A DEDICATED ALLIANCE FUNCTION, INFORMATION TECHNOLOGY, AND THE INTEGRATION OF ALLIANCE EXPERIENCE

Completed Research Paper

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Abstract

Research has suggested that alliance experience contribute to value creation in alliances, although mixed findings have been reported in the past. Using the perspective of knowledge integration, this paper explores the roles of a dedicated alliance function and information technology in the process of integrating previous alliance experience. More importantly, it proposes a potential synergistic effect between an alliance function and information technology. By employing a sample of joint ventures during the time period from 1999 to 2001, the paper has shown that both knowledge integration mechanisms strengthen the value of previous alliance experience. Furthermore the use of IT in knowledge integration, particularly regarding knowledge codification and knowledge system usage, has a stronger effect when the firm also has a dedicated alliance function. These findings highlight the role of IT in inter-firm relationships, broaden the view on the value of alliance experience, and offer important managerial implications.

Keywords: Alliance experience, alliance functions, information technology, abnormal returns

Introduction

Recent strategy research has suggested that firms may be able to extract economic rents from resources outside their scope through the sharing of such resources by their alliance partners (Dyer and Singh 1998; Gulati et al. 2000; Lavie 2006; Zaheer and Bell 2005). In reality, firms vary in their ability to extract this type of economic rent, known as relational rent (Dyer and Singh 1998). Among various firm-level factors such as the firm’s relative absorptive capacity (Lavie 2006), the firm’s ability to do so has been widely argued to be determined by the extent to which it learns from past alliances (Anand and Khanna 2000). In the alliance context, the firm’s learning capacity may derive from its 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 is an important factor that can influence alliance performance (Anand and Khanna 2000; Child and Yan 2003; Fiol and Lyles 1985; Kale et al. 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). In short, alliance experience matters because it can lead to knowledge about how to form and manage alliances.

Despite the important role of alliance experience, prior studies have reported insignificant or even negative effects of experience on alliance value, often measured by abnormal stock market returns (Anand and Khanna 2000; Merchant and Schendel 2000). Researchers have suggested a fine-grained perspective of alliance experience such as the distinction between partner-specific and general partnering experience (Gulati et al. 2009; Hoang and Rothaermel 2005). Others have suggested distinguishing alliance experience in other dimensions such as the partner’s industry and the type of the alliance (Liu and Ravichandran 2009). Although differentiating different types of alliance experience may explain why experience is not always value-adding, another important condition that may also determine when
experience pays off has not been paid sufficient attention to, i.e. the mechanisms for reusing alliance experience. If alliance experience matters because it represents the knowledge about how to form and manage alliances, then the firm's ability to reuse such knowledge determines how much the firm benefits from such knowledge. For firms having difficulty in codifying and sharing their past experience across the organization, such experience may indicate little value to them. As such, examining how knowledge integration mechanisms affect the value creation process of alliances enhances our understanding of the dynamism in applying alliance experience.

There is peculiar difficulty involved in reusing alliance experience. Difficulty in integrating knowledge within the boundary of the organization is especially prominent when the knowledge being integrated is highly tacit (Grant 1996), which is often the case for knowledge embedded in alliance experience. Knowledge embedded in action, experience, and involvement in a particular context tends to be tacit and hard to codify (Nonaka 1994). To access and use such knowledge, organizations must employ interactive processes such as training courses and workshops to allow members to communicate and share information. Besides, alliance experience is also likely to be widely distributed across the organization since alliances often involve various functions, levels of management, and divisions. To integrate such knowledge, the firm has to overcome temporal and geographic constraints, which often diminish the effectiveness of the aforementioned integrative mechanisms. Hence firms must carefully select knowledge integration mechanisms that are appropriate for the type of knowledge embedded in alliance experience.

Given the difficulty in reusing alliance experience, it is intriguing to investigate whether the stock market would react differently to the announcement of alliances made by firms with sophisticated tools for institutionalizing prior alliance experience compared to those without. The literature has suggested that a great variety of mechanisms, ranging from structural to technological means, can be used to facilitate the transformation of experience into knowledge (Argote and Miron-Spektor 2010; Grant 1996). However, so far no study has systematically investigated how structural and technological mechanisms enhance the institutionalization of alliance experience and hence change the reaction by the stock market to an alliance event, let alone the likely interplay between such knowledge integration mechanisms. In this study, we strive to fill this research gap by building a model linking alliance experience, various knowledge integration mechanisms, and the expected value (abnormal returns) of an alliance. The findings our empirical analysis should inform both alliance researchers and practitioners by furthering our understanding of how investors interpret firm-specific capabilities in their valuation of alliances.

The rest of the paper is organized as follows. The next section establishes the theoretical foundation and proposes the research hypotheses. The methodology section follows with a detailed description of the data and the variables. The section after that details the regression results and the last section discusses the implications of the findings.

