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Supply Chain Opportunism and the Interorganizational System Adoption Decision

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ABSTRACT

In certain interorganizational system (IOS) adoptions, IOS initiators have incentives to exploit the full benefit to their trading partners once the partners implement the IOS. This is termed ex post opportunistic behavior on the part of the initiator. The anticipated ex post opportunistic behavior of the initiator can deter the trading partner's ex ante IOS adoption decision, which prevents the full economic benefit from being realized. We posit that ex post opportunistic behavior will vary with the relative dependency that exists between the initiator (buyer) and follower (supplier). Using resource dependence theory (RDT), we identify the relative dependence spectrum as follows: independency, buyer power, supplier power and interdependency. We believe that this new model contributes to the IS literature because understanding of the incentive problems helps firms to design governance mechanisms to circumvent the IOS adoption incentive problems and realize the full IOS benefits.

Keywords

Interorganizational system; supply chain; opportunism; extended enterprise system adoption

INTRODUCTION

Today's competitive and global business environment has forced many companies to focus on inter-organizational collaborations (Ruppel, 2004; Siau, 2003). More and more companies are adopting a supply-chain management (SCM) philosophy in which the objective is to unify the major business functions of supply chain partners. In so doing, supply chain members are able to gain competitive advantage by synchronizing the flow of resources (i.e., material and products) and information across companies (Marquez, Bianchi and Gupta, 2004; Ruppel, 2004; Simchi-Levi, Kaminsky and Simchi-Levi, 2003).

Advances in information technology (IT) have facilitated the implementation of SCM through the use of inter-organizational systems (IOS) (Mahajan and Vakharia, 2004; Ruppel, 2004; Subramani, 2004). Interorganizational systems are defined as information and communication technology-based systems that transcend an organization's legal boundaries and link otherwise independent organizations together (Cash and Konsynski, 1985; Kumar and Van Dissel, 1996; Street and Goldsmith, 2003). IOS advancements shift the use of technology from the automation of manual processes to the facilitation of information sharing, supply chain collaborations, and strategic alliances (Subramani, 2004). According to a survey by AMR Research Inc, since 1999 companies have spent nearly \$15 billion on SCM systems (which is a particular form of IOS). One-third of the companies surveyed spent more than \$10 million each year on supply chain initiatives (Ruppel, 2004).

The implementation of IOS can reduce transaction costs between business partners and improves economic efficiency along the supply chain (Cash and Konsynski, 1985; Clemons and Row, 1992; Mukhopadhyay and Kekre, 2002). Despite the obvious net economic benefits of IOS to the supply chain as a whole and increasing IT investment, not all trading partners seem willing to adopt (Clemons and Row, 1993; Iacovou, Benbasat and Dexter, 1995; Wathne and Heide, 2000). The resistance of some suppliers to adopt IOS impedes its benefits from being fully realized (Clemons and Row, 1993; Iacovou et al., 1995). Therefore, the adoption of IOS is an interesting topic worthy of further investigation (Teo, Wei and Benbasat,

2003). This paper examines IOS adoption and the cause of non-adoption. Particularly, this study examines the adoption of IOS in a buyer (initiator)-supplier (adopter) dyad, in which we assume that the buyer initiates the IOS and the supplier decides whether to adopt. The findings, however, can easily generalize to supplier-initiated case.

IOS can only be of full benefit to a buyer-supplier dyad through mutual adoption of the technology. The adoption decision generally requires system adopters to invest in relationship-specific assets, which have little or no salvage value or use outside the particular relationship. Once the system adopter invests its capital in the IOS and related investment, the initiator may opportunistically appropriate the full benefit without sharing it with adopters (Clemons and Row, 1993; Riggins and Mukhopadhyay, 1994). For example, the move to vendor-managed inventories shifts tasks related to monitoring and managing retail inventories to suppliers creating benefits for system initiators (retailers) while adding to the tasks performed by the suppliers (Subramani, 2004). Another example is that the quick-response programs create benefits for auto manufacturers and retailers while burdening suppliers with making more frequent deliveries and incurring higher inventory holding costs (Mukhopadhyay and Kekre, 2002). In expectation of the ex post opportunism of an IOS initiator in capturing all the benefits, its trading partners may refuse to adopt the system, resulting in underinvestment and benefits unrealized (Bakos and Brynjolfsson, 1993; Clemons and Row, 1993; Williamson, 1989). In this paper, we assume the IOS initiator is the buyer and its supplier is the follower. However, the reverse will be true if a supplier leads IOS adoption and a buyer follows.

