# Alliance Capability as a Mediator between Experience and Alliance Performance

## An Empirical Investigation into the Alliance Capability Development Process

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**SMG WP 12/2005**

**November 2005**

**SMG Working Paper No. 12/2005**
**November 2005**
**ISBN: 87-91815-14-2**

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# ALLIANCE CAPABILITY AS A MEDIATOR BETWEEN EXPERIENCE AND ALLIANCE PERFORMANCE: AN EMPIRICAL INVESTIGATION INTO THE ALLIANCE CAPABILITY DEVELOPMENT PROCESS

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ABSTRACT

This study centers around the way in which firms can enhance alliance performance through the development of alliance capabilities. Whereas most research has focused on inter-firm antecedents of alliance performance, research on intra-firm antecedents pointing to prior experience and internal mechanisms to foster knowledge transfer has only recently emerged. As little is known about how firms develop alliance capabilities, this study aims to uncover how differences in sources of alliance capability development explain performance heterogeneity. The data come from a detailed survey held among alliance managers and Vice-Presidents of 151 firms. The survey covers over 2600 alliances for the period 1997-2001. This study not only finds that alliance capabilities partially mediate between alliance experience and alliance performance, but also yields novel insights into the micro-level building blocks underlying the process of alliance capability development.

*Key words: alliances, learning, knowledge transfer, alliance experience.*

JEL classification: L14

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# ALLIANCE CAPABILITY AS A MEDIATOR BETWEEN EXPERIENCE AND ALLIANCE PERFORMANCE: AN EMPIRICAL INVESTIGATION INTO THE ALLIANCE CAPABILITY DEVELOPMENT PROCESS

## Introduction

Increasingly, strategic alliances have become a cornerstone of many firms' competitive strategy. More and more firms are using strategic alliances as a means to for instance enter new markets, share development costs, increase their marketing reach, and provide complete solutions to the customer. Many firms have come to appreciate the specific benefits of strategic alliances. Surprisingly however, performance differences among firms, in terms of the success of strategic alliances, are notable: while some firms seem to be very effective in undertaking alliances, others seem to suffer from very high failure rates. Over the past decades, we have witnessed the emergence of a large body of literature that aims to unravel the factors that underlie these performance differences among companies. Various theories have been used to examine performance antecedents. Whereas traditional industrial organization (IO) literature and Porter's (1980, 1985, 1991) frameworks mainly point to industry effects and firm activities, theories such as the resource-based perspective and evolutionary economics propose firm-specific factors to cause rent differentials.

Building explicitly on the fundamentals of the latter group of theories, this study aims to analyze the role of alliance experience and capabilities in understanding persistent alliance performance differences between firms. So, far, various studies have examined the acquisition of capabilities through alliances (e.g. Powell et al., 1996; Inkpen and Dinur, 1998; Khanna et al., 1998; Kale et al., 2000; Makhija and Ganesh, 1997; Tsang, 2002a). Alliances have been found to

foster a decrease in organizational inertia by stimulating environmental adaptation (Doz, 1996) and are shown to foster an increase in a firm's strategic flexibility by increasing the number of available strategic options (Harrigan, 1986). Typically, these studies center around the gains alliances provide when firms are successful in managing the alliance process (e.g. Doz, 1996; Mowery et al., 1996; Das and Teng, 2002). Furthermore, they tend to emphasize joint gains that foster the creation of collaboration-specific rents (Khanna et al., 1998; Madhok and Tallman, 1998).

However, in spite of the important contribution of these findings, few studies have been able to explain how experience can be translated into a capability (Simonin, 1997; Kale et al., 2002). Contributions aimed at enlightening the process underlying the development of capabilities and the potential learning mechanisms to be used have been limited in number and tend to lack micro-level detail (Eisenhardt and Martin, 2000). Siminon (1997) concludes that a firm should first internalize collaborative experience before the lessons learned become useful for a firm's future alliances. The use of learning mechanisms for selection and diffusion of certain experiences and specific knowledge can be critical for the evolutionary process of the firm (Fujimoto, 2000). However, the insights generated by prior studies investigating dyadic issues tend to remain anecdotal in origin and little specific as to how to solve the matter (Park and Ungson, 2001). Firms are left in the dark about adequate actions that can be taken at the micro-level (Johnson et al., 2003). As firms continue to ally at an increasing rate (Khanna et al., 1998), the relevance of successfully managing alliances and understanding the underpinnings of alliance capabilities becomes ever more important for firms. Hence, there is an evident need to understand

*how* firms can internalize their acquired experience in order to develop alliance capabilities.

