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# Learning mechanisms and differential performance in alliance portfolios

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## Abstract

This study assesses the differential performance effects of learning mechanisms in alliance portfolios. Investigating two distinct types of learning mechanisms (i.e. integrating and institutionalizing mechanisms), the results show that different learning mechanisms have different performance effects at distinct levels of alliance experience. The results are based on a detailed survey among alliance managers and vice-presidents of 192 firms reporting on over 3400 alliances formed over the period 1997–2001. The main lesson from this study is that firms can deliberately develop their alliance capabilities by using integrating mechanisms to transfer prior experiences.

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**Key words** • alliance capabilities • alliance experience • alliance portfolio performance • learning mechanisms

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The road toward a thorough understanding of the learning mechanisms underlying the development of partnering capabilities is still long and poorly lit. (Kale and Zollo, 2005: 94)

## Introduction

Strategic alliances have fascinated academic and practitioners alike. As a dominant organizational form, they create substantial firm value (Chan et al., 1997).<sup>1</sup> However, only few firms excel at managing their strategic alliances successfully (Park and Ungson, 2001). Not only do strategic alliances impose challenges on the firms involved due to their organizational complexity, environmental uncertainties and inter-partner conflict also loom to destabilize the alliance. However, by developing superior capabilities to manage alliances, firms can learn to contract (Mayer and Argyres, 2004), mitigate hazards (Reuer and Ragozzino, 2006)

and manage and coordinate their alliances (Kale et al., 2002). Hence, firms can develop alliance capabilities that help derive collaborative advantages (Dyer, 2000; Kanter, 1994).

In spite of contradictory findings in, for instance, the merger and acquisitions (M&A) literature (Bruner, 2002), there is emerging evidence in extant alliance literature that prior alliance experience improves overall alliance performance (Anand and Khanna, 2000; Sampson, 2005). However, except for some recent findings (Heimeriks and Duysters, 2007; Kale et al., 2002; Simonin, 1997), scant evidence exists as to how alliance experience translates into an alliance capability. That is, little is known about the learning mechanisms that develop alliance capabilities. Reports in the popular press suggest that alliance capability building through learning is done in various ways: while Corning is known for its informal way of sharing prior alliance experiences, Hewlett-Packard has focused on formal processes and structures (*Alliance Analyst*, 1994, 1996).

Apart from this anecdotal evidence, we still lack convincing empirically based answers to two main questions. First, what learning mechanisms cause differential performance effects in alliance portfolios? And second, does the use of learning mechanisms differ per experience level and does that help explain differential performance in alliances?<sup>2</sup> In order to answer these two questions, we focus on micro-underpinnings of learning at the organizational (subunit) level of analysis (Argote, 1999: 5). Examining the effect of intra-firm learning mechanisms on alliance portfolio performance at different levels of alliance experience, we pay particular attention to the role integrating and institutionalizing mechanisms play in explaining performance differences. Crossan et al. (1999: 525) define four micro-level learning processes: '*Intuiting* is a subconscious process that occurs at the level of the individual. It is the start of learning and must happen in a single mind. *Interpreting* then picks up on the conscious elements of this individual learning and shares it at the group level. *Integrating* follows to change collective understanding at the group level and bridges to the level of the whole organization. Finally, *institutionalizing* incorporates learning across the organization by embedding it in its systems, structures, routines and practices.' To understand how knowledge transfer in organizations is accomplished, it is important to analyse processes at higher levels of analysis, such as the group and organization level, thereby complementing work by cognitive psychologists who focus on the individual level (see, for example, Maier et al., 2001; Singley and Anderson, 1989). This study focuses on integrating and institutionalizing as two types of mechanisms that respectively 'develop shared understanding amongst individuals' and 'establish processes for routinized action to occur' (Crossan and Berdrow, 2003: 1090).<sup>3</sup>

We define an alliance capability as a higher-order resource that is difficult to obtain or imitate and has the potential to enhance the performance of the firm's alliance portfolio (Eisenhardt and Martin, 2000; Kale et al., 2002; Makadok, 2001). In order to understand the building blocks of alliance capabilities, we focus not only on alliance experience but also on intra-firm learning mechanisms. In this study, learning is said to occur when new knowledge is translated into

meaningful action and different behaviours that are replicable (Argyris and Schon, 1978). In line with Kale et al. (2002), Kale and Zollo (2005) and Salk and Simonin (2003), we define learning mechanisms as organizational attributes that facilitate accumulation, codification and sharing of alliance-related knowledge generated through prior experience. While learning mechanisms come in many different forms and shapes (e.g. individuals, routines, information systems and structures) (Argote and Ophir, 2002), this study focuses on intra-firm learning processes through which one unit's (e.g. group, department or division) experience affects other units (Argote et al., 2003).<sup>4</sup> The main contribution of this study is that we analyse the relative contribution of integrating and institutionalizing mechanisms in improving the firm's ability to manage its portfolio of strategic alliances (i.e. alliance capability).

The study is structured as follows. First, we review extant literature on organizational learning. We use a conceptual model to describe how learning mechanisms facilitate transfer of experience causing advances in capabilities. Second, we use the logic underlying the model to explain and test the effect of learning mechanisms on alliance portfolio performance at different levels of alliance experience. Third, the results focus on examining differential performance effects of integrating and institutionalizing mechanisms. The study ends with a section on the discussion of the results, the implications and conclusions.

## Learning from experience and deliberate transfer effects

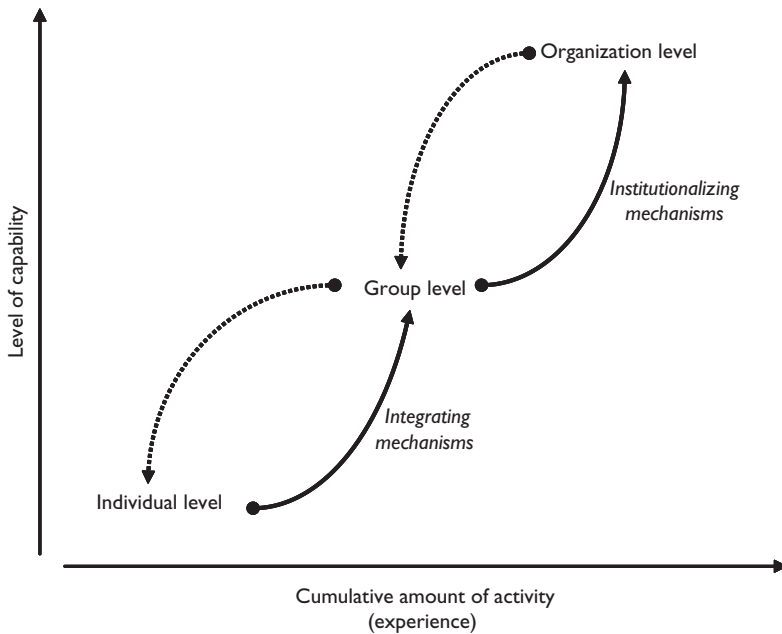
Firms learn from experience (Herriott et al., 1984; Levitt and March, 1988). There is widespread evidence that experience increases the likelihood of superior organizational (Argote, 1999), new product development (Hansen, 1999; Sivadas and Dwyer, 2000) and innovative outcomes (Tripsas and Gavetti, 2000). Literature on the learning curve and learning-by-doing sets out to explain that productivity improvements were caused by cumulative production experience effects as witnessed in, for example, the aircraft (Alchian, 1963), chemical (Lieberman, 1984), hotel (Baum and Ingram, 1998), food (Darr et al., 1995) and manufacturing industries (Maritan and Brush, 2003). While learning rates differ per industry and among firms (Argote, 1999), it has become well established that firms benefit from relative cost savings due to, for instance, skill improvement and operating efficiency.

