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Building Alliance Capabilities through Information Technology: The Effect of IT Resources on the Market Value Effects of Alliance Announcements

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ABSTRACT

Does the investment in firm-specific IT resources lead to better alliance performance? This study proposes to answer this question by empirically examining the effect of a firm's IT resources on the performance consequences of individual alliances for firms. Drawing upon previous works on organizational learning and dynamic capability, we identify and discuss key mechanisms that convert IT resources into alliance capability. Also, this study explores whether the effect of IT resources significantly varies depending on alliance characteristics, such as the types of activities and governance structures of alliances. Following an event-study approach, this empirical study analyzes the effect of IT expenditure on the stock market response to a new alliance announcement. 179 public firms spanning multiple industries in the United States account for 2,433 data points of alliance announcements from 1998 to 2005. The results are supportive of our hypotheses that a firm's IT resources enhance its alliance performance.

Keywords

Alliance, organizational capability, organizational learning, dynamic capability

INTRODUCTION

In recent decades, Information Technology (IT) resources have played an increasingly significant role in generating values in business processes that span organizational boundaries (Krishnan, Rai, and Zmud 2007; Prahalad and Krishnan 2008). The enhanced capacity to manage complex inter-organizational activities through IT resources has enabled firms to engage more aggressively in alliances, which are contractual arrangements between two or more independent firms to achieve mutually relevant benefits that neither of the firms can easily attain on its own (Kale and Singh 2009; Sahaym, Steensma, and Schilling 2007). At the same time, it is a commonplace observation that IT resources now assume a critical function in the management of alliances. For example, many high-performing firms involved in alliances, including Hewlett-Packard, Cisco Systems, FedEx and Xerox, have invested in IT applications and electronic databases specifically designed for alliance management in order to support various aspects of alliance-related tasks, such as partner selection, process management, decision making, and performance evaluation (Corporate Strategy Board 2000). Numerous practitioner-oriented business articles indicate these examples as best practices for firms to benchmark (Corporate Strategy Board 2000; Dyer, Kale, and Singh 2001). In contrast to the high interest in IT investment, however, is the relative paucity of empirical and theoretical examinations of the performance implications for IT resources in alliance performance.

Most Information Systems (IS) studies on interorganizational relationship management have primarily focused on identifying the value of IT resources that support a tight integration of business processes between partners (e.g. Mukhopadhyay and Kekre 2002; Rai and Tang 2010; Saraf et al. 2007). Close, IT-enabled integration between partners, however, may not be the best fit for all alliances. Some successful alliances may need heavy IT investment; others may not. In the latter case, it is difficult to justify the value of IT resources from the perspective of prior studies that emphasize the value of IT developed for a specific relationship. However, it such a conclusion would be premature, because few studies have investigated the effect of IT resources on managing alliance relationships from the focal firm's perspective.

Recent theoretical developments in alliance literature provide a strong incentive to assay the influence of IT resources within alliances. The research suggests that, although alliances are an essentially dyadic exchange, the processes and outcomes associated with them are critically dependent on a given firm's internal management capability. This measure is referred to as an "alliance capability", and comprises a firm's ability "to identify [alliance] partners, initiate alliances, and engage in the ongoing management and possible restructuring and termination of these alliances" (Khanna 1998 p. 351). This current study proposes that firm-specific IT resources can serve as a critical enabler for the development of the alliance capability. Drawing

¹ "Alliance performance" in this study refers to the performance consequences for firms as derived from alliances (Gulati 1998), an outcome that can be different from the performance of alliances themselves.

upon the theories of dynamic capabilities (Eisenhardt and Martin 2000; Teece, Pisano, and Shuen 1997) and organizational learning (Huber 1991), we examine whether a firm’s IT resources improve an alliance capability by investigating the following research questions: 1) Are firms with more IT resources expected to gain better results from alliances? 2) Does the influence depend on alliance characteristics, such as types of activities (non-technological vs. technological) and governance structure (equity vs. non-equity alliances)?

