THE TRIANGULAR STRUCTURE OF KEY ACTORS IN OUTSOURCED IS DEVELOPMENT PROJECTS

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ABSTRACT

The key actors in information systems development (ISD) up-to-now have been considered to be composed of a bilateral structure, *user and developer*. However, in the case of outsourced ISD (OISD), the key actors are deemed to form a triangular structure comprising *users, internal IS staff, and an external vendor*. This study examines the relationships of the three key actors' competencies (vendor competence, IS staff competence, IT-related user competence) or the partnerships between them (internal partnership, external partnership) and the success of OISD projects. The OISD success is measured by process control and system quality. This study also examines the moderating effect on the above relationships by the structuredness of the task developed into a system. Data was collected from 67 OISD projects in Korean business firms. These results clarify the importance of internal IS staff in OISD projects by showing that the competence of internal IS staff and their partnership together with users or external vendors are critical factors in determining OISD success. This study also discusses the relationships between key actors' competencies and OISD success, and the partnerships between them and OISD success. The results show that these relationships may vary according to some contingency factors by showing that vendor competence and external partnership are more important in the case of less structured target tasks. In addition, several implications are presented, and future directions are suggested.

INTRODUCTION

While many companies now understand the role of information technology and information system (IT/IS) in achieving and sustaining a competitive advantage, they have faced increasingly large backlogs and rapidly escalating costs of developing and delivering IT/IS products or services. In recent years, IS outsourcing has emerged as an acceptable solution to addressing the concerns of cost, quality and lagging IS success [23]. By employing external IS vendors, companies are able to gain access to expertise that is not available in-house, and to maximize the flexibility and control of IT/IS operations [15, 34]. IS outsourcing is defined as the significant contribution by external vendors to the physical and/or human resources associated with the entire or specific components of IT infrastructure in the user organization [20]. In spite of the attention it has received from

researchers and practitioners, there is little empirical data available on information systems development (ISD) in the outsourcing context [26].

ISD is an ongoing process that includes the entire life cycle from original suggestion through planning, system analysis/design, coding, testing and implementation of systems. It is generally agreed that ISD is not just a technical process of building information systems (IS), but also a social process involving key actors from multiple organizational units. The key actors who possess critical and complementary knowledge work together to develop better systems during the entire course of an ISD project [14]. Thus, identifying the importance of the key actors' competencies and the partnerships between them might be an initial step to understanding the success factors of ISD. Several studies have shown that the key actors' competencies and partnership are critical to ISD success [41, 42].

Most prior IS literature has regarded the key actors involved in ISD as being a bilateral structure, *user and developer*. For example, previous studies from the contexts of in-house development or end-user development have focused on the relationship between line manager and internal IS staff [25, 26, 41]. Recent studies on outsourcing have also emphasized the relationship between a client firm and an external vendor [9, 19, 32].

In the context of outsourcing, however, the key actors should be regarded as forming a triangular structure made up of *users, internal IS staff, and an external vendor* [26]. The involvement of external vendors might change the role of the key actors or the relationships between them. Generally, an external vendor participates in an OISD as a developer, and internal IS staff frequently serves as a liaison between users and the external vendor. As a result, the significance of the external vendor alternative to in-house IS function is rapidly increasing. While the internal IS staff is free from worrying about detailed operational concerns, the focus of their attention shifts toward managing outsourcing contracts and monitoring the external vendor's work [15, 20, 34]. A major role of the key actors in OISD projects is presented in Appendix A. The current empirical work in ISD is not rich enough to shed sufficient insight on the situation of outsourcing. Thus, this study investigates the effects of the competencies of users, internal IS staff, and external vendors individually on the success of ISD projects in the context of outsourcing. It also investigates the effects of partnerships between them.

The adoption of IS can be viewed as a catalyst of change in the way of doing business, and so, the characteristics of the task to be computerized will be a primary factor influencing various features of an ISD project [22]. The contents and structure of the problems arising from an ISD might be different if the characteristics of a target task are different. In the case of outsourcing, the problems are largely determined by the task characteristics because external vendors might have trouble understanding the task environments of client firms. Hence, this study also investigated the moderating effects of the task characteristics focusing on the level of task structuredness, which has been frequently addressed in IS literature [8, 33].

RESEARCH MODEL

This study examines the effects of the key actors' competencies (vendor competence, IS staff competence, IT-related user competence) and the partnerships between them (internal partnership, external partnership) on the success of OISD projects. It also explores the moderating effect of task structuredness on the above relationships. The research model is illustrated in figure 1, and their variables are discussed below.