Recently, complementing previous work on experiential learning or learning-by-doing, some scholars have started paying attention to deliberate learning effects. Various studies have tried to map conceptually how capabilities advance (Crossan et al., 1999; Helfat and Peteraf, 2003). In line with this logic, recently other studies have looked at learning effects caused by deliberate attempts to transfer lessons inside the firm in, for example, corporate acquisitions (Haleblian et al., 2006; Zollo and Singh, 2004), franchise networks (Knott, 2003; Szulanski and Jensen, 2006) and auto parts manufacturing using gainsharing (Arthur and Huntley, 2005). Acknowledging that experience is a crude proxy for the mechanisms lying at the

roots of capabilities (Kale et al., 2002), some studies have proposed more refined measures to capture how firms transfer experiences. Moving beyond empirical tests of experience to capture productivity improvement (that traditionally focused on marginal learning effects within or across units), these studies look at certain transfer mechanisms such as personnel movement, training, communication or IT systems (which concerns an additional effect caused by deliberate transfer of knowledge throughout the organization; for an overview, see Argote and Ingram, 2000). This literature suggests that learning mechanisms facilitate the transfer of experience and raise knowledge from an individual to a group level ('integrating') and from a group to the organization level ('institutionalizing'). Group-level learning is the process of developing shared understanding among individuals and taking coordinated action through mutual adjustment; it mainly pertains to train or share knowledge between individuals. Organization-level learning ensures that routinized actions occur by embedding the learning into the institutions of the organization; predefined tasks, actions and mechanisms create institutionalizing routines and structures (e.g. Hansen et al., 1999).<sup>5</sup> In this study, *integrating mechanisms* are defined as those activities in which a group of people engage to share experiences and improve their ability to solve problems. Integrating mechanisms such as training foster knowledge transfer and idea exchanges and are an important function of groups in organizations (Paulus and Yang, 2000). Hence, creating capabilities, which stem primarily from combining new knowledge (Levinthal and March, 1993), can be attributed partially to group-level learning in organizations. *Institutionalizing mechanisms* are organizational processes and structures that foster routinization of certain practices inside the firm. Such routines foster repeatable patterns of behaviour in the organization (Nelson and Winter, 1982).

Interestingly, higher levels of experience do not necessarily imply higher levels of capabilities (Helfat and Peteraf, 2003). In order to examine why some firms consistently outperform others, it is suggested in Figure 1 that advances in capabilities come about by sharing experiences in groups and by installing processes and structures.

The figure demonstrates that integrating mechanisms raise experience from an individual to a group level, while institutionalizing mechanisms help raise experience from a group to an organization level. The bold lines exemplify feed-forward processes of learning and relate to exploration or the transfer of lessons from individual- to group- to organization-level learning; the dotted lines refer to feedback processes across the levels, which demonstrate the degree of exploitation, i.e. the degree to which individuals and groups are impacted by organization-level learning (Crossan et al., 1999). We expect that at low levels of experience, advances in the firm's capability are likely to be caused by integrating mechanisms. As experience increases, there is an increasing need for institutionalizing mechanisms in order to coordinate activities and support effective management. However, it is important to note that there are both benefits and costs attached to using learning processes (March, 1991) and rates of retention and variation can differ per setting (Siggelkow and Rivkin, 2006).



**Figure 1** Levels of learning, learning mechanisms and alliance capability development  
 Source: Adapted from Crossan et al. (1999); Helfat and Peteraf, (2003).

In the next section, we extrapolate this logic to advances in alliance capabilities: deliberate transfer of alliance experience via integrating and institutionalizing mechanisms leads to enhanced alliance capabilities. In line with prior research on intra-firm learning (Teece et al., 1997; Winter, 1995; Zollo and Winter, 2002), we argue that advances in alliance capabilities can come about in two ways: by sharing experiences in teams or groups (group-level knowledge transfer) and by installing processes and structures (organizational-level knowledge transfer). The differences in use of transfer mechanisms may explain differential performance effects as a consequence of the relative ability of the type of mechanism (i.e. integrating and institutionalizing mechanisms) to transfer knowledge gained from experience.

## Hypotheses

Previous research examining learning from alliances builds predominantly on evolutionary economics and organizational learning theory. Some of these studies looked at processes inside the firm that nurture knowledge dissemination and integration (e.g. Heimeriks and Duysters, 2007; Kale et al., 2002). Analysing the internal processes underlying advances in firm-specific alliance capabilities, the unit of analysis shifts: rather than looking at the individual alliance, it is the firm's alliance portfolio that is relevant to study (Anand and Vassolo, 2002). The advantage over the traditional atomistic view is that by

studying the firm's alliance portfolio it is acknowledged that interactions between alliances exist and that lessons in individual alliances are not limited to the focal alliance, but can have both positive and negative spillover effects on other alliances the firm is engaged in (Vassolo et al., 2004). Hence, performance implications are not limited to single alliances, i.e. the outcomes of a firm's alliances are likely to be interdependent (Hoffmann, 2007).

There are three important issues regarding the interplay between alliance experience, learning mechanisms and alliance portfolio performance to discuss when examining experiential and deliberate learning effects. Each issue relates to and is discussed in relation to one hypothesis. First, with increasing alliance experience, we expect firms to have more institutionalizing mechanisms (relative to integrating mechanisms). There are a number of reasons for this. First, as firms gain experience, alliance knowledge tends to become more embedded (Fiol and Lyles, 1985). Firms having large alliance portfolios are more prone to develop common practices embedded in structures and processes nurtured by, for example, the presence of a dedicated alliance function (Goerzen, 2005; Kale et al., 2002). Group-level learning, on the other hand, often invokes codification and verbalization (Nonaka and Takeuchi, 1995; Zack, 1999). Firms that have only recently started to ally are unlikely to install an alliance function and more likely to try and derive lessons from prior alliances to use these in subsequent deals (Harbison and Pekar, 1998; Hoffmann, 2005; Spekman et al., 1999). Also, as we observed in our fieldwork, less experienced firms are more likely to hire external experts and verbally exchange whatever lessons they learned between executives involved.

Second, the sophistication of the transfer mechanisms used is likely to increase as firms form more alliances. Whereas firms that only manage a couple of alliances will deploy relatively elementary types of mechanisms to transfer knowledge, more sophisticated means are likely to be used by firms once they manage a complex portfolio of alliances. The complexity not only relates to coordination of activities and allocation of responsibilities, funds and resources, but also to gathering and dispersing lessons from prior alliances. Given the costs of setting up and maintaining an alliance department or an alliance database, firms are likely to invest in such mechanisms only when anticipated benefits outweigh the anticipated costs.

Third, the greater the firm's alliance experience, the more lessons can potentially be transferred and embedded in systems. As such, repeated practices are likely to become part of the firm's routine activity. A greater amount of activity is then likely to lead to an increase in deliberate investments in learning mechanisms (Winter, 2003; Zollo and Winter, 2002) and an increased used of standard practices (March and Simon, 1993).

**HYPOTHESIS 1** The higher the level of alliance experience, the higher the ratio of institutionalizing mechanisms to integrating mechanisms.

A second issue concerns the effect of integrating and institutionalizing mechanisms on alliance portfolio performance. Although it is important to know what intra-firm learning mechanism firms use at what level of alliance

capability, it is perhaps even more interesting to analyse what impact these mechanisms have on alliance portfolio outcomes.

A vast amount of empirical evidence is available on the positive impact of alliance experience on alliance performance (e.g. Anand and Khanna, 2000; Gulati, 1999; Hoang and Rothaermel, 2005; Reuer et al., 2002; Sampson, 2005). Acknowledging that this relationship is relatively obscure, Simonin (1997) and Heimeriks and Duysters (2007) found that alliance capabilities mediate between experience and performance. In these studies, learning mechanisms function as a catalyst for alliance capability development via (1) the assimilation, coordination and dispersion of alliance knowledge, (2) coordination of activities and allocation of resources, (3) monitoring and evaluation of alliance activities and (4) the support of day-to-day activities in alliances, and therefore prevent falling prey to common pitfalls (Kale et al., 2002).

Although both integrating and institutionalizing mechanisms are likely to have a positive impact on alliance portfolio performance as a consequence of deliberate transfer effects, we expect that *all else being equal*, integrating mechanisms have a stronger effect than institutionalizing mechanisms. In other words, the degree to which and speed with which a firm adopts new practices is likely to be predominantly influenced by integrating mechanisms. There are three reasons for this. First, strategic alliances are complex organizational forms (Williamson, 1985) and heterogeneous phenomena that often involve complex tasks (de Rond and Bouchikhi, 2004). Previous studies indicated that complex tasks perform better at lower degrees of formalized structure (e.g. Leavitt, 1958; Perrow, 1967). Therefore, in such instances, variation can potentially yield greater benefits than retention, i.e. new practice adoption is more likely to cause improved alliance performance than exploitation of existing practices.

Second, the more organizational practices are extensively described and treated as standard operating rules, the less the firm is likely to adopt new practices and learn (Cyert and March, 1963). An important difference between the types of mechanisms is the degree to which organizational learning affects individuals; or in Crossan et al.'s (1999) terminology 'feed backward', i.e. from an organization to the individual level. Similarly, the degree to which the firm transfers novel (individual) experiences to groups determines the extent to which the firm is able to rejuvenate its alliance management practices and to adopt new practices. As mentioned, the ability to renew practices is of particular importance in the case of alliance management, which is typically a non-routine and complex activity (Kale et al., 2002; Sampson, 2005).

