Contractual or Relational? Effect of Environmental Uncertainty on IOS Governance

Research-in-Progress

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Abstract

Extant literature has focused on the complementary or substitute relationship between contractual or relational governance in information systems (IS), however, only a few studies reveal the factors and their interactions which impact the decision making on inter-organizational information systems (IOS) governance mechanism. Due to the emerging multifirm environment and inter-organizational practice, choice of IOS governance is anything but trivial. This research identifies the determinants of IOS governance from the relational view, and examines the external context using environmental uncertainty. The moderate model of contingency analysis is applied to indicate how environmental factors affect the association between different types of relational assets and a specific kind of IOS governance mechanisms. Hypotheses are proposed for our theory development. This research aims to provide an insight into the decision-making on IOS mechanism and explores how relational and external contingencies interact for fit which leads to effective IOS governance.

Keywords: IOS governance mechanism, relational assets, process integrating, knowledge sharing, environmental uncertainty, moderate effect
Introduction

Inter-organizational information systems (IOS) are IT-enabled platforms facilitating the digital transactions in multifirm environments (Yao and Zhu 2012; Grover and Kohli 2012). As more and more inter-organizational activities are configured and executed on the IOS production and service platforms (Grant and Tan 2013), IOS governance is becoming complex and gaining more importance in recent years. Meanwhile, IOS governance is also facing challenges arising from inter-organizational relationships. IOS governance is characterized by complementary resources and capabilities, business processes and information flows crossing firm boundaries (Grover and Kohli 2012), and possesses distinct attributes in terms of inter-organizational goals, expectations, and abilities (Chatterjee and Ravichandran 2013). IOS governance is considered as a dynamic and adaptive mechanism which depends on platform and relational arrangements to achieve the fit between platform architecture and platform governance, as well as the fit between platform design and the environmental dynamics (Grover and Kohli 2012; Chatterjee and Ravichandran 2013). Especially the organizations in supply chain, most of which have implemented IOS, are pursuing alignment between organizational and IT strategies through effective IOS governance for valuable, risk-reduced returns and sustainable advantage (Tiwana and Konsynski 2010). In recent studies, the specific types of governance mechanisms have been classified as contractual and relational governance (Fischer et al. 2011), addressing the different practice norms and environmental factors in inter-organizational relationships. The relational arrangements challenge the traditional propositions on IOS governance. In practice, as the environmental dynamics evolve, organizations face the need to shift among different types of IOS governance.

However, the prior literature is largely focused on either governance mechanisms (Zaheer and Venkatraman 1995; Joshi and Campbell 2003; Claro et al. 2003; De Haes and Van Grembergen 2004; Wang and Wei 2007; Lai et al. 2012; Lunardi et al. 2014), or on their interdependence between contractual and relational governance (Ferguson et al. 2005; Yu et al. 2006; Rai and Keil et al. 2012). The substitute and complementary effects have been widely discussed (Poppo and Zenger 2002; Fischer et al. 2011; Rai and Keil et al. 2012). Though it is important to notice the relationship between different IOS mechanism, but before that, it’s critical to understand how organizations choose one of the IOS governance mechanisms to best fit their relational and external environments. This issue has received little attention in most of the previous studies. Although some researchers have argued that assets and governance are interdependent in the platform-based environments (Grover and Kohli 2012), few studies have tested how these relational and environmental factors impact IOS governance.

Therefore, in this paper, we aim to explore how organizations choose IOS governance mechanisms, and focus on the impact of relational assets on IOS governance. In particular, this research attempts to address the following questions: What conditions promote the adoption of contractual or relational IOS governance in the relational context? What is the role of relational assets in facilitating or inhibiting the adoption of specific IOS governance? What factors moderate the extent of a specific kind of IOS governance? How do organizations shift from one type of IOS governance to another by configuring and deploying the relational assets under certain environmental dynamics? Our work will fill the gap between the assets layer and IOS governance layer. We provide an insight on how organizations choose IOS governance according to their relational assets and external environment.

