RELATIONAL AND STRUCTURAL EMBEDDEDNESS IN IT OUTSOURCING NETWORKS

Research-in-Progress

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Abstract

Opportunistic behaviour is one of the considerable risks causing the undesirable outcomes in information technology outsourcing (ITO). Therefore, how to mitigate opportunism is a critical research topic intimately related with how to improve ITO performance. The relatively recent studies have reported that relational and structural embeddedness can play an important role in preventing opportunistic behaviour and enhancing outcomes in response to ITO features such as the unpredictability of IT service requirements and the difficulty in measuring ITO performance. This research attempts to reveal which of relational and structural embeddedness operates more successfully in the presence of the different levels of these uncertainties. A simulation and game-theoretic approach are adopted to address the research question. Also, an efficient simulation experiment is designed by introducing a full factorial design. Finally, the initial simulation results and the future research directions are discussed.

Keywords: Relational and structural embeddedness, Opportunistic behaviour, IT outsourcing

Introduction

Opportunistic behaviour is one of the considerable risks causing the undesirable outcomes of cost escalation or service debasement in information technology outsourcing (ITO) (Aubert et al. 1998). Therefore, how to mitigate opportunism is a critical research topic intimately related with how to improve ITO performance. This issue is also gaining its importance as the comprehensive and recent literature reviews point out that the research focus of ITO has shifted from "why and what" to "how and outcomes" (Dibbern et al. 2004; Lacity et al. 2010). The relatively recent studies have reported that relational and structural embeddedness can play an important role in preventing opportunistic behaviour and enhancing outcomes in response to ITO features such as the unpredictability of IT service requirements and the difficulty in measuring ITO performance (Kim and Chung 2003; Poppo and Zenger 2002; Ravindran et al. 2009). This research attempts to reveal which of relational and structural embeddedness operates more successfully in the presence of the different levels of these uncertainties through a simulation and game-theoretic approach.

Each embeddedness is defined as "personal relationships people have developed with each other through a history of interactions" and "impersonal configuration of linkages between people or units" respectively (Nahapiet and Ghoshal 1998). Therefore, once a business opportunity is given to an ITO network, a firm can select a trustworthy partner among the existing parties in the perspective of relational embeddedness. Alternatively, it can access information on various candidates through their network positions or third parties, and can select a new partner who may make better performance as well as who is considered reliable from the viewpoint of structural embeddedness. However, the initiation and maintenance of the new relationship require resources which could be better used for improving outcomes through the refinement of the existing relationship. As a result, a firm in an ITO network faces a choice between relational and structural embeddedness.

The literature addressing this problem provides the following theoretical backgrounds and empirical evidences in the ITO business environment. The scholars supporting relational embeddedness argue that a firm prefers a partner who is strongly and directly connected through prior exchanges (Gulati 1995). The repetition or long-term maintenance of a transaction relationship between specific partners fosters relational trust and commitment, which can contribute to the safeguard against opportunistic behaviour (Brown et al. 2004; Uzzi 1996). A firm can also improve its outcomes in exchanges based on relational embeddedness since relational trust and commitment can effectively reduce the transaction cost involved in deterring a partner's opportunism or switching a partner (Gopal et al. 2003; Hill 1990). Founded on these theoretical backgrounds, many empirical studies have been conducted on relational embeddedness in ITO (Balaji and Brown 2010; Flemming and Low 2007; Henderson 1990; Kim and Chung 2003; Lee and Kim 1999; Lee and Kim 2005; Poppo and Zenger 2002).

From the viewpoint of structural embeddedness, it is claimed that a network is a source of information on past exchanges and acts as a "prism" through which this information can be provided for third parties (Podolny 2001; Ravindran et al. 2009). A firm can therefore access information on the reliability and competence of multiple alternative candidates through the indirect ties to serve as a conduit of this information or the network positions to connote this information (Gulati 1995; Ravindran et al. 2009). Then, it can enhance performance by selecting a partner who is considered more suitable for a given business opportunity because diverse experts could provide more potential profits than fixed partners (Kandori 1992). Furthermore, the selected partner who is perceived to be reliable would refrain from behaving opportunistically to prevent the loss of its reputation (Ravindran et al. 2009). These theoretical backgrounds are reflected in a few empirical studies on structural embeddedness in ITO (Drath and Wayman 2010; Ravindran et al. 2009).

However, while each research stream on relational or structural embeddedness reveals the pros and cons of its own mechanism to safeguard against opportunism and improve long-term performance, they fail to explain which mechanism is more appropriate for a firm at the different levels of the requirement unpredictability and measurement difficulty imposed on the ITO business environment. That is, the literature lacks studies that compare the conditional superiority of one mechanism to the other in the presence of these uncertainties which are not uniform across a wide range of outsourced IT services or products. This one-sided emphasis sometimes leads to the conflicting conclusion that both of the mechanisms are universally optimal regardless of the various levels of the uncertainties and, what is worse, may provide confusing prescriptions for a firm facing the choice. Based on this observation, this study attempts to fill the research gap in the research area of ITO by answering the following specific question.

- Which mechanism is superior to the other in preventing opportunism and improving long-term outcomes at the various levels of the unpredictability of IT service requirements and the difficulty in measuring ITO performance?

This paper addresses the question through the simulation of a virtual ITO network where firms establish consortia to respond to given business opportunities. Each firm can play a coordinator or partner role in forming an ITO consortium. A coordinator has an option to use the partner selection and control strategy based on relational or structural embeddedness for the competition with others. A partner also behaves cooperatively or opportunistically in order to do so. Apart from these roles, a firm can seek and transfer information on others. This role enables an ITO network to serve as a "prism" for consortium members.

A simulation method is useful for dealing with the research question because it can appropriately demonstrate the behaviour of actors who compose a network and affect one another through their interactions, and the performance which is the consequence of their behaviour (Harrison et al. 2007). In addition, it would take too much time and effort to collect sufficient empirical data sets at the various levels of the uncertainties in the long term to address the research problem. In this case, a method of simulation can be an effective substitute for an empirical approach (Davis et al. 2007). A game-theoretic approach is widely adopted in organisational research. Especially, the game models developed by Shapiro and Stiglitz (1984) and Kandori (1992) are suitable for this research. The former illustrates the decision-makings and payoffs in repeated transactions between a specific employer and employee. However, particular members may not iteratively establish their consortium for each business opportunity in ITO (Ravindran et al. 2009). The latter relieves the condition of repeatedness by showing the substitutable effects of the observation of labels, the collection of information on them via third parties and the share of social norms. Therefore, the approach based on a mixture of two models can analytically reveal the decision-makings and resulting outcomes of firms in an ITO network where repeated or non-repeated interactions occur.

This paper is organised as follows. The second section reviews the existing studies on opportunistic behaviour, relational and structural embeddedness in ITO. Then, the simulation model and initial results are illustrated in the third and fourth section. Finally, we discuss the main findings and further research.

Theoretical Background and Hypotheses

Considerable research has been conducted on how to safeguard against opportunism and improve performance in ITO. The comprehensive review of Dibbern et al. (2004) describes the history, definitions of terminology, theoretical foundations and analysis of literature. The authors especially propose the ITO stage model composed of why, which, what, how and outcomes. The prior literature is also organised in accordance with these five phases. As reported in this paper, it is worth to note that "how" (i.e. vendor selection and relationship management) is closely associated with "outcomes", and the number of the related studies has rapidly increased over time. The recent review of Lacity et al. (2010) provides the analysis of the empirical literature over the past two decades. The descriptive models of ITO decisions and outcomes are established based on the statistically significant and frequently examined factors. According to their research, the roles of relationship characteristics (i.e. trust, communications, working experience and relationship quality) and contractual governance (i.e. contract detail, size and type) are important in ITO outcomes studies. A body of ITO literature discussed in these reviews uses various kinds of theories to address a relationship between outsourcing partners. This research adopts transaction cost theory and agency theory for the identification of risk factors affecting opportunism and performance. Relational exchange theory and social capital theory are also introduced as the theoretical basis of relational and structural embeddedness.