Third, advances in capabilities are dependent upon specificity and rigidity of underlying knowledge and assumptions (Nelson and Winter, 1982; Simon, 1997; Szulanski, 1996). Even though integrating mechanisms rely more heavily on explicit knowledge – which is likely to be less valuable than tacit knowledge – the complexity of alliance management demands dispersion of novel insights. This is likely to improve the firm's ability to comprehend and anticipate contingencies more efficiently, e.g. to assess whether certain practices are beneficial in different

types of alliances. The opposite also holds: the more a firm exploits and sticks to established alliance management practices, the less likely that employees will use recent lessons that have not been certified (Brown and Duguid, 1991; O'Dell and Grayson, 1998). Given the inherent difficulty in altering routines (Coriat and Dosi, 1998) – i.e. once practices become established in organizational processes and structures, they typically become more difficult to change due to complacency or 'stickiness' (Leonard-Barton, 1992; Sitkin, 1996; Szulanski, 1996) – variation in practices is most likely to come from group-level learning.

Last, not only does ambiguity of success loom large but also superstitious learning (i.e. mis-specified connections between actions and outcomes) can foster inadequate actions by managers involved in alliances (Levinthal and March, 1993; Levitt and March, 1988). Overconfidence or institutional forces can nurture false assumptions about cause–effect relationships, which are most likely to be repeated in the case where (wrongly derived) lessons become routinized in activities and systems (e.g. Klayman et al., 1999; Vermeulen, 2004). As shown in recent studies on corporate acquisitions (Zollo, 2007), technology development (Barley, 1988) and car manufacturing (Coriat, 2000), certain learning mechanisms are likely to formalize and routinize activities that cause superstitious learning.

Therefore, we expect that *all else being equal*, integrating mechanisms are a more prominent driver of alliance portfolio performance (relative to institutionalizing mechanisms).

**HYPOTHESIS 2A** Integrating mechanisms have a stronger positive effect on alliance portfolio performance than institutionalizing mechanisms.

As interviews with experts revealed, most firms with advanced alliance capabilities use a mix of group and institutionalizing mechanisms simultaneously. It is therefore interesting to examine their joint effect on alliance portfolio performance. However, the literature on group and institutionalizing mechanisms is rather scattered. While Kale et al. (2002) have analysed the effect of a firm-level alliance function, empirical testing in the field is scarce. We therefore refer to Zollo and Winter (2002), who posit that dynamic capabilities result from the co-evolution of tacit experience accumulation with knowledge codification and articulation, and posit that the performance impact of learning mechanisms is highest when these elements are used simultaneously. In other words, advances in firms' alliance capabilities and the yields of those capabilities are likely to be greatest when firms jointly deploy both integrating and institutionalizing mechanisms. Therefore, we also hypothesize that:

**HYPOTHESIS 2B** The more integrating and institutionalizing mechanisms are used simultaneously, the higher alliance portfolio performance.

A third and last important issue relates to the performance effect at different levels of alliance experience. We expect that different learning mechanisms are more effective at specific levels of alliance experience. Anand and Khanna

(2000) stressed that the trade press has referred to a life-cycle model where firms move through different stages of alliance capabilities using different mechanisms along the way. Gaining experience, firms move from an initial stage to a 'lone-ranger' stage and finally to more formal models for managing alliances (*Alliance Analyst*, 1996). Similarly, Draulans et al. (2003) found preliminary evidence of the use of different mechanisms at different levels of experience.

Following the logic presented in Figure 1, group-level learning is likely to have a positive effect for firms with little experience, while institutionalizing mechanisms are likely to benefit firms with greater experience. There are a number of reasons for this. First, the effectiveness of learning mechanisms depends on how capable a firm is: the learning processes used by inexperienced firms are unlikely to be adequate for improving alliance performance of experienced firms. Only firms that engage in a large number of alliances are likely to benefit from routine activities that are fostered by institutionalizing mechanisms. The more processes and structures a firm installs, the higher the chance knowledge becomes more embedded in, for instance, established practices. So, institutionalizing mechanisms are likely to benefit in particular firms with extensive experience, because activity patterns will emerge as firms manage more alliances, benefiting those that exploit such embedded routines.

Second, group-level learning embodies a different type of learning than does organization-level learning. Levinthal and March (1993) differentiated between simplification and specialization as mechanisms of learning. Sharing knowledge using integrating mechanisms implies simplification, since experiences are inferential and transcribed when transferred (Levinthal and March, 1993). In contrast, institutionalizing mechanisms leave much more room for specialization. As firms become more experienced, they tend to embed knowledge into processes and structures, as a consequence of which knowledge transferred becomes tacit (Carroll et al., 2003; Kieser et al., 2001) and 'sticky' (Szulanski, 1996). For instance, group training is unlikely to nurture specialists and is likely to lead an emphasis on general knowledge, or so-called 'dos and don'ts'. A similar logic applies to the use of an alliance function or department: the use of such an institutionalizing mechanism is unlikely to benefit a firm if it has a small amount of alliances to manage. Only in the case where a firm manages a large number of alliances is coordination critical and are the benefits of such a function likely to outweigh the costs. For these reasons, we posit that the performance effect of the learning mechanisms chosen is likely to depend on the firm's level of alliance experience.

**HYPOTHESIS 3A** For firms with little alliance experience, increasing the number of integrating mechanisms has a stronger positive effect on alliance portfolio performance than increasing the number of institutionalizing mechanisms.

**HYPOTHESIS 3B** For firms with extensive alliance experience, increasing the number of institutionalizing mechanisms has a stronger positive effect on alliance portfolio performance than increasing the number of integrating mechanisms.

## Data and methods

### Survey

The empirical part of this study is based on a survey about alliance capabilities. It was used to gather information on alliance management skills and the underlying learning mechanisms firms use to develop alliance capabilities (Beamish, 1984). A survey questionnaire was sent to 650 vice-presidents and alliance managers worldwide. The survey was aimed at collecting data on managerial assessments of a firm's alliance portfolio performance. The questionnaire was developed along the steps proposed by Churchill and Iacobucci (2001), Nunally and Bernstein (1994) and Oppenheim (1966). This ensured that aspects such as questionnaire length, style of question and scoring were taken into account. Moreover, the questionnaire was extensively pre-tested with various experts so as to eliminate any inconsistencies or aspects that could cause unnecessary bias. The database of the Association of Strategic Alliance Professionals (ASAP) and the Internet Society (ISOC) were used as the primary data source to collect large-sample data. Using these databases, we were able to address those who oversee and manage the alliance portfolios at the respondent firms. These persons were used as key informants on their firm's alliance activities and related management practices. As Tippins and Sohi (2003: 757) note, the use of key informants is currently the standard methodology in strategy research. Also, using key informants is an established way of gathering corporate-level data (Philips, 1981).

After sending out the survey in two batches and a reminder message to all the potential respondents, we received 192 responses. This resulted in a response rate of 29.5 percent, which is considerably higher than most international mail surveys (Harzing, 2000) but comparable to other studies on alliances (see, for example, Kale et al., 2002; Reuer et al., 2002; Zollo et al., 2002). The firms were active in the following industries: information and communications technology (ICT) (17 percent), ICT services (26 percent), financial services (5 percent), other services (e.g. consultancies) (30 percent), pharmaceuticals and biotechnology (3 percent), chemicals (3 percent), other manufacturing (10 percent) and public sector (e.g. education and non-profit organizations) (4 percent). The rest (2 percent) are missing data. The majority of the respondents were active in ICT (43 percent) and service-related sectors (61 percent). Table 1 shows the size of the firms in the data set. Over 52 percent of the firms in the data set employed over 1000 employees, while 40 percent generate sales revenues of over US\$1 billion. The average percentage of alliances considered to be successful by the firms included in the sample amounted to 52 percent, which is comparable to other studies (Das and Teng, 2000; Park and Ungson, 2001). As the firms included in the data set each manage on average 18 alliances, the total data set refers to an estimated 3477 alliances.<sup>6</sup>

### Expert interviews

In addition to the survey, in-depth expert interviews were conducted. For these, 12 experts in the field of alliances and capability development were selected

**Table 1** Distribution of firm size

	N	%
<b>Number of employees</b>		
1–500	81	42.19
–1000	8	4.17
>1000	101	52.60
Missing cases	2	1.04
<b>Total</b>	192	100
<b>Sales revenues (in US\$)</b>		
Less than 1 million	46	24
–100 million	44	22.9
–1 billion	24	12.5
–50 billion	68	35.4
Over 50 billion	9	4.7
Missing cases	1	0.5
<b>Total</b>	192	100

worldwide. Within the group of experts, there was a sound division between practitioners (seven in number) and academics (five in number). Some of the experts are active in both academia and business. Among these experts were vice-presidents and alliance managers from firms in different industries that are world-renowned for their alliance capabilities such as Dow Chemical, Royal Philips Electronics, GlaxoSmithKline and Oracle.