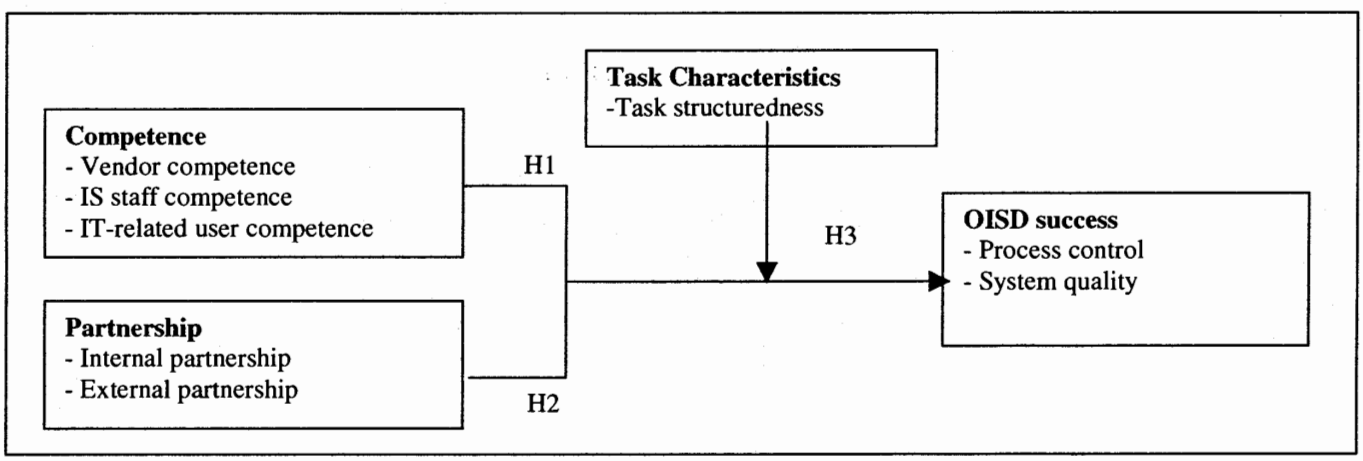

Figure 1. Research Model

Competence

The competencies of the key actors are described in terms of their problem-solving capability that is commonly assumed to contribute to OISD projects [13, 41]. In the context of outsourcing, the critical and complementary competencies of users, internal IS staff, and an external vendor will be called upon in order to ensure OISD success during an OISD project. Their competencies are described below.

Vendor Competence

The literature on IS outsourcing has indicated that the selection of a right vendor determines whether IS outsourcing is successful [2, 12, 21]. In the context of outsourcing, an external vendor undertakes a large bulk of the responsibility for an OISD project. To ensure that a good quality system is developed within budget and on schedule, the external vendor should have the capability to meet a client's IS needs as well as understand the client's business requirements and market needs [10]. Grover et al. (1996) empirically showed that the capabilities of vendors have a significant direct impact on outsourcing success. Accordingly, we can expect that a competent vendor with advanced expertise and experience is able to provide a system with supreme quality, and may help to reduce the cost and time of the OISD project. This leads to the following hypothesis:

***Hypothesis 1-1**: The competence of external vendors is positively associated with OISD success.*

IS Staff Competence

In the case of OISD, many senior executives of client firms tend to overestimate the impact of external vendors, and underestimate the importance of their internal IT-related capabilities. However, the responsibility for overseeing outsourcing contracts or monitoring external vendors' works should be left to internal IS staff. In the context of outsourcing, the vendors would possess a significant amount of power over the projects due to their distinctive competencies, and the vendors also tend to act opportunistically because they do not share profit motives with their clients [16, 27, 43]. Therefore, the importance of internal IS staff should not be overlooked in OISD projects. The existence of a competent internal IS staff is capable of minimizing the vendor's opportunistic behaviors, or at least ensuring that the client firm evaluate the vendor's activities, and claims against him in terms of their needs and capability [16, 21, 44]. On the basis of the above discussion, the following hypothesis is proposed:

***Hypothesis 1-2**: The competence of the internal IS staff is positively associated with OISD success.*

IT-related User Competence

Many studies on ISD suggest that users need IT-related competence in order to get the systems that they want, otherwise they will not be able to oversee the ISD efforts [18, 31, 41]. In the case of OISD, it is highly probable that the conflicts and disagreements between users and developers will occur because external vendors may have trouble understanding the task environment of client firms. The participation of competent users is expected to result in a better-quality system and budget-keeping, scheduling, and specifications-adhering through better communication of their requirements or superior evaluation of the systems [1, 25]. A misunderstanding between users and an external vendor in the requirements and specification of systems leads to higher costs and extra time to modify them. Thus, the more IT-related knowledge and experience users have the better contribution they can make to OISD success. Based on the above arguments, we propose the following hypothesis:

***Hypothesis 1-3**: The IT-related competence of users is positively associated with OISD success.*

Partnership

Partnership is defined as a working relationship that reflects long-term commitment, a sense of mutual cooperation, shared risks and benefits [11]. In the context of outsourcing, users, internal IS staff, and an external vendor share the responsibility for building a system during the entire process of an OISD project. These partnerships between them can bring about their contributions and cooperation during the OISD project. This study considers two types of partnerships: the partnership between internal IS staff and users (internal partnership), and the partnership between internal IS staff and an external vendor (external partnership).

Internal Partnership

In OISD projects, developing clients' own internal partnership is efficient because of users' size and diversities of their requirements. Moreover, the cultural gap between users and an external vendor is so great that

the internal IS staff should frequently serve as a liaison between them. This internal partnership is able to reduce coordination efforts between the users and the external vendor, and also helps the vendor elicit information about a targeted task environment more easily. Lasher et al. (1991) studied the case of USAA-IBM outsourcing, and they found that an internal partnership makes IS outsourcing successful. Based on the above arguments, we develop the following hypothesis:

***Hypothesis 2-1**: An internal partnership is positively associated with OISD success.*

External Partnership

Recently, the nature of the relationship between a client firm and an external vendor has been changing from merely a provider-buyer relationship to a cooperative relationship [9]. A higher quality external partnership means that the problems between the two parties would be discussed and resolved in a sociological sense rather than by contractual means [7]. Typically, these is mutual understanding that allows the two firms to share risks and rewards or to better manage complex interrelationships. Recent studies on outsourcing showed that fostering a cooperative relationship based on trust, mutual understanding, and risk sharing is critical to gain the success of outsourcing [9, 17, 19, 32]. Based on the above arguments, we propose the following hypothesis:

***Hypothesis 2-2**: An external partnership is positively associated with OISD success.*

Moderating Effect of Task Structuredness

The level of structuredness is considered to be an important task characteristic, which influences ISD success [8, 33]. Since many of the problems in an ISD project stem from the communication and coordination problems inherent in the targeted task, the requirements should be clearly defined and communicated to developers in order to maximize the benefit from outsourcing [26]. These problems are manifested in the differences in interests or goals among the key actors. [25]. When developing a system for a less structured task, it is very difficult to understand the requirements of users [13, 18] or to coordinate the activities concerned with an ISD [8]. Moreover, the users may often not articulate about their true needs [33].