Risk Factors and Opportunistic Behaviour

Opportunistic behaviour leads to negative outcomes in the ITO business environment (Aubert et al. 1998). Therefore, a lot of efforts have been made to identify risk factors which can cause this behaviour. Transaction cost theory and agency theory provide the theoretical background for the discovery of them. In transaction cost theory, opportunistic behaviour is defined as "self-interest seeking with guile" (Williamson 1975), which is supplemented with the following examples: "lying, stealing, cheating and calculated efforts to mislead, distort, disguise, obfuscate or otherwise confuse" (Williamson 1985). Based on the fundamental definition, the research of Wathne and Heide (2000) provides a systematic conceptualisation. That is, the authors classify opportunistic behaviour into four forms such as "evasion, refusal to adapt, violation and forced renegotiation" in accordance with "how active or passive opportunism manifest themselves under existing or new circumstances". Transaction cost theory predicts that

opportunistic behaviour is likely to occur when the routinisation of transactions to overcome bounded rationality and market uncertainty causes the problems of asset specificity and small-number conditions (Provan 1993). Following the prediction, a wide range of risk factors are investigated in the perspective of a client, supplier and transaction (Aubert et al. 1998; Bahli and Rivard 2003). This theory also suggests that vertical integration is efficient when risks considerably increase the transaction cost involved in managing an exchange partner's behaviour (Provan 1993). However, it is sometimes pointed out that transaction cost theory focusing on vertical integration under high risks may not be appropriate in the context of ITO where a relationship is established with an external vendor even in such a situation (Ring and Van de Ven 1992).

Agency theory suggests two types of opportunistic behaviour: adverse selection and moral hazard, which are defined as "the mispresentation of ability by the agent" and "the lack of effort on the part of the agent" respectively (Eisenhardt 1989). It is also proposed that each type is caused by the fact that the principal cannot observe the characteristic and behaviour of the agent (i.e. information asymmetry) (Aubert et al. 1998). This theory reveals that opportunistic behaviour can be controlled by elaborate bidding procedures, explicit contract clauses specifying tasks, strict monitoring of them and objective incentives according to performance (Kwon 2007). More specifically, it has been commonly recognised that a competitive tender and formal contract are the fundamental mechanisms to select a right partner and control its behaviour in ITO (Kobayashi-Hillary 2010; Poppo and Zenger 2002). A firm can control a (potential) partner's behaviour by designing elaborate bidding procedures which can reveal hidden information on bidders and developing complex and customised contract clauses which clearly stipulates a partner's obligations and responsibilities (Hirschheim and Lacity 2000). A competitive tender in ITO generally includes the following procedures: request-for-information, site visits, request-for-proposal and negotiation (Kobayashi-Hillary 2010). Through these procedures, a firm attempts to identify a partner who is suitable for meeting the needs of an outsourced service or product as well as who is reliable. The empirical study of Chen and Bharadwaj (2009) shows how an ITO formal contract is structuralised. The authors propose that it usually includes four major provisions: monitoring, dispute resolution, property rights protection and contingency planning. It is especially suggested that strict monitoring and thorough contingency planning can prevent cost escalation and service debasement caused by opportunistic behaviour.

Relational and Structural Embeddedness

The relatively high risks in ITO tend to attenuate the effects of the formal mechanisms such as a competitive tender and formal contract on the prevention of opportunism and improvement of performance (Balaji and Brown 2010; Lee and Kim 1999). In response to them, it has been reported that relational and structural embeddedness can serve as a complementary or substitutable mechanism in ITO (Poppo and Zenger 2002; Ravindran et al. 2009). The origin of embeddedness is found in the pioneering research of Granovetter (1985), which argues that embeddedness is useful to explain economic phenomena occurring between organisations as well as individuals because "most behaviour is closely embedded in networks of interpersonal relations". This initial study classifies embeddedness into two dimensions: "concrete personal relations" and "structures of such relations". In the following research, it is again emphasised that "economic actions and outcomes are affected by actors' dyadic relations and by the structure of the overall network of relations" (Granovetter 1992). The author uses the terms of relational and structural embeddedness to refer to the unique effects of two viewpoints. Based on these original conceptualisations, the more specific definitions of relational and structural embeddedness are provided: "personal relationships people have developed with each other through a history of interactions" and "impersonal configuration of linkages between people or units" (Nahapiet and Ghoshal 1998). In this research, the roles of each embeddedness in ITO are explained based on relational exchange theory and social capital theory.

The scholars supporting relational exchange theory argue that relational exchange is distinguished from discrete exchange (Macneil 1980). Discrete exchange is regarded as a one-time interaction between anonymous parties, who mainly focus on the maximisation of their own economic efficiency (Ring and Van de Ven 1992). Therefore, the identities of the participants and relational aspects between them are likely to be ignored in this exchange (Kim and Chung 2003). On the other hand, relational exchange is not viewed as a separate event but rather a dynamic process evolving through successive interactions between specific partners (Poppo and Zenger 2002). The participants decide whether to maintain the current relationship and anticipate the future performance based on the history of past transactions (Dwyer el al. 1987; Levinthal and Fichman 1998). They also place a premium on non-economic values such as relational trust and commitment generated by the iteration or long-term maintenance of their relationship (Brown et al. 2004). Therefore, relational exchange theory can provide a theoretical background for the

partner selection and control strategy rooted in relational embeddedness, which is called the relational strategy in this research.

Social capital is defined as "resources embedded in a social structure which are accessed and/or mobilised in purposive actions" and hence its concept includes "three elements intersecting structure and action: the structural embeddedness, opportunity accessibility and action-oriented use aspects" (Lin 1999). Following this conceptualisation, the scholars supporting social capital theory address the values of linkages and their structures, and especially investigate relationships between network positions and a variety of significant outcomes such as "power, leadership, mobility, employment, individual performance, individual creativity, entrepreneurship and team performance" (Borgatti and Foster 2003). They argue that an actor's network position represents its reputation which is an indicator of past performance and a predictor of future behaviour, and an indirect tie serves as a conduit of information on it (Gopal et al. 2003; Heng et al. 2009; Malik and Bouguettaya 2009; Ravindran et al. 2009). It is also empirically shown that this valuable information can be gained through the observation of a network position or the information transmission via an indirect tie (Gulati 1995; Hansen 1999; Ravindran et al. 2009). Therefore, social capital theory theoretically supports the partner choice and management strategy anchored in structural embeddedness, which is called the structural strategy in this study.

In the meantime, table 1 shows the principal factors addressed in the research on ITO partnerships in the perspective of relational embeddedness and structural properties of an ITO network from the viewpoint of structural embeddedness.

Table 1. Principal Factors in ITO

Perspective	Author	Principal factors
Relational embeddedness	Balaji & Brown (2010)	Commitment, Trust
	Henderson et al. (1990)	Information sharing, Mutual benefits
	Kim & Chung (2003)	Continuity expectation, Flexibility, Solidarity
	Kim & Park (2003)	Benefit and risk sharing , Business understanding
	Lee & Kim (1999)	Age of relationship, Benefit and risk sharing, Business understanding, Commitment, Communication quality, Coordination, Information sharing, Joint action, Trust
Structural embeddedness	Drayth & Wayman (2010)	Information collection via third parties
	Heng et al. (2010)	Referencing power
	Gopal et al. (2003)	Network position
	Ravindran et al. (2009)	Network position

As shown in the above table, each research direction in ITO mainly focuses on either side between relational and structural embeddedness. Therefore, it is necessary that two types of embeddedness should be compared with each other to relieve the problem which firms in an ITO network face at the different levels of the uncertainties.

Hypotheses

Among many risk factors drawn from transaction cost theory and agency theory, especially, uncertainty and measurement difficulty are frequently and significantly examined in empirical ITO studies (Lacity et al. 2010). The research of Robertson and Gatignon (1998) provides a well-organised classification for the two risk factors. That is, uncertainty is categorised into two dimensions: external and internal uncertainty. Also, the former includes demand and technological uncertainty while the latter involves a firm's ability to measure performance and level of experience with alliances. Furthermore, it is shown that three areas of uncertainty have been studied in ITO literature: technological, measurement and demand uncertainty (Kim and Chung 2003). Based on the classifications, this research adopts the unpredictability of IT service requirements and the difficulty in measuring ITO performance as a significant risk factor affecting opportunistic behaviour and outcomes.

When it is difficult to measure performance, considerable cost is incurred in the development of elaborate bidding procedures, the design of more detailed contract clauses and the strict monitoring of them for the prevention of a (potential) partner's opportunistic behaviour (Barzel 1982). Furthermore, several studies in line with relational exchange theory observe that the efforts to control a partner with the rigorous formal mechanisms lead to unsatisfactory results and increase its opportunistic behaviour (Ghoshal and Moran 1996; Nam et al. 1996). Instead, they take note of flexibility, solidarity and smooth information sharing based on relational trust and commitment (Poppo and Zenger 2002). Transaction partners coupled through these relational factors deeply understand each other's business, harmoniously resolve conflicts between them and share their profits and risks. The difference in their strategic goals is minimised, which facilitates the successful establishment of an ITO partnership (Lee and Kim 1999; Lee and Kim 2005). They are also willing to cooperate to maximise their joint success and believe that any short-term inequities will be compensated in the long run (Kronman 1985). Therefore, the need to precisely measure performance is reduced in this relationship.

