizational forms are not responsive. Also, without ambiguity, there can be little opportunity for the important quality of vulnerability to arise between exchange partners, and it is on this basis that trust is least likely to build to strong levels in highly structured hierarchical organizational forms. As an analogy, a channel controlled closely by a strong partner will not operate on a basis of trust, and as a result, the highest degrees of cooperation will not evolve. Participation will be structured by the wishes of the strong partner, and compliance will be the rule, as opposed to cooperation. Agility would not thrive in such circumstances, though efficiency might well entail (given the channel captain's ability to totally remove uncertainty from the exchange relationship through the exertion of control).

Certainly, in the view of Ouchi, trust reduces uncertainty, and trust arises out of the consistency that bureaucratic structures bring, but once the ability to evaluate and direct operations consistently declines – as will always be the case in unstable and dynamic environment – even the trust that members of the bureaucracy place in the structure is not sufficient to offset the perceived risks of the relationship. For such dynamic environments, Ouchi posits a new organizational form: that of the *clan*, in which non-economic benefits accrue to members who commit to cooperate with each other toward some common good. Derived from the sociological theorization of Durkheim (1933), Ouchi's clan concept draws upon cultural dynamics of common beliefs and values that tend to imply an emotional devotion to a combined enterprise in which each individual's satisfactions are subordinated to the good of the whole. To the extent that one could generalize, there are complex interpersonal qualities in clans that are not

present in bureaucracies; as Jeffries and Reed (2000) note, organizations do not trust, but individuals do. Hence, it might be expected that the quality of interpersonal trust, giving rise to the degree of coordination and combined dedication to a common goal that would be expected to support agile operations in channel relationships, is the crucial characteristic in determining whether coordinated and cooperative channel relationships can function effectively in dynamic and turbulent environments.

Theoretical Integration

Clans arise due to the lack of trust and subsequent increases in ambiguity between hierarchical parties (Ouchi 1980), and while agile practices can reduce uncertainty in supply chains (Bal, Wilding and Gundry 1999), trust is an increasingly important issue in interorganizational exchanges (Wilkins, Morris and Masseria 2000) and traditional bases of trust are harder to attain, in light of the increasing use of technology. After all, trust exists between people, not machines or even firms (Jeffries and Reed 2000). Hence, for agility to work in the intensely technological cooperative environment that modern supply chains represent (cf., Shaw, Seidman and Whinston 1997), firms will need to find ways to implement technologically enabled clans in which technology is used to enhance, and not substitute for, personal interaction and clan-based non-economic benefits such as trust (e.g., Olson and Olson 2000). Virtually integrated channel organizations arise from the use of technology and the application of trust, but the structural form that these virtual forms follow probably is more like a clan of cooperating equals than it is a structured hierarchy of leaders and followers, as in the traditional channel captain concept of supply chain organization. Along these lines, the conclusions of this paper are presented in the dialectic form:

Thesis

Relational exchange has been shown to mediate the opportunism that hinders channel efficiency relationships. Trust is a critical component of relational exchange. Hence, one does not envision taking advantage of valued partners in dynamic and agile supply chains, particularly when these chains are competing as virtual entities against other integrated supply chains.

Antithesis

Internet technology has generated an economic trend that tends to promote a default market governance of channel transactions. Channel members are often attracted by the low prices and ease of accessibility provided by online markets, in which buyers and sellers bid against each other for business from momentary transactional partners. However, in such markets, there are only transactions (and specifically, no relationships), and these transactions provide no expectation for the future. There can be little movement toward agility and flexibility in channel operations when such transitory governance structures predominate, even though they may be momentarily economic in their pricing regulation activities.

In sum, channel efficiency seems to be moving in the direction of responsiveness and efficiency, through cooperative relationships facilitated by IT-based virtual organizational forms, as opposed to the traditionally prized dimensions of effectiveness such as price.

