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## Linking inter-organizational trust with logistics information integration and partner cooperation under environmental uncertainty

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### ABSTRACT

Many organizations have undertaken information integration to coordinate their logistics activities. Such logistics information integration serves to enhance the transactional and relational mechanisms which are instrumental for buyer and supplier firms in the logistics chain to gain performance. Based on the transaction cost economics and social exchange theory, we propose and empirically test the link between logistics information integration and inter-organizational trust and their effects on partner cooperation and buyer and supplier performance, and if so, whether these effects are contingent on environmental uncertainty. Our test results with survey data collected from 154 manufacturing firms indicate the value of logistics information integration and inter-organizational trust on buyer and supplier performance particularly when they encounter unforeseen market changes. Regardless of the environmental uncertainty relating to the difficulty in predicting product demand, rate of cannibalization, and technological advancement, logistics information integration and inter-organizational trust are shown to provide transactional and relational mechanisms helpful for improving performance in the logistics chain.

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### 1. Introduction

Information integration is considered key to managing the physical flows of goods for improving cost and service performance of logistics operations (Gustin et al., 1995; Kulp et al., 2004). An increasing number of firms have established logistics information integration with their partner organizations for coordinated logistics management (Ngai et al., 2008). Examples of such coordination include collaborative planning, forecasting and replenishment (CPFR), concurrent and parallel processing, and vendor managed inventory (VMI) (Kulp et al., 2004). This integration also serves to enhance the visibility of the logistics chain by sharing related information such as order status and shipment notice in a timely manner, with the potential of speeding up economic transactions and enabling quick organizational response to satisfy market needs fully (Stefansson, 2002; Wong et al., 2011–2012; Wong et al., 2011).

Some studies found that information integration is unrelated to effective coordination of logistics activities across firms (Lai et al., 2008; Sanders, 2008; Wong et al., 2009a). Relational mechanisms (e.g., trust and long-term orientation) are needed to reinforce partner cooperation and mitigate the risks arising from unanticipated events

for a logistics chain to perform (Fiala, 2005; Lee et al., 1997; Malhotra et al., 2007; Yang et al., 2008). To leverage the business value of relationship-specific investment such as logistics information integration with partner firms, relational mechanisms should be devised in order to curtail opportunism (i.e., seeking self-interest at the expense of other partners) and enhance mutual benefits in the logistics chain (Heide and John, 1992). Relational mechanisms in the form of inter-organizational trust and partner cooperation are particularly important to allow flexibility in cross-firm logistics operations such as stock replenishment and shipment scheduling which are difficult to arrange under environmental uncertainty (Pilling et al., 1994; Wong et al., 2009b). Inter-organizational trust refers to the extent to which organizational members have a held trust orientation towards partner firms (Gulati and Nickerson, 2008). It represents the confidence of goodwill of partner firms (Ring and Van de Ven, 1994) and belief that their partners will perform in a manner that is beneficial to the exchange relationship (Smith et al., 1995), improving the ability of a focal firm to predict the behavior of its partners. Partner cooperation emphasizes the interdependency of partner firms where they cooperate when they depend on each other for businesses (Heide and Miner, 1992). It reflects their willingness to maintain flexibility in providing service beyond what has been specified in prior contractual agreement (Johnston et al., 2004), such that the partners are willing to pursue mutually compatible interests with reduced opportunistic actions (Das and Teng, 1998).

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Recognizing the importance of information sharing for coordinating logistics activities, the factors influencing effective logistics management have been explored from different theoretical perspectives pertaining to social relationships (Cousins et al., 2006; Johnston et al., 2004), transactional oriented relationship (Poppo and Zenger, 2002), and interdependence of partners (Heide and Miner, 1992; Luo, 2008b). However, there is a paucity of empirical evidence that collectively consider these theoretical perspectives to examine the associations between logistics information integration, inter-organizational trust, partner cooperation, and their performance implications. Such omission is highly undesirable, particularly for logistics management where both information sharing and partner cooperation are required to execute the logistical coordination and respond to the fast evolving market needs (Fink et al., 2006). While information transparency in an exchange relationship can serve to control opportunistic behaviors (Williamson, 1975), inter-organizational trust is helpful for generating joint benefits for socially embedded, repeated economic exchange (Gulati, 1995), particularly in logistics operations where imperfect information can be adversarial to cross-firm activities coordination. Indeed, complete, fully contingent, and costless contractual agreement to guide partner cooperation is impossible under environmental uncertainty (Williamson, 1991), which is concerned with an inability of firms to predict the outcomes of their decisions accurately due to unanticipated changes in the business environment surrounding the exchange (Hickson et al., 1971; Schmidt and Cummings, 1976). These business contingencies highlight the importance of examining how environmental uncertainty influences the links between logistics information integration, inter-organizational trust, and partner cooperation.