Theory and Model

We first introduce the theory of implementing effective IOS governance, and the interdependence theory indicating the complex relationship between relational assets and IOS governance mechanisms. Then, we propose the research model identifying the relational and environmental factors that impact effective IOS governance. The basic direct and moderate associations are proposed in this model.

Effective IOS Governance

Effective IT governance is considered as one of the ways to achieve business performance goals from IT investments through making consistently better IT-related decisions (Weill and Woodham 2002). In this paper, IOS governance is defined as the organizational capacity to control the formulation and implementation of inter-organizational IT strategy, which ensures the alignment of business strategy and
IOS (Van Grembergen et al. 2004; Kim and Mahoney 2006). The mechanisms of IOS governance can be classified as contractual or relational according to the IOS decision making processes and inter-organizational practice norms (Fischer et al. 2011).

The contractual governance mechanism relies on formalized, legal agreement, and can be indicated by market, production or other contracts. The relational governance builds on the ability of social processes to enforce obligations, promises and expectations, in form of cooperative norms or trust (Poppo and Zenger 2002). In this paper, we classify contractual and relational IOS governance as the division of IOS governance mechanism into separate and opposed paired constructs. Organizations can encourage the desirable behavior which leads to different IOS governance mechanisms. Effective IOS governance requires careful analysis on the relational and environmental factors that impact the decision making regarding governance mechanisms.

Dyer and Singh (1998) took the lead in indentifying sources of inter-organizational competitive advantage. They proposed that resources and capabilities may traverse across the organizational boundaries, four components which determine the inter-organizational value are relationship specific assets, knowledge-sharing routines, complementary resources and capabilities, and effective governance. These components are suitable to our context and outline our main research framework. Grounded on the relational view, Saraf et al (2007) proposed relational assets to reveal the mechanisms that differentially leverage the inter-organizational coordination. They indentified two specific types of relational assets which include inter-firm knowledge sharing and process coupling with channel partners and customers. The definition of relational assets closely maps to Dyer and Singh's (1998) constructs as inter-firm knowledge sharing routines, relation-specific assets, and inter-firm asset interconnectedness. Therefore, we adapt knowledge sharing and process integrating in our model theoretically grounded on the relational view. Further, relational assets are discussed as antecedents of IOS governance.

It has been noted that relational assets and IOS governance are interdependency which means that the configuration or deployment of one can stimulate the change in another. Specifically, effective IOS can significantly incentivize inter-organizational learning and knowledge sharing (Saraf et al. 2007), which leads to greater investments in specialized assets and generate desirable behavior. Therefore, relational assets may be enabled or expanded by IOS platform. Similarly, investments in process integration or knowledge sharing can stimulate opportunities for certain kind of governance enhancement (Grover and Kohli 2012) to achieve the business goals. Process integration provide the drive and operational context for applying IOS governance, while knowledge sharing of IOS developmental skills or leveraging IOS platform can generate the extent of adoption of IOS governance.

Besides, we incorporate environmental uncertainty into our research scope because IOS governance in inter-organizational context is highly sensitive to environmental uncertainty (Lai et al. 2012; Chatterjee and Ravichandran 2013). In this paper, environmental uncertainty is represented by the extent of market volatility and diversity (Lai et al. 2012), which are incorporated to examine how business environmental factors influences decision making behaviors and the interaction effect with relational factors on different IOS governance mechanisms.