In the case of OISD, the problems arising from task structuredness may become more serious because an external vendor generally has little knowledge of the target task and shared value of a client. In this situation, the participation of competent key actors, or the good qualities of the partnerships between them, allows these problems to be alleviated. Based on the above arguments, we can expect the key actors' competencies or the partnerships between them to be important in attaining OISD success when the target task is less structured. Specifically, the following hypotheses are developed:

***Hypothesis 3-1**: The positive relationship between vendor competence and OISD success is stronger when task structuredness is low than when task structuredness is high.*

***Hypothesis 3-2**: The positive relationship between IS staff competence and OISD success is stronger when task structuredness is low than when task structuredness is high.*

***Hypothesis 3-3**: The positive relationship between IT-related user competence and OISD success is stronger when task structuredness is low than when task structuredness is high.*

***Hypothesis 3-4**: The positive relationship between the internal partnership and OISD success is stronger when task structuredness is low than when task structuredness is high.*

***Hypothesis 3-5**: The positive relationship between the external partnership and OISD success is stronger when task structuredness is low than when task structuredness is high.*

RESEARCH METHOD

Sample and Data Collection

We conducted a survey of the current status of ISD in Korean business firms. Initially, 400 firms with an IS department were selected in the list of the firms surveyed by *Management and Computer* (1995), one of the principal magazines in the field of information industries, based on stratified random sampling, which took into account industrial sector and firm size. One hundred and sixty responses (40.3%) were received and 18 responses were discarded since the responses were incomplete. Among them, 67 responses (53.1%) made our sample of outsourcing, which were used for this research.

Two respondents were identified for each project; an internal IS staff member and a user representative. In each firm, the IS department manager was first asked to select an OISD project based on the following criteria: ① the development of targeted systems involved users, internal IS staff, and an external vendor. ② the targeted systems had been developed within the last 2 years and were currently in use. ③ the targeted systems had distinct user departments, which were responsible for the system.

And then they were asked to select an internal IS staff member and a user representative associated with the project.

This method would tend to bias measurement. For example, the responses of respondents would rely on their own experience and belief. To avoid this problem, a multiple-informant method should have been used, which would have enabled us to reduce the likelihood of single respondent bias. However, such access is typically difficult to obtain in a large sample survey. In this study, however, this problem was also thought not to be so serious because each respondent was a key informant selected by the IS department manager. The selection criteria included knowledge of their community, a targeted system, and an OISD project. Previous research has shown that using key informant techniques for data collection is effective for survey research in organizations [36]. Table 1 summarizes the sample characteristics according to industry, number of employees, number of IS employees, the type of systems, the cost and duration of OISD projects.

Table 1. Profile of the Respondant Companies

(a) Types of Industry

Industry	Frequency	Percent
Manufacturing	30	44.8
Banking/Finance/Insurance	11	16.4
Construction	11	16.4
Retail/wholesales	8	11.9
Transportation	3	4.5
Publishing	2	3
Others	2	3
Total	67	100

(b) Number of Total Employees

Range	Frequency	Percent
Less than 100	5	7.5
100 to below 300	4	6.0
300 to below 500	12	17.9
500 to below 1,000	20	29.8
1,000 to below 3,000	14	21.0
3,000 to below 10,000	9	13.4
10,000 and above	3	4.4
Total	67	100

(c) Number of IS Employees

Range	Frequency	Percent
Less than 5	8	11.9
5 to below 10	17	25.4
10 to below 20	13	19.4
20 to below 50	15	22.4
50 to below 100	4	6.0
100 to below 300	4	6.0
300 and above	2	2.9
Unanswered	4	6.0
Total	67	100

Table 1 (cont.)

(d) Types of Information Systems

Range	Frequency	Percent
Sales management	16	23.9
Accounting	14	20.9
On-line banking/financing	11	16.4
Production management	11	16.4
Project management	5	7.5
Personnel management	2	3.0
Others	4	5.9
Unanswered	4	5.9
Total	67	100

(e) Project Cost

Range (US$)	Frequency	Percent
Less than 10,000	1	1.5
10,000 to below 100,000	13	19.4
100,000 to below 300,000	16	23.9
300,000 to below 600,000	13	19.4
600,000 to below 1 millino	6	9
1 million and above	3	4.4
Unanswered	15	22.4
Total	67	100

(f) Project Duration

Range	Frequency	Percent
Less than 6	5	7.5
6 to below 12	23	34.3
12 to below 24	17	25.4
24 to below 30	8	11.9
30 and above	2	3
Unanswered	12	17.9
Total	67	100

Measurement

OISD Success

This study focuses on OISD success at the project level. We consider two important aspects of OISD success -- process control and system quality. Generally, the evaluation of ISD projects should take into account both the final system and the development process because a potential trade off may exist between process efficiency and product quality [26].

In this study, the internal IS staff member of each client firm has been asked to assess the two aspects of OISD success. This method tended to overstate them. If the performance data had been collected from users, this problem would be avoided. However, it is not suitable for this study because this study focuses on the technical level of systems development project perfor-

mance, which is usually evaluated by IS staff [6, 29]. Moreover, this problem does not seem to be so serious in the outsourcing context rather than in the in-house development context because external vendors had developed the systems.

Process Control

Process control describes the extent to which OISD projects are under control. Based on several studies [26,30], the process control is measured on five items: (1) adherence to the given budget, (2) adherence to the given time schedule, (3) adherence to the initial standard, (4) adherence to audit standards, and (5) overall controllability over the project.

System Quality

System quality is defined as the desired characteristics of a system itself that produces information. Rivard et al.(1991) provided a system quality measurement scheme in which internal consistency and construct validity were empirically supported [28]. Their measure consists of 10 factors, which are decomposed to 24 second-level criteria and 93 item instruments. However, they are too complex for practical use, so we adopted the Shin & Lee (1996)'s instruments that had been modified from those of Rivard et al.(1991).