Extant empirical research has examined different interorganizational factors that potentially affect IOS adoptions, among which are dependence, power, trust and external pressure etc (Chwelos, Benbasat and Dexter, 2001; Hart and Saunders, 1997; Iacovou et al., 1995; Teo et al., 2003). However, relatively little attention has been paid in this literature to role of opportunism (Wathne and Heide, 2000). In this paper, we hypothesize that opportunism is affected by the relative dependence between the IOS initiator and its adopting partner.

Resource dependence theory (RDT) contends that dependence creates potential power (Pfeffer and Salancik, 1978; Thompson, 1967). In a buyer-supplier dyad, we identify the relative power as follows: independence, supplier power, buyer power and interdependence. Existing literature has differentiated between potential power and exercised (enacted) power (Provan, 1980). Exercised power involves an attempt to influence the behavior of another firm, particularly IOS adoption, (Chwelos et al., 2001; Premkumar and Ramamurthy, 1995). Potential power arises from relative dependence between trading partners (Hart and Saunders, 1997; Premkumar and Ramamurthy, 1995). Only potential power, measured by relative dependence (Hart and Saunders, 1997; Premkumar and Ramamurthy, 1995), is theoretically related to ex post opportunism. Therefore, we focus on potential power rather than exercised power.

Relative dependence in a buyer-supplier dyad leads to different patterns of IOS initiator opportunistic/cooperative behaviors after IOS adoption. Given opportunity to allocate the economic surplus, the buyer has incentive to maximize his/her own welfare without properly compensating for the suppliers' IOS investment cost. This misallocation incentive is greatest when a supplier is asymmetrically dependent on a buyer and weakest when a buyer is asymmetrically dependent on a supplier. The expectation of different ex post buyer' opportunistic/cooperative behavior in turn leads to different ex ante supplier's adoption decisions. Therefore, relative dependence affects the IOS adoption through its effect on post-adoption opportunism.

Previous IOS research also produced inconsistent results in relating dependence to IOS investment decision and its use. It has been generally hypothesized that higher dependence leads to IOS adoption or greater IOS use (Hart and Saunders, 1997; Hart and Saunders, 1998; Iacovou et al., 1995). However, little empirical support has been found for the relationship except for Iacovou et al. (1995) using a case study with 7 government suppliers. Other studies, in contrast, found the opposite results that greater dependence will lead to less use of IOS (Chwelos et al., 2001; Hart and Saunders, 1998). The inconsistent results may be due to the mediating role of ex post opportunism between relative dependence and IOS adoption decisions.

Overall supply chain economic benefit is affected by its members' IOS adoptions. Since relative dependence (potential power) affect adopters' investment decision, it, therefore, also affects the overall economic surplus realization.

The objective of this paper is to examine the following research questions (refer to Figure 1): How does the ex post buyer opportunism affect the ex ante adoption of IOS system by suppliers? (Link 1) How does the relative dependence between supply chain members affect ex post initiator opportunism through the allocation of economic benefits from IOS adoption? (Link 2) How does the relative dependence between supply chain members affect IOS adoption decision? (Link 3) How will the IOS adoption decision due to the ex ante asymmetric dependency between customers and suppliers affect the overall ex post supply chain economic efficiency? (Link 4)