The post-survey fieldwork – consisting of interviews and follow-up interaction with executives – served three important purposes. First, it allowed for a verification of the empirical findings. Second, the interviews were aimed at validating and extending the argumentations for expected and unexpected results and the reasons why the study's findings were appropriate. Mirroring the findings against the opinion and insights of practitioners and academics should nurture stronger and more reliable results. Last and perhaps most importantly, the interviews allowed us to discuss the learning stages and learning processes in various firms. The interviews revealed that lessons from prior alliances were transferred in these organizations in a way which matched the use of integrating and institutionalizing mechanisms as shown in Figure 1.

The interviews consisted of two sections, were semi-structured and lasted between 60 and 90 minutes. The interview questions were partly exploratory and mostly open-ended (Greer et al., 2000). Before interviewing the envisioned experts, a panel of interviewees allowed for informal pre-testing of the questionnaire (Churchill and Iacobucci, 2001). After the pre-tests, the interviews were recorded with the consent of the interviewees and thereafter transcribed to allow for comparison of the different interviews. Moreover, the results were summarized during the interview in order to ensure an adequate representation of the expert's answers. Analyses of the results were done by comparing individual arguments and comments of the interviewees to our findings and categorizing any arguments given to provide additional support for those findings.

### Alliance portfolio as unit of analysis

In line with the logic of Ray et al. (2004), who compare two types of dependent variables deemed credible in studies relying on the resource-based logic, this study uses a firm's alliance portfolio as a unit of analysis. This unit is deemed appropriate as this study tries to improve our understanding of how intra-firm learning processes impact the outcomes of the firm's portfolio of strategic alliances. In contrast to other previous studies that mostly rely on measures related to the performance of individual alliances or measuring the partner benefits from one specific alliance (e.g. Bleeke and Ernst, 1991, 1995; Olk, 2002), studying alliance capabilities benefits from a portfolio level of analysis because studying an individual or dyadic level leaves any interdependencies between a firm's alliances unanalysed (Doz and Prahalad, 1991; Vassolo et al., 2004). While we acknowledge that it is difficult to connect learning mechanisms to individual alliances or to control for factors and interactions at the alliance and portfolio level (Stulz, 1982), we argue that the impact of a firm's alliance capabilities (or alliance management skills) is by nature not restricted to one alliance but affects its entire alliance portfolio.

Moreover, given that different alliances tend to have different goals (e.g. blocking competition, learning, new product development), when studying the firm's alliance portfolio there is a need to use a generic measure that can capture diverse alliance goals. This measure represents the degree to which firms succeed in realizing the original goals set in the alliances formed. Interestingly, the results of our fieldwork clearly indicate that management overseeing alliance portfolios of substantial size use a real options approach to evaluate the outcomes of their alliance portfolio. In other words, the outcome of the individual alliance is not necessarily deemed critical in all cases; in particular, for firms managing larger portfolios of alliances, the evaluation tends to be based on the degree to which a bundle of strategic investments, i.e. strategic alliances, achieves its goal.

So, in order to examine how learning from alliances occurs *within* firms, we use the firm's alliance portfolio as the unit of analysis. We use it to analyse the *average* impact of a firm's alliance capability on its alliance portfolio performance. This allows us to verify whether heterogeneity in alliance portfolio outcomes is attributable to the use of certain intra-firm mechanisms. Alliance portfolio performance as a dependent variable therefore fits the theoretical framework, which is in line with other recent studies (Faems et al., 2005; George et al., 2001; Parise and Casher, 2003) and meets the methodological requirements in measuring the instruments (Ray et al., 2004).

### Dependent variables

We use two dependent variables in this study: alliance experience (for hypothesis 1) and alliance portfolio performance (for hypotheses 2 and 3). *Alliance experience*, the first dependent, is measured by the number of alliances – using a five-point scale – that a firm has established over a five-year period (1997–2001). This is in line with earlier studies (Kale et al., 2002; Li and Rowley, 2002; Zollo

et al., 2002). The five-point scale defined different categories representing a firm's number of alliances (0–5, 6–15, 16–25, 26–40, >40).

*Alliance portfolio performance*, the second dependent variable, relates to the performance of a firm's alliance portfolio. We decided to construct the alliance portfolio performance measure by asking alliance managers about the average performance of their alliance portfolio. Alliance performance is therefore defined as the percentage of alliances in which the original goals were realized over the period 1997–2001. It was measured at an ordinal level and the item is based on a five-point scale (0–20 percent, 21–40 percent, through to 81–100 percent).

Triggered by the dissatisfaction with the performance of many alliances, the topic of alliance performance and its measurement has been dealt with extensively over the last years. Nonetheless, it is a very challenging topic due to measurement problems and data access (Anderson, 1990; Gulati, 1998). Different studies have used different measures and levels of analysis (for a critical review, see Gulati, 1998; for an overview, see Park and Ungson, 2001). Various studies have investigated the need to use an objective, a subjective or a composite index to measure alliance performance (Arino, 2003; Olk, 2005). Geringer and Herbert (1991) have shown that objective and subjective measures tend to be highly correlated. Given the inaccuracy of generic performance measures (e.g. return on assets [ROA] or stock market reaction) (Olk, 2005) and in spite of early criticism on the use of managerial assessments as a measure for alliance performance, there seems to be an emerging consensus that managerial assessments of performance provide a sound reflection of alliance performance (Kale et al., 2002). Given the fact that firms form alliances for specific reasons, asking alliance managers to what extent the stated alliance objectives were achieved is an effective and scientifically established manner to assess the success of an alliance (Geringer and Herbert, 1991; Kale and Singh, 1999; Tuchi, 1996). Extending this line of reasoning to the portfolio level (in which different alliances are formed for different reasons) allows us to assess the degree to which a firm is successful in achieving objectives in its entire alliance portfolio. Therefore, in line with previous studies (Hamel, 1991; Hamel et al., 1989), alliance performance is defined as the percentage of alliances in which the original goals were realized.

As this measure is somewhat different from the subjective measure Kale et al. (2002) use, who aggregated scores of managerial assessments of individual alliance to compute a firm's overall alliance success, we ran a number of tests to rule out systematic bias or unobserved heterogeneity. Due to the fact that the aggregate measure might be more complex to report on, respondents might have been biased in their reporting on the dependent variable. However, in separate regressions, none of the additional variables – firm size ( $B = .184, p > .05$ ), dummy for alliance department ( $B = .298, p > .05$ ), dummy for respondents holding positions as alliance vice-presidents or managers ( $B = .442, p > .05$ ) – proved significant. This suggests that the aggregated portfolio performance measure is not biased as a consequence of firm and portfolio size or respondent position.

### Explanatory variables

We included three explanatory variables in our study: alliance experience, integrating mechanisms and institutionalizing mechanisms. In addition, we included their interaction effects. *Alliance experience*, the first explanatory variable, which is used as the dependent variable to test hypothesis 1, is measured by the number of alliances that a firm has established over a five-year period (1997–2001) and is measured using a five-point scale (see section ‘Dependent variables’).

*Integrating mechanisms*, the second explanatory variable, was constructed using a list of learning mechanisms. On the basis of previous research (Draulans et al., 2003; Dyer et al., 2001) and the input of an expert panel, a list of 29 mechanisms critical to alliance capability development was generated (see Appendix for an overview). In line with Knott (2003: 937), who proxied routines as a sum of practices, all mechanisms are calculated as binary variables, as a firm either has or does not have a certain mechanism in place. As the results of the interviews clearly indicated that the firms interviewed first distilled and shared lessons from prior alliances after which they started installing processes and structures – which pointed to a similar learning process or alliance capability development process – we adopted the terminology and steps as shown in Figure 1. To detect integrating mechanisms, we made use of exploratory factor analysis (EFA) to construct the scale and verify the validity of the constructs. As the binary variables violate the assumption of multivariate normality, Mplus was used since this program is able to perform factor analyses with binary variables (for an overview, see Bartholomew, 1987; Muthen, 1978). We used Varimax as factor rotation and included factor loadings of .40 or higher (Hair et al., 1998). The following seven items loaded on a single factor with an eigenvalue of 1.955: internal alliance training, external alliance training, training in country differences, best practices in alliance management, culture programme, comparison of alliance evaluations and alliance performance metrics. The Cronbach’s alpha for this index is .71, demonstrating sufficient reliability (Nunally and Bernstein, 1994).

*Institutionalizing mechanisms*, the third independent variable, consists of nine items that loaded on the second factor with an eigenvalue of 7.564: alliance department, vice-president of alliances, alliance manager, local alliance managers, partner selection programme, intranet, rewards for alliance managers tied to alliance success, formally structured knowledge exchange between managers and country-specific alliance policies. The Cronbach’s alpha for this index is .83, which is also sufficient (Nunally and Bernstein, 1994). The remaining factors shown had eigenvalues lower than 1 and were therefore excluded. The factor analysis results are shown in Table 2.