On the other hand, several researchers supporting social capital theory pay attention to the fact that particular partners may not repeatedly transact with each other or maintain their long-term exchange relationship. Especially, they claim that the existence of firms related with multiple exchange parties in an ITO network is a proof that relational exchange theory is likely to be incomplete to explain the initiation and maintenance of an ITO relationship (Ravindran et al. 2009). Rather, a network position indicating reputation is emphasised in this theoretical approach. A firm collects information on multiple alternative candidates through the observation of their network positions and the information transfer by third parties, and has an opportunity to compare them. Therefore, it can flexibly respond to unpredictable requirements by transacting with a more suitable partner. In fact, it is reported that ITO project managers place a premium on reputation rather than cost and consider the role of third parties important to find a competent partner in uncertain situations (Drath and Wayman 2010; Gopal et al. 2003). By the way, reputation is regarded as a collective measure of reliability rooted in the evaluation of counterparties and an intangible asset (Jøsang et al. 2007; Lee and Roh 2012). A firm would therefore refrain from behaving opportunistically because the damage of its reputation caused by this behaviour is the loss of its capital (Kandori 1992).

Based on this reasoning, the following hypotheses are proposed.

H1: When it is difficult to gauge ITO outcomes, the relational strategy is likely to be superior to the structural strategy.

H2: When IT service requirements are unpredictably changing, the structural strategy is likely to be superior to the relational strategy.

Simulation Model

We model the dynamics of a virtual ITO network where vendors form consortia to respond to given business opportunities. The market offers ITO business opportunities with the various levels of the requirement unpredictability and measurement difficulty. In response to these opportunities, vendors in an ITO network perform the role of either a coordinator or partner to establish consortia. As a coordinator, vendors use the relational or structural strategy. Each strategy enables them to select and control partners who are strongly and directly connected through prior working experience in the perspective of relational embeddedness (Poppo and Zenger 2002) or who are located in prominent positions from the viewpoint of structural embeddedness (Ravindran et al. 2009). As a partner, vendors behave cooperatively or opportunistically. Opportunistic behaviour manifests itself as the appearance of two types in the simulation model: adverse selection and moral hazard (Eisenhardt 1989). That is, an opportunistic vendor attempts to attend an ITO consortium exaggerating its current resource availability although the amount of its resources is smaller than is required (adverse selection). Furthermore, when selected as a partner, it invests no resources for its own interest (moral hazard). These types of behaviour may induce a coordinator to select an unqualified partner and decrease the quality of a delivered IT service (Aubert et al. 1998).

The decision-makings and payoffs of ITO consortium members in the simulation model follow the game model developed by Shapiro and Stiglitz (1984). Their research shows the repetition of transactions between a specific employer and employee can serve as a mechanism to safeguard against opportunism and improve long-term performance. However, particular members may not repeatedly form their consortium for each business opportunity in ITO (Ravindran et al. 2009). The research of Kandori (1992) reveals that the role of repeatedness can be substituted with the direct observation of various labels (i.e. reputation, membership and license) or the indirect collection of this information through third parties. In addition, the author suggests that a norm such as an

opportunistic member is permanently expelled from a community can serve as an alternative to repeatedness. Following the results, the simulation model assumes that vendors in an ITO network share a norm such as a vendor is deprived of its further transaction opportunities when its opportunistic behaviour is detected. It is also assumed that they can seek, update and transfer information on others' behavioural propensities. These assumptions allow the existence of cooperative vendors as well as opportunistic ones in an ITO network without the condition of repeated transactions.

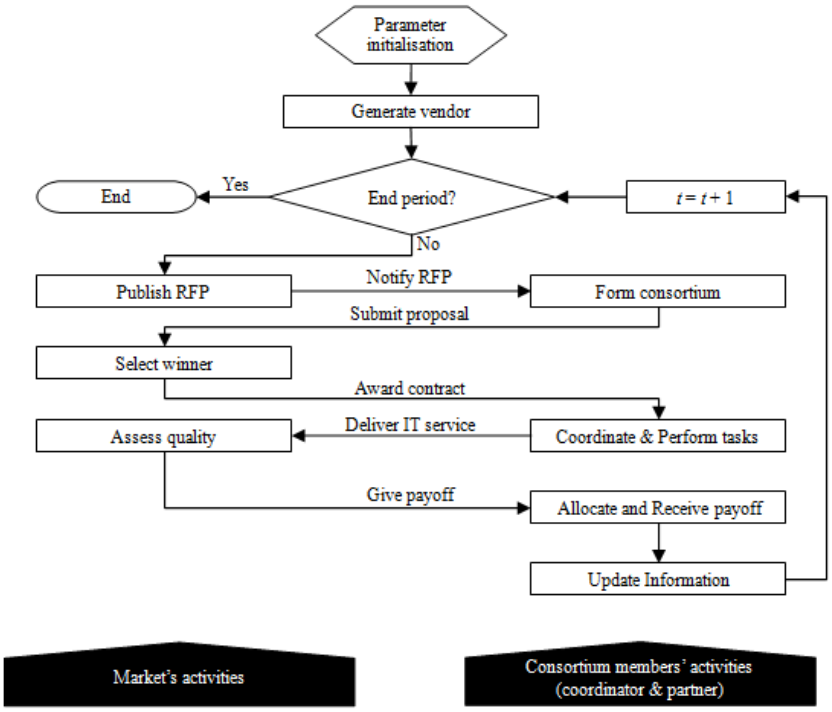

Figure 1. Simulation Procedures

Figure 1 shows how the simulation proceeds. Initially, the market generates an ITO business opportunity, of which the details are defined in a request-for-proposal (RFP). The RFP is also notified to vendors in an ITO network. Then, several vendors who can cover the requirement for a coordination ability establish their ITO consortia and submit proposals to the market. When receiving them, the market selects the proposal with the highest level of a coordination ability and awards a contract in accordance with the RFP to the winner consortium. Next, the members of this consortium perform their tasks and, when they are completed, the coordinator delivers the IT service. The market assesses the quality of the delivered IT service and gives the payoff according to the assessment result. Then, the coordinator allocates the payoff to its consortium partners in proportion to their contributions.

Meanwhile, the simulation model mainly includes three parts: the activities of the market, coordinator and partner. More specifically, the market's activities involve publishing the RFP, selecting the winner consortium, assessing the quality of the delivered IT service and awarding the payoff. The coordinator's activities include identifying the types and quantities of resources secured for the service delivery, selecting partners according to the identified resource set, coordinating the tasks, allocating the payoff and updating information. The partner's activities contain applying for a consortium member, performing the task through the investment of its resources and updating information. The technical details of each party are provided in following sub sections.

Vendors in an ITO Network

A vendor plays the role of either a coordinator or partner in establishing an ITO consortium. As a coordinator, a vendor has an ability to form and coordinate a consortium. It also uses the relational or structural strategy, which influences a decision-making on how to select and control a partner. As a partner, a vendor has resources which can

be provided for a consortium. It also behaves cooperatively or opportunistically. This behavioural propensity affects a decision-making on whether to attempt to participate in an ITO consortium and, when selected as a partner, how many resources to invest.

In detail, suppose that following vendors exist in an ITO network.

$$v_{i1}, v_{i2}, \cdots, v_{ij}, \cdots, v_{in_i} \text{ for } i = 1, 2, \cdots, m,$$

where m, n_i and v_{ij} denote the number of resource types, the number of vendors to provide the i th type resources and the j th vendor among them.

Then, v_{ij} has following characteristics to play a coordinator role.

$$a_{ij}(t) \text{ for } t = 0, 1, \cdots, T \text{ and } s_{ij},$$

where $a_{ij}(t)$ and s_{ij} indicate the level of a coordination ability which v_{ij} has at the period of t and its strategy. At the initial period of $t = 0$, $a_{ij}(0)$ is generated to follow the uniform distribution over the range $[a_{\min}(0), a_{\max}(0)]$. Also, +1 or −1 is randomly given to s_{ij}, where each value means that v_{ij} uses the relational or structural strategy.

