Value Gains in Alliances: The Role of Related Experience and Information Technology

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VALUE GAINS IN ALLIANCES: THE ROLE OF RELATED EXPERIENCE AND INFORMATION TECHNOLOGY

Completed Research Paper

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Abstract

This paper investigates the role of related alliance experience and information technology in value creation through strategic alliances. Past research has shown that alliance experience is an important antecedent of the value of an alliance. Built on the existing literature on alliance experience, this study highlights the importance of relatedness in alliance experience and examines how various kinds of related experience affect value creation differently. This study also looks at IT-enabled knowledge management capability and proposes a moderating effect on value creation in alliances. Using abnormal returns as the measure for value gains in alliances, this paper finds evidence of the different effects on value creation of related experience as well as the interaction effect of alliance experience and IT-enabled knowledge management capability.

Keywords: Alliance experience, information technology, knowledge management, absorptive capacity
Introduction

Recent strategy research has suggested that firms may be able to extract economic rents from resources outside their scope through the sharing of these resources by their alliance partners (Dyer & Singh, 1998; Gulati, Nohria, & Zaheer, 2000; Lavie, 2006; Zaheer & Bell, 2005). This type of economic rent, known as relational rent (Dyer & Singh, 1998), is a part of the total economic rent that can be obtained from the firm’s overall resource base, i.e., the combination of proprietary resources and network resources (Gulati, 1999). Given this insight, it is not surprising to observe that in reality firms increasingly look to alliances as a source of revenue. As a result, alliances have become a new arena of corporate competition (Lane & Lubatkin, 1998). Such competition is further fueled by the increasing turbulence in the business environment that stresses the centrality and criticality of knowledge as an ultimate source of competitive advantage, as alliances are often used as an interorganizational arrangement to transfer knowledge between partners. To be competitive in this context, firms particularly need to understand how to gain value from alliances. The co-operative nature of any alliance relationship implies that the scope of economic value that accrues to the firm may depend on firm-specific characteristics. Accordingly, the identification of factors that may assist the firm in extracting value from alliances is of critical importance for the firm to obtain an advantageous competitive position.

Lavie (2006) suggested absorptive capacity as a theoretical lens to examine the amount of value that can be captured by the focal firm in an alliance. Absorptive capacity is an organizational capability to identify, evaluate, assimilate, and exploit external knowledge (Zahra & George, 2002), the development of which should be domain-specific and path-dependent. In the alliance context, the firm’s absorptive capacity may manifest itself in the form of cumulative alliance experience. This is largely due to the “learning by doing” or “experiential learning” effect through which the firm develops superior capabilities in managing alliances. Previous alliance research has suggested that prior alliance experience perhaps is the most important factor to influence alliance performance (Fiol & Lyles, 1985; Child & Yan, 2003; Anand & Khanna, 2000; Kale, Dyer, & Singh, 2002). As the firm accumulates experience in forming partnership, its ability to select the right alliance partners and manage interorganizational conflicts also increases (Simonin, 1997). However, previous studies on alliance experience fall short of discerning the difference in alliance experience. Absorptive capacity is often determined by the stock of related knowledge, which warrants the need to study a subset of alliance experience that is most relevant to the present relationship. The literature on absorptive capacity also suggests that there are both content and process components in learning capabilities. While the process aspect of alliance experience has been well recognized in the past research, alliance experience contributing to the transfer of the subject knowledge has received little attention.

Prior alliance experience can be viewed as a form of organizational knowledge about how alliances should be managed to maximize economic rents out of any new alliance relationships. However, such knowledge is likely to be widely distributed across the organization, thus making it possible to deploy knowledge management (KM) processes to enhance the effect of prior alliance experience on alliance value creation. Lenox and King (2004) have shown that when knowledge is distributed across the firm, absorptive capacity can be enhanced by managerial information provision, defined as the transfer of practice-specific data from a central repository to agents. While their work was more focused on information provision mechanisms such as internal seminars, demonstrations, and promotional brochures, information technology (IT) can provide considerable help in creating a favorable communication infrastructure for knowledge management (Alavi & Leidner, 2001). Network and telecommunication technologies can be used to support collaboration between organizational members, who can exchange information and combine knowledge. Such a process is central to knowledge articulation, codification, sharing, and application. Also IT can be used for capturing and storing knowledge in a central repository, which overcomes geography and time constraints in using knowledge. Alliance databases, for example, are used by firms such as FedEx and Philips to maintain alliance-related information and knowledge for alliance tactics such as how to select a partner. Meanwhile certain intranet-based tools like alliance-dedicated portals can facilitate search and retrieval of information out of knowledge repositories to support decision-making. The use of IT in knowledge management therefore underpins the process of using prior alliance experience to enhance value creation in new alliances.

In this study we investigate how prior alliance experience, information technology, and their combination affect the extent to which the firm may extract economic value from an alliance. Previous studies have used prior alliance experience as a measure of a firm’s alliance capability and found it positively related to abnormal stock market returns and long-term alliance success (Anand & Khanna, 2000; Kale, Dyer, & Singh, 2002). In this study, we use
prior alliance experience as a correlate of the firm’s absorptive capacity applicable in the alliance context. Unlike the previous studies, we provide a more nuanced view of prior alliance experience by recognizing relatedness in alliance experience. This conceptualization is consistent with the notion of absorptive capacity, which is essentially determined by the firm’s stock of prior related knowledge (Cohen & Levinthal, 1990). We also contend that prior alliance experience, as a stock of related knowledge, is likely to be predominantly tacit and widely distributed across the organization. Therefore knowledge management tools such as those enabled by IT are crucial in transforming alliance experience into economic value.