**Contingency Analysis**

Contingency analysis has been considered as one stream in IT governance research (Brown and Grant 2005). This framework focuses on “why and how” of IT governance fit with organizational goals. In IS governance contingency analysis, researchers try to understand which option is best for the firm, through analysis of contingency factors which affect IS governance. The best IS governance solution for a given firm is contingent on a variety of factors (Brown and Magill 1994). Analyses have expanded to complex situations involving multiple contingencies in research framework where single governance design gives way to multiple business specific governance forms. Interstices of IOS with a firm’s governance choices and firm’s interfirm networks have been identified (Rai and Tang 2014). IOS governance is proposed as a relational process that seek to bring congruence between organizational and IT strategies (Grant and Tan 2013). Networks value creation increasingly depends on the effective IOS governance (Morgan et al. 2013). IOS governance choices are becoming complex in multi-firm environment, and raise the question of what are the main contingency factors shape IOS governance.
In IOS literatures, asset and environmental uncertainty are specified to impact on IOS governance (Robey et al. 2008). It was pointed out that the effectiveness of value net depends on the process and IT capabilities aligned with the governance mode (Rai et al. 2008). In particular, relational changes including inter-organizational processes and knowledge sharing correspond to firm's attitudes about the role of IOS, as well as the IOS governance practices (Ross and Beath 2006). Different governance modes, such as prescriptive, evaluative and collaborative governance, are enabled by different process architectures, information flows or business intelligence (Rai et al. 2008). Therefore, it is important for both theory and practice to figure out how to choose appropriate governance mechanism given the contingencies of relational assets and environmental uncertainty.

Dyer and Singh (1998) studied interfirm relation-specific assets from the strategic perspective, and argued that relation-specific assets are sources of interorganizational competitive advantage. Dunning (2002) define firm specific relational assets as the stock of a firm’s willingness and capability to access, shape and engage in economically beneficial relationships; and to sustain and upgrade these relationships. Accordingly, we define relational assets as a firm’s strategic stocks of intentions and behaviors on long-term interfirm relationships. This definition of relational assets can be applied more easily in IOS management processes, and guide the organizational decision-making behavior.

The propositions of relational assets as IOS governance antecedents are theoretically grounded both from IT governance and strategy management. Firstly, literatures on business and IT strategy alignment argued that firms should fit their IT goals and behaviors with business strategies and objectives (Xue et al. 2012). It suggests that IT enabled business practices or IT governance behaviors are driven by firm’s strategic intent (Patnayakuni et al. 2006; Rai and Tang 2014). Consequently, relational assets as strategic decision for interfirm long-term collaboration generate firm choices of IOS governance. Secondly, assets layer in the relational view is fundamental layer to co-create new value in multifirm environments (Grover and Kohli 2012). Effective governance is facilitated by basic layers to employ formal or informal governance mechanisms (Dyer and Singh 1998; Grover and Kohli 2012). Path dependencies have been noted between relational assets and governance mechanisms. We argue this point that value creation in basic layer can create the option for further value. For instance, once virtuous relational assets are in place, they could create higher quality capabilities at governance layers. In this paper, we count the choices of effective IOS governance mechanism as firm’s higher capabilities, and relational assets as their antecedents in forms of digital or physical products and services.

IS literature also emphasize to consider both resource complementarity and moderating factors in IS practice and research (Kumar and Van Dissel 1996; Wade and Hulland 2004; Melville et al. 2004; Xue et al. 2012). Environmental uncertainty, such as turbulence, munificence, and complexity have been proposed as key moderating environmental factors (Wade and Hulland 2004; Newkirk and Lederer 2006; Ray et al. 2009; Yaylaand Hu 2012), and has also been conducted as one of moderating contingencies in IT governance literature (Lee and Cavusgil 2006; Xue et al. 2011; Lai et al. 2012; Chatterjee and Ravichandran 2013). In inter-organizational context, the uncertainty of relationship is the main concern of researchers (Rai and Tang 2010; Im and Rai 2013). Therefore, in this paper, we construct the moderating factor stressing the relational uncertainty, which is defined as the environmental uncertainty of the inter-organizational relationships, reflecting the key contingency in multi-firm environment. So far as our knowledge, few studies have specifically examined how environmental characteristics moderate the choice of IOS governance mechanisms associated with relational assets.

Research Model

In this paper, we focus on the decision making for choice of IOS governance mechanism. Abiding by Weill and Woodham’s (2002) proposition of effective IOS governance and the interdependency between relational assets and IOS governance, we examine the main effect of relational assets on IOS governance, as well as the moderate effect of external environment on the decision process.