**Theory and Hypotheses**

**Integration of 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. However, such spillover effects may not take place automatically as knowledge transfer is subject to internal stickiness (Szulanski 1996). 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 et al. 2002). This is because the knowledge embodied by alliance experience tends to be tacit, unevenly distributed, and improperly stored in the organization. Tacit knowledge is not well articulated and hard to codify, hence may not be effectively shared among organizational members or across various decision-making scenarios. The knowledge derived from 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 a higher level. If experience-based knowledge is not well articulated or
codified, it may stay with those 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.

Therefore, rather than relying on the spontaneous and hence casual process of experience accumulation, the firm needs to install mechanisms for knowledge integration. In other words, the firm needs to be proactive in learning from past experience and institutionalizing the associated alliance know-how. To capture and use such knowledge the firm needs communication-intensive processes to allow or help knowledge bearers articulate and codify the knowledge. In reality firms differ greatly in their ability to capture and codify knowledge. Like human beings, organizations tend to forget(Holan and Phillips 2004). Without effective knowledge retention, the firm may lose the experience earned in earlier years. When the firm assumes a strong capability in codifying knowledge, tacit knowledge obtained from past experience can stay with the firm in a more articulated format. Competences in turning tacit knowledge into codified knowledge and storing it in the firm’s knowledge repositories therefore underlie the efforts of using past alliance-related knowledge to manage new alliances, and hence enhance value creation in these new ventures.

Besides codifying tacit knowledge, accessing various knowledge sources is also of critical importance in the process of integrating alliance experience. The actual use of knowledge repositories represents a crucial antecedent of the firm’s capability in reusing any type of knowledge. Simply digitalizing content does not suffice for the effective use of codified knowledge(Zack 1999). If employees lack the motivation or ability to use the knowledge repository then knowledge retained in such a repository contribute little value to the firm. Therefore in order to integrate alliance experience, the firm must also install mechanisms to encourage or facilitate alliance participants’ use of knowledge systems or knowledge repositories. Rewards or incentives, for example, can be used to promote the participation of organizational members in knowledge codification efforts. Culture and norms of cooperation and reciprocity are also found to increase the usage of knowledge management systems (KMS) such as electronic networks of practice and knowledge repositories (Kankanahalli et al. 2005; Wasko and Faraj 2005). Given the importance of accessing knowledge embedded in alliance experience, the firm must be mindful toward the accessibility of knowledge assets in the process of integrating alliance experience.

To sum up, merely accumulating past alliance experience in an unstructured and sporadic manner may not contribute to value creation in alliances. Instead firms need to have processes and mechanisms in place to turn experience into more codified knowledge and also to make such knowledge visible and accessible to alliance participants. We consider particularly in this study two mechanisms that firms may use to meet this purpose, namely, a dedicated alliance function and IT-enabled knowledge integration.

A Dedicated Alliance Function

So far we have argued that integration mechanisms matter in the process of institutionalizing alliance know-how. Such integration mechanisms can be manifested in the firm’s routines and processes to effectively codify knowledge and update knowledge repositories. For example, the firm may have specialized personnel who are responsible for capturing and codifying knowledge on a daily basis. Some companies have established the position of chief knowledge officer (CKO) who oversees internal knowledge management processes(Zack 1999). More relevantly, a number of firms have established an independent organizational unit that oversees the integration of alliance-related experience, known as a dedicated alliance function(Kale et al. 2002). In those firms, a senior executive, often called VP of Strategic Alliances or VP of Global Business Partners, is appointed to assume the responsibility of coordinating all alliance-related activities. The most important role of the dedicated alliance function is to provide a central location to coordinate alliance-related activities, including evaluation and selection of partners, management of alliance practices, and integration of alliance-related knowledge(Dyer and Singh 1998). For example, it has been found that a dedicated alliance function contributes to the alliance learning process, defined as the articulation, codification, sharing, and internalization of alliance know-how (Kale and Singh, 2007). Hence a dedicated alliance function represents a structural mechanism for the institutionalization of alliance experience.

First, a dedicated alliance function is an ideal location for codifying alliance know-how from past alliance experience. Staff in the alliance function is often charged with the responsibility of forming and managing alliances, as such they are the immediate bearer of alliance experience. Staff can use resources to capture, interpret, and codify knowledge from past alliance experience in a systematical way(Sarkar et al. 2009).
The codified alliance know-how can then be stored in an organizational memory that may be shared by all alliance participants. For example, Hewlett Packard has developed manuals containing valuable codified alliance-related knowledge in an attempt to guide future alliance practices (Dyer and Singh 1998). Second, a dedicated alliance function can also improve the accessibility of alliance know-how for being a centralized knowledge exchange site. Such a function serves as an organizational structure to economize on the amount of communications needed to facilitate knowledge integration (Grant 1996). With its existence, those who bear alliance-related knowledge can meet, communicate, and share experience obtained from past involvement in alliance activities. With the help of such communications alliance participants can easily locate the proper experience or knowledge they need in a particular alliance event. Formal mechanisms such as regular meetings or informal mechanisms such as interpersonal networks can be employed in a dedicated alliance function and can improve the visibility and accessibility of alliance know-how.