LITERATURE REVIEW

Prior literature relevant to this study can be broadly categorized into two key areas: (1) studies in alliance literature that use the event study approach to empirically examine the performance consequences of alliances for firms, and (2) studies in IS research that perceives organizational capabilities as a key factor through which IT resources influence organizational performance. The performance consequences of alliances for participating firms are difficult to investigate empirically, because a firm engages in many other non-alliance activities that influence its performance (Gulati 1998). In attempting to mitigate this difficulty and to assess the effect of individual alliances on firm performance, several studies have adopted the event study approach, which primarily examine how the stock market responds to information newly released to the market – in this case, the announcement of a new alliance (Anand and Khanna 2000; Das, Sen, and Sengupta 1998; Kale, Dyer, and Singh 2002). Among them, Anand and Khanna (2000) is notable for two important findings. First, this study empirically shows that firms with more extensive prior alliance experience generate significantly higher stock market returns from alliance announcements than firms with less alliance experience, because stock market investors expect experience to increase the chance for firms to find solutions to the various issues that arise throughout the course of an alliance relationship. Second, the results show the existence of firm-specific internal capabilities for alliances other than experience, which the authors refers to as an alliance capability. Kale et al. (2002) focus on the issue of “how prior experience translated into a capability (p.749)”, and advocate the need for additional mechanisms to *foster* the development of alliance capability. The authors show that a dedicated alliance function, which governs all alliance activities in an organization, explains a significant portion of abnormal returns to alliance announcement, because the function serves as a critical mechanism for the coordination of alliance activities and knowledge management for sharing best practices. Still, as the authors also noted, having a dedicated function is only one of a wide range of actions that firms can undertake to develop an alliance capability, a phenomenon that demands further research.

Recent IS literature suggests that IT resources enable higher-order business capabilities, which in turn influence firm performance (Ray, Muhanna, and Barney 2005). Many studies in this vein often focus on a particular business process and explain the contribution of IT resources to the improved performance of the process through enhanced capabilities, such as customer service capability (Ray et al. 2005), cross-knowledge management capability (Tanriverdi 2005), innovation capability (Pavlou and El Sawy 2006), and process capabilities in supply chains (Rai and Tang 2010). However, alliance capability has not been comprehensively examined in IS research, despite its strategic importance in modern business.

THEORY AND HYPOTHESIS DEVELOPMENT

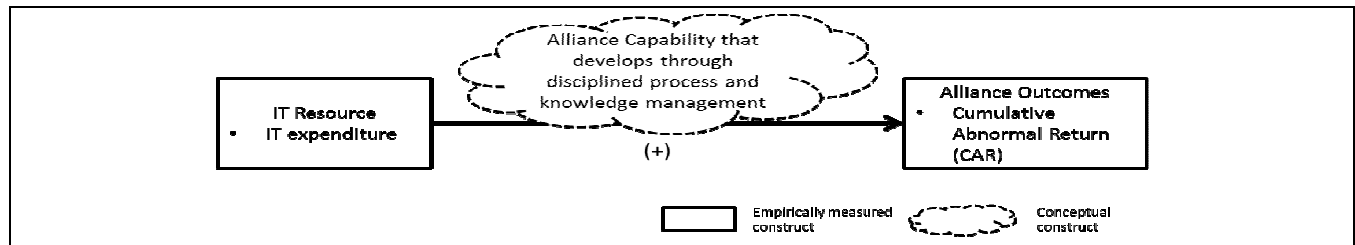


Figure 1. Conceptual Model

In alliances, firms can passively learn various aspects of alliance management from experience, such as identifying opportunities, selecting partners, designing contracts, governing processes, transferring information to and from alliance partners, etc. (Anand and Khanna 2000; Kale et al. 2002; Sampson 2005). Experience alone, however, may not be sufficient to guarantee better alliance performance. The organizational learning theory emphasizes the need for firms to facilitate the process of acquisition, distribution, and interpretation of information and to prepare organizational memory to store relevant information (Huber 1991; Tippins and Sohi 2003). The dynamic capability perspective further advocates that firms deliberately convert their knowledge from experiences into corresponding capabilities (Zollo and Winter 2002). We view investment in IT resources as constituting a firm’s deliberate efforts to develop alliance capability, the efforts which facilitate effective management of knowledge acquired from passive learning from experiences and encourage alliance managers to adhere to disciplined alliance procedures by embedding the best practices and know-how into IT-enabled processes (Figure 1).