This study intends to fill this void by investigating the role alliance experience, learning mechanisms and alliance capabilities play in the quest for enhanced alliance performance. As has been done in previous studies (e.g. Lambe et al., 2002), we build on a mix of theories which consists of the resource-based view, dynamic capability view, the knowledge-based view, organizational learning theory and evolutionary economics. Taken together, these perspectives allow us to investigate the process which lies at the root of a firm's ability to integrate, acquire and develop capabilities through organizational learning (Mowery et al., 1996).

The aim of this study is threefold. First, we wish to extend the current understanding of the process underlying alliance capability development. Therefore, we will describe a model in which the concepts of experience, learning mechanisms, routines and capabilities are linked. By linking these concepts, we hope to enhance our understanding of the underlying process of experience leveraging and the creation of alliance capabilities. Second, we will empirically test how capabilities influence alliance performance. To realize this, we analyze the relationships between alliance experience, capabilities and performance. Third, as a consequence of the two former goals, we aim to provide insights into critical concepts to ease firms' efforts in developing their alliance capabilities through which they can potentially improve their alliance performance.

This study is divided into two parts. First, we describe a model for alliance capability development. Second, we empirically analyze the hypotheses that are derived in the first part. The results should provide us with a better understanding of the building blocks of alliance capabilities. Furthermore, they

should enhance our insight into the interactions between alliance experience, capabilities and performance.

**A model of alliance capability development**

Although concepts such as resources, capabilities and competences have been extensively described, their terminology has been subject to a lot of confusion (Dosi et al., 2000; Williamson, 1999). Increasingly, a growing body of literature is directed towards identifying intra-firm factors to explain performance differences among firms (Dierickx and Cool, 1989; Levinthal and March, 1993). This has fostered an interest in the interplay between organizational capabilities, knowledge and learning (Prahalad and Hamel, 1990; Hamel and Heene, 1994). In these studies, experience (Nelson and Winter, 1982; Pisano, 2000) and mechanisms (Zahra and Nielsen, 2002; Zollo and Winter, 2002) have been put forward as important antecedents which can be used to explain persistent performance differences among firms.

In the area of alliance research, recent investigations have tried to unravel the underpinnings of structural fixed-firm alliance performance differences by researching the role of alliance experience (see e.g. Powell et al., 1996; Anand and Khanna, 2000; Hoang and Rothaermel, 2005). Although alliance experience is likely to have a direct and positive effect on alliance performance (Deeds and Hill, 1996), a more subtle process is expected to underlie this relationship. Some recent studies have suggested that certain critical deliberate learning mechanisms or capability-building mechanisms (hereafter also referred to as '(learning) mechanisms') are required for alliance experience to lead to increased alliance performance (Kale et al., 2002; Zollo and Winter, 2002; Draulans et al., 2003). These deliberate learning mechanisms can help leverage

and disperse alliance knowledge. For instance, Lenox and King (2004) find that, controlling for the positive effect of experience on adoption, information provision stimulates adoption of practices. However, the precise interplay between the constructs experience, mechanisms, routines, capabilities and performance has remained obscure (King and Zeithaml, 2001; Shafer et al., 2001). Hence, little empirical evidence exists with respect to how firms can best distribute and institutionalize organizational knowledge. More precisely, the mechanisms that allow for knowledge transfer which can enhance adoption of new practices have hardly been analyzed. Following Zollo and Winter (2002: 340), we argue that learning mechanisms, routines and capabilities are inherently linked (see figure 1).