Our study makes two key contributions to the management information systems literature and practice. First, this study extends the information integration research with a focus on logistics operations. We advance knowledge on how firms can improve partner cooperation and performance in logistics management through development of information integration and inter-organizational trust. Second, our findings provide useful references for firms to design and develop appropriate exchange (both transaction and relational) mechanisms to foster partner cooperation and gain performance in their logistics management under environmental uncertainty. Our systematic investigation on the links of logistics information integration and inter-organizational trust with partner cooperation provides an integrated framework for contemporary logistics management which is increasingly required to tackle environmental uncertainty due to fast changing market needs. The framework can be employed to develop a responsive supply chain in the networked global economy in which customized products/services are exchanged using e-commerce where inter-organizational trust and partner cooperation is essential for this initiative to succeed (Gunasekaran et al., 2008; Yang et al., 2008).

## 2. Theoretical background

### 2.1. Inter-organizational trust for logistics management: A consequence of logistics information integration and an antecedent of partner cooperation

While many management information systems studies are confined to investigating individual trust on the basis of individual cognitive (e.g., performance reliability and professional credentials) and contact-based (e.g., interaction frequency) forms (Piccoli and Ives, 2003) on the use of such IT artifacts as websites (Lowry et al., 2008; Zahedi and Song, 2008) and B2C e-commerce (Pavlou et al., 2008; Wang and Benbasat, 2008), this study focuses

on examining trust in managing organizational relationship rather than as a personal attribute (Barney and Hansen, 1994). Inter-organizational trust is widely acknowledged as a key relational mechanism in governing and coordinating logistics activities between partner firms (Lai et al., 2008). It reflects a condition of buyer–supplier exchange relationship where they show reliance on each other in supporting their operations with mutual understanding and respect (Doney and Cannon, 1997). A firm will develop greater confidence in the relationship if its partners fulfill positive expectation and this confidence would lessen the concerns about opportunism in the relationship (Nooteboom et al., 1997). While the social exchange theory suggests organizational reactions are contingent on the rewarding actions from the exchange relationship (Blau, 1964), when firms experience trust they tend to reciprocate and consider the needs of the trusting partners. Inter-organizational trust serves as an implicit contract between partners that reinforce the expected relationship continuity of the partnership in view of the anticipated benefits from the cooperative behaviors in the logistics chain (Gulati et al., 2000). With partner cooperation, it allows flexibility for the involved partners to handle unforeseen contingencies (e.g., disrupted production or change of market demand) in adjusting the activities (e.g., replenishment schedule) across the logistics chain as well as aligning divergent goals in the partner relationship (Contractor and Lorange, 1988).

Investing in relationship-specific assets such as information integration can help establish a trusting relationship and mutual confidence in coordinating cross-firm activities (Rowley et al., 2000). Environmental uncertainty presents operational challenges due to bound rationality in decision making for logistics activities including demand forecasting, stock replenishment, and shipment schedule. Improved information visibility and confidence in the exchange are useful mechanisms to prevent opportunistic behaviors due to expected relationship continuity for business. Logistics information integration is also helpful to lower performance monitoring costs and improve understanding of legitimate actions by the exchange partners, hence nurturing inter-organizational trust, and partner cooperation in the logistics chain.

### 2.2. Transaction cost economics perspective of inter-organizational trust

Transaction cost economics (TCE) posits that the costs involved in an economic exchange (e.g., specifying, monitoring, and measuring desired performance) will determine the governance choices between buyers and suppliers (Williamson, 1975). The governance choice can be in extreme forms of market or hierarchy (Coase, 1937; Williamson, 1975), but it can never be completely at arms-length without communication and information sharing. These governance choices possess inherent information asymmetry in economic exchange. The lack of information transparency explains why opportunism or self-interest seeking with guile occurs (Williamson, 1975). To protect from opportunistic appropriation, firms will choose to internalize the transaction or increase the extent of hierarchical control to establish a stable relationship with partners (Williamson, 1985) through information integration for coordinating cross-firm activities. This tenet of the TCE is concerned with the risk of partner opportunism that has serious consequences for partner cooperation. Opportunism will give rise to transaction costs in the exchange because self-interest seeking behaviors are costly to detect and verify. Firms perceiving this threat are presented with greater need for screening, negotiating, and monitoring the partner firm's behavior, resulting in increased information costs (Clemons and Row, 1991).

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