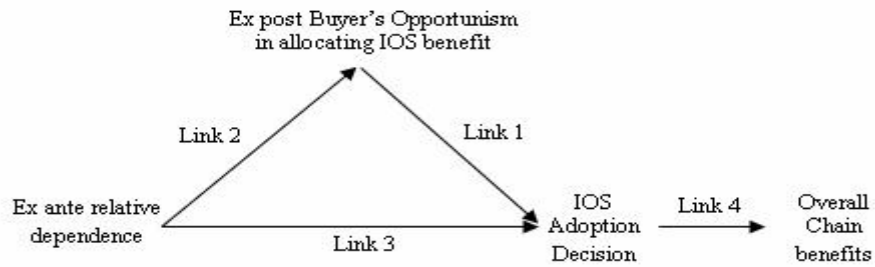


Figure 1. Conceptual Model

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Opportunism

In the original transaction cost literature, opportunism is defined in general as ‘self-interest seeking with guile’ (Williamson, 1975). In Williamson’s (1985) discussion, opportunism may manifest itself through (1) deliberate misrepresentation of private information during relationship initiation (i.e. ex ante) and (2) various forms of violations over the course of the relationship. (i.e. ex post). The former is also known as ‘adverse selection’, and the latter is ‘moral hazard’ (Milgrom and Roberts, 1992). The original conceptualization is referred to as ‘blatant’ or ‘strong form’ opportunism (Wathne and Heide, 2000), which quite often involves active or passive violation of explicit contract.

In a supply chain setting, formal contracts often play a relatively limited role (Wathne and Heide, 2000). Instead, if a contract exists in a particular relationship, it is often augmented by a variety of norms and informal agreement (Wathne and Heide, 2000). For example, purchasing relationships are often governed by contracts of finite duration, yet the buyers and suppliers in question may consider the relationship ‘evergreen’ and firmly expect to renew the contract upon expiration. This is one example of so-called relational contracts (Wathne and Heide, 2000).

Transaction cost theory has extended the original notion of opportunism to the domain of relational contracts (Williamson, 1985; Williamson, 1991). Williamson (1991) referred as ‘lawful opportunism’ to the violations of a relational contract. One typical example is the holdup problem. It arises when one party in supply chain invests in a relationship-specific asset, which has little or no salvage value outside a particular relationship. This asset is associated with a stream of ‘quasi assets’, which can be expropriated by the other party in the supply chain (Milgrom and Roberts, 1992).

In an IOS initiator (buyer) – adopter (supplier) dyad, when a supplier decide whether to invest in IOS and its related assets, it faces transaction risk (Clemons and Row, 1992). This risk is the possibility of opportunistic behavior by another party to the relationship, leading to uncertainty surrounding the “division of the benefits from the increased integration of decisions and operations” (Clemons and Row, 1992). Once the supplier sunk its capital in the IOS and other relationship-specific investment, the buyer have incentive to bargain away the entire economic return on that capital (Clemons and Row, 1992). From transaction cost theory, this ex post opportunism may deter the ex ante investment (Bakos and Brynjolfsson, 1993; Clemons and Row, 1993; Williamson, 1989).

Interorganizational System Research

It has been generally recognized that the implementation of IOS can reduce transaction cost between business partners and improves economic efficiency along the supply chain (Cash and Konsynski, 1985; Clemons and Row, 1992; Mukhopadhyay and Kekre, 2002; Subramani, 2004). Despite the obvious net economic benefits of IOS to the supply chain as a whole and increasing IT investment, not all trading partners seem willing to adopt the IOS (Clemons and Row, 1993; Iacovou et al., 1995; Wathne and Heide, 2000). The resistance of some suppliers to adopt IOS impedes its benefits from being realized (Clemons and Row, 1993; Iacovou et al., 1995). Therefore, the adoption of IOS, while not new, is still an interesting topic worthy of further investigation (Teo et al., 2003).

Prior literature suggests that opportunism may induce resistance in adopting new IT (Bakos and Brynjolfsson, 1993). Somewhat surprisingly, few studies have been conducted to empirically test the effect of opportunism on IOS adoption. Extant empirical IOS research has examined different interorganizational factors that potentially affect IOS adoptions, among which are dependence, power, trust and external pressure etc (Chwelos et al., 2001; Hart and Saunders, 1997; Iacovou et al.,

1995; Son, Narasimhan and Riggins, 2005; Teo et al., 2003). However, none of them explicitly examine the effect of opportunism on the IOS adoptions. Also noted by Wathne and Heide (2000), literature on inter-firm relationships has paid little attention to opportunism construct itself. In this study, we refer to ‘opportunism’ specifically as a buyer’s ex post opportunism in dividing economic surplus from a supplier’s IOS investment.