Competence

Vendor Competence

Vendor competence reflects the client-evaluated problem-solving capability of an external vendor that is commonly assumed to contribute to OISD success. This variable was measured using three items drawn from several studies -- general reputation, technical capabilities, and financial stability [5, 10, 12, 21]. The perceptual measures tend to rely on respondents' own experience and beliefs as well as other variables. To avoid this problem objective data should have been collected, but there was neither information about external vendors nor an institution to evaluate them in Korea. Thus, we asked the IS staff not only about their perception of vendor competence, but also for the evaluation of vendor competence considering information (e.g.: proposals, materials) gathered during selecting process.

IS Staff Competence

IS staff competence is defined as the problem-solving capability of the IS staff of a client firm that is commonly assumed to contribute to OISD success. This variable was measured using seven items on the basis of several studies [24, 37]: (1) the extent of knowledge about IT/IS, (2) the extent of knowledge about new techniques and methods (3) the extent of experience in IS development, implementation and operation, (4) the extent of communication skills, (5) the extent of knowledge about the business operation of a client firm, (6) the extent of ability to deal logically with difficult problems, and (7) the extent of project management skills. The measures were taken from the internal IS staff members.

IT-related User competence

User competence describes the problem-solving capability of users that is commonly assumed to contribute to OISD projects. We adopted the instruments developed by Kim & Lee(1991): (1) the extent of knowledge of the kinds and content of the IS output data, (2) the extent of knowledge about the kinds and content of input data for the IS operation, (3) the extent of knowledge of IS usage methods, (4) the extent of knowledge of the range and limitations of the IS functions, (5) the extent of experience in participating in IS development, and (6) the extent of experience in IS use. These measures were taken from user representatives.

Partnership

Internal Partnership

Internal partnership refers to the quality of the working relationship between internal IS staff and users. The internal partnership was measured by three items based on Weitzel & Graen (1989): (1) the extent of empathy between users and IS staff, (2) the extent of trustworthiness between users and IS staff and (3) valid communication between users and internal IS staff. User representatives evaluated these items.

External Partnership

External partnership refers to the quality of the working relationship between a client firm and a vendor. Based on several studies [11, 41], three items were developed: (1) the extent of empathy between a vendor and IS staff of client firms (2) the extent of trustworthiness between a vendor and internal IS staff of client firms, and (3) the extent of benefit/risk-sharing between a vendor and IS staff of client firms. These measures were taken from the internal IS staff.

Task Structuredness

Task structuredness indicates the extent that a task developed into a system is standardized, defined, specified, routine, simple, concrete, and easily documented in a manual. The measurement used five items adapted from Lee & Kim (1991): (1) the extent to which a task is standardized, (2) the extent to which task procedures are documented in the job manual, (3) the extent to which the objectives and range of a task are specified, (4) the extent to which a task is routinely performed, and (5) the extent to which a task is simple to carry out. These items were evaluated by user representatives.

RESULTS

Descriptive Statistics

Table 2 summarizes the mean, the standard deviation, and the reliability of the variables studied. It shows that the standard deviation of the variables substantiates enough variation for statistical analysis. Cronbach alpha coefficients were calculated to test reliability with respect to all multi-item scale variables. Except for the alpha coefficient of task structuredness, all the alpha coefficients are above 0.79. If an alpha coefficient is above 0.6, the reliability of a multi-item variable is satisfactory [40]. The alpha coefficient of task structuredness for five items was 0.53, and deletion of two items could increase the coefficient up to 0.84. In this study, all of the variables used a multi-item method and Likert scaling ranging from 'very low' to 'very high', which has obtained by computing the arithmetic means of individual item scores in further analyses.

Table 2. Descriptive Statistics for Variables

Variables	# of Items	Cronbach Alpha	Mean	Std. Dev.
Task Characteristics				
Task sturcturedness[a]	3	0.84	4.27	1.22
Competence				
Vendor competence	3	0.79	4.94	1.02
IS staff competence	7	0.82	4.62	0.81
IT-related user competence	6	0.84	4.27	1.03
Partnership				
Internal partnership	3	0.87	5.08	1.01
External partnership	3	0.85	4.89	0.96
OISD Success				
Process control	5	0.87	4.46	1.20
System quality	11	0.90	4.56	0.86

N=67

a): All the variables were measured by a multi-item method and by a seven-point Likert scale ranging from 'very low' to 'very high'

The Effects of Key Actors' Competencies or Their Partnership on OISD Success

Pearson correlation analysis was conducted to examine the effects on the success of OISD projects by the key actors' competencies individually and in partnership with each other. Table 3 contains the correlation matrix for the research variables. The results show that vendor competence, IS staff competence, internal partnership, and external partnership is individually in significantly positive association with the two aspects of OISD success -- process control, system quality. IT-related user competence is not significantly related to OISD success.

Therefore, hypothesis 1-1, hypothesis 1-2, hypothesis 2-1, and hypothesis 2-2 are strongly supported. Hypothesis 1-3, which suggested that IT-related user competence is positively associated with OISD success, is not supported.

Table 3. Pearson Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Task structuredness							
(2) Vendor competence	0.231*						
(3) IS staff competence	0.287*	0.161					
(4) User competence	0.123	0.037	0.078				
(5) Internal partnership	0.262*	0.026	0.101	0.176			
(6) External partnership	0.121	0.677***	0.174	0.151	-0.001		
(7) Process control	0.336***	0.435***	0.20**	0.015	0.295*	0.440***	
(8) System quality	0.524***	0.514***	0.324***	0.121	0.311**	0.478***	0.634***

N=67

*p<0.1; **p<0.05; ***p<0.01

Additionally, multivariate regression analysis was conducted to examine the pure impact of a particular independent variable while controlling the other independent variables. In this study, three regression models were used on each of the dependent variables (process control, system quality): (1) competence variables only (Model 1), (2) partnership variables only (Model 2), and (3) all variables together (Model 3).