The root mean square residual is .0722 for both indices, which is at an acceptable level (Hair et al., 1998). The factor correlation is .554, which is a moderate level of intercorrelation, suggesting that the factors overlap to some degree but also represent conceptually distinct measures. Furthermore, we used Harman’s (1967) single factor test to rule out a significant amount of common variance (Podsakoff and Organ, 1986).

**Table 2** Exploratory factor analysis (Varimax rotated factor pattern)<sup>a</sup>

Subordinate variables <sup>b</sup> (questionnaire items)	Factor 1 Integrating mechanism	Factor 2 institutionalizing mechanism
Alliance department	.040	.986
Vice-presidents of alliances	.110	.732
Alliance manager	.223	.844
Local alliance managers	.288	.764
Partner selection programme	.342	.591
Intranet	.231	.567
Rewards for alliance managers tied to alliance performance	.047	.815
Formally structured knowledge exchange between alliance managers	.354	.623
Country-specific alliance policies	.210	.510
Internal alliance training	.575	.159
External alliance training	.495	.138
Training in country differences	.502	.186
Alliance best practices	.857	.275
Culture programme	.562	-.037
Comparison of alliance evaluations	.603	.329
Alliance metrics	.685	.377
Cronbach's alpha	.71	.83
Eigenvalue	1.995	7.564
Total variance explained	23.507	31.983

Notes:

<sup>a</sup> Factor analysis and Cronbach's alpha were performed for the entire sample (N = 192).

<sup>b</sup> All variables used are measured as dichotomous items (0 = mechanism is not used; 1 = mechanism is used).

The face validity of the measures was confirmed by the experts interviewed: all experts from practice confirmed that (1) the mechanisms were all 'important' to 'very important' to improve alliance management skills; and (2) that their firms had first started sharing general lessons from prior experiences between individuals by, for example, distilling best practices before they installed formal structures and processes using alliance managers and rewards systems. This confirmed our interpretation of the factor structure: the factors – as the conceptual model shows – relate to learning processes taking place at different levels of capability.

## Controls

A number of control variables are included in the multivariate analyses. *Firm size*, the first control variable, is included since large firms tend to have more resources available to manage alliances, increasing their chances of success. *Firm size* is measured as the firm's annual sales revenues generated in 2000 (in US\$). *ICT industry* and *service industry* are also included as dummy variables to control for industry-specific effects. Certain high-tech industries such as ICT are more actively

engaged in alliances (Hagedoorn, 2002). Therefore, two dummy variables representing industry controls for ICT firms and firms in service-related sectors were included.

## Analysis and results

A first analysis of the data showed that the independent variables seemed to be highly correlated with the interaction term. In order to solve this problem, we centred the data in order to overcome the problems associated with multicollinearity (see, for example, Aiken and West, 1991).<sup>7</sup> Applying this method allows, on the one hand, to reduce the correlation between the variables and, on the other, to render more meaningful results (Aiken and West, 1991; Long, 1997). Table 3 lists the unstandardized descriptive statistics and the correlation matrix. The table shows that in the data set used, firms on average – out of the nine mechanisms listed in Table 2 – make use of 3.65 institutionalizing mechanisms; and 1.90 integrating mechanisms. In our data set, the average rate of successful alliances of firms is 52 percent (refers to the 3.22 as a mean listed in the table).

### Experience levels and use of learning mechanisms (hypothesis 1)

Having centred the data, we verified whether firms use relatively more institutionalizing mechanisms as alliance experience increases (hypothesis 1). The means of the variables by experience level were calculated and are reported in Table 4a.

Based on the categorical variable, three levels of experience were defined that took into account the average of 18 alliances in the data set: a low-experience group (0–15 alliances), a moderate-experience group (16–25 alliances) and a high-experience group (>26 alliances). The bold figures shown in Table 4a represent the ‘relative’ mean use of the mechanisms.<sup>8</sup> To test whether the use of mechanisms differs proportionally per experience level, we separated firms that used relatively more institutionalizing than integrating mechanisms (ratio >1) from firms that use relatively less institutionalizing mechanisms (ratio <1). The chi-square tests test shows that as experience increases, firms tend to make relatively more use of institutionalizing mechanisms than integrating mechanisms ( $\chi^2 = 7.374, p < .05$ ).

As the use of learning mechanisms may also be influenced by endogenous factors such as firm size, we also test the relationship in a multivariate setting. The results are shown in Table 4b. Using the ratio as dependent variable, we find that in addition to firm size (measured as sales revenues) ( $B = .572, p < .01$ ), alliance experience ( $B = .960, p < .01$ ) is a positive and significant predictor of the relative use of institutionalizing mechanisms. The results show that the relative use of institutionalizing mechanisms compared to integrating mechanisms increases significantly as firms gain experience. Hence, we find support for hypothesis 1.

**Table 3** Descriptive statistics and correlation matrix

	Mean <sup>b</sup>	SD	(1)	(2)	(3)	(4)	(5)	(6)
Alliance performance <sup>a</sup>	3.2216	1.3057	.248**					
Alliance experience (1)	2.1302	1.4100						
Integrating mechanisms (2)	1.8958	2.9292	.189*					
Institutionalizing mechanisms (3)	3.6510	1.3773	.517**	.421**				
Firm size <sup>c</sup> (4)	2.7240	1.3072	.259**	.215**	.522**			
ICT sector (5)	.4271	.4960	.139	-.164*	.203**	-.034		
Service sector (6)	.6458	.4795	-.117	-.020	-.108	-.063	-.138	

Notes:

\*\* $p < .01$ ; \* $p < .05$  (two-tailed),  $N = 192$ .<sup>a</sup> Categorical variable representing alliance performance.<sup>b</sup> Mean and standard deviation are uncentred, while correlations are given for centred variables.<sup>c</sup> Firm size = annual sales revenues.

**Table 4a** Relative frequencies of learning mechanisms by experience level

	Relative mean (SD)			$\chi^2$
	Low experience group (N = 88)	Moderate experience group (N = 47)	High experience group (N = 31)	
<b>Factor 1<sup>a</sup></b>	<b>.188</b>	<b>.267</b>	<b>.382</b>	
Integrating mechanisms	(1.62)	(1.74)	(1.70)	
<b>Factor 2<sup>b</sup></b>	<b>.227</b>	<b>.435</b>	<b>.638</b>	
Institutionalizing mechanisms	(2.23)	(2.79)	(2.22)	
<b>Ratio</b>	1.207	1.629	1.670	7.374*
<i>Factor 2</i>				
<i>Factor 1</i>				
<b>Interaction effect</b>	4.48	9.51	16.55	
Factor 1 × factor 2	(8.93)	(13.46)	(12.87)	
<b>Dependent variable</b>				
Alliance performance	2.78 40.8%	3.67 63.8%	3.37 57.9%	

Notes:

Note that the figures which are bold represent the 'relative' mean, i.e. the mean divided by the number of mechanisms included in the factor:

\* $p < .05$ ; SDs in parentheses,  $N = 192$ .

<sup>a</sup>The number of mechanisms included in this factor is seven, therefore the average of this factor is divided by seven to obtain a comparable figure with institutionalizing mechanisms (factor 2).

<sup>b</sup>The number of mechanisms included in this factor is nine, therefore the average of this factor is divided by nine to obtain a comparable figure with integrating mechanisms (factor 1).

**Table 4b** Binary logistic regression analysis

Explanatory variables	
Alliance experience	.960** (.360)
Control variables	
Sales	.572** (.200)
ICT	.847 (.566)
Services	-.776 (.563)
N	166
-2 Log likelihood	101.684**
$\chi^2$	32.483
Nagelkerke $R^2$	.370

Notes:

Dependent variable: (institutionalizing mechanisms/ integrating mechanisms).

\*\*  $p < .01$ .

### Overall performance effects of learning mechanisms (hypothesis 2)

To measure the impact of learning mechanisms on alliance portfolio performance (hypotheses 2A and 2B), we used ordered logit regressions. The technique takes into account the fact that the dependent variable, alliance portfolio performance, is measured at an ordinal scale (Cohen et al., 2003; Tabachnick and Fidell, 2001). The results are shown in Table 5.

Model 1 is the baseline model that summarizes the findings when the following control variables are included: firm size (based on annual revenues) and dummy variables for the ICT sector and service sector. Only the coefficient of firm size is statistically significant. The positive sign indicates that being small is a liability in creating alliance success. However, this effect is no longer significant when learning-related independent variables are introduced (see models 2 and 3).