To help understand and achieve more effective IOS governance, we propose a research model that specifies how decisions are made in choosing IOS governance mechanisms. This model harmonizes the desired inter-organizational behaviors (process integrating and knowledge sharing) and two types of IOS governance mechanisms (contractual or relational governance). We investigate whether the choice of specific IOS governance mechanisms is the outcome of distinct processes of interaction between relational assets and environmental factors. For this purpose, we propose a research model shown in Figure 1.
The moderating IT governance contingency model is adopted in our research where the environmental uncertainty is introduced as covariation effect to influence the impact of relational assets on IOS decision process of certain governance mechanism (Ribbers et al. 2002). Effective IOS governance achieves the fit between relational assets and environmental dynamics, and ensures the alignment between inter-organizational strategy and IOS strategy. Before analyzing substitute or complement relationship between contractual and relational governance, we should choose one first. To illustrate the following theoretical propositions clearly, the definitions of our main constructs are showed in Table 1.

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<th>Construct</th>
<th>Definition</th>
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<td>Process integrating</td>
<td>The interactions of a focal firm with its business partners providing the ability to operationally integrate the processes spanning firm boundaries, indicated by operational integration of joint actions and quicker assistance with exception handling.</td>
<td>Wang and Wei 2007; Rai and Tang 2010.</td>
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<td>Knowledge sharing</td>
<td>The extent to which a focal firm’s provision or receipt of business information, knowhow, insights, and feedback on its business context, helping better understanding of mutual needs.</td>
<td>Tsai, W. 2002; Saraf et al. 2007; Foss et al. 2010.</td>
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<td>IOS governance mechanisms</td>
<td>Inter-organizational actions or norms to manage the relationships and safeguard relation-specific assets to generate value.</td>
<td>Fischer et al. 2011; Hadaya and Cassivi 2012.</td>
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<td>Contractual IOS governance</td>
<td>The use of a formalized, legally-binding agreement or a contract to govern the inter-organizational partnership.</td>
<td>Poppo and Zenger 2002; Yu et al. 2006; Ferguson et al. 2005; Lee and Cavusgil 2006; Rai and Keil et al. 2012.</td>
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<td>Environmental uncertainty</td>
<td>The extent of market volatility and diversity in business environment, whereas market volatility represents the rapid changes in the environment, and market diversity represents the multiple sources of uncertainty.</td>
<td>Artz and Brush 2000; Lai et al. 2012.</td>
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Hypotheses Development

Based on the theory and model proposed above, we develop the theoretical hypotheses in this part. The detailed model is showed as Figure 2.

Impact of Relational Assets

Saraf et al. (2007) indentified two specific types of relational assets as interfirm knowledge sharing and process coupling, which closely map to the relational view of Dyer and Singh (1998), and also aligned with our definition of relational assets in this paper. On one hand, inter-organizational knowledge sharing is considered as key driving force in value chain activities, relating to long-term relationships and cooperative synergies among business partners (Saraf et al. 2013; Chen et al. 2014). On the other hand, process capabilities are proved to be core competence in inter-organizational relationship management (Pavlou and El Sawy 2006; Rai and Tang 2010; Wang et al. 2013). In specific, integration is seen to be essential for interconnected and streamlined processes between business parties (Rai et al. 2006; Chen et al. 2009). Therefore in this paper, we construct relational assets as knowledge sharing and process integrating as the key decisions and behaviors of firms in inter-organizational strategy.

Limited studies examined the factors that impact the governance choices of firms (Chatterjee and Ravichandran 2013). We try to address this issue from the relational view (Dyer and Singh 1998; Grover and Kohli 2012). Relational assets involve the relationship specific skill or knowledge and inter-organizational processes, which enhance the inter-organizational learning and practice norms. Either organization on its own is unlikely to extract effective IOS governance despite relational assets. Relational assets may impact IOS governance directly from the assets layer (Grover and Kohli 2012).