Alliances are often initiated and executed at a business unit level, a practice which can spawn potential complications. One is that it can create inconsistent approaches to alliances across business units. Another is that the resultant alliance knowledge is likely to be scattered across business units in an organization, inhibiting the identifying of the existence and location of available alliance-related knowledge within the firm (Alavi and Tiwana 2002). Alliance literature stresses the need to develop a firm-level disciplined routine (Frei, Kalakota, Leone, and Marx 1999; Kale and Singh 2009), which can be imposed by IT resources through codified tools and embedded processes in their IT systems. IT-enabled guidelines, checklists, or manuals, which are used in Dow Corning Corporation and Cisco Systems (Corporate Strategy Board 2000), can encourage alliance managers to take a consistent approach to decision making during the different phases of strategic alliances and potentially minimize process variability across business units (Frei et al. 1999; Kale and Singh 2009). The disciplined process enabled by IT resources can also facilitate organization-wide learning efforts by encouraging the replication and transfer of best practices within a firm by rendering a new practice easier to apply (Galunic and Rodan 1998).

IT-enabled group memory systems can nurture the communicability of organizational knowledge regarding alliance management by enabling easy access, modification, share, and reuse (Alavi and Leidner 2001; Stein and Zwass 1995). For example, Cisco System's Partner Candidate Assessment database that contains a list of potential candidates for alliance with brief evaluations contribute to the improvement of a firm's ability to identify good alliance opportunities through the rigorous vetting involved in the actions (Corporate Strategy Board 2000). High quality and multiple informational media with interrelated informational items situated in context can further support alliance managers in internalizing and interpreting alliance-related knowledge. In addition, for knowledge that is difficult to codify into memory systems, corporate knowledge directories, which compile alliance experts inside and outside of organization, facilitate direct interactions with experts so that alliance managers may glean hands-on insights on particular issues (Alavi and Leidner 2001).

Enhanced interactions among alliance managers enabled by IT resources can also contribute to the development of alliance capability. An extensive web of communication channels constructed by emails, online messenger, groupware, online communities, and now pervasive social network applications (e.g. internal wikis and blogs) can facilitate the sharing and transfer of information and knowledge among alliance managers (Alavi and Leidner 2001; Goodman and Darr 1998; Huber 1991; Tippins and Sohi 2003). In addition, these systems also stimulate mutual understanding among alliance managers and strengthen the social ties that support sense-making, perspective sharing, and development of tacit knowledge related to alliance management (Sambamurthy, Bharadwaj, and Grover 2003).

Taken together, IT resources can accelerate the development of alliance capability by encouraging disciplined routines for alliance management and facilitating organizational learning efforts. The enhanced alliance capability can increase the likelihood of alliance success, which is reflected in firm valuation. Hence we hypothesize,

Hypothesis 1. *Alliance announcements of firms with more IT resources will produce higher abnormal stock market returns than alliance announcements of firms with fewer IT resources.*

Alliances comprise a wide range of collaborative activities between firms. The depth of collaboration, types of knowledge shared between partners, and levels of complexities and uncertainties surrounding alliances largely depend on the specific types of alliance activities, which can be generally categorized into technology-related and non-technology-related activities. Alliances that involve the joint development of new technology or technological process, such as manufacturing, software development, research and development are considered as technological alliances. Uncertainty, ambiguity, and the potential risk for opportunistic behavior of partners tend to be higher in the context of technological alliances, increasing the need for a higher level of alliance capability than in non-technological alliances (Das et al. 1998). This argument has been substantiated by empirical studies that reveal more potent effects of alliance capability on performance in technological alliances than in non-technological partnerships when the performance is measured by abnormal returns in the stock market (Anand and Khanna 2000) and by the patenting activities of high-tech firms (Sampson 2005). Applying the model wherein IT resources enhance alliance capability, we hypothesize,