**Table 5** Ordinal logistic regression analyses

	Ordered logit		
	Model 1	Model 2	Model 3
<b>Explanatory variables</b>			
Alliance experience		.441*	.539**
		(.192)	(.205)
Integrating mechanisms		.374**	.369*
		(.130)	(.147)
Institutionalizing mechanisms		-.060	.020
		(.073)	(.081)
(Alliance experience) *			.005
(integrating mechanisms)			(.157)
(Alliance experience) *			-.128*
(institutionalizing mechanisms)			(.065)
(Integrating) *			-.067
(institutionalizing mechanisms)			(.048)
<b>Control variables</b>			
Sales	.220*	.059	.058
	(.105)	(.136)	(.137)
ICT	.182	.067	.096
	(.273)	(.323)	(.326)
Services	.393	.207	.190
	(.284)	(.316)	(.323)
N	176	176	176
-2 Log likelihood	210.976†	439.845**	456.363**
$\chi^2$	6.345	16.519	23.718
Nagelkerke $R^2$	.037	.109	.153

Notes:

Heteroskedastic-consistent standard errors in brackets.

\*\*  $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

Hence, firm size might simply capture the effect of omitted variables that are related to alliance learning. Alliance portfolio performance is not influenced by the industry to which the allying firms belong. As a result, alliance failures seem to be a potential threat to firms regardless of the industry the firm is active in.

The next model, model 2, introduces the main effects of intra-firm learning. Alliance experience has a positive and significant impact ( $B = .441, p < .05$ ) on alliance portfolio performance. Hence, simply having experience with alliances increases the share of successful alliances. Similarly, the coefficient of integrating mechanisms is positive and significant ( $B = .374, p < .01$ ). On the contrary, institutionalizing mechanisms have no significant effect on the success rate of alliances. These results provide convincing support for hypothesis 2A.

Model 3, in addition to the earlier introduced variables, also takes several interaction effects into account. The main effects for the three explanatory variables do not change compared to the results of model 2. This implies that alliance experience in its own right increases alliance success. Concerning the interaction terms, we first tested for the possible interaction between alliance experience and institutionalizing mechanisms. This interaction effect has a negative and significant effect on alliance performance ( $B = -.128, p < .05$ ). This means that the positive impact of alliance experience is gradually attenuated the more a firm relies on institutionalizing mechanisms for the management of its alliance portfolio.

Upon closer inspection of the mechanisms the proxy for institutionalizing mechanisms is composed of (see Table 2), it shows that this type of learning is based on processes and structures that may create inertia at an organizational level. The interaction between alliance experience and integrating mechanisms has no impact on the success rate. Similarly, there is no significant interaction between integrating and institutionalizing mechanisms. As a result, hypothesis 2B is rejected.

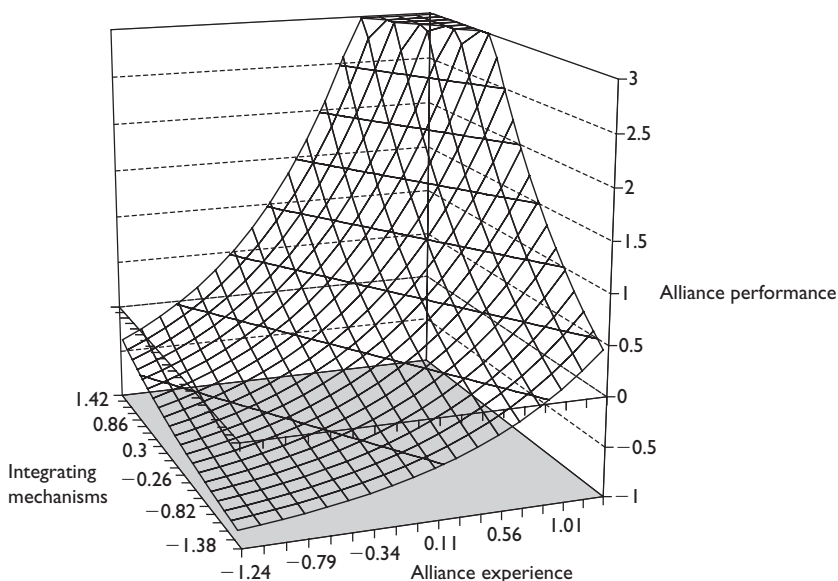
In sum, integrating mechanisms and alliance experience have no effect on each other's positive impact on alliance portfolio performance. This means that both can be used simultaneously without affecting their joint effect on alliance portfolio performance. This seems to support the notion that experiential learning (or learning-by-doing) and deliberate learning are distinct ways to improve alliance portfolio performance. On the other hand, institutionalizing mechanisms have a negative and moderating effect on the positive impact of alliance experience. Nor are these mechanisms interfering with the positive effect of integrating mechanisms on alliance performance. Hence, institutionalizing mechanisms barely foster learning since they have no direct effect on the success rate of alliances. In fact, they negatively affect the impact of alliance experience on alliance performance. Installing processes and structures to determine alliance management practices seems to only decrease a firm's ability to benefit from its cumulated alliance experience. Moreover, these findings suggest that – as they gain experience – firms mistakenly overinvest in institutionalizing mechanisms to capture lessons from their prior experience. These results indicate that

alliance experience and integrating mechanisms (i.e. group-level learning) are the key drivers of alliance portfolio performance.

### Performance effects of learning mechanisms for different experience levels (hypothesis 3)

The findings of model 3 allow us to compare the effect of integrating and institutionalizing mechanisms on alliance portfolio performance for firms with different levels of experience. Figures 2, 3 and 4 elucidate our findings.

Figure 2 depicts the relationships between alliance experience, integrating mechanisms and alliance portfolio performance for low levels of institutionalizing mechanisms.<sup>9</sup> The figure clearly shows that both integrating mechanisms and alliance experience have a strong positive effect on alliance performance. More specifically, the effects add up to each other, resulting in high values for the dependent variable in the far right of the figure – the highest value is 6.24 but we kept the maximum at 3 to improve the comparability between the three figures. Figure 3 shows the results for firms with mean values for institutionalizing mechanisms. This figure illustrates that institutionalizing mechanisms have an attenuating effect on the impact of both alliance experience and integrating mechanisms on alliance performance. Figure 4 shows that high values for institutionalizing mechanisms further attenuate the effect on alliance performance of the two other variables.