Each kind of relational asset (process integrating and knowledge sharing) has different effect on the two types of IOS governance mechanisms separately. Take process integrating for example, firms could achieve structural, functional or social integration through process integrating (Peterson et al. 2002), which will lead to much formal and steady contractual governance mechanisms In the contrast, when firms face the dynamics of cooperation or competition, process integrating may not support firm to react quickly to the change of inter-organizational relationships (Saraf et al. 2007), which will decrease the mutual trust or commitment to some extent among firms, probably generating the negative effect on relational governance mechanism. Therefore, we hypothesize that:

**Hypothesis 1A.** Process integrating positively impacts on contractual IOS governance.

**Hypothesis 1B.** Process integrating negatively impacts on relational IOS governance.
Knowledge sharing has been stressed in long-term inter-organizational relationships, but it was not always found to have positive effect on relationship performance in different data set (Im and Rai 2008). Thus, it is suggested inter-organizational knowledge sharing should ward off complacency with current practices. What's more, while firms share knowledge in networks, they may also expose to specific risks. For example, partners are likely to act opportunistically to make use of the asymmetric or incomplete information (Oxley and Sampson 2004), which has been identified as the boundary paradox in knowledge management (Quintas et al. 1997). Our paper addresses this dilemma, and suggests that knowledge sharing should match appropriate governance mechanism, thus, knowledge sharing has different effects on contractual or relational IOS mechanisms.

Firms which established fixed and formal contracts with their business partners may find high level of knowledge sharing disturb the equilibrium between the relative dyadic power and bargaining advantage of the focal firm, causing frequent range of alterations to the contracts, which seems to confer negative effect on contractual governance mechanism. In contrast to contractual governance, relational governance emphasizes more on relational norms that embed in the inter-organizational business activities. Trust and commitment have been indentified as the most important features of relational governance (Goo et al. 2009). Knowledge sharing could be indicated endogenous in high levels of trust and commitment, and manifest in informal adjustments among organizations (Poppo and Zenger 2002; Goo et al. 2009; Rai and Pavlou et al. 2012). Accordingly, we propose that:

**Hypothesis 2A.** Knowledge sharing negatively impacts on contractual IOS governance.

**Hypothesis 2B.** Knowledge sharing positively impacts on relational IOS governance.

**Environmental Uncertainty**

The environmental factors or dynamics affecting IOS governance are widely discussed in IS or organization studies, and are described as contingencies, dynamism, trubulence, complementors' influence, exchange hazards, demand uncertainty, technological uncertainty et al. (Zaheer and Venkatraman 1995; Jones et al. 1997; Jap 1999; Ribbers et al. 2002; Peterson et al. 2002; Poppo and Zenger 2002; Joshi and Campbell 2003; Lee and Cavusgil 2006; Weber et al. 2009; Tiwana et al. 2010; Lai et al. 2012; Chatterjee and Ravichandran, 2013). Xue et al. (2008) concluded that external environmental factors influence IT governance. These factors include competitive pressure forcing organizations to make quick decisions to allocate IT resources, institutional forces such as coercive, mimetic, and normative pressure to compel organizations to invest in known information systems, and other external resources that participate in the decision processes. In this paper, we refer to business areas where intense competition or cooperation leads to environmental uncertainty, and adapt the moderation model where the contingency factors are conducted as covariation effect to test the effect of environmental uncertainty on IOS decision process (Umanath 2003). We propose our hypotheses based on the empirical literature (Jap 1999; Artz and Brush 2000; Poppo and Zenger 2002; Joshi and Campbell 2003; Lai et al. 2012; Chatterjee and Ravichandran, 2013).

External environmental factors play significant roles in decision-making in IOS governance. The interaction between relational assets and environmental uncertainty is one of the determinants of decision on IOS mechanism choice. How does different degree of uncertainty moderate the impact of relational assets on specific IOS mechanism? We ask if higher environmental uncertainty encourage more tendency to relational governance rather than contractual governance?