Theory and Hypotheses

Related Alliance Experience

Rooted in the organizational learning literature, the research on alliance experience is focused on the effect of experiential learning or learning-by-doing and heavily dependent on the assumption that knowledge about how to manage alliances will spill from one alliance to another. The reinforcement-based process increases efficiency and reduces errors in routine tasks involved in alliances. Experience-based knowledge, however, may transfer only into related domains (Beckman & Haunschild, 2002). This is consistent with the view of absorptive capacity, as the latter is often manifested in the firm’s stock of prior relevant knowledge (Cohen & Levinthal, 1990). As a result, knowledge about how to manage alliances is quite different from knowledge about how to integrate an acquired business during mergers and acquisitions. It is also unlikely for such knowledge to be homogeneous in itself as alliance experience may differ in its origin and context. Alliance experience may vary due to the function performed by the alliance in terms of R&D, manufacturing, and marketing, or due to specific partner characteristics such as industry and technology (Heimeriks & Duysters, 2007; Reuer, Zollo, & Singh, 2002). Unrelated alliance experience is less likely to assist the firm in generating necessary knowledge to manage the current alliance. For example, knowledge about managing licensing contracts may be so different that it may not be of much use in equity-based alliance forms. The functional focus and industry context of alliance experience may determine its utility in managing a new alliance.

Therefore, conceptualizing alliance experience as a firm’s absorptive capacity allows a more nuanced perspective on the contribution of the former to alliance performance. When viewing absorptive capacity as a learning capability, we need to differentiate the object of learning. On the one side, the notion of absorptive capacity centers on the relevance of existing knowledge to new and external knowledge to be assimilated. The greater we know about certain subject matters, the more able we are to absorb any related new knowledge. In the alliance domain, to understand the partner’s knowledge being shared in the alliance, the firm may need to refer to previous partners who share similar knowledge bases with the current partner. It has been shown that for a knowledge seeker, prior experience reduces causal ambiguity of knowledge in the process of knowledge transfer between alliance partners and thus favors the transferability of knowledge (Simonin, 1999). On the other side, when explained together with learning curves, absorptive capacity may also embrace the capability of “learning to learn” (Ellis, 1965, p. 32). In the alliance domain, this capability taps into the efficiency of the process by which the firm manages alliance relationships. The more the firm engages itself in forming alliances, the more competent it becomes in managing this organizational form. This type of capability has been employed as the primary theoretical explanation as to why alliance experience should enhance alliance performance. In short, the concept of absorptive capacity has “both content and process components” (Schilling, Patricia, Ployhart, & Marangoni, 2003, p. 44). However, previous alliance researchers have focused on using alliance experience to explain the process part of the story.

While examining the process aspect of alliance experience and its impact on alliance performance, although previous researchers have not dealt with the relatedness issue conceptually or explicitly, many have implied it in their research design. Anand and Khanna (2000), for instance, only considered two forms of alliances, joint ventures and licensing contracts and their measures for alliance experience were confined in the two domains. In another study, Hoang and Rothaermel (2005) chose to focus on R&D collaboration projects between pharmaceutical and biotechnology companies and accordingly the measures for alliance experience were specific to the field. The type of the alliance, or more specifically, the functional focus of the alliance, serves as one dimension by which we can define relatedness in alliance experience. As alliance experience is often defined by the cumulative number of past alliances, type-based related experience is defined by the extent to which past alliances resembles the new alliance with respect to the alliance type. Relatedness in alliance experience as defined in this way has much to do with the
process part of absorptive capacity. As a subset of the firm’s total alliance experience, this form of related experience can be directly applied to the alliance management process since managers learn how to deal with alliances of the same type via knowledge accumulated through such experience. If the current alliance is a collaboration project in R&D, related experience as indicated by previous R&D partnerships provides managers examples as well as lessons to be used in the process of managing the present alliance. Related experience defined by the alliance type hence increases the efficiency of the alliance management process and contributes to value creation accordingly.

**Hypothesis 1:** Type-based related experience is positively related to abnormal stock market returns following alliance announcements.

Most past research on alliance experience only considers the effect of experience on alliance management processes and fails to take the content component into consideration. The content part of alliance experience pertains to the actual knowledge transferred between the partners. Recently, Hoang and Rothaermel (2005) argued that alliance experience could be both general and partner-specific. Partner-specific experience developed through repeated relationships reduces transaction costs and hence increases value created in alliances. Their conceptualization considered alliance experience as a dyadic construct and thus recognized the importance of alliance experience in facilitating inter-firm knowledge transfer/sharing at the dyad level. Notwithstanding this recognition, alliance experience has been generally conceived to affect learning to manage alliances rather than learning from alliances (Hoang & Rothaermel, 2005). We explore the possibility of the latter by examining relatedness in alliance experience based on similarities or relatedness between a firm’s partners. More specifically, we measure related alliance experience also based on relatedness in terms of partners’ industries.