In addition, v_{ij} has the following features to serve as a partner.

$$r_{ij}(t) \text{ for } t = 0, 1, \cdots, T \text{ and } b_{ij},$$

where $r_{ij}(t)$ and b_{ij} represent the amount of resources which v_{ij} has at the period of t and its behavioural propensity. At the initial period of $t = 0$, $r_{ij}(0)$ is generated to follow the uniform distribution over the range $[r_{\min}(0), r_{\max}(0)]$. Also, +1 or −1 is randomly given to b_{ij}, where each value means that v_{ij} behaves cooperatively or opportunistically.

Market-side Dynamics

Unpredictability of IT service requirements

A RFP is a combination of the types and quantities of resources required for an outsourced IT service. Then, the RFP published at the period of t is indicated by

$$\mathbf{RFP}(t) = [pa(t), pr_1(t), pr_2(t), \cdots, pr_x(t), \cdots, pr_m(t)],$$

where $pa(t)$ and $pr_x(t)$ denote the level of a coordination ability and the amount of the x th type resources required for the service delivery.

By the way, uncertainty is usually defined as "the degree of unpredictability or volatility of future states as it relates to the definition of IS requirements, emerging technologies, and/or environmental factors" (Lacity et al. 2010). Borrowing this definition, uncertainty in the simulation model is represented via the extent to which the requirements necessary for an outsourced IT service are unpredictable. In order to simulate this situation, $pa(t)$ and $pr_x(t)$ are generated to follow the normal distribution with $\mu_a(t)$, $\sigma_a(t)$ and $\mu_r(t)$, $\sigma_r(t)$, where

$$\mu_a(t) = \alpha \times \frac{\sum_{i=1}^{m}\sum_{j=1}^{n_i} a_{ij}(t)}{\sum_{i=1}^{m} n_i},\ \sigma_a(t) = \alpha \times \sqrt{\frac{\sum_{i=1}^{m}\sum_{j=1}^{n_i}\left[a_{ij}(t) - \mu_a(t)\right]^2}{\left(\sum_{i=1}^{m} n_i\right) - 1}} \text{ and}$$

$$\mu_r(t) = \alpha \times \frac{\sum_{i=1}^{m}\sum_{j=1}^{n_i} r_{ij}(t)}{\sum_{i=1}^{m} n_i},\ \sigma_r(t) = \alpha \times \sqrt{\frac{\sum_{i=1}^{m}\sum_{j=1}^{n_i}\left[r_{ij}(t) - \mu_r(t)\right]^2}{\left(\sum_{i=1}^{m} n_i\right) - 1}}.$$

Then, α indicates the increasing rate and instability of requirements. That is, as the value of α is higher, $pa(t)$ and $pr_x(t)$ are likely to increase more steeply and the fluctuation range of them seems to become larger over time.

Difficulty in measuring ITO performance

The quality of a delivered IT service is one of the critical indicators to measure ITO outcomes (Dibbern et al. 2004). Also, quality is considered from the perspective of fitness of use, that is, whether a product or service satisfies a

customer's requirements (Garvin 1988). Let $ar_x(t)$ be the amount of resources which are actually invested by the partner for the x th type resources. Then, ITO performance in the simulation model is evaluated based on the following proportion of the actual investments by the consortium members to the requirements in the RFP.

$$Prop(t) = I(t) / R(t),$$

where $I(t) = ar_1(t) + ar_2(t) + \cdots + ar_m(t)$ and $R(t) = pr_1(t) + pr_2(t) + \cdots + pr_m(t)$.

In the meantime, this paper adopts Lacity and her colleagues' definition of measurement difficulty, which is defined as "the degree of difficulty in measuring performance of exchange partners under circumstances of joint effort, soft outcomes, and/or ambiguous links between effort and performance" (Lacity et al. 2010). It is generally believed that the difficulty in measuring ITO performance stems from various sources according to the types of IT activities, for example, "high in company-specific application development such as application development, systems conversion and integration, consulting services and disaster recovery" and "low in routine and commodity type service such as network maintenance, data centre operations and systems maintenance" (Goo et al. 2007). The type of an IT service therefore makes a difference in the extent to which $Prop(t)$ can be exactly measured. In order to represent this situation, an outsourced IT service is given a cut-off value (β) between 0 and 1, which refers to the degree to which requirements can be verified. An IT service with the higher value of β is more similar to routine and commodity type service and vice versa. Then, the criterion for the quality assessment is as follows.

The quality of a delivered IT service is assessed as satisfactory if $\beta \leq Prop(t)$.

For example, $Prop(t) = 0.8$ means that the members of an ITO consortium complete eighty percent of the requirements which should be satisfied. Also, in case of $\beta = 0.7$, seventy percent of them can be verified. Then, the quality of the delivered IT service is evaluated as satisfactory.

Coordinator-side Dynamics: Relational vs. Structural Strategy

The central issue in this paper is the choice between two exclusive strategies to select and control partners for an ITO consortium. A coordinator employing the relational or structural strategy selects a partner who is coupled via a direct and strong tie or who occupies a prominent position. Furthermore, the type of its strategy makes a difference in the cost of managing the selected members to provide a successful IT service (Gopal et al. 2003; Poppo and Zenger 2002)

In detail, a vendor (v_{ij}) can qualify as a coordinator if $a_{ij}(t) \geq pa(t)$, which means that the level of its coordination ability is higher than is required in the RFP. However, in order to prevent too many coordinators from forming their consortia in the simulation, p_1 percent of the vendors satisfying this condition are randomly selected as a coordinator. Next, a coordinator publishes CFBs (call-for-bid) to secure resources required in the RFP. Again, let v_{ij} be a coordinator. Then, it does not need to find a partner to have the i th type resources if $r_{ij}(t) \geq pr_i(t)$ since it can cover the requirement for the i th type resources. However, it needs to additionally secure this type resources if $r_{ij}(t) < pr_i(t)$ because the amount of its resources is smaller than is required in the RFP. For the convenience of the description, let $r_{ij}(t) \geq pr_i(t)$ and $r_{ij}(t) < pr_i(t)$ be the condition 1 (C1) and condition 2 (C2) respectively. Then, v_{ij} publishes the following CFBs to secure resources under C1.

$$CFB_{ij1}(t),\ CFB_{ij2}(t),\ \cdots,\ CFB_{i,j,i-1}(t),\ CFB_{i,j,i+1}(t),\ \cdots,\ CFB_{ijm}(t),$$

where $\mathrm{CFB}_{ijx}(t) = [br_{ijx}(t)]$ and $br_{ijx}(t) = pr_x(t)$. Under C2, it additionally publishes the following CFB to compensate for the lack of the i th type resources.

$$CFB_{iji}(\mathrm{t}),$$

where $\mathrm{CFB}_{iji}(t) = [br_{iji}(t)]$ and $br_{iji}(t) = pr_i(t) - r_{ij}(t)$.

In the meantime, a coordinator using the relational strategy prefers a partner who is directly and strongly connected through prior working experience. Let $p_{xy \to ij}(t)$ be the proportion of v_{ij}'s cumulative profits gained through the participation in ITO consortia together with v_{xy} until the period of t. Then, this indicator can denote the strength of the tie between v_{ij} and v_{xy} (Uzzi 1996). Also, let $v_{x,p\max}(t)$ be the vendor with the maximum value of $p_{xy \to ij}(t)$. Then, v_{ij} such as $s_{ij} = +1$ (using the relational strategy) requests $v_{x,p\max}(t)$ to attend its ITO consortium for the x th type resources. Alternatively, a coordinator employing the structural strategy attempts to select a partner who is located in a prominent position. Let $c_{xy}(t)$ be v_{xy}'s degree centrality at the period of t. Then, this measure can indicate the extent to which v_{xy} is prominent in the ITO network (Wasserman and Faust 1994). Also, let $v_{x,c\max}(t)$ be the vendor

with the maximum value of $c_{xy}(t)$. Then, v_{ij} such as $s_{ij} = -1$ (employing the structural strategy) asks $v_{x,c\max}(t)$ to participate in its consortium for this type resources. In the meantime, if there is no such vendor, v_{ij} such as $s_{ij} = +1$ or -1 notifies $CFB_{ijx}(t)$ to vendors who have the x th type resources and unavoidably uses a competitive tender to find a right partner. It however incurs the substantial cost of running a bid, which is denoted by *bc* in the model.