Hypothesis 2. *The positive correlation between IT resources and abnormal returns attributable to alliance announcements is greater for technological alliances than for non-technological alliances.*

Equity and non-equity alliances— alternative alliance forms – straddle the continuum between hierarchy and market. Because firms tend to choose an equity alliance when the benefits from formal governance exceed the additional set-up and administration costs, equity alliances are more likely to occur in complex and ambiguous situations (Sampson 2005). The findings of prior alliance studies may imply that the benefits from IT resources can be higher for equity alliances than non-equity alliances, because the former requires a higher level of alliance capability due to higher complexity (Anand and Khanna 2000). However, higher complexity in equity alliances might dilute the potential effect of IT on performance (Nelson 2007). Moreover, equity alliances might be difficult to apply processes and knowledge supported by IT resources, because

the substantial amount of uncertainty and ambiguity is managed through a formal governance mechanism. On the other hand, because non-equity alliances solely depend on contract specifications, the incremental benefits from IT resources can be higher for non-equity alliances than for equity types. This perspective is supported by Zollo and Winter (2002) which suggest that implementing routines, which can be supported by IT resources, can provide higher benefits in the absence of additional equity-based governance mechanisms. Prior IS literature showing IT resources as having a greater effect in facilitating markets than in coordinating activities in hierarchies also provides support for this view (Brynjolfsson, Malone, Gurbaxani, and Kambil 1994; Dewan, Michael, and Min 1998; Gurbaxani and Whang 1991). Hence we hypothesize,

Hypothesis 3. *The positive correlation between IT resources and abnormal returns attributable to alliance announcements is greater for non-equity alliances than equity alliances.*

RESEARCH DESIGN AND METHODOLOGY

To assess the relationship between IT resources and alliance outcomes, we use the event-study approach, which has been extensively exploited in finance and accounting as well as in alliance and IS research (Chatterjee, Pacini, and Sambamurthy 2002; Dehning, Richardson, and Zmud 2003; Dos Santos, Peffer, and Mauer 1993). Specifically, the event of interest in this study is the announcement of an alliance by a firm. We view stock market responses to alliance announcements as a measure of alliance outcomes and examine them as a function of IT resources of the firm and relevant controls. The dependent variable deployed is the cumulative abnormal return (CAR) during the period surrounding alliance announcements. This measure reflects the expected value that the market believes the firm will capture by entering into the particular alliance. The underlying assumption of this methodology is that, according to the efficient market assumption, stock prices incorporate all relevant information about the value-creation and growth prospects of a firm. With the release of new information about an event (an alliance in this case), investors assess the value of investment associated with the event. If the investment is expected to outweigh the costs, the additional benefit exceeding costs derived from the investment will be reflected on firm valuation, and the firm will enjoy excessive market returns. CAR was calculated by aggregating these excess returns of a five-day period surrounding the announcement, from two days before to two days after.

The key explanatory variable, ITEXP, is measured as the ratio of annual IT expenditure to the total sales of a firm. For the comprehensiveness in capturing all of a firm's IT related expenses, such as hardware, software, data communication, and salaries and recruitment of IT professional, this construct has been used as a proxy for overall IT resources of a firm in prior studies (Bharadwaj, Bharadwaj, and Konsynski 1999; Chari, Devaraj, and David 2008). We obtained IT expenditure data from the Information Week annual surveys (1998-2005) and retained only publicly listed and identifiable firms for further analyses. We retrieved alliance information, in which at least one Information Week sample firm was involved, from the Securities Data Company (SDC) Platinum database on Joint Ventures and Alliances. For each alliance announcement, we calculated the CAR around the announcement date. We removed the cases where a firm announced two or more alliances on the same day. Table 1 presents the measure of variables with their sources.