-- insert figure 1 about here --

The process shows the relationships between alliance experience, capabilities and alliance performance. Although alliance experience is likely to have a direct and positive influence on alliance performance (Reuer et al., 2002b; Hoang and Rothaermel, 2005), we propose a more subtle process by suggesting that the effect of alliance experience is also explained by a firm's alliance capability. As the results of the Lenox and King (2004) study suggest, merely referring to experience as the explanatory variable for sustained heterogeneity in firms' alliance performance seems to be an overly simplistic representation of reality. Therefore, using experience as a single means to explain performance limits our understanding of how firms can leverage their experience and as well as of how firms can develop alliance capabilities. We expect the process to be subject to iterations because learning is an inherently interactive and volatile process

(Argyris, 1977), which in our model is represented by the dotted lines. The model suggests that a firm's alliance capability is a mediating variable (Lehmann et al., 1998). This implies that the impact of experience on alliance performance is realized via a firm's alliance capability. For instance, codification of individual experiences makes it easier to apply the lessons learned, which helps accelerate the development of firm-wide routines (Zander and Kogut, 1995). This suggests that certain learning mechanisms help transfer knowledge throughout the firm to induce the creation of organizational routines (Nelson and Winter, 1982). Consequently, alliance capabilities are expected to mediate between a firm's alliance experience and performance: experiences are disseminated via learning mechanisms thereby fostering the creation of firm-wide knowledge-sharing routines (Helleloid and Simonin, 1994; Grant, 1995; Dyer and Singh, 1998). By empirically testing this model we intend to shed new light on the process underlying the development of alliance capabilities.

## Theory and hypotheses

*Experience*

The impact of 'experience' on firm performance has been investigated in various empirical settings (e.g. Ingram and Baum, 1997; Simonin, 1997; King and Tucci, 2002). The majority of these studies suggests a positive relationship between experience and performance, suggesting experience to be the predominant explanatory variable for capability development (Teece et al., 1997). Lack of experience and ignorance are said to be a critical cause for alliance failure (Kleiner and Roth, 1987; Lei and Slocum, 1992). Furthermore, as firms gain experience, they can afford to devote less attention to solving a particular problem (Bereiter and Scardamalia, 1993), providing the firm with standardized

solutions. Gaining experience allows firms to become more effective at managing particular processes than less experienced firms (Das and Teng, 2002). Although there is extensive evidence that the learning is associated with larger numbers of alliances, having too many alliances might lead to diminishing returns from these alliances (Kogut et al., 1992; Uzzi, 1997). Saturation effects occur because there seems to be a natural limit to the overall number of strategic alliances that a company can support successfully (Gomes Casseres, 1996). Moreover, alliance experience can also be related to different types of alliances, partner-specific aspects of alliances or for exchanges of for example technologies (Reuer et al., 2002b).

In line with previous research, we define alliance experience as the lessons learned, as well as the know-how generated through a firm's former alliances (e.g. Gulati, 1995; Kale and Singh, 1999; Kale et al., 2002; Reuer et al., 2002b). These lessons and know-how are likely to become embedded in the minds of the individuals involved. This provides a basis for an organizational routine with respect to performing a certain task or activity (Nelson and Winter, 1982).

Various researchers have investigated the role of alliance experience as an antecedent for alliance performance. Although the majority of these studies finds a positive linear relationship (Anand and Khanna, 2000), other studies suggest a curvilinear relationship (Deeds and Hill, 1996; Hoang and Rothaermel, 2005). Overall, these studies suggest a positive relationship between experience and performance. A number of reasons account for this positive relationship. First of all, previous research suggests that experience enables firms to better understand the critical processes and issues in alliance management. Not only does it allow firms to select more appropriate partners and to manage the

alliance process more effectively (Simonin, 1997), it also increases their ability, for instance, to ease conflict situations (Mohr and Spekman, 1994).

Second, shared experience engenders the development of 'common perspectives' (Nonaka, 1994: 24), enabling a firm to absorb new knowledge more effectively (Grant, 1996). In this context various scholars have looked at the role which absorptive capacity plays in enhancing a firm's "*ability to recognize the value of new information, assimilate it, and apply it to commercial ends*" (Cohen and Levinthal, 1990: 128). Several scholars have differentiated between dyadic-level and intra-firm level factors influencing absorptive capacity (Lane et al., 2001). Dyadic level factors refer to concepts such as trust which influence the relative absorptive capacity or partner-specific absorptive capacity (Mowery et al., 2002). These studies have analyzed the role of absorptive capacity to understand differences in rates of learning in alliances (Cohen and Levinthal, 1990; Lane et al., 2001). Other scholars have looked at intra-firm determinants of absorptive capacity such as information provision and organizational infrastructures (Lane and Lubatkin, 1998). Inkpen and Crossan (1995: 611) for instance stress that transfer problems can arise *"as individual learning spirals its way to the organizational level, dissipation in learning will occur".*