Clemons and Row (1993) studied the resistance to IT technology in manufacturer-retailer dyad. They interviewed managers from six retailers and three manufacturers. They found that retailers’ resistance to the new IT-enabled coordination structure is due to its impact on bargaining power. Retailers perceive that their ex post bargaining power in dividing economic surplus may be eroded under the new coordination structure, and fear that this will preclude their sharing in the economic benefits. Similar to their study, we also study the IT introduction and its effect on the economic outcome, ‘division of economic surplus.’ However, we focus on the ex post opportunism arisen from the introduction of IT in the form of renegotiating the purchasing price, which determine the division of the profit. Clemons and Row (1993) focus on the shift in ex post bargaining power resulted from the introduction of IT. We will also study the bargaining power in this paper, but in the form of relative dependence. And the relative dependence is assumed not to change with the introduction of the IT.

H1: A buyer’s ex post opportunism in dividing the economic surplus from IOS adoption is negatively related to its supplier’s likelihood of adopting the IOS.

Ex post Opportunism versus Relative Dependence

Early transaction cost theory view opportunism as a fixed or exogenous variable. What Williamson’s theory does not address are factors that ‘contribute to or detract from the propensity of a firm to behave opportunistically’(Provan and Skinner, 1989). Marketing and management literature has suggested that opportunism can also be viewed as a variable to be explained (Provan and Skinner, 1989; Wathne and Heide, 2000). In this study, we will examine whether and how the relative dependency between trading partners affects ex post opportunism.

Resource dependence theory (RDT) provides the foundation for the study of relationships between organizations (Premkumar and Ramamurthy, 1995). Thompson (1967) noted that “an organization is dependent on some element of its task environment (1) in proportion to the organization’s need for resources or performances which that element can provide, and (2) in inverse proportion to the ability of other elements to provide the same resource or performance.” Augmenting the above argument, Pfeffer and Salancik (1978) proposed a resource-dependence theory that defined dependence based on an organization’s ability to (1) control critical resources needed by others and (2) reduce their dependencies on others for critical resources. Organizations are further assumed to consider institutional survival as a fundamental motivation for action (Pfeffer and Salancik, 1978). As such, organizations respond readily to the demands of external organizations that control critical resources (Street and Goldsmith, 2003).

Resource dependence theory (RDT) contends that dependence creates potential power, “the capacity to control” (Pfeffer and Salancik, 1978; Thompson, 1967). This potential power may or may not be exercised (Provan, 1980). Prior IOS literature has examined effect of both factors on the IOS adoption, however, their effect on ex post opportunism remain largely untapped. Exercised power involves an attempt to influence the behavior of another firm, for instance, IOS adoption, (Chwelos et al., 2001; Premkumar and Ramamurthy, 1995). Potential power arises from relative dependence between trading partners (Hart and Saunders, 1997; Premkumar and Ramamurthy, 1995). Only potential power, measured by relative dependence (Hart and Saunders, 1997; Premkumar and Ramamurthy, 1995), is theoretically linked to ex post opportunism (Provan and Skinner, 1989). Therefore, this study focuses only on the potential power, also referred to as relative dependence from now on. In a buyer-supplier dyad, we identify the relative dependence as follows: independence, buyer power, supplier power and interdependence (refer to Table 1). Independence is characterized by low mutual dependence on each other for profits, and interdependence is characterized by high mutual dependence. Supplier power is characterized as asymmetrically greater dependence of a buyer on its supplier for its profit, giving greater power to the supplier. In contrast, in a buyer power dyad, a supplier has asymmetrically greater dependence on its buyer for its profit.