In relatively stable environment, organizations invest in process integrating for close interaction and coordinate to achieve operational efficiency (Saraf et al. 2007; Rai and Tang 2010). Consequently, high level of uncertainty will decrease the effect of process integrating, which is to say, environmental uncertainty negatively moderates the impact of process integrating on IOS governance, when environmental uncertainty becomes higher, the relationship decreases between process integrating and IOS governance. Therefore, we propose the following:

**Hypothesis 3A.** The impact of process integrating on contractual IOS governance is moderated by environmental uncertainty, that the impact is weaker when uncertainty is higher.

**Hypothesis 3B.** The impact of process integrating on relational IOS governance is moderated by environmental uncertainty, that the impact is stronger when uncertainty is higher.
Firms in stable environments tend to emphasize static efficiency (Ghemawat and Costa 1993). Such firms which keep stable relationships with their business partners prefer to emphasize the normalized and streamlined governance mechanism at the expense of informal governance. Otherwise, in highly unstable environment, organizations seek to locate timely and precisely key information in order to match the environmental turbulence (Claro et al 2003; Lee and Cavusgil 2006). In general, firms with lower level of environmental uncertainty have a tendency to contractual governance rather than relational governance. Thus, the associations between relational assets and governance mechanism are moderated by environmental uncertainty.

In more stable relationships, the association between relational assets and contractual governance may be strengthened. While in more turbulent relationships, the association between relational assets and relational governance will be strengthened, knowledge sharing will be more stressed and necessary to confront the turbulence, and be a stronger antecedent than process integrating. In other words, higher external uncertainty may enhance the role of knowledge sharing on IOS governance. Thus, it seems that environmental uncertainty positively moderates the impact of knowledge sharing on IOS governance (Artz and Brush 2000), when environmental uncertainty becomes higher, the relationship increases between knowledge sharing and IOS governance. Therefore, we propose the theoretical arguments that:

**Hypothesis 4A.** The impact of knowledge sharing on contractual IOS governance is moderated by environmental uncertainty, that the impact is weaker when uncertainty is higher.

**Hypothesis 4B.** The impact of knowledge sharing on relational IOS governance is moderated by environmental uncertainty, that the impact is stronger when uncertainty is higher.

**Control Variables**

Firm size is used as a control variable in this IOS governance research, considering the argument that larger firms in terms of the number of employees tend to own and control IOS, or prefer centralized authority (Yu et al. 2006; Lee and Cavusgil 2006; Chatterjee and Ravichandran 2013). Age of the inter-organizational relationship is another control applied in IOS research area, represented by relational length or years of relationship establishment (Lee et al. 2003; Joshi and Campbell 2003; Lai et al. 2012). In this paper, we use relational length to describe the years of inter-organizational relationship establishment using IOS, consistent with the idea that longer time accumulates richer experience or interactions that may lead to better relational understanding or coordination. Relating the specific inter-organizational activities, bargaining authority is suggested to be included as a control to indicate the dyadic power and bargaining advantage of the focal firm (Chatterjee and Ravichandran 2013).

**Research Methodology**

This paper aims to explore how firms choose appropriate IOS governance mechanisms, synthetically considering the relational assets and environmental contingencies, and tries to provide suggestions to firm decision-making practice. Therefore, our research object is firms in networks and with munificent relationships with their partners. Manufacturing firms have been widely suggested to be investigated empirically in both IOS and supply chain literatures (Banker et al. 2006; Rai et al. 2006; Yao and Zhu 2012; Chatterjee and Ravichandran 2013), for these firms have abundant strength and experience in long time IOS and inter-organizational relationships practice. Therefore, our analysis unit is core firm in networks, and we collect survey data from vice-presidents, executives, directors, and other top managers of the manufacturing firms. This data collection method is also applied and recommended by many IS researchers (Swafford et al. 2008; Dong et al. 2009; Li et al. 2009; Rai and Tang 2010; Wang et al. 2012). Measurement instrument is designed and reported in Table 2. Measurement items are recorded using Likert scale from 1 (strongly disagree) to 7 (strongly agree).