As one can either learn from own experiences or from the experience of others (Levitt and March, 1988), experience can be seen as a key concept in capability development. Moreover, on average learning from experience via simplification and specialization will improve organizational performance (Levinthal and March, 1993). Hence, stressing the need to thoroughly embed knowledge in the organization's routines and practices in order to be optimally leveraged, various scholars have suggested that prior experience shape future firm capabilities (Helfat, 2000; Zollo and Winter, 2002). Overall, on the basis of

these arguments, we posit that alliance experience will have a positive effect on a firm's alliance performance.

*H1: Prior alliance experience has a positive impact on alliance performance.*

*Capabilities*

Various scholars have proposed different constructs to underline the differences between resources and capabilities. Following the logic of Grant (1990), Makadok (2001) and Thomke and Kuemmerle (2002), an alliance capability is defined as a higher-order resource which is difficult to obtain or imitate and has the potential to enhance the performance of the firm's alliance portfolio. This higher-order resource consists of or is captured by learning mechanisms (Grant, 1995; Tsang, 2002b), which can increase a firm's ability to perform repeatable patterns of action with respect to, for instance, identifying partners, initiating relationships or restructuring individual alliances as well as alliance portfolios (Simonin, 1997; Spekman et al., 1999; Dyer et al., 2001). What is critical in this respect is that these mechanisms can act as organizing principles to facilitate the transfer of and adaptation of knowledge and practices to a wider circle of individuals by engaging in a stable and repetitive activity pattern to capture, disseminate and apply alliance management knowledge (Kogut and Zander, 1997; Winter, 2003). A firm's alliance capability can thus be seen as its ability to internalize alliance management knowledge (Eisenhardt and Martin, 2000; Kale et al., 2002). Essentially, we view alliance capabilities as a multi-layered phenomenon: learning mechanisms (being organizational attributes such as an alliance department) are the building blocks of routines which again form the basis of a firm's alliance capabilities (Dosi et al., 2000; Gittell, 2002; Zollo and Winter,

2002). As a result, a firm's alliance capabilities are embedded in organizational routines, which are repetitive activities that a firm develops to deploy its resources in alliances (Nelson and Winter, 1982, Helfat and Peteraf, 2003; Winter, 2003).

When it comes to alliance management, learning mechanisms can be represented by functions (e.g. alliance department), tools (e.g. alliance training), control and management processes (e.g. alliance metrics) and external parties (e.g. use of external consultants). An overview of these groups and the mechanisms belonging to each group is represented in appendix 1. We expect that alliance capabilities positively influence alliance performance for a number of reasons. First of all, various studies have suggested that firms which consistently generate above-average rents in alliances possess specific alliance capabilities (Alliance Analyst, 1996; Kale and Singh, 1999; Anand and Khanna, 2000). Second, because individual experiences and skills account for an essential part of the organizational memory and entail a set of repetitive activities ensuring a smooth functioning of the organizational operations (Coriat, 2000: 214). In this respect, Knott (2003) finds that, while operationalizing 'routines' by such mechanisms as training, assistance and operations manual, these mechanisms positively influence franchise performance. Similarly, Gittell (2002) investigates skill and knowledge transfer in the health care sector. By operationalizing 'routines' by mechanisms such as regular team meetings and best practices, she confirms that such mechanisms represent routines that enhance performance by engendering organizational capability development. In the area of alliances, similar findings are brought forward by for instance Kale et al. (2002), who find that alliance departments are important drivers of alliance capabilities.

However, in addition to structure and process elements that can be installed to improve knowledge flows, capabilities are also affected by behaviors and attitudes. Acknowledging that routines are in many respects seen as the equivalent of individual skills (Nelson and Winter, 1982: 73), it becomes evident that individual behavior also impacts the firm's ability to store, collect and disseminate alliance related materials. While this study primarily pays attention to structure and process aspects, different studies have confirmed the importance of relational and interpersonal issues in alliances such as partner fit, trust and compatibility (e.g. Medcof, 1997; Doz and Hamel, 1998; Zaheer et al., 1998; Dyer, 2000; Tsang, 2002a). Moreover, organizational learning theory in particular has paid attention to learning barriers such as organizational forgetting, employee turnover, fragmented learning, communication, tacitness and superstitious learning (see e.g. Stata, 1989; Senge, 1990; Levinthal and March, 1993; Argyris, 1994; Martin de Holan and Philips, 2003). Nonetheless, as different studies have confirmed (e.g. Argote, 1999; Leonard and Swap, 2004), mechanisms fostering knowledge sharing can be seen as prerequisites for success, which serve to disseminate knowledge in order to prepare and also stimulate constructive behavior by those involved (Kanter, 1994; Kale and Singh, 1999). This is also implied in popular readings such as Alliance Analyst (1994), the Corporate Strategy Board (2000) and Forbes Magazine (2001).