		Buyer’s dependence on supplier for profit	
		Low	High
Supplier’s dependence on customer for profit	Low	Independence	Supplier power
	High	Buyer power	Interdependence

Table 1. Relational Dyads

Relative dependence is likely related to ex post opportunism. In a buyer-supplier dyad, the buyer has incentive to bargain away the entire surplus without properly compensating for the suppliers' IOS investment cost (Bakos and Brynjolfsson, 1993). This opportunism is likely to be greatest in a buyer-power dyad, because exiting the relationship will be very costly for a supplier and the exiting cost for a buyer is minimal. That is, when a buyer opportunistically bargain away most economic surplus, he does not need worry too much about the retaliation from the supplier, given the high cost for retaliation. In a supplier-power dyad, the termination of the relationship caused by a buyer's opportunistic behavior is very costly for the buyer, while pose little cost on its suppliers. As such, the supplier is more than willing to retaliate in case of the buyer's opportunistic behavior. Therefore, the ex post opportunism will be lowest in a supplier-power relationship.

The ex post opportunism for an independent and/or interdependent dyad will be between the above two extremes. The interdependent dyad will be expected to have less opportunism than the independent dyad in that the former is characterized by mutual dependence and usually have the long-term orientation, while the later may sometimes produce short-sight behavior (Lusch and Brown, 1996).

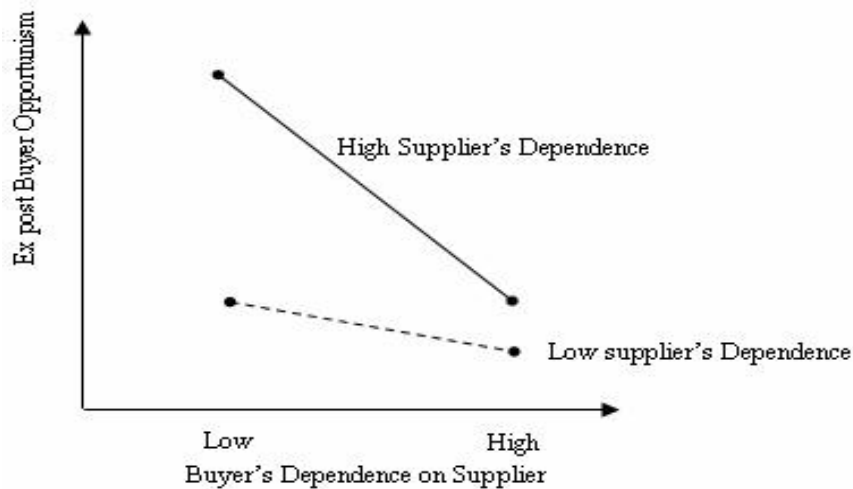


Figure 2. Relative Dependence and ex post Opportunism

Provan and Skinner (1989) empirically showed that highly dependent dealers are less likely to engage in opportunistic behavior than moderately dependent ones with their primary equipment suppliers. Our prediction is generally consistent with Provan and Skinner (1989) except we consider bilateral dependence instead of just unilateral dependence.

H2: The dependence of a buyer on its supplier is negatively related to its ex post opportunistic behaviors in allocating the IOS benefits. The buyer's opportunism levels for the four types of dyads are in the following order:

Buyer power > Independence > Interdependence > Supplier Power

Relative Dependence and IOS adoption

The few IOS studies have examined the role of interorganizational dependence in the IOS adoption setting, providing limited evidence. It has been generally hypothesized that more dependent a firm is on its trading partner, more likely the firm will adopt the IOS system initiated by its trading partner (Chwelos et al., 2001; Hart and Saunders, 1997; Hart and Saunders, 1998; Iacovou et al., 1995; Saunders and Clark, 1992). However, the findings from these studies have been generally inconsistent with their predictions.

Some studies hypothesized, without finding, positive relation between dependence and IOS adoption. Saunder and Clark (1992) argued a positive relationship between dependence and EDI adoption, and found insignificant results. Premkumar and Ramamurthy (1995) studied the effect of net dependence on the EDI adoption mode: proactive versus reactive. They found that firms with higher net dependence (greater power) are more likely to reactively adopt the EDI, however, the result is not significant.