To sum up, the existence of a dedicated alliance function can indicate a relatively strong alliance capability of the firm, which derives both from a strong competency in transforming experience into alliance knowledge and from presenting such knowledge to users. As the presence of an alliance function is often public information, when the firm announces an alliance, investors can use the information to adjust their expectation on how much value the alliance can create. Hence the existence of an alliance function may strengthen the positive effect of alliance experience on excess returns.

Hypothesis 1: The relationship between alliance experience and abnormal stock market returns following alliance announcements will be stronger if the firm has a dedicated alliance function.

IT-Enabled Knowledge Integration

Another useful approach to knowledge integration is to deploy computer-aided tools. IT can be used to streamline business processes as well as to strengthen knowledge exchange within the organization (Alavi and Leidner 2001; Davenport 1993; Davenport and Prusak 1998; Tanriverdi 2005). IT may provide a great deal of help in the codification of knowledge embedded in alliance experience. Alliance participants can create entries in alliance-related repositories or databases to document their past experience electronically. In practice, such alliance databases are widely 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. More broadly, a number of integrative applications ranging from “electronic publishing” to “integrated knowledge-bases” can be used for capturing and codifying tacit knowledge (Zack 1999). For example, an 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 and Leidner 2001).Information systems (IS) scholars have studied IT-enabled organizational memory systems such as electronic knowledge repositories (Kane and Alavi 2007; Kankanhalli et al. 2005) and found them to be critical factors for leveraging the firm’s knowledge resources.

Besides, communication technologies such as intranets, 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, helping convert tacit knowledge into codified knowledge. Particularly certain intranet-based tools like alliance-dedicated portals can facilitate the search and retrieval of information out of knowledge repositories to support decision-making and enhance the productivity of knowledge workers.

Once tacit knowledge such as alliance experience has been codified and stored, it becomes much easier to access and share such knowledge. Computer-mediated search and retrieval tools provide an efficient means for users to access knowledge in an either centralized or distributed manner. However, there are concerns that the actual use of such knowledge management systems may not suffice to the extent which maximizes the value of codified knowledge. Lack of motivation or ability to use the systems may hinder the actual use of knowledge management systems such as an electronic knowledge repository and therefore limit the value potentials of codified knowledge. For example, perceived usefulness and perceived ease of use may determine the extent to which an information system will be used. Besides, the usage of knowledge management systems is also found to be determined by organizational and social factors such as rewards and reciprocity (Kankanhalli et al. 2005; Wasko and Faraj 2005). Given the efforts of the firm in codifying the knowledge obtained from past experience, the resulting knowledge
management systems contain important knowledge assets that alliance participants can tap into to create value in alliances. Hence we would expect that the actual usage of such knowledge management systems improves the accessibility of such resources, enhances the integration process of alliance experience, and strengthens the value of alliance experience.

Given the above arguments as to how IT can be used to streamline knowledge integration processes, we expect that firms which have installed IT tools to codify their knowledge will be able to learn more effectively from their previous experience. Particularly the relationship between alliance experience and abnormal returns will be stronger if the firm has superior capabilities in codifying knowledge by using IT. Furthermore, it is equally important for organizational members to actually use these IT tools proactively in order to leverage the codified knowledge. The extent of actual usage therefore may also affect the extent to which alliance experience contributes to value creation. Unlike a dedicated alliance function, the information about a firm’s use of IT in knowledge integration may not be immediately available to the stock market. But there are channels through which such information can be communicated to the external investors. For example, various media outlets such as professional IT publications frequently publish best practices in knowledge management systems. Research and consulting firms also report cases regarding how firms use IT to improve knowledge management processes. Therefore:

*Hypothesis 2a: The relationship between alliance experience and abnormal stock market returns following alliance announcements will be stronger if the firm has a strong IT-enabled capability in codifying knowledge.*

*Hypothesis 2b: The relationship between alliance experience and abnormal stock market returns following alliance announcements will be stronger if the firm’s actual usage of KM systems is high.*

**Interplay between Alliance Function and IT**

As knowledge represented by alliance experience often varies in the degree of equivocality, context specificity, and tacitness, the use of IT to support knowledge integration may have its limit. Alliance-related knowledge can be heterogeneous as alliance experience may differ in its origin and context. For instance, alliance experience differs depending on the value chain function performed by the alliance in terms of procurement, R&D, manufacturing, marketing, sales, and customer service, or due to specific partner characteristics such as industry and technology(Heimeriks and Duysters 2007; Reuer et al. 2002). Due to the different functions performed by alliances, equivocality can arise in the process of internalizing alliance experience. Alliance managers who work on different alliance projects may have different functional backgrounds. An ambiguous problem can be perceived differently by managers from different functional departments, thus impeding the effective reuse of alliance experience. To cope with ambiguity or equivocality managers must pool their opinions and reach a shared understanding of the problem. As a result, communications of equivocal knowledge may require richer media such as traditional face-to-face meetings rather than IT-based means (Daft et al. 1987). Such a tendency can be greater when the context specificity of alliance experience is low. Alliance researchers have studied partner-specific experience and general partnering experience and found them differing in context specificity(Gulati et al. 2009; Hoang and Rothaermel 2005). More context-specific experience such as partner-specific experience incurs less equivocality whereas integrating general partnering experience involves multiple frameworks of reference and therefore increases equivocality.