Next, when the formation of an ITO consortium is completed and it is selected as the winner, v_{ij} such as $s_{ij} = +1$ does not need to spend the cost of initiating and maintaining a new relationship because it selects an existing partner. However, v_{ij} such as $s_{ij} = -1$ may select a new partner who is considered more suitable. In this case, it should bear this cost for the new ITO relationship, which is represented by *nc* in the model. Furthermore, when there is no relationally or structurally embedded partner and hence a bid process is applied, the coordinator needs to design more rigorous contract clauses and to more strictly enforce them. They also incur the considerable cost, which is indicated by *cc* in the model.

Let $aa(t)$ be the level of a coordination ability which is actually used by the winner consortium coordinator. Also, let u and v be the number of partners who are selected through a competitive tender when there are no existing or prominent partners to cover requirements and the number of members who are switched when the structural strategy is used. Then, table 2 shows the actual investments by the coordinator of the winner consortium.

Table 2. Actual Investments by Coordinator

Coordinator	Actual investments	
	Under C1	Under C2
v_{ij} such as $s_{ij} = +1$ (Relational strategy)	$aa(t) = u \times (bc + cc)$ and $ar_i(t) = pr_i(t)$	$aa(t) = u \times (bc + cc)$ and $^{*}ar_i{}^{c}(t) = r_{ij}(t)$
v_{ij} such as $s_{ij} = -1$ (Structural strategy)	$aa(t) = u \times (bc + cc) + v \times nc$ and $ar_i(t) = pr_i(t)$	$aa(t) = u \times (bc + cc) + v \times nc$ and $^{*}ar_i{}^{c}(t) = r_{ij}(t)$

* $ar_i^c(t)$ indicates the amount of the i th type resources which are actually invested by the coordinator under C2.

Partner-side Dynamics: Cooperative vs. Opportunistic Behaviour

A cooperative (potential) partner attempts to participate in an ITO consortium only when it has enough resources to cover a requirement and invests as many resources as required. However, an opportunistic one tries to become a consortium member exaggerating its current resource availability (i.e. adverse selection) and inputs no resources for its own interest (i.e. moral hazard) (Eisenhardt 1989; Kandori 1992; Shapiro and Stiglitz 1984).

More specifically, when a vendor is requested to participate in an ITO consortium by a coordinator using the relational or structural strategy, it decides whether to accept this asking. Let $v_{x,p\max}(t)$ or $v_{x,c\max}(t)$ be v_{xy} again. Then, v_{xy} such as $b_{xy} = +1$ (behaving cooperatively) agrees to the request only if it satisfies $r_{xy}(t) \geq br_{ijx}(t)$, which means that the amount of its resources is higher than is required. In contrast, v_{xy} such as $b_{xy} = -1$ (behaving opportunistically) accepts the request regardless of its current resource availability. That is, although the vendor cannot cover the requirement, it agrees to this asking and becomes a partner. This deceit may induce the coordinator to select an unqualified partner (Aubert et al. 1998).

When a coordinator cannot find a relationally or structurally embedded partner and hence a CFB is notified for a competitive tender, the behaviour of a bidder is similar to that of a vendor requested to attend an ITO consortium. A cooperative bidder decides to apply for a consortium member only if it can cover the requirement. On the contrary, an opportunistic candidate unconditionally bids for the CFB. This deception may also induce the coordinator to choose an incompetent partner (Aubert et al. 1998). Meanwhile, in order to prevent too many vendors from bidding for the CFB, p_2 percent of the cooperative vendors satisfying the above condition and the opportunistic vendors are randomly selected as a bidder. Let v_{xy} be a bidder in case of the notification. Then, v_{xy} such as $b_{xy} = +1$ submits a bid which represents that the amount of its resources is $r_{xy}(t)$. On the other hand, v_{xy} such as $b_{xy} = -1$ submits a bid which indicates that the quantity of its resources is $r_{xy}(t)$ if $r_{xy}(t) \geq br_{ijx}(t)$ or $br_{ijx}(t)$ if $r_{xy}(t) < br_{ijx}(t)$. Then, the coordinator selects the candidate submitting the bid with the largest amount of resources as a partner.

When a vendor (v_{xy}) becomes a partner via a coordinator's request or a competitive tender, and its consortium becomes the winner, v_{xy} such as $b_{xy} = +1$ invests as many resources as the coordinator requires while v_{xy} such as $b_{xy} =$

−1 spends no resources for its own interest. This breach may decrease the quality of an IT service (Aubert et al. 1998).

Let $ar_x(t)$ be the amount of resources which are actually invested by v_{xy}. Then, table 3 shows the actual investments by the partners of the winner consortium to provide an IT service.

Table 3. Actual Investments by Partner

Partner	Actual investments	
	Under C1	Under C2
v_{xy} such as $b_{xy} = +1$ (Cooperative partner)	$ar_x(t) = br_{ijx}(t) = pr_x(t)$ for $x \neq i$	$ar_x(t) = br_{ijx}(t) = pr_x(t)$ for $x \neq i$ and $^{*}ar_i^{P}(t) = br_{iji}(t) = pr_i(t) - r_{ij}(t)$ for $x = i$
v_{xy} such as $b_{xy} = -1$ (Opportunistic partner)	$ar_x(t) = 0$ for $x \neq i$	$ar_x(t) = 0$ for $x \neq i$ and $^{*}ar_i^{P}(t) = 0$ for $x = i$

* $ar_i^{P}(t)$ represents the amount of the i th type resources which are actually invested by the partner under C2.

Additionally, figure 2 demonstrates how an ITO consortium is formed.

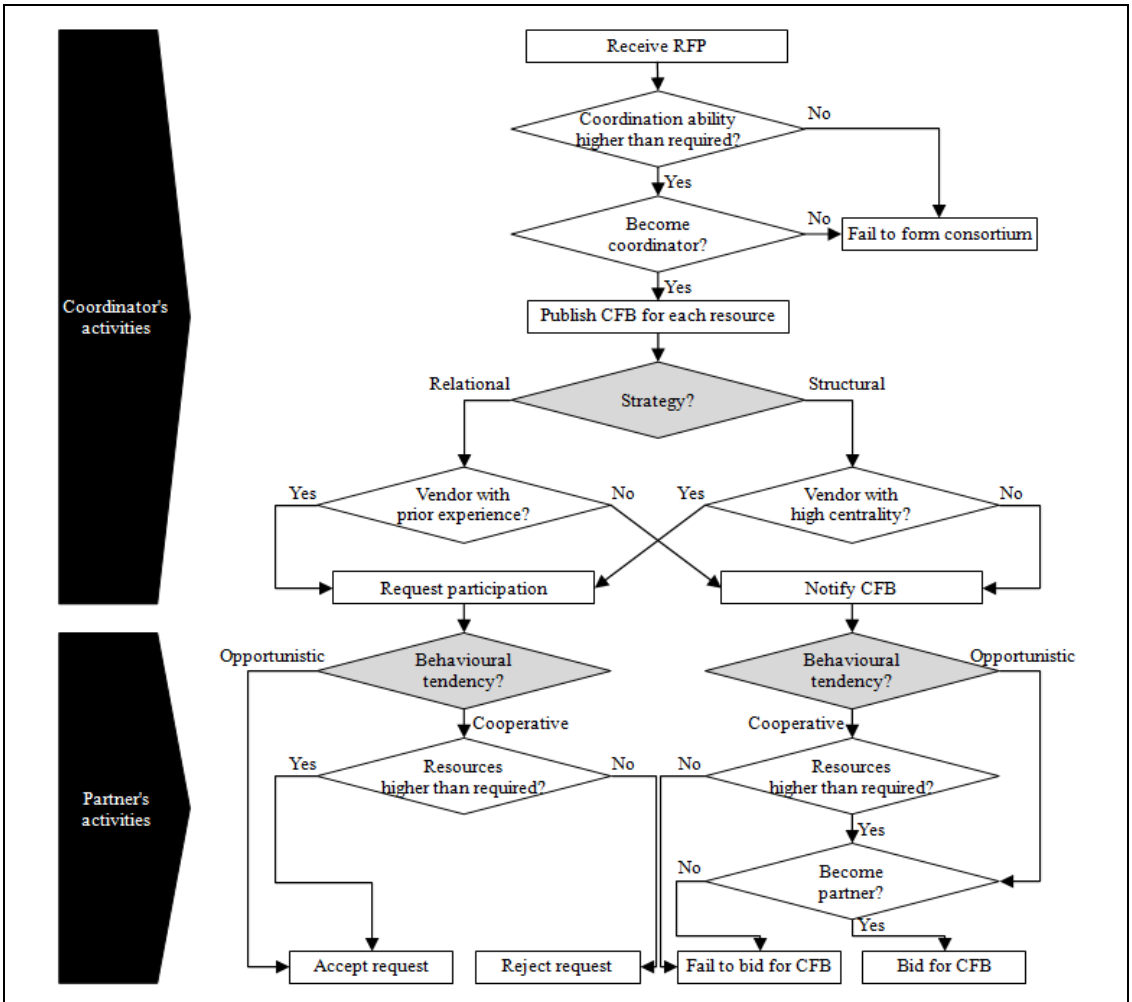

Figure 2. Consortium Formation

Payoff and Updating Information

The payoff awarded by the market is different according to the quality assessment of a delivered IT service. When the quality is unsatisfactory and opportunistic partners for the resource type $f, \cdots, g$ are detected, the market gives the following payoff to the contracted consortium.