Table 4. Results of multivariate regression analyses

Dependent Variables	Model 1		Model 2		Model 3	
Independent Variables	Process Control	System quality	Process control	System quality	Process control	System quality
Competence						
Vendor competence	0.52[a]***	0.44***			0.44**	0.34*
IS staff competence	0.30**	0.25*			0.29**	0.23*
IT-related user competence	-0.05	-0.05			-0.08	-0.09
Partnership						
Internal partnership			0.28**	0.29**	0.27**	0.28**
External partnership			0.45***	0.40***	0.11	0.14
Statistics						
Adjusted R^2	0.35	0.23	0.24	0.20	0.41	0.28
F-value	8.33***	4.89***	7.41***	6.01***	6.5***	4.15***

N=67
*p<0.1; **p<0.05; ***p<0.01
a): standardized beta coefficients

Table 4 contains the results of the regression analysis. All the regression models are significant (F = 4.15 to 8.33, $p < 0.01$). Each model explains a significant amount of variation of OISD success from 20 % to 41% by predictor variables (R^2 = 0.20 to 0.41). The results of Model 1 show that both dimensions of OISD success are significantly related to vendor competence (β=0.52, p<0.01; β=0.44, p<0.01) and IS staff competence (β=0.30, p<0.05; β=0.25, p<0.1), but IT-related user competence is not significantly associated with OISD success. This finding is consistent with the previous bivariate correlation analysis. The competence variables in this model account for 35% of the variance of the process control, and explain for 23% of the variance of the system quality.

The results of Model 2 indicate that both internal partnership (β=0.28, p<0.05; β=0.29, p<0.05) and external partnership (β=0.45, p<0.01; β=0.40, p<0.01) has significantly positive effects on the two facets of OISD success. This finding is consistent with the correlation analysis shown above. The partnership variables appear to explain 24% of the variation in the process control, and 20% of the variation in the system quality.

In Model 3, each of the aspects of OISD success was regressed over all the five independent variables. Overall, these independent variables account for 41% of the variance of the process control, and explain 28% of the variance of the system quality. In the case of competence variables, vendor competence (β=0.44, p<0.05; β=0.34, p<0.1) and IS staff competence (β=0.29, p<0.05; β=0.23, p<0.1) are positively associated with OISD success, but IT-related user competence is not significantly associated with any aspects of OISD success.

These results are consistent with the results of the regression analysis in Model 1 and the previous correlation analysis. In the case of partnership variables, internal partnership (β=0.27, $p<0.05$; β=0.28, $p<0.05$) has a significant positive association with OISD success. However, the external partnership has no significant effect on the two aspects of OISD success. This finding is not consistent with the results of the previous bivariate correlation analysis and the regression analysis in the Model 2. This result is caused by the multicollinearity between vendor competence and external partnership (r=0.677, $p<0.01$). In other words, external partnership would be explained or predicted by vendor competence, thus the external partnership adds little to the exploratory power of OISD success. This result is investigated further and discussed in more detail in the Discussion section.

The Moderating Effect of Task Structuredness

To test the moderating effect of task structuredness on the relationships between independent variables and OISD success, there are two basic analysis methods: moderated regression analyses (MRA) and subgroup analyses [35]. Subgroup analysis is less robust than MRA since the information on continuous variables is lost [4]. However, MRA has some potential problems in this study. Fist, there is a serious multicollinearity between independent variables [38]. Second, moderating effects are known to be notoriously difficult to examine via MRA with a limited sample size [18]. Taking these problems into account, subgroup analysis was used in this study[1].

We have conducted moderated regression analysis (MRA) by following the procedure described by Sharma et al.(1981). Appendix C –(a), (b) shows the results of MRA analyses. The results indicate that in the only one of 10 cases the interaction terms is statistically significant. The interaction term of external partnership and task structuredness is statistically significant, and the significant interaction term is in the proposed direction. This result is consistent with the result of subgroup analysis except for the moderating effect between vendor competence and system quality. However, the multicollinearity between the independent variables and the interaction terms were found to be significant in this sample, which may cause difficulty in interpreting the results. All the tolerance values, which are one of most common measures for assessing multicollinearity, of each moderated regression model range from 0.006 to 0.09. A common cut off tolerance value is above 0.1 (Hair et al. 1992; Multivariate Data analysis, p. 48). Thus, there is serious multicolinearity in this sample.

In the subgroup analysis, the sample was divided at the median into two groups of high and low task structuredness. The correlation coefficients between an independent variable and OISD success were computed separately for each subgroup. The correlation coefficients between them were compared by using the Fisher Z statistics.

Table 5 contains the results of the subgroup analysis. The results with process control as the dependent variable indicate that none of the interaction terms are significant. In the results, with system quality as the dependent variable, there is evidence that task structuredness affects the relationship between vendor competence and system quality. The Fisher Z score (-2.41, $p<0.05$) indicates that the correlation coefficient between vendor competence and system quality is greater when task structuredness is low rather than high. This is the same in the case of the external partnership (Z=-2.09, $p<0.05$). These results lend support to hypothesis 3-1 and 3-5.

There are interesting results in Table 5, which are opposite to our expectations. The difference in the correlation coefficient between IS staff competence and system quality for each subgroup is not statistically significant, but the effects of task structuredness on the relationship between them contradicts hypothesis 1-2. In other words, IS staff competence is significantly correlated with system quality in the more structured task subgroup whereas in the less structured task subgroup, the correlation coefficient between them is not significant. This is the same in the case of the internal partnership. These results are elaborated upon in the Discussion section.

Consequently, hypothesis 3-1 and hypothesis 3-5 are partially supported. Hypothesis 3-2, hypothesis 3-3, and hypothesis 3-4 are not supported.

Table 5. Results of Subgroup Analysis

IS outsourcing success	Process control			System quality		
The level of Task structuredness	High (N=33)	Low (N=34)	Difference[b]	High (N=33)	Low (n=34)	Difference[b]
Vendor competence	0.418[a]**	0.311*	0.47	0.063	0.599***	-2.41**
IS staff Competence	0.126	0.270	-0.59	0.330*	0.179	0.63
IT-related user competence	-0.037	-0.154	0.36	0.016	-0.066	0.25
Internal partnership	0.097	0.307	-0.67	0.421*	0.063	1.17
External partnership	0.411**	0.341**	0.31	0.114	0.577**	-2.09**

*p<0.1; **p<0.05; ***p<0.01

a): pearson correlation coefficients

b): the test of the differences in correlation coefficients by using the Fisher Z test

DISCUSSION

Of the ten hypotheses tested, four of them are supported; five of them are partially supported; one of them is not supported.