For decades the diversification literature has been using the relatedness argument to depict value creation in diversified firms (Rumelt, 1982). Relatedness adds to the firm’s bottom line through the use of common production factors, the sharing of similar production processes, and the transferring of technical and managerial skills across related areas. The concept of relatedness and the attached economic benefits may also be applied in the alliance context. Previous relationships with partners in a particular industry are more instrumental if the new partner is also in the same industry than if it is from a different one. The focal firm may accumulate familiarity and comfort with that industry through sequences of partnerships with firms operating in that context, which eases the knowledge transfer process in the alliance. Even though the focal firm’s primary business may fall outside that particular industry, it is still able to gather information and knowledge about that industry from previous partners. Besides, as the firm continuously partners with similar companies, it may be able to exploit existing arrangements and channels to facilitate access and transfer of knowledge and reuse established heuristics and governance mechanisms for assimilating knowledge (Lavie & Rosenkopf, 2006). More importantly, the similarity in partners’ knowledge base allows the firm to use existing knowledge and new knowledge in a synergistic way, thus creating even greater value in alliances. Therefore:

**Hypothesis 2:** Partner industry-based related experience is positively related to abnormal stock market returns following alliance announcements.

**Knowledge Management & Alliance Experience**

Alliance experience, even related, might not be transformed into economic value automatically. The extent to which alliance experience may contribute to economic performance of the focal firm is largely dependent on its ability “to capture, share, and disseminate the alliance management know-how associated with prior experience” (Kale, Dyer, & Singh, 2002, p. 755). This is because the knowledge embodied by alliance experience tends to be tacit, unevenly distributed, and improperly stored in the organization. Tacit knowledge based on previous experience is not well articulated and hard to codify (Nonaka, 1994). Therefore it may not be effectively shared among organizational members or across various decision-making scenarios. To capture and use such knowledge, firms need communication-intensive processes to allow or help knowledge bearers to articulate and codify the knowledge. The knowledge embedded in alliance experience is also likely to be unevenly distributed across the organization. The participants in an entire alliance life cycle may vary depending on managerial levels involved in specific alliance activities. In addition, alliances may occur in various functions such as R&D, manufacturing, sales, and marketing, or in different subsidiaries, impeding the effective integration and combination of such knowledge at the corporate level. If experience-based knowledge is not well articulated or codified, it may remain with those individuals who
are actually involved in previous alliances. Without an effective means to retain or store the knowledge, firms might lose it if those individuals leave the organization.

Firms differ greatly in their ability to capture and codify knowledge, or in general, to manage such knowledge. Like human beings, organizations tend to forget. Without effective knowledge management, the firm may lose the experience earned in earlier years. It is then argued that when the firm assumes a strong capability in managing knowledge, the positive relationship between alliance experience and abnormal stock market returns would become even stronger. Competence in turning tacit knowledge into codified knowledge and storing it in the firm’s knowledge repositories complements the efforts to using past alliance-related knowledge to manage new alliances, and hence value creation in these new ventures. There has been evidence that investors value the firm’s knowledge management initiatives (Sabherwal & Sabherwal, 2005). Firms frequently engaging in alliances are also likely to be knowledge-intensive organizations such as those in the pharmaceutical and computer industries. We expect that investors in such industries would be well aware of the firm’s knowledge management capability and use it to assess the firm’s value creation potential.

IT can facilitate knowledge management in numerous ways. IT can improve the communication infrastructure within the organization, which underpins the firm’s absorptive capacity. Technologies such as intranets, groupware, electronic mail, videoconferencing, instant messaging, and chat significantly increase communication frequency and media richness, and hence the effectiveness of socialization efforts among organizational members, especially knowledge workers. In addition, the creation of an organizational memory represents another critical endeavor to centralize the firm’s knowledge assets. Organizational memory provides a central location to bank a firm’s knowledge assets such as written documents, structured information, codified human knowledge, and documented organizational procedures and processes and tacit knowledge acquired by individuals (Alavi & Leidner, 2001). Information systems (IS) scholars have studied IT-enabled organizational memory systems such as electronic knowledge repositories (Kankanhalli, Tan, & Wei, 2005; Kane & Alavi, 2007) and found them to be critical factors for leveraging the firm’s knowledge resources.

Given the above arguments as to how IT can be used to streamline knowledge management processes, we expect that firms which have installed these IT tools to manage their knowledge will be able to learn effectively from their previous experience. In other words, IT-based KM tools can be deployed to better institutionalize alliance know-how earned from previous alliances. As a result these firms will have better chances to exploit their alliance experience in value creation. Therefore:

*Hypothesis 3: The relationship between alliance experience and abnormal stock market returns will be stronger if the firm has a strong IT-enabled KM capability.*

In general, a strong IT-enabled KM capability enhances the economic value of alliance experience. However, IT-based KM tools may have different effects on the two types of related experience. Type-based experience represents alliance know-how that can be applied to improve the management process of alliances. To some degree this type of knowledge is more tacit and involves more subjective judgment. As a result, it is more difficult to codify and apply such knowledge to the new alliance without sufficient interactions among key knowledge workers. Sharing knowledge in non-codified or tacit forms often requires personal, high-context, and hands-on settings provided by traditional face-to-face contacts (Ganesan, Malter, & Rindfleisch, 2005). Moreover, this mode of communication is also considered to be much richer and more effective as it uses nonverbal cues and real-time feedbacks to convey more nuanced understandings (Daft & Lengel, 1986). Alliance managers therefore may prefer non-technical approaches such as meetings, workshops, or even luncheon talks to access and share such knowledge. While firms will still benefit from their efforts to codify knowledge and make it available for use across the organization through IT-enabled KM systems, the likely use of these mechanisms could be contained thereby diminishing the potential complementary effects.