$$PO_u(t) = [aa(t) + I(t)] - [pr_f(t) +, \cdots, + pr_g(t)].$$

Then, the coordinator allocates this payoff to the partners as follows. A cooperative partner receives as much payoff as it invests. On the contrary, an opportunistic partner receives nothing. Furthermore, the consortium members punish this partner by transferring its negative information to other vendors. The vendors receiving the information will not select it as a partner in their future transactions.

In contrast, when the quality is satisfactory, the market rewards the cooperation of the consortium with the following payoff.

$$PO_s(t) = [1 + r] \times R(t),$$

where r denotes the profit rate. Then, the coordinator allocates this payoff to its partners in proportion to their investments. Let $po_{ij}(t)$ and $po_{xy}(t)$ be the payoffs which are allocated to the coordinator and partner. Then, table 4 demonstrates them.

Table 4. Payoff

Case	Member	Payoff	
		Under C1	Under C2
Not satisfactory and Opportunism detected	v_{ij} such as $s_{ij} = +1$ (Relational strategy)	$po_{ij}(t) = u \times (bc + cc) + pr_i(t)$	$po_{ij}(t) = u \times (bc + cc) + r_{ij}(t)$
	v_{ij} such as $s_{ij} = -1$ (Structural strategy)	$po_{ij}(t) = u \times (bc + cc) + v \times nc + pr_i(t)$	$po_{ij}(t) = u \times (bc + cc) + v \times nc + r_{ij}(t)$
	v_{xy} such as $b_{xy} = +1$ (Cooperative partner)	$po_{xy}(t) = br_{ijx}(t)$, where $br_{ijx}(t) = pr_x(t)$ for $x \neq i$	$po_{xy}(t) = br_{ijx}(t)$, where $br_{ijx}(t) = pr_x(t)$ for $x \neq i$ and $br_{iji}(t) = pr_i(t) - r_{ij}(t)$ for $x = i$
	v_{xy} such as $b_{xy} = -1$ (Opportunistic partner)	$po_{xy}(t) = 0$	$po_{xy}(t) = 0$
Satisfactory	v_{ij} such as $s_{ij} = +1$ (Relational strategy)	$po_{ij}(t) = (1 + r) \times [pa(t) + pr_i(t)]$	$po_{ij}(t) = (1 + r) \times [pa(t) + r_{ij}(t)]$
	v_{ij} such as $s_{ij} = -1$ (Structural strategy)		
	v_{xy} such as $b_{xy} = +1$ (Cooperative partner)	$po_{xy}(t) = (1 + r) \times br_{ijx}(t)$, where $br_{ijx}(t) = pr_x(t)$ for $x \neq i$	$po_{xy}(t) = (1 + r) \times br_{ijx}(t)$, where $br_{ijx}(t) = pr_x(t)$ for $x \neq i$ and $br_{iji}(t) = pr_x(t) - r_{ij}(t)$ for $x = i$
	v_{xy} such as $b_{xy} = -1$ (Opportunistic partner)		

In the meantime, the profits of the coordinator and partners can be obtained by subtracting the actual investments from the payoffs.

Initial Results

We apply a full factorial design with two factors at five levels for the efficient experiment and systematic analysis. An experimental design has two or more factors and each of them has discrete possible values, which are called a level. The combinations of these levels are also called an experimental point. Then, a full factorial experiment is conducted on all of the possible experimental points. In this research, there are two key factors related to the

uncertainties imposed on the ITO business environment: increasing rate and instability (α) and verifiability (β). Also, in accordance with responses to each factor, vendors in an ITO network are categorised into two groups: the group using the relational strategy (group 1) and the group employing the structural strategy (group 2). Meanwhile, the performance of each group is denoted by the average of the profits accumulated until the end period. Then, we can investigate the main and interaction effects of the requirement unpredictability and measurement difficulty on the average cumulative profits for each group by applying the full factorial design. Figure 3 shows all the experimental points in the full factorial design employed to this research. For example, the combination of the middle level of α and the high level of β is one of the experimental points. This point also indicates that the amount of resources required for outsourced IT services increases steadily and, at the same time, it is easy to measure ITO performance.

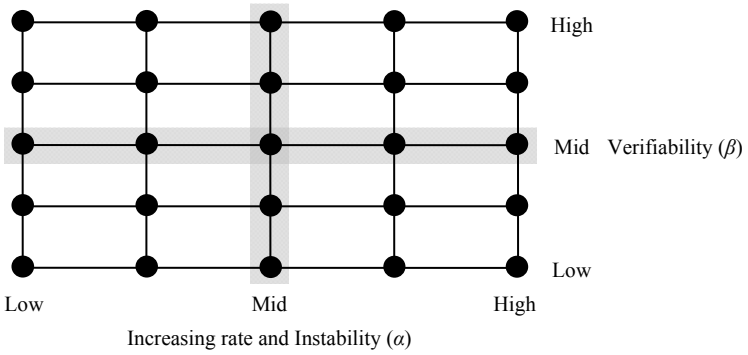

Figure 3. Experimental Points

The simulation experiment involves two steps: the basic test on the selected experimental points as highlighted in the above figure and the complete test on the whole experimental points. Initially, we need to justify the developed simulation model. For the justification, the basic test is implemented where one factor is fixed at the middle level and the other is varied from the low level to the high level. Then, we can justify the simulation model by examining the consistency between the results from this first experiment and the existing studies addressing each embeddedness at the high level of either the requirement unpredictability or measurement difficulty. Next, the complete test with the confirmed model is conducted where two factors are varied simultaneously. Then, the results from the second experiment enable us to compare the conditional superiority of relational or structural embeddedness in the presence of both of the uncertainties which are not uniform in ITO.

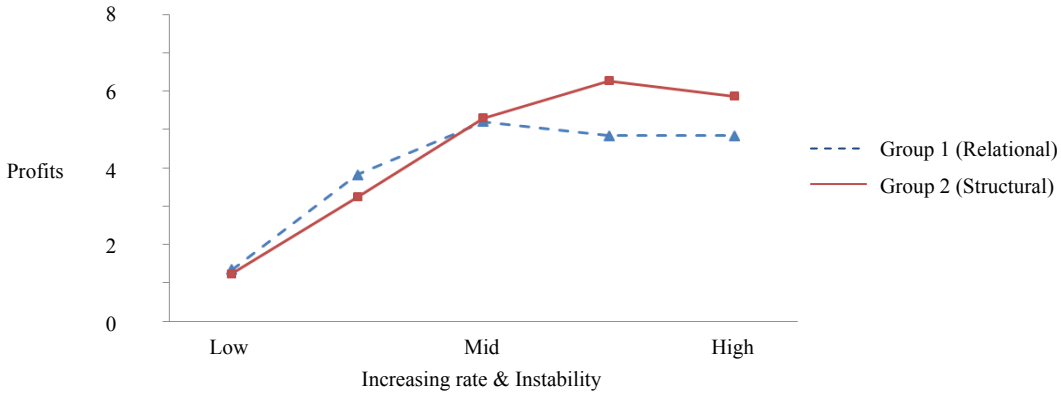

Figure 4. Average Cumulative Profits at Middle Level of Verifiability

Figure 4 demonstrates the results of the experiment where the verifiability (β) is fixed at the middle level and the increasing rate and instability (α) are varied from the low level to the high level. The larger the amount of resources required for IT services, the higher the resulting payoff. Each group's profit therefore shows a tendency to rise at first. However, as the increasing rate and instability become closer to the high level, the profits start to decrease again and group 2 makes better performance than group 1. When α is at the low level, there is likely to be a partner

who is coupled via a direct and strong tie and who at the same time has enough resources to satisfy a requirement. A coordinator in group 1 can therefore select and control it with little cost, if any, by using the relational strategy. However, when α is at the high level, it may be difficult that the coordinator finds an existing partner who can cover a requirement. It should therefore choose and manage an alternative consortium member by employing a bid process and strict formal contract, which incur the considerable cost. In the meantime, in response to the high level of α, a coordinator in group 2 observes the network positions of multiple potential partners and selects a new one who is considered more suitable. The use of a vendor's network position representing its reputation can efficiently complement or substitute a competitive tender and formal contract. That is, the cost of initiating and maintaining a new ITO relationship based on reputation is smaller than that of designing elaborate bidding procedures, running a bid, developing complex and customised contract clauses and enforcing them. The coordinator can therefore choose and manage a new reputational partner with the lower cost at the high level of α.