Given the frequent delineation that mechanisms and routines are an interlinked concept (e.g. Winter, 2003), we hypothesize that the level of a firm's alliance performance depends on the extent to which firms use mechanisms to integrate alliance-related knowledge and which enables them to create routines for managing alliances (i.e. the degree to which they develop alliance capabilities).

*H2: A firm's alliance capability is positively related to a firm's alliance performance.*

*Interaction between experience and capabilities*

With respect to the alliance capability process as presented in the model in Figure 1, one last interaction needs to be addressed. The model tries to describe a more subtle process that we expect to lie at the roots of the causal relationship between alliance experience and performance. Capabilities must be built through experience since they are not easily available in the spot market (Teece et al., 1997) and are an outcome of the firm's ability to integrate knowledge (Grant, 1996). We argued above that we expect mechanisms to play an important role in two ways. First, we suggested that the learning mechanisms allow firms to leverage their alliance experience. Second, we described the related notion of how firms can develop an alliance capability by proposing that experience provides an essential input to learning mechanisms and routines. In addition, we acknowledge that the development of firm-specific capabilities requires the interplay between different organizational elements (Helfat and Peteraf, 2003), i.e. it relates to a process wherein individual experiences and knowledge ultimately shape the organizational learning process which impacts capability development (Helleloid and Simonin, 1994). This process is multi-faceted (Crossan et al., 1999) and can lead to an 'architectural competence' (Henderson and Cockburn, 1994) when mechanisms are used to structure and coordinate knowledge flows.

Therefore, we expect that a combination of and simultaneous development of a firm's alliance experience and learning mechanisms will reinforce a firm's

ability to improve its alliance performance. This implies that alliance experience is expected to positively influence alliance performance via its positive impact on alliance capability development (alliance capability as a mediating variable). Therefore, we posit:

*H3: Alliance capability mediates between alliance experience and performance.*

## Data and methodology

### *Data*

In order to empirically validate this study's model, a survey method was used which is in line with earlier studies (Beamish, 1984). A survey questionnaire was sent to 500 Vice-Presidents and alliance managers worldwide. The survey was aimed at collecting data on managerial assessments of a firm's strategic alliance portfolio performance. For the purpose of the study, strategic alliances (also referred to as 'alliances') were defined as temporary cooperative agreements in which two or more firms share reciprocal inputs to realize improved competitive positions while maintaining their own corporate identities (Contractor and Lorange, 1988). The database of the Association of Strategic Alliance Professionals (ASAP) and the Internet Society (ISOC) were used as primary data source to collect large-sample data. Using these databases, we were able to approach alliance managers and alliance specialists who can be considered to be appropriate when gathering data on the performance of alliance portfolios.

After sending a reminding message to all the potential respondents, we received 161 responses. This resulted in a response rate of 32.2%, which is considerably higher than most international mail surveys (Harzing, 2000) but comparable to other studies on alliances (see e.g. Kale et al., 2002; Reuer et al.,