First, this study investigates the relationships between key actors' competencies and OISD success. The results show that the competencies of internal IS staff or external vendors have positive effects on OISD success. In particular, these findings empirically validate the recent argument on outsourcing research, which emphasizes the importance of internal IT capability as well as the capabilities of external vendors [15, 44].

However, contrary to initial expectations, IT-related user competence is not significantly related to OISD success. This can be explained in two ways. First, the failure to properly consider the dimensions of user competence might have caused this result. The dimensions of user competence in the ISD context can be categorized into two groups: IT-related and task-related dimensions [24]. However, this study considered IT-related competence only, the deficiencies of IT-related abilities of users would be compensated for by competent vendors or competent internal IS staff [31]. Second, the importance of IT-related user competence might be contingent of the types of system being outsourced, but this study did not measure system characteristics directly. This data does contained brief information about the systems and the area to be developed into system. We have carefully analyzed the briefs, and have divided the systems into seven categories (See table 2-(d)). Thus, this study employed one-way analysis of variance (ANOVA) to identify the differences of variables studied among the seven categories of systems. The result shows that there are no differences of all the variables studied among seven categories of systems (See Appendix D).

This study also shows that the partnerships between the key actors have positive effects on OISD success. The positive relationships between internal partnership or external partnership and OISD success indicate that the quality of partnerships based on trust, valid communication, and empathy among the key actors is critical to achieving OISD success. This finding would seem to be especially salient for internal IS staff, and suggests that they should try to make the partnerships with users or external vendors in order to the success of OISD projects.

The result of multiple regression analysis produced unexpected finding. The result indicates that the effect of external partnership on OISD success depends on the level of vendor competence. In this sample, the fact that external partnership is highly correlated with vendor

competence also supports this finding. There are two possible explanations for this finding. First, it may be that competent vendors could build partnerships with internal IS staff or users through facilitating communication or narrowing the cultural gap between a client and a vendor. High competent vendors also have the ability, which comes from years of experience to interpret and to cope with events around ISD projects, and it gives clients credibility [3]. The other possible explanation is that when the quality of external partnership is high, a client is more likely to recognize the vendor as being competent [41]. However, further research is needed to address these or other possibilities because this explanation would require longitudinal analysis to verify it.

This study also investigates the moderating effect of the targeted task structuredness. The results provide support for some of the moderating effects of task structuredness on the above relationships. It was found that vendor competence and external partnership have more strong associations with system quality when the target tasks are less structured. These findings are consistent with the information processing perspective [39] that has been widely used in organization theory and IS research [26]. If the task to be computerized is unstructured, higher information processing capacity will be required to handle unexpected or ambiguous events during the course of OISD. In this case, higher competencies of the key actors or better partnerships between them will be required. These findings are noteworthy in light of recent studies. Henderson (1990) indicated that external partnership is not always appropriate because of the difficulty in building or maintaining the partnership. Fitzgerald and Willcocks (1994) suggested that partnership based on risks and rewards might only be appropriate under conditions of high uncertainty.

The subgroup analysis also produced counterintuitive results. Specifically, IS staff competence and internal partnership are positively correlated with system quality in the less structured task sub-sample, but the relationships between them are not significant in the more structured task sub-sample. Although these contradictory results are not statistically supported by the Fisher Z Test, they are worthy of attention. In our opinion, there are thresholds of internal factors (IS staff competence, internal partnership) to solve the problems arising from task structuredness. These findings would seem to result from the Korean effects. First, Korean business firms lag behind relatively in the use of IT and lack internal technical expertise compared to the companies in developed countries. Second, many of OISD projects result from the shortage of internal capability in Korea. In order to further investigation, we conducted another subgroup analysis. The sample was split into four groups on the basis of the quartiles of task structuredness, and then the correlation coefficients between the independent variables (IT-related user competence, internal partnership) and system quality were computed separately for each subgroup. The results are summarized in Appendix E and depicted in Appendix F. The result shows that the correlation coefficient between IS competence and system quality increases according to the level of task unstructuredness, but it is drastically falls in the extremely unstructured sample. This finding indicates that when the level of the task structuredness is extremely low, the problems arising from that may be relatively high, so the internal factors are not able to remove the problems by themselves without the intervention of external expertise. In case of internal partnership, we cannot observe apparent evidence, but we could suppose that the threshold of internal partnership is located in the very highly structured sample.

It is interesting to note that task structuredness does not moderate the relationships between process control and the independent variables. Specifically, the result shows that the importance of vendor competence or external partnership in completing projects on time, within budget, and adhering to an initial standard does not vary depending on the level of task structuredness. These results may be explained because external vendor are forced to observe the process control of completing projects on time, within budget, and adhering to an initial standard by contracts in the outsourcing context. Therefore, there is a less deviation with the level of task structuredness.

CONCLUSION

This research attempts to provide an understanding of the contributions of the key actors during OISD projects. This study proposed a triangular structure of the key actors in the OISD context, and examined the relationships between the key actors' competencies or their partnership, and OISD success. This study also investigates the moderating effect of targeted task structuredness. The results suggest that the competencies of external vendors or internal IS staff, the partnership between an external vendor and internal IS staff (external partnership), and the partnership between users and internal IS staff (internal partnership) are positively associated with OISD success. Furthermore, the results show that vendor competence and external partnership are more important in the case of less structured tasks.