**Figure 2** Alliance performance with low levels of institutionalizing mechanisms

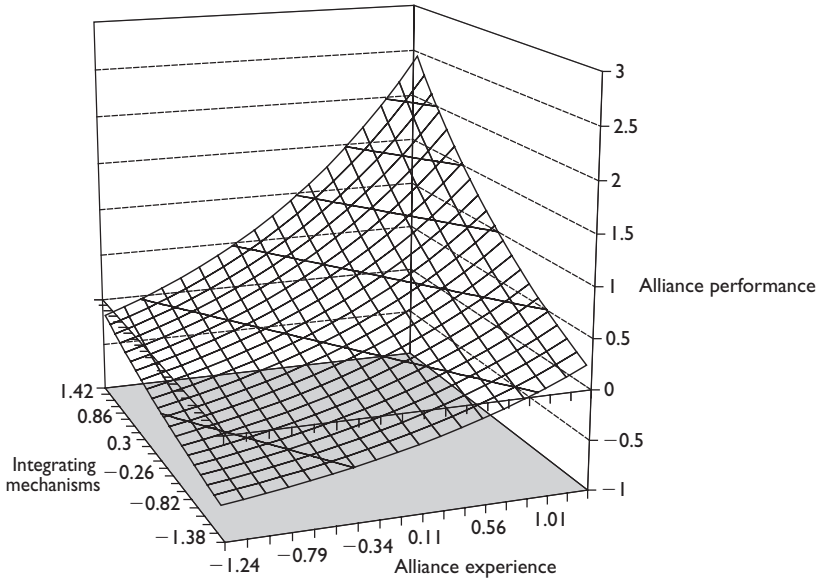


Figure 3 Alliance performance with institutionalizing mechanisms at mean level

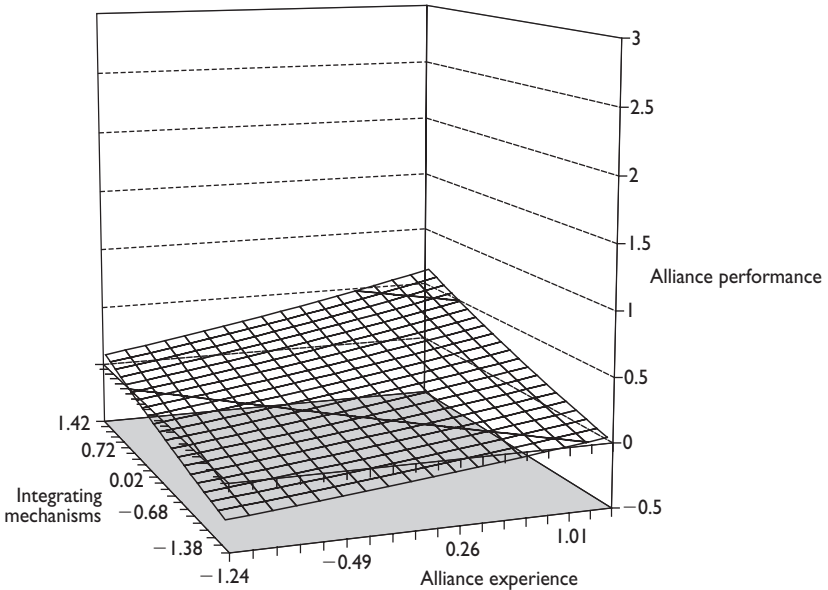
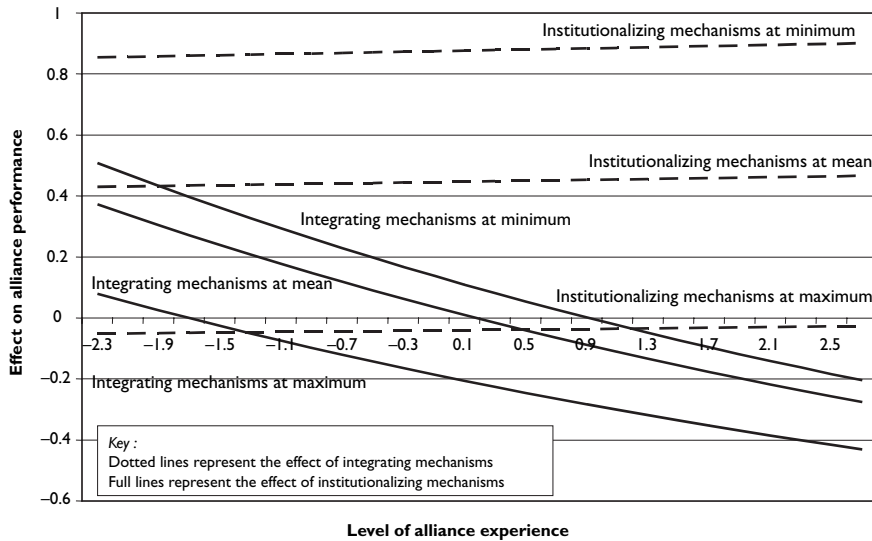


Figure 4 Alliance performance with high levels of institutionalizing mechanisms

We can test hypotheses 3A and 3B by analysing how alliance portfolio performance improves or worsens when a firm increases the number of integrating or institutionalizing mechanisms *all else being equal*. The results, which are based on model 3, are represented in Figure 5.



**Figure 5** Effect of group and institutionalizing mechanisms on alliance performance for different levels of alliance experience

The impact of integrating mechanisms is represented by the dotted lines. The three lines represent different levels of the institutionalizing mechanisms. The fact that these lines are horizontal indicates that integrating mechanisms are *not* helpful in improving alliance performance at higher levels of alliance experience. In contrast, higher levels of institutionalizing mechanisms decrease the impact of integrating mechanisms on alliance portfolio performance (downward shift of the curves).

Similarly, the effect of institutionalizing mechanisms is illustrated by the (solid) downward sloping lines. The curves have a negative slope because of the negative coefficients for the interaction term with alliance experience. Higher levels of integrating mechanisms also shift down these curves. The effect of institutionalizing mechanisms on alliance performance is only positive at low levels of alliance experience.

Combining both sets of curves allows us to test hypotheses 3A and 3B. First, we do not find any evidence for hypothesis 3B. On the contrary, at high levels of experience, integrating mechanisms have a positive and institutionalizing mechanisms have a negative effect on alliance performance. The results in Figure 5 indicate that hypothesis 3A cannot be rejected for low levels of institutionalizing mechanisms. In that case, an increase in integrating mechanisms has a more positive effect on alliance performance than institutionalizing mechanisms (the dotted lines are situated higher than the solid lines at the upper left-hand corner of Figure 5). The situation is different for firms that deploy a greater number of institutionalizing mechanisms, in particular in the case of firms that make little use of integrating mechanisms. Hence, hypothesis 3A cannot be rejected for a range of (low) values of institutionalizing mechanisms. As

a result, we conclude that at low levels of alliance experience firms gain most from using integrating mechanisms conditional upon institutionalizing mechanisms being barely present. Institutionalizing mechanisms have a stronger effect on alliance portfolio performance when integrating mechanisms are only used to a marginal extent. However, the effect is always negative for firms that have extensive experience with alliances. These results suggest that integrating and institutionalizing mechanisms can in certain instances substitute for one another.

## Discussion and conclusion

This study has analysed 192 firms worldwide to provide evidence of what types of learning mechanisms are critical to develop alliance capabilities at different levels of alliance experience. The results show that the use of integrating mechanisms and alliance experience are both important and significant predictors of a firm's alliance portfolio performance. Integrating mechanisms such as training sessions establish process routines and capabilities; institutionalizing mechanisms embed routine behaviour and capabilities in systems, processes and structures, which tend to make practices rigid and difficult to adjust. In Crossan et al.'s (1999) terminology, we find that the effect of feed-forward loops (i.e. exploration) are most important to advance a firm's alliance capability.

Moreover, we find that alliance experience changes the way firms learn. In the sample used, firms at different experience levels make use of different sets of learning mechanisms. Firms with little alliance experience make relatively more use of integrating mechanisms in comparison to institutionalizing mechanisms. Firms with extensive alliance experience make relatively more use of institutionalizing mechanisms. In other words, the more alliance experience, the higher the ratio of institutionalizing to integrating mechanisms. A director of alliances of the Dutch flag carrier, KLM, confirmed this by outlining how the use of mechanisms altered with increasing alliance experience at KLM:

Initially, alliances were managed individually. At that point, we primarily relied on exchanging best practices. However, as we reckoned alliances were a major contributor to the business development of our firm, we started building alliances competences; this was done by consolidating our knowledge. This way, we anticipated, we could develop the discipline called alliance management. . . . We created units which specialized in alliance management through which institutional learning could take shape, in which knowledge could be developed and processes could be adopted more easily.

He added that it appeared important to continue to use integrating mechanisms in addition to institutionalizing mechanisms. Institutionalizing mechanisms allowed for better coordination of alliance activities, while integrating mechanisms facilitated transfer of new lessons to other employees.

Moreover, the findings suggest that emphasis on institutionalization of prior experience (i.e. using institutionalizing mechanisms) is likely to negatively impact a firm's alliance performance. There are a number of reasons for this. First, existing processes and structures can potentially inhibit transfer and replication of new practices, in particular when it concerns knowledge that is difficult to transfer (Szulanski, 1996). While organizations may initially benefit from their experience, it may start to harm them in the longer run (Ingram and Baum, 1997; Sampson, 2005). In other words, reliance on espoused practice (or canonical practice) can distort the use of usually valuable practices of its members (Brown and Duguid, 1991). Or as Leonard and Swap (2004: 94) put it: 'mindless repetition can hone the wrong skills'.

Second, not only do institutionalizing mechanisms seem to cause inertia in alliance management practices, they also seem to represent a discrepancy between what processes and structures prescribe and what action is needed in alliances. While Bamford et al. (2003) discuss that different firms use different structures to manage alliances, such organizational design solutions create new 'distances' between the employees that manage alliances and those that 'merely think about and support it'. Hence, institutionalizing mechanisms can cause practices inside firms to become 'out of touch' with what their alliances require.

Overall, these findings point to an important extension of prior findings: while institutionalizing mechanisms (i.e. processes and structures) are useful to help firms manage alliance portfolios of substantial size, it is important to continue to share prior experiences using other types of mechanisms such as best practice dispersal.<sup>10</sup> The results extend what research in related areas has suggested: in order to outperform others in alliances, firms should develop an ability to share and adjust their practices (Bruderer and Singh, 1996; Nelson and Winter, 1982; Teece et al., 1997). In line with the 'dual nature of routines' (Coriat and Dosi, 1998), embedded organizational practices can cause suboptimal performance as the prescribed practice does not match the requirements of the particular circumstance (for an overview, see Huber, 1991). This means that to optimally manage alliance portfolios, integrating mechanisms can be used to instil new practices and ultimately change organizational routines (Nelson and Winter, 1982).

Although it is difficult to define an optimal mix of learning mechanisms, the findings do give information on how firms can balance their investments in order to optimize performance effects. In the data set, firms with moderate alliance experience seem to make use of an 'optimal' mix of integrating and institutionalizing mechanisms, as their average alliance portfolio performance is 63.8 percent, substantially higher than the other categories. It appears that as a firm's alliance portfolio continues to grow, firms should guard against installing too many institutionalizing mechanisms that hinder transfer of new lessons drawn from novel experiences.

Nonetheless, in spite of the fact that institutionalizing mechanisms do not have a significantly positive effect on alliance performance (see Table 5), it should be acknowledged that such structures and processes are likely to provide

for the necessary organizational structure to develop alliance capabilities. As Levinthal (1991: 140) noted: 'In complex decision problems the discovery of the optimum is an extremely difficult task. ... This makes it imperative to use building blocks derived from previous "good" solutions (Holland, 1975) even though doing so contributes to inertia.'