Partner industry-based experience, on the other hand, represents alliance know-how that can be applied to improve the transfer of knowledge shared in an alliance relationship. This type of knowledge pertains to certain characteristics of the partners, such as their industry focuses, and therefore can be more objective and involve less judgment. It is also less difficult to codify and store such knowledge in organizational memories enabled by IT as it is more fact-based. It has been shown that electronic means of communication such as e-mail are strongly related to the acquisition of fact-based knowledge such as product knowledge in new product development (Ganesan, Malter, & Rindfleisch, 2005). More importantly, the process of institutionalizing such knowledge may involve very little human intervention and be well supported by technologies such as text mining, electronic knowledge repositories,
and search and retrieval tools. As a result, the complementary effect of IT-based KM tools should be more significant for this type of alliance experience.

**Hypothesis 4:** IT-enabled KM capability will have a stronger positive moderating effect on the relationship between partner industry-based related experience and abnormal stock market returns than between type-based related experience and abnormal stock market returns.

## DATA AND METHODOLOGY

### Data

We drew the data on alliances from the Mergers, Acquisitions, and Alliances’ database of the Securities Data Company (SDC). SDC maintains complete records of firms’ alliances for all years beginning in 1988 by obtaining information from publicly available sources such as SEC filings, trade publications and international counterparts, and news and wire sources. It has been noted in previous research that the data maintained by SDC prior to 1990 is far from comprehensive (Anand & Khanna, 2000). As such we collected the data on alliances from 1990 until 2001. Like many previous alliance studies we focused on industries which rely heavily on alliances as an important element of corporate strategy. Such industries include Drugs (SIC 283), Chemicals (SIC 28, excluding SIC 283), Computers (SIC 357), Communications (SIC 366), Chips (SIC 367), and Software Services (SIC 737). We excluded alliances which involved more than two partners in the sample. It became difficult and inaccurate to measure relatedness in alliance experience when the firm allied with more than one partner in the current relationship. We then collected the data on firms’ ability in managing knowledge through IT from the annual surveys conducted by InformationWeek in their special issue InformationWeek 500. InformationWeek has been conducting annual surveys of US firms on their innovative use of information technologies since 1989. In their surveys during 1999 to 2001 they included items asking the participating firms about the use of knowledge management tools in their organizations. To combine the two data sources we matched firms engaging in alliance activities from the SDC database with firms using IT-based KM tools from the InformationWeek surveys. The matching process left us a sample of 1118 alliance announcements made by 66 firms in the three-year period (1999-2001). Table 1 reports the distribution of the alliances by the focal firm’s industry.

<table>
<thead>
<tr>
<th>Industry</th>
<th>SIC</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals and Allied Products (excluding drugs)</td>
<td>28</td>
<td>117</td>
<td>10.46%</td>
</tr>
<tr>
<td>Drugs</td>
<td>283</td>
<td>71</td>
<td>6.35%</td>
</tr>
<tr>
<td>Computer and Office Equipments</td>
<td>357</td>
<td>314</td>
<td>28.08%</td>
</tr>
<tr>
<td>Communications Equipments</td>
<td>366</td>
<td>86</td>
<td>7.69%</td>
</tr>
<tr>
<td>Electronic Components and Accessories</td>
<td>367</td>
<td>58</td>
<td>5.19%</td>
</tr>
<tr>
<td>Computer Programming, Data Processing, and Other Computer Related Services</td>
<td>737</td>
<td>472</td>
<td>42.22%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1118</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### Dependent Variable

**Abnormal stock market returns**

To measure the economic value gained from an alliance, we used the event study methodology to extract abnormal stock market returns following new alliance announcements during the time period 1999-2001. Rooted in the finance research, the event study method has become an increasingly important research methodology in both strategy and information systems (IS) fields. Finance researchers employ a standard asset pricing model to predict firms’ stock returns and use the residuals obtained from the model as a proxy for firms’ excess returns. Standard
event study methodology uses daily data on the stock market returns of each publicly traded firm in the sample over a pre-event estimation period to estimate the following market model (Brown & Warner, 1985; Fama, 1976):

\[ r_{it} = \alpha_i + \beta_i r_{mt} + \epsilon_{it} \]

In the above equation \( r_{it} \) denotes the daily returns of firm \( i \) on day \( t \), \( r_{mt} \) denotes the corresponding daily returns on the value-weighted market returns, \( \alpha_i \) and \( \beta_i \) are firm specific parameters, and \( \epsilon_{it} \) is distributed i.i.d. normal. The methodology then uses the estimated firm specific parameters \( \hat{\alpha}_i \) and \( \hat{\beta}_i \) to predict the daily returns for each firm over a chosen event window surrounding the event day, using the following equation:

\[ \hat{r}_{it} = \hat{\alpha}_i + \hat{\beta}_i r_{mt} \]

where \( \hat{r}_{it} \) is the predicted daily return. The daily excess return for firm \( i \) can be calculated using the following equation:

\[ \hat{\epsilon}_{it} = r_{it} - \hat{r}_{it} \]