Meanwhile, in the process of reusing alliance experience, certain partner characteristics such as industry, size, or financial information are easier to codify, while others including technology, culture, and management style are not. It should involve few problems to codify and store explicit or less tacit knowledge using IT-enabled tools such as organizational memories given its inherent communicability(Grant 1996). 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 et al. 2005). Furthermore, the process of institutionalizing such knowledge may be well supported by technologies such as text mining, electronic knowledge repositories, and search and retrieval tools. However, it should be more difficult to codify and apply more tacit 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 et al. 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 and Lengel 1986). Compared to IT-enabled communication tools, working together on a project or task, for example, represents a more effective means to capture, transfer, and use knowledge perceived to be more tacit as they provide a more intimate and friendly environment to discuss complicated and subtle issues.

Given the limit in the use of IT tools in knowledge integration, one can infer that the existence of an alliance function can complement the use of technology in integrating equivocal or tacit alliance know-how. The alliance function provides a central location for knowledge bearers to exchange and share alliance-related knowledge. Numerous non-IT-based processes can be used to facilitate the transfer of knowledge or the integration of alliance experience. For example, the function can hold meetings, workshops, seminars, and training sessions for alliance managers to articulate and share their experience, even though they are from different functional departments. As the codification of and access to more tacit knowledge often require traditional face-to-face contacts, the alliance function provides the necessary organizational means for the integration efforts. While IT may be less capable of handling knowledge integration in such a context, the alliance function complements the use of IT to a great extent. With the help of the alliance function, the firm will still be able to benefit from the efforts to codify knowledge and make it available for use across the organization through IT-enabled tools. Moreover, by creating interpersonal networks among alliance managers, the alliance function can promote the effectiveness of integrating tacit knowledge through IT-based means due to the closer relationship between the knowledge contributor and knowledge recipient. The alliance function can also take advantage of advanced IT tools to overcome geographic or time limits. For example, “virtual conferences” can be employed to involve managers located in different geographic locations. Last but not least, the alliance function can be an optimal place for hosting the IT-enabled central repository of alliance-related knowledge. In other words, the firm’s efficiency in the integration of alliance experience will increase due to the complementarity between IT-based tools and a dedicated alliance function.

Hypothesis 3a: The moderating effect of IT-enabled knowledge codification will be stronger (more positive) if the firm has a dedicated alliance function.

Hypothesis 3b: The moderating effect of the actual usage of KM systems will be stronger (more positive) if the firm has a dedicated alliance function.

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 and Khanna 2000). As such we collected the data on alliances from 1990 until 2001. We used data of only manufacturing firms because a number of manufacturing industries rely heavily on alliances as an important element of corporate strategy. Such industries may include chemicals, pharmaceuticals, semiconductors, communications, and automotive. We were aware that personal computer industries are also alliance-intensive industries. However, the time period of our sample (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. As a result we excluded them in the sample. Since there are various forms of strategic alliances ranging from licensing agreements to equity-based joint ventures, to minimize the potential impact of the contractual form on our analyses, we selected only joint ventures into our sample.

We then collected the data on firms’ use of IT tools in knowledge integration 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. The respondents were mostly firms’ senior IS executives. 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 329 joint ventures made by 90 firms in the three-year period (1999-2001). We then collected data on control variables such as firm size from Compustat.

**Dependent Variable**

**Abnormal stock market returns**

To measure the economic value gained from an alliance, we used the event study methodology to compute abnormal stock market returns following new alliance announcements. The event study method has become an increasingly important research methodology in both strategy and IS fields. It is 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 and 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 \( \hat{r}_{it} \). 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 (Brown and Warner 1985; Halebian and Finkelstein 1999). 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

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

Brown and Warner (1985) has shown that the approach of standard OLS market model and the approach of using market adjusted returns (our approach) 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. We chose a relatively long event window to capture any information leakage or lagging effects accompanying the announcement of alliances, which is also similar to what has been used in the past research (see e.g. (Anand and Khanna 2000; Kale et al. 2002)) The window we used was a twelve-day period starting from ten days before the event day to one day after the event day, i.e., day -10 through day 1. 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 et al. 2002; Koh and Venkatraman 1991).

The average abnormal return on the announcement day (day zero) is 0.06 percent (Partell Z statistic = 0.488, n.s.), which is not statistically significant. However, the cumulative abnormal returns over the 12-day event window is significant at the 5% level (CAR = 1.03%, \( p < 0.05 \)), suggesting that there were strong information leakage effects prior to the announcement of the event in our sample. We have also tried different event windows such as a 14-day window starting from 10 days before the event day to three days
after the event day, used by previous studies such as Anand and Khanna (2000). The results are generally consistent with those reported in the paper and are available upon request from the authors.