Table 1. Measures and Data Sources

Variable	Description	Source of Data
CAR	Aggregated abnormal returns of a five-day period surrounding the alliance announcement, from two days before to two days after.	Eventus, which performs event study using the Center for Research in Security Prices (CRSP) database
ITEXP	The percentage of annual IT budget with regard to the total sales.	Information Week survey (1998-2005)
EXP	Log-transformed count of total alliances formed by each firm, up to and including the specific alliance in question for the past five years. For the analysis for equity and non-equity alliances, we counted the number of equity and non-equity alliances, respectively.	Securities Data Company (SDC) Platinum database on Joint Ventures and Alliances
SIZE	Log-transformed total assets for each firm.	Compustat North America
FIRM	Dummy variables of each firm. Firm fixed-effects control for differences in average performance across firms.	
YEAR	Dummy variables of each year.	Securities Data Company (SDC) Platinum database on Joint Ventures and Alliances
IND	Dummy variables indicating industry classification of alliance activities identified at the one-digit SIC level.	

We formulated the following equation:

$$CAR_{ijt} = \beta_{CONS} + \beta_{IT}IT_{jt} + \beta_{EXP}EXP_{ijt} + \beta_{SIZE}SIZE_{jt} + \beta_{FIRM}FIRM_j + \beta_{YEAR}YEAR_t + \beta_{IND}IND_i + \varepsilon_{ijt}$$

where *i* represents each alliance announcement of firm *j* in year *t*. The model is estimated by using the Feasible Generalized Least Square (FGLS), because not all errors in the model are independent. FGLS allows us to relax one of the ordinary least square (OLS) assumptions, namely that the variances of error terms are constant across observations. We grouped observations at a firm level and allowed the variances of error terms to vary across firms.

RESULTS AND DISCUSSION

The sample consists of 2,433 firm-alliance observations, involving 179 firms and 2,338 alliances. Of the 2,338 total alliances, 86 of them (3% of the total) involved two or more firms within the sample, creating 95 additional observations at a firm-alliance level. The rest involved an alliance between an Information Week sample firm and out-of-sample partners for which there is no IT-related data. Table 2 provides descriptive statistics and the correlation matrix for the key variables.

Table 2. Summary Statistics and Correlation Matrix

	Obs.	Mean	Std. Err.	MIN	MAX	CAR	SIZE	EXP	IT
CAR	2433	0.00269	0.05943	-0.6060	0.67930	1			
SIZE	2433	10.025	1.3997	5.5805	13.7126	-0.0209	1		
EXP	2433	3.6314	1.2725	0	5.9162	0.00124	0.497***	1	
IT	2433	4.3515	3.777	0.05	30	0.0193	0.00101	-0.0506*	1

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

The results from the FGLS estimation are shown in Table 3. As per prior research that views alliance experience as a primary driver of alliance capability and success, we treated experience as a base case (Model I). The result of Model II for all alliances shows that IT expenditure is a significant factor in explaining abnormal stock market returns; the coefficient of IT expenditure is positive and significant at the 1 percent significance level. This result suggests that firm-specific IT resources contribute to developing alliance capability, which enhances the likelihood of alliance success (Hypothesis 1).

Table 3. FGLS Result: Excessive Returns from Alliance Announcement

Dependent variable – Cumulative Abnormal Return						
	Model I	Model II	Model III		Model IV	
		All	Non-Tech	Tech	Non-equity	Equity
Firm Size	-0.00779* (0.00459)	-0.00677 (0.00462)	-0.00544 (0.00541)	-0.0107* (0.00634)	-0.00757 (0.00494)	0.0225** (0.0102)
EXP	0.00266 (0.00333)	0.000678 (0.00319)	-0.000928 (0.00374)	0.00788** (0.000892)	-0.00188 (0.00279)	-0.00540 (0.00581)
ITEXP		0.00219** (0.000605)	0.00303*** (0.000530)	0.00294*** (0.000523)	0.00274*** (0.000574)	-0.000691 (0.00225)
Firm Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Ind. Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Num. of obs.	2433	2433	1145	1288	2001	432
Num. of firms	179	179	170	154	178	132
Wald χ^2	352.4	407.8	1865.8	167071.0	578.7	2712.1
df	196	197	172	139	186	101
		H1. Supported	H2. Not Supported		H3. Supported	

Standard errors in parentheses. * *p* < 0.10, ** *p* < 0.05, *** *p* < 0.01. Estimates of firm, industry, and year fixed effects are suppressed.