However, a strong assumption of this approach is that there is no other event in the estimation period. When one or more events fall into the estimation period, they will confound the calculation of the expected normal returns \( r_{it}^- \). An alternative proxy for the expected normal returns, as suggested by previous research, is the value-weighted market returns or the equally-weighted market returns (Haleblian & Finkelstein, 1999; Brown & Warner, 1985). As our sample includes firms that had multiple alliances within the same year, we chose to use the value-weighted market returns as the expected normal returns. The equation to compute daily access returns then becomes

\[ \hat{\epsilon}_{it} = r_{it} - r_{mt} \]

Brown and Warner (1985) has shown that the approach of standard OLS market model and the approach of using market adjusted returns have similar statistical power to detect abnormal market movements. The excess returns thus reflect the daily unanticipated movements in the stock price for each firm over the event period. To capture any information leakage or information lagging effects while simultaneously avoid the influence of other firm events that possibly occurred within the event window, we adopted a relatively small window to calculate the cumulative stock market abnormal returns (CARs). The window we used was a five-day period starting from two days before the event day and two days after the event day, i.e., day -2 through day 2. Regarding the use of abnormal returns to represent value gains from a strategic move such as forming an alliance, researchers have expressed concerns that the stock market reaction might not reflect the actual success of the implementation of the strategy. Past empirical research, however, has revealed that stock market-based measures such as abnormal returns and perceptual measures such as managerial assessment of alliance success are highly correlated (Kale, Dyer, & Singh, 2002; Koh & Venkatraman, 1991).

The average abnormal return on the announcement day (day zero) is 0.27 percent (z-statistic = 3.141, \( p < 0.001 \)), which is smaller than that of previous alliance studies documenting day zero average abnormal returns. For example, Chan et al (1997) reported 0.64 percent and Anand & Khanna (2000) reported 0.67 percent respectively. But considering the large size of the firms in our sample (average assets of 41 billion dollars), the wealth effects associated with the abnormal returns can still be of economic significance. To measure the wealth effects, we
multiplied the cumulative abnormal returns during the five-day event window ($\text{CAR} = 0.65\%$, z-statistic = 3.232, p < 0.001) by the market value of equity of the firm at the end of day -3. We also used that measure as another dependent variable to test our hypotheses.

**Independent Variables**

**Alliance Experience**

Unlike previous research on alliance experience, we differentiated between total alliance experience and related alliance experience. A firm’s total alliance experience was measured by counting the number of each firm’s alliances starting from January 1, 1990 to the event day when the firm had a new alliance (not including the new alliance). We identified the type of each alliance by examining the activities performed by the alliance, as reported by SDC. The major types of alliances include licensing services, R&D services, marketing services, manufacturing services, supply services, retail and wholesale services, and computer integration services. They reflected different business functions performed by the alliances. We then used the number of previous alliances having the same type as the current alliance as a measure for type-based related experience. Of the previous alliances the firm had, the partners may come from the same industry as the current partner. Therefore we measured partner industry-based related experience using the number of previous alliances in which the partner(s) had the same four-digit SIC code as the current partner. Any previous multilateral alliances were included in computing this measure as long as at least one of the partners had the same SIC code. The data on alliances was obtained from the SDC database. When we collected the alliance data we read through the summary description of each alliance and removed any duplicate records. We also referred to other data sources such as the LexisNexis Academic database to verify the announcement dates reported by the SDC database. In case there was a discrepancy about the date we resolved the inconsistencies by referring to other news and wire sources. The accurate announcement dates would ensure the measurement reliability in both abnormal returns and alliance experience.

**IT-enabled KM Capability**

The firm’s capability in managing knowledge through IT was measured by the extent of knowledge codification using IT-based KM tools. In the InformationWeek annual surveys, participants were asked to estimate the percentage of their knowledge assets and intellectual property data that are captured by current knowledge management procedures. This item reflects the firm’s efforts in codifying knowledge which can be stored in the firm’s knowledge repositories. It also reflects how effective the firm is in codifying hard-to-articulate knowledge through either formal or informal manners with the help of technology. It should be noted that a variety of IT-based KM tools ranging from groupware to expert systems constitute the knowledge management procedures. Technologies considered as IT-based KM tools in the InformationWeek annual surveys are groupware or teamware, systems for group memory or content management, tools for text/document search, systems for expertise profiling, and expert systems or artificial intelligence tools.

**Control variables**

Like many previous studies using abnormal stock market returns to capture value gains, we controlled for firm size measured by the natural logarithm of total assets of the firm. Past alliance research has suggested that similarity or complementarity in partners’ resources affects alliance outcomes (Lavie, 2006; Sampson, 2007). Hence we controlled for the relatedness in partners’ industries by using a dummy variable, which was set to the value of 1 if the two partners had the same four-digit SIC code and 0 otherwise. We also controlled for industry effects by using industry dummies at the three-digit SIC code level. Year dummies were included to control for potential time effects. The type of alliances was also controlled for by using dummy variables representing joint ventures, licensing services, R&D services, marketing services, manufacturing services, supply services, retail and wholesale services, and computer integration services respectively. Table 2 provides the descriptive statistics and the correlation matrix for all the key variables.
Data Analysis and Results

Our dataset consists of 1118 events over three years and across 66 firms. We used ordinary least squares (OLS) regression for the pooled data. Including firms with multiple events (records) may violate the homoskedasticity assumption of OLS, resulting in biased estimates of standard errors. To correct for this bias we ran the analysis with Huber-White standard errors clustering on firms, which will produce a robust estimation of standard errors given the presence of arbitrary correlations in error terms within the cluster. This method, also called Rogers standard errors (Rogers, 1993), is robust to different specifications of the dependence in error terms within a cluster. Petersen (2006) compared multiple methods of calculating standard errors for panel data including OLS, Huber-White robust standard errors, Fama-MacBeth estimate, and fixed effects. He concluded that “the standard errors clustered by firm are unbiased and produce correctly sized confidence intervals whether the firm effect is permanent or temporary” (Petersen, 2006, p. 40). Since the precise form of the dependence in the residuals is unknown an estimate which is robust to different specifications is advantageous (Petersen, 2006).