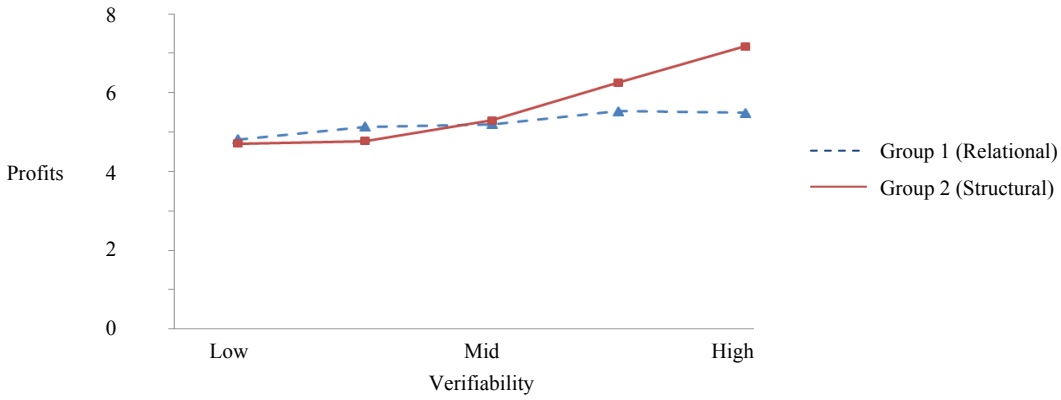

Figure 5. Average Cumulative Profits at Middle Level of Increasing Rate & Instability

Figure 5 illustrates the results of the experiment where the increasing rate and instability (α) are fixed at the middle level and the verifiability (β) is varied from the low level to the high level. Group 1's profit shows a tendency to increase steadily while group 2's profit rises slowly at first and then starts to goes up quickly later. Regardless of the level of β, a coordinator using the relational strategy (group 1) attempts to establish an ITO consortium with an existing partner which is already confirmed to be cooperative. The variation of this parameter therefore has little effect on group 1's profit. In the meantime, the structural strategy is superior to the relational strategy when the verifiability is at the high level. When the level of β is high, vendors' behavioural tendencies are easily and exactly identified. A coordinator in group 2 can therefore have accurate information on multiple potential partners by observing their network positions. Then, it can improve performance by forming an ITO consortium with the most suitable one among these candidates.

Conclusions and Further Research

The research in line with relational embeddedness emphasises relational trust and commitment generated by the repetition or long-term maintenance of a transaction relationship between specific partners. Contrarily, from the viewpoint of structural embeddedness, the related literature focuses on the observation of a network position and the exchange of information through a network tie. However, each research stream fails to reveal which embeddedness is superior to the other at the various levels of the requirement unpredictability and measurement difficulty in the ITO business environment. This paper examines the situation where the strategies based on relational and structural embeddedness compete with each other in the presence of these uncertainties via a simulation and game-theoretic approach. A full factorial design is also applied for the efficient experiment and systematic analysis.

The basic test on the selected experimental points verifies the developed simulation model and shows several results. When the amount of resources required for IT services increases steadily and the measurement difficulty is at the high level, the relational strategy is superiority to the structural strategy as predicted in the existing research (Dimaggio and Louch 1998; Poppo and Zenger 2002). At the low level of the increasing rate and instability, there can be a partner who is strongly and directly coupled via prior working experience and who at the same time has enough resources to cover a requirement. Furthermore, this partner is not likely to behave opportunistically although

it is difficult to exactly measure ITO outcomes. In fact, it is empirically shown that transaction parties tend to use the relational strategy at the high level of the measurement difficulty (Poppo and Zenger 2002).

On the other hand, when the increasing rate and instability is at the high level and ITO performance can be exactly verified, the structural strategy is better than the relational strategy. This finding is also supported by the literature on the argument between exploitation and exploration. It is argued that "the essence of exploitation is the refinement and extension of existing competencies, technologies and paradigms" and "the essence of exploration is experimentation with new, uncertain alternatives" (March 1991). They compete with each other due to scarce resources and hence the amount of resources allocated to exploitation and exploration is different in accordance with an environment which a firm faces (March 1991; Levinthal and March 1981). Generally, a firm should invest more resources in exploration than in exploitation in an uncertain situation (Lant et al. 1992). A coordinator employing the structural strategy can gain information on multiple candidates through the observation of their network positions. In addition, this information is not likely to be wrong at the high level of the verifiability. Therefore, the coordinator can flexibly respond to the requirement unpredictability and enhance ITO performance by selecting and managing the most suitable partner.

The contribution of this paper is to open a black box which encapsulates the relative superiority of relational or structural embeddedness in preventing opportunistic behaviour and improving performance in the presence of the requirement unpredictability and measurement difficulty which are not uniform across a wide range of outsourced services and products in ITO. In the practical perspective, the investigation on the conditional advantages of each embeddedness can provide firms in an ITO network with a guideline for the selection between the relational and structural strategy. The theoretical contribution is to examine the effects of relational and structural embeddedness by introducing a simulation method, game-theoretic approach and design-of-experiments technique. The examination based on these analytical methods can offer an explicit framework to understand the roles of the relational and structural strategy.

The work is still in progress and we will conduct the complete test on the whole experimental points. The basic test on the selected experimental points has verified the developed simulation model and gives several results. However, they can provide only partial solutions to the research problem in the perspective that one factor is fixed. In order to compensate for this partialness, we need to implement the complete test where two factors are varied simultaneously. The generalised results from this test can support the existing findings which mainly focus on either side between relational and structural embeddedness. At the same time, they enable us to compare the conditional superiority of each embeddedness according to the variation of the uncertainties in ITO. Furthermore, the comparison between the relational and structural strategy in this research is in line with the argument between exploitation and exploration for adaptive systems in the perspective that they focus on the utilisation of something present and the search of something emergent. We believe that the thorough examination of each strategy's conditional superiority can confirm and extend the opinions on exploitation and exploration.

References

Aubert, B. A., Patry, M., and Rivard, S. 1998. "Assessing the Risk of It Outsourcing," in *Proceedings of the 31st Annual Hawaii International Conference on System Sciences*, Hawaii, pp. 685-692.

Balaji, S., and Brown, C. V. 2010. "The Effects of Client Governance Mechanisms Relational Exchange on Is Outsourcing Effectiveness," in *Proceedings of the 31st International Conference on Information Systems*, St. Louis, Paper 78.

Barzel, Y. 1982. "Measurement Cost and the Organization of Markets," *Journal of Law and Economics* (25:1), pp. 27-48.

Borgatti, S. P., and Foster, P. C. 2003. "The Network Paradigm in Organizational Research: A Review and Typology," *Journal of Management* (29:6), pp. 991-1013.

Brown, M., Falk, A., and Fehr, E. 2004. "Relational Contracts and the Nature of Market Interactions," *Econometrica* (72:3), pp. 747-780.

Chen, Y., and Bharadwaj, A. 2009. "An Empirical Analysis of Contract Structures in IT Outsourcing," *Information Systems Research* (20:4), pp. 484-506.

Davis, J. P., Eisenhardt, K. M., and Bingham, C. B. 2007. "Developing Theory through Simulation Methods," *Academy of Management Review* (32:2), pp. 480-499.

Dibbern, J., Goles, T., Hirschheim, R., and Jayatilaka, B. 2004. "Information Systems Outsourcing: A Survey and Analysis of the Literature," *ACM SIGMIS Database* (35:4), pp. 6-102.