Next, we examined how the effect of IT resources varies according to the type of alliance activity. In Model III, we separated the sample into two groups according to their main activities: technological and non-technological alliances. The results suggest that the effect of IT expenditure is positive and significant in both technological and non-technological alliances at the 1 percent level. The similar effect sizes of IT resources indicate that the influence of IT resources in non-technological

alliances is as strong as in technological alliances, a finding that fails to support Hypothesis 2. A potential explanation for this finding is that there is no systematic difference in terms of the overall level of demand for alliance capability between different types of activities, because all alliances share similar coordination difficulties in managing their tasks across organizational boundaries. Though the results fail to support Hypothesis 2, they underscore the significant role of IT resources in alliances regardless of the types of activities.

To test the impact of IT expenditure under different governance structures, we separated the sample into two groups according to their contract types: equity and non-equity alliances (Model IV). Consistent with expectation, while the coefficient of IT expenditure in non-equity alliances is positive and significant at the 1 percent level, it is negligible in equity alliances, supporting Hypothesis 3 that predicts a stronger effect of IT resources for non-equity alliances than for equity alliances.

Limitations and Contributions

This study encompasses limitations that suggest opportunities for further research. First, we did not directly measure alliance capability in terms of the specific managerial skills required to administer various aspects of alliance tasks. Therefore, one path for future research is to directly examine whether IT resources improve the elements constituting an alliance capability. Second, we examined the IT resources of firms as measured by IT expenditure. However, prior studies suggest that a mere deployment of IT resources may not be sufficient for firm to generate quantifiable values, instead stressing that the actual use of IT resources (Devaraj and Kohli 2003) or the ability to leverage them (Mithas, Ramasubbu, and Sambamurthy 2011) is more important. Therefore, future research investigating the actual usage or capability of leveraging IT resources in alliance management and its effect on alliance capabilities would buttress the model presented in this study. Finally, a survey approach would allow future work to measure *ex-post* actual alliance outcomes, such as managerial assessment of long-term performance (Kale et al. 2002), and examine the robustness of the findings of this study.

This study potentially comprises several important contributions. First, broadly speaking, it contributes to the vein of IT business value literature that considers organizational capabilities as key intermediates (Melville, Kraemer, and Gurbaxani 2004; Ray et al. 2005). By examining the role that IT resources play in developing alliance capability, this study advances prior works that examined the relationship between IT and organizational capabilities. Second, this study represents a nascent attempt to explore the role assumed by IT resources in alliances. Despite increasing interfirm interactions via alliances, the expanse of IS literature focusing on alliances remains a sparsely populated realm. This work's alliance-level analysis enables a deeper examination of the influence of IT resources, such as their various impacts within different regimes of alliances vis-à-vis alliance activities and governance structures. Finally, the study's findings have important practical implications. Congruent with the increasing strategic importance of alliances, there has emerged a need for managers to determine whether and how they can utilize IT resources to enhance the performance of alliances. The findings of this study suggest that companies desiring to possess alliance capabilities and enhance alliance performance should invest in firm-specific IT resources that can serve as a critical mechanism for developing the capabilities and engendering improved alliance outcomes.

CONCLUSION

Alliances have become an indispensable choice in most industries, allowing companies to keep abreast of fast-changing business environments. Despite speculation on the value of IT resources in alliances, the diversity of alliances in terms of purpose, activity, depth of interaction, and type of knowledge exchanged between partners, obfuscates whether and how IT resources contribute to alliance performance. This work represents an initial effort at an in-depth examination of the role of IT resources in alliances. We hope this research stimulates further explorations on the interplay between IT resources, organizational capability, and interorganizational interaction.

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