Table 3 reports the results of regression analysis with the firm’s cumulative abnormal returns (CARs) as the dependent variable. In Model I we only included total alliance experience as the predictor variable of excess returns. The result confirmed the previous finding that alliance experience is a positive contributor of value creation in alliances. Model II added the two related experience variables: type-based related experience which captures the process-related alliance experience, and partner industry-based related experience which captures the content-related alliance experience. The variable of type-based related experience, as expected in H1, has a positive and significant coefficient (b = 0.005, p < 0.10). Surprisingly the partner industry-based related experience variable has a negative and significant coefficient (b = -0.006, p < 0.05), suggesting that the more this type of related experience, the less abnormal returns the firm realized from the new alliance. This finding is contradictory to H2, which states that partner industry-based related experience should have a positive effect on valuation of the firm’s share prices.
Table 3. Regression analysis examining the relationship between abnormal stock market returns and alliance experience

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
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<td>0.001***</td>
<td>0.001**</td>
<td>3.89e-04</td>
<td>0.001</td>
<td>0.007*</td>
<td>8.801*</td>
<td>-0.117</td>
</tr>
<tr>
<td></td>
<td>(3.68)</td>
<td>(3.30)</td>
<td>(2.62)</td>
<td>(0.70)</td>
<td>(0.77)</td>
<td>(1.75)</td>
<td>(2.08)</td>
<td>(0.85)</td>
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<tr>
<td>Type-based Related Experience</td>
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<td>0.005</td>
<td>0.005*</td>
<td>0.006**</td>
<td>0.009**</td>
<td>12.348**</td>
<td>1.687*</td>
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<tr>
<td></td>
<td>(1.91)</td>
<td>(1.63)</td>
<td>(1.75)</td>
<td>(2.07)</td>
<td>(2.05)</td>
<td>(3.06)</td>
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</tr>
<tr>
<td>Partner Industry-based Related Experience</td>
<td>-0.006**</td>
<td>-0.006**</td>
<td>-0.005**</td>
<td>-0.012***</td>
<td>-0.012**</td>
<td>-21.599**</td>
<td>-0.211</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.39)</td>
<td>(-2.53)</td>
<td>(-2.51)</td>
<td>(-4.46)</td>
<td>(-2.38)</td>
<td>(-2.38)</td>
<td>(-0.24)</td>
<td></td>
</tr>
<tr>
<td>IT-enabled KM Capability</td>
<td>0.002</td>
<td>0.029**</td>
<td>0.031***</td>
<td>-0.002</td>
<td>0.0005**</td>
<td>41.750</td>
<td>0.100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.23)</td>
<td>(2.60)</td>
<td>(3.26)</td>
<td>(-0.09)</td>
<td>(0.54)</td>
<td>(1.42)</td>
<td>(0.54)</td>
<td></td>
</tr>
<tr>
<td>Alliance Experience × IT-enabled KM Capability</td>
<td>1.46e-4**</td>
<td>1.28e-4*</td>
<td>-4.16e-5</td>
<td>(-0.47)</td>
<td>0.158*</td>
<td>0.006*</td>
<td></td>
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<tr>
<td></td>
<td>(2.44)</td>
<td>(1.82)</td>
<td>(-0.89)</td>
<td>(1.99)</td>
<td>(1.71)</td>
<td></td>
<td></td>
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<tr>
<td>Type-based Related Experience × IT-enabled KM Capability</td>
<td>-1.74e-4</td>
<td>-1.51e-4</td>
<td>-0.569</td>
<td>-0.040***</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(-0.89)</td>
<td>(-0.64)</td>
<td>(-1.43)</td>
<td>(-3.33)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner Industry-based Related Experience × IT-enabled KM Capability</td>
<td>0.001***</td>
<td>0.001**</td>
<td>0.800</td>
<td>0.055*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.73)</td>
<td>(2.01)</td>
<td>(0.84)</td>
<td>(1.72)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Size</td>
<td>-0.861**</td>
<td>-0.929***</td>
<td>-0.925**</td>
<td>-1.018***</td>
<td>-1.043***</td>
<td>-781.575</td>
<td>-0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.54)</td>
<td>(-2.71)</td>
<td>(-2.61)</td>
<td>(-2.92)</td>
<td>(-2.99)</td>
<td>(-8.0)</td>
<td>(-1.18)</td>
<td></td>
</tr>
<tr>
<td>Related Alliance</td>
<td>0.035</td>
<td>0.297</td>
<td>0.295</td>
<td>0.283</td>
<td>0.304</td>
<td>0.231</td>
<td>609.92***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.09)</td>
<td>(0.81)</td>
<td>(0.81)</td>
<td>(0.88)</td>
<td>(0.88)</td>
<td>(0.56)</td>
<td>(4.16)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.79)</td>
<td>(2.04)</td>
<td>(1.93)</td>
<td>(1.92)</td>
<td>(2.01)</td>
<td>(-0.81)</td>
<td>(0.67)</td>
<td>(-2.36)</td>
</tr>
<tr>
<td>Firm-level Fixed Effects</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td>Observations</td>
<td>1118</td>
<td>1118</td>
<td>1118</td>
<td>1118</td>
<td>1118</td>
<td>1075</td>
<td>995</td>
<td>119</td>
</tr>
<tr>
<td>R-squared</td>
<td>2.61%</td>
<td>3.05%</td>
<td>3.06%</td>
<td>3.73%</td>
<td>4.17%</td>
<td>9.37%</td>
<td>2.18%</td>
<td>72.24%</td>
</tr>
</tbody>
</table>