**Independent Variables**

**Alliance Experience**

Like most previous research on alliance experience, a firm’s prior alliance experience was measured by counting the number of each firm’s alliances (joint ventures) starting from January 1, 1990 to the event day when the firm announced the present alliance (not including the present alliance). We also 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. Such information was used to create dummy variables as controls (described later in the section of control variables). The data on alliances was obtained from the SDC database. Sometimes the SDC database might contain multiple records for the same alliance because it collects data from multiple sources such as SEC filings and their international counterparts, trade publications, wires, and news sources. 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.

**Alliance Function**

A dedicated alliance function is measured by a categorical variable indicating the extent to which the firm has established a position which is responsible for all alliance-related activities. After conducting executive interviews and examining past research, we have found that this position may have different names, such as “VP of Global Alliances”, “VP of Strategic Business Partnerships”, “VP of Strategic Alliances”, “VP of Strategic Relationships”, and “President of North American Joint Ventures”. We obtained this information primarily from the firm’s annual report. Firms are required to report the names and positions of their senior executive officers in annual reports. For example, in its 1999 Form 10K, 3Com reported the names, ages, and positions held by all executive officers of 3Com on Page 11 through 14. We then searched for the positions mentioned above that may serve as the head of a dedicated alliance function. If we found such a position, we then coded the variable as one. If not then we searched the report to see if the firm had a position such as “VP of Business Development” or “VP of Corporate Development”. Although they might not suggest a dedicated alliance function, such positions are often involved in alliance-related issues. For example, Anik Bose, as the former VP of Corporate Business Development at 3Com, architected the firm’s joint venture with Huawei known as H3C. If the firm had such positions, we then coded the variable as 0.5. We coded the variable as zero if none of the aforementioned positions was found in the firm. We also referred to other data sources such as the LexisNexis Academic database to verify the existence of an alliance function in a particular firm primarily through news search. Note that we lagged this variable, i.e. we coded the variable as one only when the firm had a dedicated alliance function prior to the year when the alliance was formed.

**IT-enabled Knowledge Integration**

IT enablement in knowledge integration refers to the extent to which the firm uses IT-based tools to codify and access knowledge. We particularly measured the extent of IT-enabled knowledge codification and the actual usage of knowledge management systems. The extent of IT-enabled knowledge codification was measured by the proportion of the firm’s knowledge captured by KM systems. 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 then be stored in the firm’s knowledge repositories. The InformationWeek surveys considered a variety of IT-based KM tools ranging from groupware to expert systems that constituted the knowledge management procedures. We then
measured KM systems usage by the percentage of knowledge workers who have used these KM systems. The surveys also asked participants to estimate the percentage of the firm’s knowledge workers who accessed and used the firm’s various knowledge systems.

### Table 1. Descriptive Statistics and Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CAR</td>
<td>0.97</td>
<td>8.76</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2 Alliance Experience</td>
<td>16.83</td>
<td>22.13</td>
<td>0.07</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Alliance Function</td>
<td>0.21</td>
<td>0.30</td>
<td>-0.06</td>
<td>-0.22**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 IT-enabled Knowledge Codification</td>
<td>31.71</td>
<td>27.35</td>
<td>-0.00</td>
<td>0.02</td>
<td>-0.01</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 KM Systems Usage</td>
<td>32.91</td>
<td>27.79</td>
<td>-0.05</td>
<td>-0.01</td>
<td>0.16**</td>
<td>0.51**</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Firm Size</td>
<td>4.30</td>
<td>0.50</td>
<td>0.05</td>
<td>0.36**</td>
<td>-0.02</td>
<td>0.16**</td>
<td>0.18**</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>7 Partner Relatedness</td>
<td>0.18</td>
<td>0.39</td>
<td>0.00</td>
<td>-0.05</td>
<td>-0.08</td>
<td>0.02</td>
<td>0.002</td>
<td>-0.02</td>
<td>1.00</td>
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</tbody>
</table>

Note: 1. N = 329; 2. * significant at 5%; ** significant at 1%; 3. CARs (Cumulative abnormal returns), IT-enabled in Knowledge codification, and Actual Usage of KM Systems are measured in percentage.

### 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 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 1 provides the descriptive statistics and the correlation matrix for all the key variables.

### Results

Our dataset consists of 329 events over three years and across 90 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.