In spite of its exploratory nature, this study has implications for researchers. First of all, this study

proposed a triangular structure of the key actors in OISD projects. Many studies of system development success have addressed the in-house development context, and they have considered the key actors to be in a bilateral relationship -- *user and developer*. But in the outsourcing context, it is not just the user-developer relationship but also a triangular structure -- *users, internal IS staff, and an external vendor*. Next, this study clarifies the importance of internal IS staff in OISD projects. The results showed that the competence of internal IS staff, together with their partnership with users or an external vendor are critical factors in determining OISD success. Finally, this study also discusses that the relationships between key actors' competencies and OISD success, and the partnerships between them and OISD success. The results show that these relationships may vary according to some contingency factors. For example, the partnership between a vendor and a client firm is more critical to the success of OISD projects in the case of less structured target tasks. Thus, further research should move toward clarifying under what contingencies the relationships between the key actors' competencies and OSID success or the relationships between their partnerships and OISD success would be strong.

This study also provides practical implications for information technology managers. First, to increase the probability of the success of OISD projects, client firms have to devote sufficient efforts to selecting competent vendors or to managing partnerships with the selected outsourcer during the entire project period. For example, the client firms should consider the general reputation, technical capability, and financial stability of external vendors. Second, even though outsourcing offers an attractive solution for ISD projects, the client firms have to maintain a strong internal IS specialist group that is able to manage OISD projects properly.

There are some limitations in this study, which need to be examined in further research. First, this study examined one type of project structure, in particular in which individual internal IS staff members assumed the role of project manager and in which an external vendor did the bulk of the work and users representatives functioned in liaison roles. While this structure is not atypical, it is also the only way in which OISD projects might be organized. Thus, the result of this study cannot be generalized to other forms of governance, for example, projects in which several external vendors participate in the projects.

Second, a limitation concerns the use of perceptual measures. The perceptual measures used in this study were developed through an extensive review of relevant literature or the authors' experience in managing OISD projects. Since one of the authors has worked for a large global company as a project manager for over five years, we are able to grasp an in-depth understanding of OISD projects. However, the perceptual measures tend to rely on each respondent's own experience and belief as well as other variables. Especially, the perceptual measure of performance or the competence variables must always be viewed with caution.

Third, the contingent variables were not exhaustive and should be extended. These contingent variables can include system characteristics -- technological complexity, technological compatibility, etc. or contextual variables -- corporate culture, the dependency structures between a client and a vendor, etc.

Finally, since this study is restricted to Korean business firms, these findings should be interpreted and generalized with caution. The Korean situation might be different from those of advanced countries, where outsourcing practices are relatively mature. In Korea, the outsourcing trend began to prevail in mid 1990s. In the Korean context, client firms have little chance to acquire accurate information about external vendors, and have had little past experience to manage OISD projects. Moreover, the external vendors do not have a standard methodology for outsourcing. In this situation, the success of OISD projects would seem to rely on the key actors' competencies and the partnerships among them rather than other variables that are important in mature countries, such as types of contracts and the length of outsourcing contracts. Hence, the findings of this study need to be further investigated in other countries to test their validity and generalizability.

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Appendix A: A Major role of key actors in outsourced IS development (OISD)

Key actors Stages of a typical ISD[a]	User	Internal IS staff	External Vendor
Planning	-requesting requirements -defining current problem -determining goal & scope of system -approving plan	-defining current problem -determining goal & scope of system -preparing RFP -selecting vendor	-presenting proposal
System design & analysis	-providing information -reviewing design output	-coordinating & monitoring project -reviewing design output	-conducting requirement analysis -integrating & adjusting design output
Coding		- monitoring project	-programming -module testing -program documentation
Testing	-verifying system	-monitoring project -verifying system	-performance testing -validation testing
Implementation	-using & evaluating system	-coordinating & monitoring vendor -evaluating system	-training user -operating & maintaining system

a) : We adopt the Kirsch's (1996) definition of ISD. ISD is an ongoing process that includes the entire life cycle from original suggestion through preliminary study, system analysis and design, coding, testing and implementation of systems.

Appendix B: Operational Definition and Related Literature

Variable	Operational definition	Key supporting
Task Structuredness[a]	the extent to which (1) a task is standardized (2) a task procedures are documented (3) the objectives and range of a task are specified (4) a task is routinely performed (5) a task is simple to carry out	Kim & Lee (1991)
User Competence	the extent of (1) knowledge of the kinds and content of IS output data (2) knowledge of the kinds and content of IS input data (3) knowledge of effective IS use method (4) knowledge the range and limitations of the IS function (5) experience in participating in ISD process (6) experience in IS use	Kim & Lee (1991)
IS staff Competence	the extent of (1) knowledge about IT/IS (2) knowledge about techniques & methods (3) experience in IS development, implementation, operation (4) communication skill (5) domain knowledge (6) the ability of deal logically with problems (7) the ability of project planning and management	Nelson(1991) Srinivasan (1987)
Vendor Competence	the extent of (1) reputation (2) technical capability (3) financial stability	Collins & Millen(1995), Ketler & Walstrom(1993) Lowell(1992)
Internal Partnership	the extent of (1) empathy between users and IS staff (2) trust between users and IS staff (3) valid communication between users and IS staff	Weitzel & Graen (1989)
External Partnership	the extent of (1) empathy between a vendor and a client firm (2) trust between a vendor and a client firm (3) benefit/risk-sharing between a vendor and IS staff	Henderson (1990) Weitzel & Graen (1989)
Process Control	adherence to the given (1) budget (2) schedule (3) initial standard (4) auditability (5) overall controllability	Nidumolu (1996) Saarinen & Vepsäläen (1994)
System Quality	the extent of (1) operational reliability (2) functional reliability(3) user-friendliness (4) integrity (5) correctness (6) usefulness (7) understandability (8) efficiency (9) testability (10) maintainability (11) portability	Shin & Lee (1996)

a) : All the variables were measured by a multi-item method and by a seven-point Likert scale ranging from 'very low' to 'very high'

Appendix C: Results of Moderated Regression Analysis (MRA)