Most other IOS studies do not assume a direct relation between dependence and IOS use and/or adoption. Instead, dependence is hypothesized to be positively related to exercised power or external pressures, which in turn have a positive effect on the IOS adoption. Hart and Saunder (1997) hypothesized that a firm's dependence on its trading partner gives rise to the power of its trading partner, without explicitly testing the relation. Hart and Saunders (1998) contend that supplier dependence creates customer's power to influence the supplier to adopt the EDI. Although they found a positive relation between supplier dependence and customer power, customer power was found to be negatively related to both the volume and diversity of EDI use, inconsistent with their prediction. Chwelos et al. (2001) hypothesized that dependence positively affects the external pressure, and found the opposite, though insignificant.

The current studies provided inconsistent, or at best insignificant, results regarding the relation between dependence and IOS adoption. The inconsistent results may be due to the mediating role of ex post opportunism between relative dependence and IOS adoption decisions. From hypothesis one, the ex post buyer's opportunism may impede the ex ante supplier adoption decision. From hypothesis two, we theorize that greater supplier's dependence leads to the greater buyer's ex post opportunism. As such, a greater supplier's dependence on the buyer may lead to less likelihood of supplier to adopt IOS.

This conjecture is in sharp contrast to the intuition behind the relation between dependence and IOS adoption and also the predictions from the previous research. However, we must caution the readers to distinguish relative dependence from exercised power. According to resource dependence theory (Pfeffer and Salancik, 1978), dependence creates power, if and only if exercised, which will promote the EDI adoption. Previous studies generally found positive relation between exercised power (coercive pressure, external pressure) and IOS adoption (Chwelos et al., 2001; Son et al., 2005; Teo et al., 2003). However, when researchers study the exercised power together with dependence, they generally ignored the effect of relative dependence, potential power, on ex post opportunism, which may defer IOS investment decision.

H3: Greater dependence of a supplier on its buyer is negatively related to the likelihood of its adoption of IOS.

Dependency and Performance

IOS can only be of full benefit to a buyer-supplier dyad through mutual adoption of the technology. In a buyer-power dyad where ex post opportunism is expected to be greatest, the overall supply chain performance will be expected to be lowest. In a supplier-power dyad, ex post buyer opportunism is expected to be lowest and the supplier is most likely to adopt the system. However, with greater power, suppliers may require greater shares of the economic surplus. They are more likely to penalize buyers, if buyers share less economic surplus. Therefore, in both buyer-power and supplier-power dyad, the asymmetric dependence can easily lead to conflict between the buyer and supplier, resulting in lower supply chain performance. In the independent and interdependent dyad, where relative dependence is symmetrical and less opportunism is expected, overall supply chain performance is expected to be high.

H4: A dyad with symmetric dependency can realize greater IOS-enabled benefits than a dyad with asymmetrical dependency structure.

FUTURE RESEARCH

"The current study has the following limitations that provide opportunities for future research. First, this paper provides only one potential explanation for the failure of the wide adoption of IOS. There could be other reasons for this phenomenon. Second, the current study considers the IOS adoption decision in a static environment. However, the relationship between a buyer (leader) and a supplier (follower) is inherently dynamic. Recent research has used game theory to study interorganizational information sharing along the supply chain (Li, 2002) and resource allocation decisions (Samaddar and Kadiyala, 2006). Future research can build on the current theoretical framework and develop a dynamic theory of IOS adoption decision. "

Using the proposed model and hypotheses, future research can empirically examine the cause-effect relation between opportunism and IOS adoption decision. In particular, future research should test whether the effect of relative dependence on IOS adoption decision is mediated by opportunism as proposed. Such a study could potentially reconcile the inconsistent findings in prior literature of relations between relative dependence and IOS adoptions. In outlining the theoretical model above, we provide a contextual understanding of the role of opportunism in IOS adoption setting under different relative dependence structures. This contextual understanding of the incentive problems should help managers design governance mechanisms to circumvent the IOS adoption incentive problems in order to realize the full benefits from IOS adoption.

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