Table 2 reports the results of regression analyses using the firm’s cumulative abnormal returns (CARs) as the dependent variable. In Model I we only included control variables in the equation. Model II included the variables alliance experience and alliance function. The result confirmed the previous finding that alliance experience is a positive contributor to value creation in alliances (b = 0.068, p < 0.01). However, the variable of alliance function does not have a significant coefficient. To test Hypothesis 1, Model III included the interaction between alliance experience and alliance function. The result of Model III supports Hypothesis 1 in that the interaction has a positive and significant coefficient (b = 0.523, p < 0.01). Model IV added the variable IT-enabled knowledge codification, which does not have a significant effect on abnormal returns. Model V added the interaction term between alliance experience and IT-
Table 2. Regression Analysis Examining the Relationship between Abnormal Stock Market Returns and Alliance Experience

<table>
<thead>
<tr>
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<th>I</th>
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<th>VII</th>
<th>VIII</th>
<th>IX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliance Experience</td>
<td>0.068** (0.025)</td>
<td>0.154*** (0.035)</td>
<td>0.071* (0.028)</td>
<td>0.086** (0.026)</td>
<td>0.064* (0.026)</td>
<td>0.099** (0.026)</td>
<td>0.155*** (0.033)</td>
<td>0.160** (0.047)</td>
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<tr>
<td>Alliance Function</td>
<td>-1.844 (1.948)</td>
<td>3.117 (2.290)</td>
<td>-1.424 (1.915)</td>
<td>-1.887 (1.967)</td>
<td>-1.365 (2.135)</td>
<td>-0.861 (2.165)</td>
<td>1.895 (1.515)</td>
<td>4.649† (2.205)</td>
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<tr>
<td>Alliance Experience × Alliance Function</td>
<td>0.523** (0.154)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.509** (0.122)</td>
<td>0.483* (0.202)</td>
</tr>
<tr>
<td>IT-Enabled Knowledge Codification</td>
<td></td>
<td>-1.596 (3.765)</td>
<td>3.117 (2.290)</td>
<td>-1.844 (3.289)</td>
<td></td>
<td></td>
<td>-2.326 (4.457)</td>
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</tr>
<tr>
<td>Alliance Experience × IT-Enabled Knowledge Codification</td>
<td></td>
<td></td>
<td>0.265* (0.119)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.316** (0.099)</td>
<td></td>
</tr>
<tr>
<td>KM Systems Usage</td>
<td>-2.859 (3.657)</td>
<td>-2.555 (3.386)</td>
<td></td>
<td></td>
<td>-3.660 (3.460)</td>
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<tr>
<td>Alliance Experience × KM Systems Usage</td>
<td></td>
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<td></td>
<td></td>
<td>0.211** (0.075)</td>
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<td>0.110 (0.096)</td>
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<tr>
<td>Alliance Function × IT-Enabled Knowledge Codification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-16.216† (8.001)</td>
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<tr>
<td>Alliance Experience × IT-Enabled Knowledge Codification × Alliance Function</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>1.247** (0.371)</td>
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<tr>
<td>Alliance Function × KM Systems Usage</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td>-12.042 (9.009)</td>
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<tr>
<td>Alliance Experience × KM Systems Usage × Alliance Function</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>-0.952 (0.476)</td>
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</tr>
<tr>
<td>Firm Size</td>
<td>0.325 (2.00)</td>
<td>-1.091 (2.26)</td>
<td>-0.648 (2.224)</td>
<td>-0.602 (2.548)</td>
<td>-0.876 (2.435)</td>
<td>-0.499 (2.634)</td>
<td>-0.765 (2.572)</td>
<td>-0.757 (1.496)</td>
<td>-0.224 (2.051)</td>
</tr>
<tr>
<td>Partner Relatedness</td>
<td>0.587 (1.70)</td>
<td>0.915 (1.70)</td>
<td>0.969 (1.709)</td>
<td>0.751 (1.624)</td>
<td>1.139 (1.636)</td>
<td>0.985 (1.704)</td>
<td>1.037 (1.712)</td>
<td>1.105 (1.580)</td>
<td>1.034 (1.418)</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.789 (9.11)</td>
<td>1.745 (10.22)</td>
<td>-5.035 (9.782)</td>
<td>-0.724 (11.353)</td>
<td>1.450 (10.577)</td>
<td>1.297 (10.621)</td>
<td>-1.186 (10.778)</td>
<td>-3.171 (5.627)</td>
<td>-4.890 (7.350)</td>
</tr>
<tr>
<td>Observations</td>
<td>329</td>
<td>329</td>
<td>329</td>
<td>329</td>
<td>329</td>
<td>329</td>
<td>329</td>
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<td>329</td>
</tr>
<tr>
<td>R-squared</td>
<td>5.79%</td>
<td>6.99%</td>
<td>8.85%</td>
<td>6.83%</td>
<td>8.08%</td>
<td>7.31%</td>
<td>8.15%</td>
<td>11.85%</td>
<td>10.09%</td>
</tr>
<tr>
<td>Increased R-squared</td>
<td>1.86%**</td>
<td>1.25%*</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>0.84%†</td>
</tr>
</tbody>
</table>

Note: 1. † significant at 10%, * significant at 5%, ** significant at 1%, *** significant at 0.1%; 2. Clustered robust standard errors were reported in parentheses; 3. Coefficients for industry and year dummies are not shown.
enabled knowledge codification to test Hypothesis 2a. The interaction effect is positive and significant at the 5% level ($b = 0.003, p < 0.05$), thereby supporting the hypothesis. Similarly the testing of Hypothesis 2b was conducted in Model VII, which produced a positive and significant interaction effect of alliance experience and the actual usage of KM systems ($b = 0.002, p < 0.01$), thereby supporting Hypothesis 2b. It should be noted that the increased $R^2$ resulting from adding the interaction variable is statistically significant in the testing of all three hypotheses. According to Table 1, there is a high correlation between IT-enabled knowledge codification and KM systems usage ($r = 0.51$). In fact when we included both interaction terms in one regression, the mean variance inflation factor (VIF) jumped from 3.85 to 6.65 and the interaction between alliance experience and KM system usage had a negative and marginally significant coefficient, suggesting a potential multicollinearity problem. Hence we decided not to include the two interactions in the same equation. We plot the moderating effects in Figure 1.