2002a; Zollo et al., 2002). In order to ensure that our data was not biased as a result of non-response, various analyses were performed. Chi-square tests allowed us to compare early with late respondents with respect to a number of key variables (i.e. number of employees of parent firm, worldwide sales revenues and alliance performance). The results show that there is no difference between the two categories, which implies that there is no significant non-response bias in our dataset (Kanuk and Berenson, 1975; Armstrong and Overton, 1977). After data screening, in which we deleted unusable entries and outliers, the final dataset consisted of 151 valid cases from the following industries: Information and Communication Technology (ICT) (25%), ICT services (18%), financial services (7%), other services (e.g. consultancies) (25%), pharmaceuticals and biotechnology (5%), chemicals (3%), other manufacturing (12%) and public sector, e.g. education and non-profit organizations (5%). Two interesting industry categories can be distilled from this sample: ICT-related (43%) and service-related sectors (55%). Table 1 provides an overview of the relative distribution of the respondents in terms of the three relevant variables: number of employees, sales revenues and nationality. With respect to the number of employees, the dataset proved to consist of two relatively balanced sets of firms: 45.7% of the respondents works for a parent firm having between 1 and 500 employees and 49% of our respondents works in a firm that employs over 1000 employees. With respect to sales revenues, the largest amount of respondents, namely 32.5%, is found in the category of US$ 1-50 billion worldwide sales per year. Furthermore, 25.8% of the firms in our dataset generate sales revenues below $1m, 24.5% between $1-100m, 13.2% between $100m-$1b, 3.3% generates over $50b in sales revenues, and the rest is missing data. With respect to the nationality of our respondents, the vast majority originated from either the United States. or

Europe, with only four respondents working for firms that had headquarters stationed outside of either of these two regions.

- insert table 1 about here-

The average alliance performance of the firms included in our sample is 52.03%, which is comparable to other studies (Park and Ungson, 2001). In our study, this implies that 52% of the strategic alliances in the firms' portfolios realize the initially defined goals in their strategic alliances; the remaining 48% of strategic alliances in their portfolio fails to achieve these goals. Since we excluded the average performance group (40-60%) from our analyses, the results report on 99 firms that each manage an average alliance portfolio of 17.33 alliances.

*Expert interviews*

In addition to this survey, expert interviews were conducted among 10 experts in the field of alliances and capability development. These interviews were performed after the empirical analyses and results and were aimed at getting expert input on the interpretation of our findings. To ensure a balanced mix, we interviewed 5 experts with an academic and 5 experts with a professional background. The experts were selected on the basis of their established reputation in the field and ability to sufficiently contribute to the goal of the interviews.

After extensive pre-testing with a panel, the interviews were recorded with consent of the interviewees and thereafter transcribed in order to compare the results. The interviews lasted between thirty and fifty minutes and served two purposes. On the one hand, they allowed us to verify and validate the logic of

our model. On the other hand, they enabled us to verify our findings and the reasons why these findings were adequate. The results were summarized during the interview in order to ensure an adequate representation of the expert's answers.

**Measures**

*Alliance portfolio as unit of analysis*

Earlier studies relied primarily on measuring the performance of the individual alliance or on measuring the partner benefits from the alliance (Olk, 2002). An obvious detriment to using the alliance as level of analysis is that each alliance is treated as a single and independent transaction (Doz and Prahalad, 1991). As researchers have recently started to analyze knowledge transfer *within* firms (earlier referred to as the second stream of alliance research), doubts arise whether an alliance or partner level of analysis is an appropriate level (Levinthal, 2000). As this study builds on the premises of this stream of alliance research, using the performance of a firm's alliance portfolio as a level of analysis is more likely to be a reliable representation of a firm's average alliance performance because it allows us to analyze the *average* impact of a firm's alliance capability on its alliance performance. The impact of a firm's alliance capability is by nature not restricted to one alliance but is centered on the creation of a firm-wide ability to deal with its entire alliance portfolio (Anand and Vassolo, 2002). In line with Ray et al. (2004), who compare two types of dependent variables deemed credible in studies relying on the resource-based logic, we use the firm's alliance portfolio performance as the unit of analysis and dependent variable. Given that -except for some notable recent exceptions (e.g. George et al., 2001; Vassolo et al., 2004; Hoffmann, 2005; Reuer and Ragozzino,

2005)- this unit of analysis has so far rarely been used, it is useful as it allows us to observe the impact of certain business processes involving alliance practices on alliance performance. This allows us to verify whether heterogeneity in alliance performance is attributable to differences in use of certain intra-firm alliance-related processes.