The interpretation of the empirical analyses was confirmed by different experts. One expert confirmed that certain mechanisms such as intranet are specifically useful to help institutionalize alliance-related knowledge, while others, such as dispersing best practices from new experiences, can renew routines. This logic is consistent with Dyer's (2000) findings, who suggested that superior capabilities at Toyota and Chrysler are derived from the knowledge transfer mechanisms used.

### Theoretical contributions

The results of this study build on the previous literature in various ways. First, the findings contribute to previous work on organizational learning. The results confirm the need for firms to balance exploration and exploitation (e.g. Benner and Tushman, 2003; March, 1991). More importantly, the findings provide micro-level insight into how firms can counter an overreliance on exploitative learning in alliance management, i.e. by more installation of and paying attention to processes that foster group-level learning (e.g. Paulus and Yang, 2000). While 'intra-firm practice transfer has not received much systematic study' (Maritan and Brush, 2003: 946), this study has explored how transfer of experience can lead to superior capabilities. Similarly, the results extend the application of evolutionary economics by suggesting that – in the case of alliance portfolios – organizational processes and structures should be aimed at rejuvenation of routines rather than merely installation. As Holmqvist (2004: 71) puts it, 'An organization eventually becomes "closed" in the sense that it only experiences what is in accordance with its history', causing what also has been referred to as organizational inertia (Hannan and Freeman, 1984). This study provides evidence of how firms may avoid such 'competence traps' (Levitt and March, 1988) by opening themselves up to new experiences and having employees share these lessons, thereby renewing organizational practices and routines (Feldman, 2000).

Second, there are theoretical implications for the resource-based view. The findings potentially resolve some of the casual ambiguity surrounding alliance capability development by demonstrating the differential performance effect different types of learning mechanisms have (Lippman and Rumelt, 1982). While isolating mechanisms are often referred to as a requirement for superior resources, we find that the isolating mechanism is inherent in whether the firm's management is willing to invest in deliberate transfer of prior alliance experience.

Third, the results expand the work on dynamic capabilities by analysing in detail one such capability. Analysing the effect of different types of learning

mechanisms on alliance portfolio outcomes, the results show that firms differ in the use of alliance mechanisms to develop their alliance capabilities. Hence, the study supports the notion that such dynamic capabilities can be a source of firm-level heterogeneity.

### Limitations and future research

While this study contributes to our understanding of how firms develop alliance capabilities, a number of limitations should be noted. First, the data set we used is cross-sectional, which restricts the ability to draw conclusions on learning cycles and sequential processes. The precise timing or isolated effect of certain practices would be interesting to study. For instance, the direct impact of individual action (Felin and Foss, 2005; von Hayek, 1955) could be added to the findings of this study by analysing the moderating role of the individual on group- and organizational-level learning mechanisms. Also, the effectiveness of certain mechanisms to integrate or institutionalize knowledge would be an interesting issue for future research; as would be the extent to which embedded knowledge tends to be forgotten and the degree to which firm age moderates institutionalization effects.

Second, the database sources we used (Association of Strategic Alliance Professionals and Dutch Internet Society) may limit the ability to generalize the findings. Even though the average alliance portfolio performance is 52 percent, which is comparable to previous studies (see Park and Ungson, 2001), the sample may be biased.

Third, although the number of prior alliances reflects the firm's relative alliance activity over a certain period, it is unlikely to capture the true extent or richness of their experiences nor does it reflect experiences of the period preceding the survey. While respondents reported on strategic alliances only, each alliance brings along different experiences and some are likely to carry more important lessons than others. Similarly, the measure of alliance portfolio performance is an interesting but complex measure in which certain unobserved variables may play a role. Future research could address the usefulness of various measures of alliance portfolio performance and establish how subjective aggregate portfolio measures are best constructed and whether and when they are preferable over alternative measures such as generic firm outcomes. Testing different aggregated measures of performance is one way to find out whether alliance portfolio and firm performance are confounded.

Last, even though we cannot directly measure marginal benefits due to data constraints, the data set does allow for an analysis of the degree to which deliberate transfer of prior experience benefits performance in alliance portfolios. Despite these limitations, the findings of this study clearly indicate how learning mechanisms at different experience levels cause differential performance effects. In this way, this study has clear implications for executives involved in alliance management and the use of learning mechanisms to develop organization-wide

capabilities in this area. In spite of the fact that we should be cautious in generalizing the findings, this study provides clear evidence of how firms develop alliance capabilities and how firms can continue to improve their alliance management skills.

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## Notes

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- 1 Strategic alliances, hereafter also referred to as 'alliances', are temporary cooperative agreements in which two or more firms share reciprocal inputs to realize improved competitive positions for the partners involved, while maintaining their own corporate identities (Contractor and Lorange, 1988; Parkhe, 1993).
- 2 March (2006: 206) recently made a similar point: 'theories of adaptation typically do not provide powerful understandings about the generation of new ideas, attributes or actions, or about the ways in which persistence in novelty is supported'.
- 3 Please note that while Crossan and colleagues treat integrating as processes occurring at the group and organization level (Crossan and Berdrow, 2003: 1089), this study for the sake of clarity and ease of operationalization assumes integrating processes to take place at the group level (i.e. among individuals to develop shared understanding and coordinated action [Crossan et al., 1999: 525]).
- 4 Please note that this argumentation is in line with Coleman (1990), who emphasizes that there is a need in the social sciences to analyse lower-level phenomena, e.g. the role of and interaction between individuals to explain aggregate phenomena. In line with Coleman's reasoning, recent attempts by scholars to uncover micro-level learning processes have been referred to as 'the emerging knowledge governance approach' (Foss, 2007).
- 5 While this terminology partially overlaps with that used in organization theory and information processing theory (see also Galbraith, 1973; Thompson, 1967), it is nevertheless distinct: integrative devices – as defined in Lawrence and Lorsch (1967: 4, 30) – are defined as mechanisms 'that facilitate the coordination of ... activities of the various subsystems by providing formal machinery for discussing and resolving mutual problems'. Extant organizational learning (OL) theory is interested in 'learning as a process of change' (Vera and Crossan, 2003: 127), moving beyond the interest in how firms coordinate activities as a matter of rational design and conscious choice. Moreover, it is interested in not only structures, routines and formal processes but also lower-level learning effects caused by mechanisms located at the individual and group level. In short, while some scholars implicitly discussed the drivers and barriers to learning in organizations (e.g. March and Simon, 1993), most of the early literature on information processing and organization theory did not – in contrast to OL theory – focus on the processes and mechanisms through which the 'mutual problems' or the 'formal machinery' come about or how prior experiences cause changes in practices in the firm.

- 6 To calculate the average number of alliances, we used five categories to measure the firm's number of prior alliances over the last five years. For the last category ( $\geq 40$  alliances), we assumed an average of 50 alliances. The total number of alliances in our data set then is an estimated 3477 alliances or 18.11 alliances per firm.
- 7 We also ran informal tests using OLS, but with  $VIF \leq 10$  for all variables variance, inflation was not an issue.
- 8 The relative figures represent the mean divided by the number of mechanisms included in the factor (see Table 2 for details; factor 1 consists of seven separate mechanisms; factor 2 consists of nine separate mechanisms).
- 9 We kept the level of the institutionalizing mechanisms at the mean minus one standard deviation in Figure 1, at the mean level in Figure 2 and at the mean plus one standard deviation in Figure 3.
- 10 This should be even less of a surprise if one acknowledges that alliance departments are often positioned as staff departments giving it a 'status apart' and often at considerable distance from those actually involved in day-to-day management of alliances (e.g. Bamford et al., 2003: 334–42). Also, alliance functions may be more prone to pursue negative 'net present value' alliances to legitimize their existence and try and prove their worth.

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## Appendix: Learning mechanisms

Learning mechanisms	
<b>Functions</b>	(1) vice-president of alliances, (2) alliance department, (3) alliance specialist, (4) alliance manager; (5) gatekeeper; (6) local alliance manager
<b>Tools</b>	(7) internal alliance training, (8) external alliance training, (9) training in country differences, (10) partner selection programme, (11) joint business planning, (12) alliance database, (13) use of intranet to disperse knowledge, (14) best practices, (15) culture programme, (16) partner programme, (17) individual alliance evaluation, (18) comparison of evaluations, (19) joint evaluations
<b>Control and management processes</b>	(20) rewards and bonuses for alliance managers, (21) rewards and bonuses for business managers, (22) formally structured knowledge exchange between alliance managers, (23) use of own knowledge about national cultural differences, (24) alliance metrics, (25) country-specific alliance policies
<b>External parties</b>	(26) consultant, (27) lawyer; (28) mediator; (29) financial expert

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