To test Hypothesis 3a, we introduced a three-way interaction variable between alliance experience, IT-enabled knowledge codification, and alliance function, into Model VIII. If the estimated coefficient of the three-way interaction variable is positive, then the actual moderating effect of IT-enabled knowledge codification will be greater if the firm has a dedicated alliance function than otherwise. We found that the three-way interaction variable had a positive and significant coefficient ($b = 0.012, p < 0.01$), hence Hypothesis 3a is supported. When the firm has a dedicated alliance function, the actual moderating effect of IT-enabled knowledge codification will increase from 0.003 to 0.015 ($0.003 + 0.012$), suggesting a strong complementary relationship between structural and technological knowledge integration mechanisms. We conducted a similar analysis on the variable of actual usage of KM systems in Model IX but it failed to yield a significant three-way interaction effect. Thus Hypothesis 3b is not supported.

![Figure 1. The Moderating Effects of a Dedicated Alliance Function and IT Enablement in Knowledge Integration](image)

**Discussion**

So far our analyses have revealed some interesting findings. We have found that a dedicated alliance function serves as an important means for knowledge integration in the exploitation of alliance experience. We have also found a firm’s capability in using IT-based KM tools to enhance the process of reusing alliance experience. The latter finding is particularly important because it suggests that a firm’s IT capability be important in forming inter-firm relationships. As information technology has become an integral part of firms’ management and operations, technological means can be an important mechanism for organizational learning (Kane & Alavi, 2007). Information technologies underlie many knowledge management practices and often represent a cost-effective means to store, share, and distribute knowledge across the organization. Since we view the reuse of alliance experience as a learning process, 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 capability in using 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 integration mechanisms, firms are more likely to create economic value from shared knowledge and resources in an alliance relationship. This study, together with other previous studies, highlights the role of IT in inter-firm relationships (Krishnan et al. 2007; Rai et al. 2006; Tanriverdi et al. 2007; Teo et al. 2003; Zhu et al. 2006). While previous studies have mostly examined inter-organizational systems, this study is focused on the role of internal oriented IT in such relationships, therefore contributing to a systematic and holistic view of the use of IT in inter-firm relationships.

Our findings also suggest the potential complementarity between different knowledge integration mechanisms. Knowledge integration mechanisms can be organizational, technological, or even social (Argote and Miron-Spektor 2010). In this study we focus on the organizational and technological means of knowledge integration: a dedicated alliance function and IT-based tools. Our study has shown that not only both mechanisms strengthen the reuse of alliance experience individually, but also they interact in a way that further streamlines the internalization of alliance know-how embedded in alliance experience. Particularly we have found that a dedicated alliance function complements a firm’s IT-enabled capability in knowledge codification. Previous research has suggested that knowledge management efforts should be accompanied by effective organizational structure and technical architecture appropriate for the need of the firm (Zack 1999). In the context of integrating or managing alliance know-how, such a need can be met by implementing certain structural and technological changes. However, potential synergies between these knowledge integration mechanisms have not been sufficiently addressed and explored in the past research. Our results seem to suggest that, given the scope of knowledge that needs to be integrated in alliances, simply using one type of knowledge integration means may not suffice. Hence an increasing focus on the interplay between various knowledge integration mechanisms can further our understanding of the strengths and weaknesses of such mechanisms in a certain knowledge processing context. Our study has undertaken a first step in revealing the interesting interplay in the particular context of reusing alliance experience.

However, we did not find a similarly significant interaction effect on value creation of a dedicated alliance function and the actual usage of KM systems. As we argued earlier, the codification of certain knowledge may encounter particular difficulties, which cannot be fully addressed by technological means. Therefore a dedicated alliance function, as a structural means to integrate knowledge, has the potential to complement the use of IT if such necessities arise. However, when it comes to the matter of accessing and using KM systems, a dedicated alliance function may not be particularly useful because the usage intention of such systems can be influenced more by technological or organizational factors. For example, a tremendous body of research studying the adoption of information systems has found that technological aspects such as perceived usefulness and perceived ease of use may determine the actual usage of such systems (Davis 1989). A later extension of the technology acceptance model has suggested that social influence processes and cognitive traits may also explain the antecedents of technology adoption (Venkatesh and Davis 2000). Particularly in the context of knowledge management, organizational factors such as an atmosphere of sharing knowledge, trust, and rewards may explain the extent of using KM systems (Kankanhalli et al. 2005). Given the above factors that promote the use of KM systems in a stronger manner, the effect of a dedicated alliance function on KM systems usage is less likely to prevail and entail a significant interaction. In other words, although it may complement knowledge codification efforts through IT, such a function has few synergies with the use of or access to IT-based tools.