Note: 1. * significant at 10%; ** significant at 5%; *** significant at 1%; 2. Clustered robust standard errors were used to calculate the t statistics, which is reported in parentheses; 3. Coefficients for industry and year dummies are not shown; 4. The dependent variable in Model VII was wealth change. 5. The dependent variable in Model VIII was abnormal ROA on a two-year period, measure in percentage.
Model III included the variable IT-enabled KM capability, which produced no significant effect on abnormal returns. The interaction between alliance experience and IT-enabled KM capability, however, yielded a positive and significant effect on abnormal returns in Model IV ($b = 1.46e-4$, $p < 0.05$). This result is consistent with H3, which proposes that the relationship between alliance experience and abnormal returns will be stronger if the firm has a strong IT-enabled KM capability. This positive relationship remained after the two additional interaction terms were added into Model V. The interaction term between type-based related experience and IT-enabled KM capability has a negative but not significant coefficient ($b = -1.74e-4$, ns), which implies no significant moderating effect. The result here suggests that the positive relationship between type-based experience and abnormal returns does not change as IT-enabled KM capability changes. The coefficient of the other interaction term is positive and significant at the 1% level ($b = 0.001$, $p < 0.01$). As a negative relationship was previously found between partner industry-based related experience and abnormal returns, this result in fact suggests that a strong IT-enabled KM capability reduces the negative effect of content-related experience on abnormal returns. Altogether the results of Model V show that IT-enabled KM capability has a much weaker moderating effect on the relationship between type-based related experience and abnormal returns than between partner industry-based related experience and abnormal returns. H4 is thus supported.

It is noteworthy that in all the six regressions, firm size measured by the logarithm of total assets is negatively related to abnormal returns. It seems that the investors put a relatively low valuation on large firms' stocks when they announce an alliance. This could also imply asymmetric gains between partners. Partner relatedness measured by whether they share the same four-digit SIC code is positively related to excess returns, though the effect is not statistically significant in any of the models. Model VI included firm fixed effects to control for unobserved heterogeneity in firm capabilities (Anand & Khanna, 2000). This model produced similar results as Model V, except for the interaction term between total alliance experience and IT-enabled KM capability. Also in Model VI the statistical significance of some predictor variables was reduced, probably due to the reduced statistical power resulting from adding 66 dummy variables (firm fixed effects) into the regression model. It could also be the reason why a significant interaction effect of alliance experience and KM capability was not found. Model VII used the aforementioned wealth change as the dependent variable. The model yielded comparable results, although the interaction term of partner industry-based related experience and KM capability failed to reach statistical significance. As total alliance experience and type-based experience increase by one deal respectively, the new alliance increases the market value of the firm by $8,801 and $12,348 accordingly. However, each additional deal of partner industry-based alliance experience would decrease the firm value by $21,599.

All the above analyses used the alliance as the unit of analysis. Since some of our variables are at the firm level, such as IT-enabled KM capability and firm size, we included an additional analysis at the firm level to provide better understanding of the relationships. For each firm-year observation in the sample, we created a firm-level performance measure for the aggregated value created through all alliances in a given year. This measure was obtained in three steps. First, we computed the difference in returns on assets (ROA) between the year when the firm announced alliances (Year 0) and the next year (Year 1). Then we obtained the same two-year performance difference based on industry average ROA. We used the firm’s primary industry. Third, we calculated the difference in the two ROA differences (firm minus industry) and used it as the measure for abnormal performance. We also aggregated experience variables by taking their averages across all the alliances announced by the firm in a given year. The results are reported in Model VIII. This model produced comparable results as Model V except for the reduced significance level for some of the variables.

**Discussion**

The negative effect of partner industry-based related experience on abnormal returns needs to be explained and discussed firstly. Our theoretical rationale was, although in general alliance experience has been found to contribute to value created in alliances, related alliance experience, whether defined by the functional focus or by the industry context, should be more relevant to value creation as it is more closely tied to the notion of absorptive capacity in the alliance domain. The past research has been silent on the type of alliance experience measured by the extent to which the current partner and the previous partners share something in common, such as their industry focus. We argued that this type of related experience helps shape the focal firm’s familiarity with the partner’s knowledge base, therefore easing the knowledge transfer process between them. We expected to see a value-adding role of partner industry-based related experience, but nevertheless our empirical analysis revealed a negative effect. Such a finding, although surprising, is not brand new. For instance, Hoang and Rothaermel (2005) actually found that partner-
specific experience, a concept similar to our partner industry-based related experience, had a negative effect on project success, their measure for alliance performance.