DiMaggio, P., and Louch, H. 1998. "Socially Embedded Consumer Transactions: For What Kinds of Purchases Do People Most Often Use Networks?," *American Sociological Review* (63:5), pp. 619-637.
Drath, P., and Wayman, S. 2010. "How Research Project Co-Ordinators Choose Partners for ICT Proposals (Report for a Survey)," D5.6.1, Ideal-ist.
Dwyer, F. R., Schurr, P. H., and Oh, S. 1987. "Developing Buyer-Seller Relationships," *Journal of Marketing* (51:2), pp. 11-27.
Eisenhardt, K. M. 1989. "Agency Theory: An Assessment and Review," *Academy of Management Review* (14:1), pp. 57-74.
Flemming, R., and Low, G. 2007. "Information Systems Outsourcing Relationship Model," *Australasian Journal of Information Systems* (14:2), pp. 95-112.
Garvin, D. A. 1988. *Managing Quality: The Strategic and Competitive Edge*. New York: Free Press.
Ghoshal, S., and Moran, P. 1996. "Bad for Practice: A Critique of the Transaction Cost Theory," *Academy of Management Review* (21:1), pp. 13-47.
Goo, J., Kishore, R., Nam, K., Rao, H. R., and Song, Y. 2007. "An Investigation of Factors That Influence the Duration of IT Outsourcing Relationships," *Decision Support Systems* (42:4), pp. 2107-2125.
Gopal, A., Sivaramakrishnan, K., Krishnan, M. S., and Mukhopadhyay, T. 2003. "Contracts in Offshore Software Development: An Empirical Analysis," *Management Science* (49:12), pp. 1671-1683.
Granovetter, M. 1985. "Economic Action and Social Structure: The Problem of Embeddedness," *American Journal of Sociology* (91:3), pp. 481-510.
Granovetter, M. 1992. "Problems of Explanation in Economic Sociology," in *Networks and Organizations: Structure, Forms, and Action,* N. Nohria and R. G. Eccles (eds.). Boston, MA: Harvard Business School Press, pp. 25-56.
Gulati, R. 1995. "Social Structure and Alliance Formation Patterns: A Longitudinal Analysis," *Administrative Science Quarterly* (40:4), pp. 619-652.
Hansen, M. T. 1999. "The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits," *Administrative Science Quarterly* (44:1), pp. 82-111.
Harrison, J. R., Lin, Z., Carroll, G. R., and Carley, K. M. 2007. "Simulation Modeling in Organizational and Management Research," *Academy of Management Review* (32:4), pp. 1229-1245.
Henderson, J. C. 1990. "Plugging into Strategic Partnerships: The Critical IS Connection," *MIT Sloan Management Review* (31:3), pp. 7-18.
Heng, C. S., Du, W., and Feng, Y. 2009. "Investigating Vendors' Decision to Terminate IT Oursourcing Contracts," in *Proceedings of th 30th Interanational Conference on Information Systems*, Phoenix, Paper 32.
Hill, C. W. L. 1990. "Cooperation, Opportunism, and the Invisible Hand: Implications for Transaction Cost Theory," *Academy of Management Review* (15:3), pp. 500-513.
Hirschheim, R., and Lacity, M. 2000. "The Myths and Realities of Information Technology Insourcing," *Communications of the ACM* (43:2), pp. 99-107.
Jøsang, A., Ismail, R., and Boyd, C. 2007. "A Survey of Trust and Reputation Systems for Online Service Provision," *Decision Support Systems* (43:2), pp. 618-644.
Kandori, M. 1992. "Social Norms and Community Enforcement," *Review of Economic Studies* (59:1), pp. 63-80.
Kim, S., and Chung, Y. S. 2003. "Critical Success Factors for IS Outsourcing Implementation from an Interorganizational Relationship Perspective," *Journal of Computer Information Systems* (43:4), pp. 81-90.
Kobayashi-Hillary, M. 2004. *Outsourcing to India: The Offshore Advantage*, (2nd ed.). Berlin: Springer-Verlag.
Kronman, A. T. 1985. "Contract Law and the State of Nature," *Journal of Law, Economics, and Organization* (1:1), pp. 5-32.
Kwon, S. -S. 2007. “The limits of Organizational Economics and Reciprocity Norm,” *The Korean Journal of Human Resource Development Quaterly* (9:2), pp. 83-104.
Lacity, M. C., Khan, S., Yan, A., and Willcocks, L. P. 2010. "A Review of the IT Outsourcing Empirical Literature and Future Research Directions," *Journal of Information Technology* (25:4), pp. 395-433.
Lant, T. K., Milliken, F. J., and Batra, B. 1992. “The Role of Managerial Learning and Interpretation in Strategic Persistence and Reorientation: An Empirical Exploration,” *Strategic Management Journal* (13:8), pp. 585-608.
Lee, J.-N., and Kim, Y.-G. 1999. "Effect of Partnership Quality on IS Outsourcing: Conceptual Framework and Empirical Validation," *Journal of Management Information Systems* (15:4), pp. 29-61.
Lee, J.-N., and Kim, Y.-G. 2005. "Understanding Outsourcing Partnership: A Comparison of Three Theoretical Perspectives," *IEEE Transactions on Engineering Management* (52:1), pp. 43-58.
Lee, J., and Roh, J. J. 2012. "Revisiting Corporate Reputation and Firm Peformance Link," *Benchmarking: An International Journal* (19:4), pp. 649-664.

Levinthal, D. A., and March, J. G. 1981. “A Model of Adaptive Organizational Search,” *Journal of Economic Behavior and Organization* (2:4), pp. 307-333.

Levinthal, D. A., and Fichman, M. 1988. "Dynamics of Interorganizational Attachments: Auditor-Client Relationships," *Administrative Science Quarterly* (33:3), pp. 345-369.

Lin, N. 1999. "Building a Network Theory of Social Capital," *Connections* (22:1), pp. 28-51.

Macneil, I. R. 1980. *The New Social Contract.* New Haven: Yale University Press.

Malik, Z., and Bouguettaya, A. 2009. "RATEWeb: Reputation Assessment for Trust Establishment among Web Services," *The VLDB Journal* (18:4), pp. 885-911.

March, J. G. 1991. “Exploration and Exploitation in Organizational Learning,” *Organization Science* (2:1), pp. 71-87.

Nahapiet, J., and Ghoshal, S. 1998. "Social Capital, Intellectual Capital, and the Organizational Advantage," *Academy of Management Review* (23:2), pp. 242-266.

Nam, K., Rajagopalan, S., Rao, H. R., and Chaudhury, A. 1996. "A Two-Level Investigation of Information Systems Outsourcing," *Communication of the ACM* (39:7), pp. 36-44.

Podolny, J. M. 2001. "Networks as the Pipes and Prisms of the Market," *American Journal of Sociology* (107:1), pp. 33-60.

Poppo, L., and Zenger, T. 2002. "Do Formal Contracts and Relational Governance Function as Substitutes or Complements?," *Strategic Management Journal* (23:8), pp. 707-725.

Provan, K. G. 1993. "Embeddedness, Interdependence, and Opportunism in Organizational Supplier-Buyer Networks," *Journal of Management* (19:4), pp. 841-856.

Ring, P. S., and Van de Ven, A. H. 1992. "Structuring Cooperative Relationships between Organizations," *Strategic Management Journal* (13:7), pp. 483-498.

Ravindran, K., Susarla, A., and Gurbaxani, V. 2009. "Social Network and Contract Enforcement in IT Outsourcing," in *Proceedings of the 30th Interanational Conference on Information Systems*, Phoenix, Paper 143.

Shapiro, C., and Stiglitz, J. E. 1984. "Equilibrium Unemployment as a Worker Discipline Device," *American Economic Review* (74:3), pp. 433-444.

Uzzi, B. 1996. "The Sources and Consequences of Embeddedness for the Economic Performance of Organizations: The Network Effect," *American Sociological Review* (61:4), pp. 674-698.

Wasserman, S., and Faust, K. 1994. *Social Network Analysis: Methods and Applications*. New York: Cambridge University Press.

Wathne, K. H., and Heide, J. B. 2000. "Opportunism in Interfirm Relationships: Forms, Outcomes, and Solutions," *Journal of Marketing* (64:4), pp. 36-51.

Williamson, O. E. 1975. *Markets and Hierarchies: Analysis and Antitrust Implications*. New York: Free Press.

Williamson, O. E. 1985. *The Economic Institutions of Capitalism*. New York: Free Press.