The managerial implication of this study is straightforward. Generally speaking, our results seem to suggest that alliance experience is more likely to pay off in technologically sophisticated firms. Specifically in forming inter-firm relationships such as alliances, systems that allow prior alliance experience to be accessible and shared within the organization need to be created (Rai et al. 1996). This necessity may require firms to tailor their IT applications to specific purposes such as alliance databases or alliance-dedicated portals. According to Figure 1, when firms have abundant experience in forming and managing alliances, they are better off by having a strong IT-enabled capability in knowledge management. In the mean time, it is also interesting to note that when firms assume limited alliance experience, they incur more positive reactions from the stock market when the level of technological sophistication is low. This finding conveys an important message to firms that investors do not always perceive investments in knowledge management systems as value-adding or simply necessary, especially when firms are not particularly experienced in forming and managing alliances. The stock market tends to react unfavorably
to such conditions when firms are believed to overinvest in technologies at the expense of other investment opportunities.

Although the use of IT-based tools can help, our study does suggest that the use of IT in knowledge integration may have its limit. First, certain alliance experience is likely to be equivocal as it may entail multiple interpretations and blur the causal linkages. When facing such equivocality, managers often prefer richer media channels such as traditional face-to-face meetings rather than ordinary IT. Second, alliance experience that is more context-specific can be less subject to the problem of equivocality whereas ambiguity becomes higher when alliance experience is non-specific or general. As a result IT can also become less relevant when integrating general partnering experience. Such limits suggest that organizational means such as a dedicated alliance function can be complementary to the use of IT-based tools in knowledge integration. Managers should be aware of the super-additive relationship between an alliance function and IT-based tools in knowledge integration. They may consider deploying various IT tools in the specific alliance function. Particularly personnel in the alliance function may take the responsibility of maintaining the alliance-dedicated repository, into which they collect and codify alliance-related knowledge.

**Limitations and Future Research**

The first limitation pertains to the measures of IT-enabled knowledge integration capabilities. In this study we relied on the *InformationWeek* annual surveys to obtain our measures, which can be relatively narrow and biased given the perspectives that the respondents had. By using secondary data, however, we had no control over the reliability and validity of such measures. As a result, our findings should be treated with caution considering the limitation in our measures. We hope that future research can address this data limitation and seek for measures that can be tested on both reliability and validity.

Another limitation concerns about the scope of knowledge integration mechanisms considered in this study. We only examined two types of mechanisms: an alliance function and IT-based tools. There are many other ways to gauge the firm’s use of knowledge integration mechanisms, which may or may not be based on IT. For instance, social mechanisms such as intrafirm social networks can also serve as conduits for knowledge (Argote and Miron-Spektor 2010). Hence future research can look at the role of intrafirm social networks in the internalization process of alliance experience.

Thirdly, we did not differentiate alliance experience in our study. Recent research on alliance experience has advocated a more nuanced perspective of alliance experience, such as partner-specific and general partnering experience (Gulati et al. 2009; Hoang and Rothaermel 2005), or related and general alliance experience (Liu and Ravichandran 2009). Given these thoughts, a more nuanced perspective regarding the relationship between knowledge integration mechanisms and different alliance experience may be an interesting direction to pursue.

Fourthly, alliances, especially joint ventures, are dyadic in nature. As a result, the stock market may react differently when both partners possess knowledge integration capabilities. However, we were unable to address the dyadic character in our model and analysis due to data limitations. The *InformationWeek* survey covers only a limited number of firms, making it difficult to obtain the variables on IT-enabled knowledge integration capabilities for any firm. In the mean time, not all participating firms in joint ventures are public firms, making it impossible to obtain abnormal returns or the variable on alliance functions for such firms. Future research can address this limitation by conducting primary data collections.

Last, 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.
Conclusion

In this paper we explored the role of a dedicated alliance function and information technology in the process of institutionalizing alliance experience. We found that both mechanisms for knowledge integration enhance the effect of alliance experience on excess returns in alliances. Moreover we highlighted the interaction effect between the two types of knowledge integration approaches. We argued that IT tools such as groupware, organizational memory, search tools, expertise profiling, and expert systems may reach a limit when enhancing the positive influence of alliance experience on value gains. We explained why this is the case by explicating the nature of alliance experience. We further proposed that an alliance function performs well where information technologies fall short of. We found empirical evidence that the existence of an alliance function complements the use of IT tools in knowledge integration. Our findings suggest the importance of using technological tools and organizational means to internalize alliance experience, a type of tacit knowledge about how to manage alliances.

References

Argote, L., and Miron-Spektor, E. in press. "Organizational Learning: From Experience to Knowledge," Organizational Science.