Synthesis

Virtual integration is the information age analog for vertical integration. Market-based factors once motivated firms to seek control over their operational efficiency by owning important sources of supply and distribution, but alternative hierarchical arrangements are efficient only in circumstances of predictable outcomes. In dynamic environments, the ability to extract efficiencies superior to and more desirable than that of anarchistic economic markets tends to degrade. Hence, new organizational forms are required to govern transactions in dynamic channels.

Integration across organizational boundaries, using the *clan* form seems to be a useful solution to the problems engendered by faster cycle times, more demanding customers, and more intense competition. In clans, members trust each other, and work together for reasons that are not entirely economic. Hence, clan structures based on trust and cooperation in the channel will tend to outperform other governance structures, since they are not strictly tied to economic outcomes or forms of rationality.

However, the technological forces that fostered the market governance revolution in the past decade must also be integrated into the virtually integrated clan organizational form, since these technologies provide not only important efficiency mechanisms, but also because the way that clans organize in modern business requires multiple intimate connections between relational partners. Shared information resources across co-owned information technology infrastructures appears to be the ultimate measure of the types of relationships necessary to support the highly coordinated and extremely efficient organizational forms capable of providing agile supply chain performance in the present business environment.

References

- Anonymous "Integrated Logistics: Journey to the Ultimate Customer," *Material Handling Engineering* (51:3), 1996, pp. 63-66.
- Bal, J., Wilding, R., and Gundry, J. "Virtual Teaming in the Agile Supply Chain," *International Journal of Logistics Management* (10:2), 1999, pp. 71-82.
- Ballou, R. H. *Business Logistics Management: Planning, Organizing and Controlling the Supply Chain*, Upper Saddle River, NJ: Prentice-Hall, 1999.
- Bensaou, M. "Interorganizational Cooperation: The Role of Information Technology," *Information Systems Research* (82), 1997, pp. 107-124.
- Cassell, J. and Bickmore, T. "External Manifestations of Trustworthiness in the Interface," *Communications of the ACM* (43:12), 2000, pp. 50-56.
- Christopher, M. "The Agile Supply Chain," *Industrial Marketing Management* (29:1), 2000, pp. 37-44.
- Coase, R.H. "The Nature of the Firm," *Economica*, N.S. (4), 1937, pp. 386-405.
- Dove, R. "Agile Supply-Chain Management," *Production* (108:4), 1996, pp. 16-17.
- Durkheim, E. *The Division of Labor in Society*, New York, NY: Free Press, 1933.
- Dwyer, F.R. and Oh, S. "Output Sector Munificence Effects on the Internal Political Economy of Marketing Channels," *Journal of Marketing Research* (24), 1987, pp. 347-358.
- Erenguc, S., Simpson, N. C., and Vakharia, A.J. "Integrated Production/Distribution Planning in Supply Chains: An Invited Review," *European Journal of Operational Research* (115:2), 1999, pp. 219-236.
- Friedman, B., Kahn, P.H., and Howe, D.C. "Trust Online," *Communications of the ACM*, Vol.43 No. 12, pp. 34-40.
- Fukuyama, F. *Trust: The Social Virtues and the Creation of Prosperity*, New York, NY: Free Press, 1995.
- Gefen, D. "E-commerce: The Role of Familiarity and Trust," *Omega* (28:6), 2000, pp. 725-737.
- Gonzalez-Benito, J., Suarez-Gonzalez, I., and Spring, M. "Complementarities Between JIT Purchasing Practices: An Economic Analysis based on Transaction Costs," *International Journal of Production Economics* (67:3), 2000, pp. 279-293.
- Grover, V. and Malhotra, M.K. "A Framework for Examining the Interface between Operations and Information Systems: Implications for Research in the New Millennium," *Decision Sciences* (30), 1999, pp. 901-919.
- Hanan, M. and Freeman, J. "The Population Ecology of Organizations," *American Journal of Sociology* (82:5), 1977, pp. 929-964.
- Jeffries, F.L. and Reed, R. "Trust and Adaptation in Relational Contracting," *Academy of Management Review* (25:4), 2000, pp. 873-882.
- Kasarda, J.D. and Rondinelli, D. A. "Innovative Infrastructure for Agile Manufacturers," *Sloan Management Review* (39:2), 1998, pp. 73-82.
- Kiefer, A.W., and Novack, R.A. "An Empirical Analysis of Warehouse Measurement Systems in the Context of Supply Chain Implementation," *Transportation Journal* (38:3), 1999, pp. 18-27.
- Mabert, V. A., and Venkataramanan, M.A. "Special Research Focus on Supply Chain Linkages: Challenges for Design and Management in the 21st Century," *Decision Sciences* (29), 1998, pp. 537-550.
- Malmgren, H.B. "Information, Expectations, and the Theory of the Firm," *Quarterly Journal of Economics* (75:3), 1961, pp. 399-421.
- Malone, T.W., Yates, J., and Benjamin, R.I. "Electronic Markets and Electronic Hierarchies," *Communications of the ACM* (30:6), 1987, pp. 484-497.
- Malone, T.W., Yates, J., and Benjamin, R.I. "The Logic of Electronic Markets," *Harvard Business Review* (67:3), 1989, pp. 166-172.
- Mason-Jones, R. and Towill, D. R. "Total Cycle Time Compression and the Agile Supply Chain," *International Journal of Production Economics* (62:1-2), 1999, pp. 61-73.
- Narasimhan, R. and Das, A. "Manufacturing Agility and Supply Chain Management Practices," *Production & Inventory Management Journal* (40:1), 1999, pp. 4-10.
- Naylor, J. B., Naim, M.M., and Berry, D. "Leagility: Integrating the Lean and Agile Manufacturing Paradigms in the Total Supply Chain," *International Journal of Production Economics* (62:1-2), 1999, pp. 107-118.