Sample test is conducted to estimate the instrument’s reliability and validity. Large-scale survey data is being collected with government support. In the next step, hierarchical regression analysis will be used to assess the main effects and two-ways interaction effects (Rai and Tang 2010), and moderating effect will be measured using the methodology recommended by IS researchers (Dedrick et al. 2008; Xue et al. 2012; Chatterjee and Ravichandran 2013). Further theoretical and practical implications will be proposed based on the empirical findings.
Table 2. Measurement of Constructs

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<th>Constructs</th>
<th>Measurements</th>
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<tr>
<td><strong>Process integrating (PI)</strong></td>
<td>P11: Our business procedures and routines are linked with our partners. P12: Our way of doing business is closely linked with our partners. P13: Our operations are closely connected with our partners. P14: We coordinate production plan with partners. P15: We coordinate inventory level with partners.</td>
<td>Wang and Wei 2007; Rai and Tang 2010.</td>
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<td><strong>Knowledge sharing (KS)</strong></td>
<td>KS1: We share information about our other business relationships with our partners. KS2: We exchange product price and market information with our partners. KS3: We regularly inform business partner about our business plans. KS4: We provide business partner long range forecasts of our needs. KS5: We exchange business insights with our partners.</td>
<td>Tsai, W. 2002; Saraf et al. 2007.</td>
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<td><strong>Contractual IOS governance (CG)</strong></td>
<td>CG1: Our IOS applications with partners are governed by rules and regulations of contracts. CG2: Our contracts with partners required considerable legal work. CG3: The formal contract is customized with different partners. CG4: The contracts are adapted to our specific service level agreements.</td>
<td>Poppo and Zenger 2002; Yu et al. 2006; Ferguson et al. 2005; Lee and Cavusgil 2006.</td>
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<td><strong>Relational IOS governance (RG)</strong></td>
<td>RG1: We rely on mutual understanding with partners to assign roles and responsibilities of IOS project. RG2: We manage unexpected information systems events by relying on mutual understanding. RG3: We remained with business partners to stand for as one organization. RG4: We can rely on business partners to keep promises. RG5: We jointly act with partners to find out proper solutions to the IOS conflicts.</td>
<td>Poppo and Zenger 2002; Joshi and Campbell 2003; Ferguson et al. 2005.</td>
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<td><strong>Environmental uncertainty (EU)</strong></td>
<td>EU1: Our business partners’ are often surprised by our firm’s actions. EU2: The price of the business partners’ service often fluctuates. EU3: There are many similar business partners in the market. EU4: Our business partners’ service requirements often change.</td>
<td>Artz and Brush 2000; Lai et al. 2012.</td>
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<td><strong>Size</strong></td>
<td>Firm size are measured by the number of employees, for A. below 100 employees; B. 100-300 employees; C. 300-500 employees; D. above 500 employees.</td>
<td>Yu et al. 2006; Lee and Cavusgil 2006.</td>
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<td><strong>Relational length (RL)</strong></td>
<td>We have done business with this partner through IOS for A. less than 1 year; B. 1-5 years; C. 5-10 years; D. more than 10 years.</td>
<td>Joshi and Campbell 2003; Lai et al. 2012.</td>
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<td><strong>Bargaining authority (BA)</strong></td>
<td>BA1: We can always get business partner to agree to major policy changes related to our practices. BA2: We can completely dictate the rules and procedures of the transaction processes. BA3: We can significantly influence how business partner runs its operations.</td>
<td>Chatterjee and Ravichandran 2013.</td>
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**Conclusions**

IOS governance has been noted by theory and practice. Our research tries to bring insight into decision-making on IOS mechanisms in multifirms. Firstly, we identify two types of relational assets in inter-organizational activities from cooperative strategy. Secondly, impacts of relational assets on different IOS governance mechanisms are proposed specifically. Thirdly, contingency factors are conducted as environmental uncertainty to moderate the effect of relational assets on IOS governance. We try to figure out how contingency factors impact the decision making of IOS governance mechanism. Our findings will fill the gap on decide how to choose IOS governance mechanism considering relational and environmental factors, and bring implications for managers to understand and implement effective IOS governance.
References