Previous research has shown that forming repeated ties in a turbulent environment can have some detrimental performance effects (Goerzen, 2007). By this token, engaging in repeated partnerships with firms in a single industry may lead to adverse impacts on firm performance, despite the potential value of partner industry-based experience. Another possible explanation can be found in the study on organizational acquisition experience by Halebian and Finkelstein (1999). In their study of the influence of acquisition experience on acquisition performance, Halebian and Finkelstein suggested that novice firms with limited acquisition experience tend to commit the error of inappropriate generalization, wherein they overestimate the similarity between the previous acquisition and the current acquisition and mistakenly apply past event experience to the present event. Their argument leads to a U-shaped curvilinear relationship between acquisition experience and acquisition performance.

Using their argument, we suspect that the negative relationship between partner industry-based related experience and abnormal returns is due to the same cause. When forming alliances with partners from the same industry as the previous partners, inexperienced firms tend to overestimate the similarity between the current partners and past partners and apply their past experience to an unnecessary extent, i.e. inappropriate generalization, often resulting in poor performance in the present alliance. Experienced firms, instead, would be able to discern the underlying dissimilarities between the present and previous partners and hence more likely to use their experience to an appropriate extent. If indeed the relationship is U-shaped and the firms in our sample are dominated by “inexperienced firms”, then the negative effect can be explained by the inappropriate generalization argument. To verify our speculation, we re-examined the characteristics of the alliances in terms of their partner industry-based related experience. We found the distribution of this variable to be largely skewed to the left end, i.e. many alliances were formed by firms with very limited related experience. More than a half of the alliances had less than six previous alliances in which the partners had the same industry focus as the present partner.

As information technology has become an integral part of firms’ management and operations, the process of reusing knowledge obtained from previous alliance experience can be facilitated by the use of IT. More importantly, information technologies underlie many knowledge management practices and often represent a cost-effective means to store, share, and distribute knowledge across the organization. Anecdotal evidence and academic research suggest that the firm’s use of IT-based KM tools contribute to the development of capability in managing knowledge. Since a strong capability in managing knowledge serves as an important factor in determining the scope of economic rents in an alliance, the effect of IT-based KM tools in the value creation process of alliances is evident. This finding seems to suggest that investors and analysts do consider the firm’s use of IT-based KM tools when evaluating a new alliance formed by the firm. They would adjust their expectations toward how much value can be gained by the firm accordingly. With the help of IT-based tools in knowledge management firms are more likely to capture a larger portion of economic value from shared knowledge and resources in an alliance relationship. The enhanced learning capability attributed to the use of IT-based KM tools becomes public information that is shared and used by investors and analysts when assessing the firm’s share price. Our results indicate that the stock market reacts favorably towards the firm’s use of IT-based KM tools, indicating the economic value of these IT-based KM tools.

**Limitations and Future Research**

The first limitation pertains to the measure of the firm’s capability to manage knowledge. We used the percentage of knowledge assets captured by technology-based knowledge management procedures. There are many other ways to gauge the firm’s knowledge management capability, which may or may not be based on IT. As one direction, future researchers can expand the scope of IT-based KM tools, which will add great depth to the research question of interest. Meanwhile knowledge management systems need to be tailored to firms’ situations. As such research on what types of knowledge management tools fit certain firms may yield important prescriptions for alliance managers.

Second, we used abnormal stock market returns as the primary measure for alliance performance which may not reflect the actual success of the focal alliance relationship. Although such a measure may not seriously affect the analysis as previous studies have found a correlation between market-based measures and perceptual measures, we suggest future researchers to use alternative measures for alliance performance, such as managerial assessment of alliance performance, knowledge flow between partners, and innovation output.
Third, we measured relatedness in alliance experience by its type and industry focus. There are, however, many other means by which relatedness can be evaluated. Alliance characteristics such as exploration versus exploitation focus (Rothaermel & Deeds, 2004), and partner characteristics such as country of origin, organizational structure, and capital structure may be considered by future researchers to capture related alliance experience differently. Moreover, recently scholars have stressed the importance of diversity in the learning context, which taken into the alliance domain implies the variance in alliance experience. It is then intriguing to investigate the role of alliance experience that is less relevant in value creation of alliances, which may yield strategic implications for decision makers.

The fourth limitation concerns the time period of our sample. The three-year period (1999-2001) represents the time that the Internet bubble grew and burst. IT firms might have formed alliances differently from what they might have done in normal economic environments and the stock market might also have reacted differently to these events as they might have in normal economic environments. We could not rule out the impact of the special context on our results because some of our variables are available only for the three-year period. Therefore our results should be interpreted and applied with a necessary extent of caution.

Conclusion

In this paper we explored the roles of related alliance experience and information technology in the value creation process of alliances. We found that type-based related experience was positively related to value gains in alliances whereas partner industry-based related experience affected value creation negatively. Moreover we highlighted the impact of IT-based KM tools in such a value creation process. We argued that such IT tools as groupware, organizational memory, search tools, expertise profiling, and expert systems affected the extent to which the firm can gain economic value from an alliance. The effect of alliance experience on alliance values is likely to be moderated by the firm’s capability in managing knowledge, the latter being achieved through using the aforementioned IT-based KM tools. We found empirical evidence that the firm’s capability in managing knowledge though the use of IT strengthened the relationship between alliance experience and abnormal stock market returns of new alliances. This finding suggests the importance of using information technology in the alliance management process and can be used by alliance managers to develop necessary IT systems to enhance the economic value created through cooperative strategies.
References