- Olson, J.S. and Olson, G.M. "I2i Trust in E-commerce," *Communications of the ACM* (43:12), 2000, pp. 41-44.
- Ouchi, W.G. "Markets, Bureaucracies and Clans," *Administrative Science Quarterly* (25:1), 1980, pp. 129-141.
- Porter, M.E. *Competitive Advantage: Creating and Sustaining Superior Performance*, New York, NY: Free Press, 1985.
- Raghunathan, S. "Interorganizational Collaborative Forecasting and Replenishment Systems and Supply Chain Implications," *Decision Sciences* (30), 1999, pp. 1053-1071.
- Schneiderman, B. "Designing Trust into Online Experiences," *Communications of the ACM* (43:12), 2000, pp. 57-59.
- Schoder, D., and Yin, P. "Building Trust Online," *Communications of the ACM* (43:12), 2000, pp. 73-39.
- Shaw, M.J., Seidmann, A., and Whinston, A.B. "Information Technology for Automated Manufacturing Enterprises: Recent Developments and Current Research Issues," *International Journal of Flexible Manufacturing Systems* (9:2), 1997, pp. 115-120.
- Turban, E., Lee, J., King, D., and Chung, H.M. *Electronic Commerce: A Managerial Perspective*, Upper Saddle River, NJ: Prentice-Hall, 1999.
- Urban, G.L., Sultan, F. and Qualls, W.J. "Placing Trust at the Center of your Internet Strategy," *Sloan Management Review* (42:1), 2000, pp. 39-48.
- Valenzuela, J.L.D. and Villacorta, F. S. "The Relationships between the Companies and their Suppliers," *Journal of Business Ethics* (22:3), 1999, pp. 273-280.
- Wilkins, M., Morris, P., and Maseria, M. "Trust Requirements in E-business," *Communications of the ACM* (43:12), 2000, pp. 81-87.
- Williamson, O.E. *Markets and Hierarchies: Analysis and Antitrust Implications*, New York, NY: Free Press, 1975.
- Williamson, O.E. and Ouchi, W.G. "The Markets and Hierarchies and Visible Hand Perspectives," in Van de Ven, A. and Joyce, W. (Eds.), *Perspectives on Organizational Design and Behavior*, New York, NY: John Wiley & Sons, 1981.