(a) dependent variable is process control

Regression Equation[a]	F-value[b]	R^2	F-ratio of R^2 increment	Type of Moderator[e]
PC= 1.165 +0.448 VCP +0.253 TS (***)[c] (**) PC=4.601 –0.232 VCP –0.621 TS +0.171 VCP*TS (**)	10.36*** 7.86***	0.251 0.279	2.396	Not Moderator
PC= 1.918 +0.297 ISCP + 0.273 TS (**) (**) PC= 3.597 -0.065 ISCP –0.139 TS +0.088 ISCP*TS	5.63*** 3.81***	0.150 0.154	0.29	Not Moderator
PC=3.020 -0.036 UCP +0.367 TS (**) PC=3.89 –0.228 UCP +0.162 TS + 0.044 UCP*TS	2.97* 1.95	0.129 0.130	0.056	Not Moderator
PC= 1.898 +0.260 INP +0.306 TS (**) PC= -0.305 +0.728 INP +0.838 TS –0.120 INP*TS	4.15** 2.84**	0.172 0.180	3.722	Not Moderator
PC=0.709 +0.512 EXP + 0.290 TS (***) (***) PC= -1.210 +0.888 EXP +0.758 TS –0.091 EXP*TS	11.91** 8.09**	0.278 0.284	0.595	Not Moderator

a) : PC= process control; TS= task structuredness; VCP= vendor competence; ISCP= IS staff competence; UCP= IT-related user competence; INP= internal partnership; EXP= external partnership
b) : The F-vales and their significance levels are for the whole regression equation
c) : Significance levels for individual regression coefficients: *= p<0.1; **=p<0.05; ***=p<0.01
d) : The F-ratio of R^2 increments and their significance level are for the increment of R^2 for entering cross-product terms: *= p<0.1; **=p<0.05; ***=p<0.01
e) : Type of Moderator is suggested by Sharma et al (1981)

(b) dependent variable is system quality

Regression Equation[a]	F-value[b]	R^2	F-ratio of R^2 increment	Type of Moderator[e]
SYSQL=1.712 +0.342 VCP +0.280 TS (***)[c] (***) (***) SYSQL= -0.149 +0.71 VCP –0.753 TS –0.093 VCP*TS (**) (**)	22.93*** 16.12***	0.425 0.443	1.94	Not Moderator
SYSQL= 2.221 +0.201 ISCP + 0.331 TS (***) (*) (***) SYSQL= 4.838 –0.362 ISCP –0.312 TS +0.136 ISCP*TS (**)	14.19*** 10.42***	0.307 0.326	1.72	Not Moderator
SYSQL=2.925 +0.046 UCP +0.339 TS (***) (***) SYSQL=2.363 –0.16 UCP +0.47 TS –0.028 UCP*TS	7.63*** 4.99***	0.276 0.277	0.06	Not Moderator
SYSQL= 2.553 +0.149 INP +0.311 TS (***) (***) SYSQL= 3.815 –0.116 INP +0.006 TS +0.06 INP*TS	8.80*** 5.89***	0.305 0.312	0.35	Not Moderator
SYSQL=1.472 +0.367 EXP + 0.311 TS (***) (***) (***) SYSQL= -3.291 +1.423 EXP +1.626 TS –0.256 EXP*TS (***) (***) (***) (***)	23.89** 25.12**	0.435 0.553	16.01***	Quasi Moderator

a) :SYSQL= system quality; TS= task structuredness; VCP= vendor competence; ISCP= IS staff competence; UCP= IT-related user competence; INP= internal partnership; EXP= external partnership
b) :The F-vales and their significance levels are for the whole regression equation
c) :Significance levels for individual regression coefficients: *= $p<0.1$; **=$p<0.05$; ***=$p<0.01$
d) :The F-ratio of R^2 increments and their significance level are for the increment of R^2 for entering cross-product terms: *= $p<0.1$; **=$p<0.05$; ***=$p<0.01$
e) :Type of Moderator is suggested by Sharma et al (1981)

Appendix D: Results of Analysis of Variance (ANOVA)

System type[a] / Variables	1 (n=16)	2 (n=14)	3 (n=11)	4 (n=11)	5 (n=5)	6 (n=2)	7 (n=4)	F-value (sig. level[c])
Task structuredness	4.14[b]	4.82	3.89	4.61	4.72	3.50	3.17	1.79 (0.117)
Vendor competence	5.08	4.67	5.15	5.36	4.72	5.50	3.92	1.51 (0.194)
IS staff competence	4.98	4.50	4.60	4.79	4.79	4.50	3.86	1.27 (0.286)
IT-related user competence	4.31	4.26	4.13	4.10	5.17	4.42	4.42	0.16 (0.958)
Internal partnership	4.87	4.71	3.92	4.43	4.50	6.42	4.43	1.86 (0.118)
External partnership	5.32	4.56	4.82	5.18	4.80	5.25	4.75	0.93 (0.481)
Process control	4.74	4.35	3.87	4.49	4.37	5.90	4.40	1.04 (0.408)
System quality	4.65	4.44	4.35	4.90	4.82	4.55	4.07	0.73 (0.626)

a) :1=Sales management; 2=Accounting; 3=Online-banking/finacing; 4=Production management; 5= Project management; 6= Personnel management; 7= Others
b) :Mean value
c) :Significance level : * = $p<0.1$; **=$p<0.05$; ***$p<0.01$

Appendix E: Result of subgroup analysis

The level of task structuredness Independent variables	Highest (n=18) correlation with system quality.[a]	High (n=15) correlation with system quality	Low (n=20) correlation with system quality	Lowest (n=14) correlation with system quality
IS competence	0.32	0.33	0.59***[b]	-0.27
Internal partnership	0.73***	0.12	0.09	0.07

a) :correlation coefficients between independent variables and system quality
b) :* = p<0.1; ** = p<0.05; ***= p <0.01

Appendix F: Trend of correlation coefficients between IT-related user competence, internal partnership and system quality