*Explanatory variables*

We included three main independent variables in our study: alliance experience, alliance capability and their interaction effect. For the first explanatory variable, we used the number of alliances that a firm formed (in our case over the period 1997-2001) as a proxy for alliance experience which is in line with prior research (Kale and Singh, 1999; Tsang, 2002b). In the literature, there is growing consensus that five years is the correct period to examine (Kale et al., 2002; Li and Rowley, 2002; Zollo et al., 2002). It is considered to be the average period in which an alliance can still contribute to the experience level of companies. A 5-point scale defined different categories representing a firm's number of alliances. These were defined as follows: (1) 0-5 alliances; (2) 6-15 alliances; (3) 16-25 alliances; (4) 25-40 alliances and (5) over 40 alliances. As the average alliance portfolio of firms in our dataset consisted of over 17 alliances, the total dataset refers to approximately 2617 alliances. For the last category (>40 alliances), the average was set at 50 alliances. We arrived at a total of 2617 alliances by multiplying the number of respondents within each category by the average of each category. Overall, the average alliance portfolio of our respondents consisted of 17.33 alliances (N=151).

Second, in spite of the difficulty of measuring 'capabilities' (Dosi et al., 2000), we posit that the learning mechanisms investigated compose a valid

representation of a firm's alliance capability. In this respect, Salk and Simonin (2003) state that *"mechanisms through which learning is realized and potentially converted into performance, often directly inferred rather than directly observed, imply structures and processes at the organizational and sub-organizational levels"*. This clearly underlines the fact that sound operationalizations should be sought in organizational attributes reflecting the absence or presence of such mechanisms.

These recent scholarly efforts, which are aimed at finding the building blocks of routines and capabilities, convey the ambition to understand a firm's knowledge transfer capacity (Martin and Salomon, 2003; Miller, 2003; Minbaeva et al., 2003). In line with these recent efforts, this study analyzes a set of learning mechanisms potentially critical to a firm's ability to manage alliances. In spite of the fact that there is a difference between having a certain mechanism in place and using it in an effective way, the fact that a firm installs mechanisms to manage alliances reflects a commitment and recognition of the importance of its alliances. Moreover, the results of the expert interviews clearly underlined the important of learning mechanisms as representation of a firm's alliance capability. All experts confirmed that our items (i.e. learning mechanisms) were important representations of a firm's ability to develop alliance capabilities. In this way, we verified for the face validity of the operationalization chosen. Hence, in this study we measure alliance capabilities as learning mechanisms possessed by the firm and assume learning mechanisms to cause repeatable patterns of actions or capabilities (Winter, 2003).

Therefore, in line with Knott (2003: 937) and Gittell (2002), who operationalize routines as a sum of practices, we operationalize a firm's alliance capability as a sum of its alliance mechanisms. The thirty mechanisms

investigated are all measured by single-item dummy variables (functions, tools, control or management processes or external parties- see appendix 1). This is also referred to as a binominal semantic differential scale, as the end points consist of two bipolar activities (i.e. 'good' versus 'bad' or 'yes' versus 'no'). In this study, we used the binominal scale to understand whether firms have or do not have a certain mechanism in place. This means that a firm can obtain a score which lies between zero and thirty, depending on the number of mechanisms in use. On the basis of the input of an expert panel, a list of mechanisms critical to alliance management was generated. Recently, relying on extensive practical fieldwork and experience, Bamford and Ernst (2003) have come up with a similar list of mechanisms. Some earlier studies use alliance experience as a proxy for alliance routines (Zollo et al., 2002) or measure one mechanism such as an alliance department (Kale et al., 2002). However, measuring alliance capability using a greater number of mechanisms allows for a more detailed picture of the origins of alliance capability to arise. Given the inherent complexity of managing alliances, we expect that measuring alliance capability using thirty separate items is more likely to give a solid representation of a firm's ability to fully master all aspects involved in managing alliances.

*Dependent variable*

Triggered by the dissatisfaction with the performance of many alliances (Khanna et al., 1998), the topic of alliance performance and its measurement has been dealt with extensively over the last years. Although this area has been baptized as being 'challenging' due to measurement problems and data access (Anderson, 1990; Gulati, 1998), various studies have used different measures and levels of analysis (for a critical review see Gulati, 1998; for an overview see Park and

Ungson, 2001). A number of studies have investigated the need to use objective, subjective or a composite index to measure alliance performance. Geringer and Hebert (1991) have shown that objective and subjective measures tend to have a high correlation. Consequently, 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 provides a sound reflection of alliance performance (Kale et al., 2002). Given the fact that companies 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; Tuchi, 1995; Kale and Singh, 1999). Consequently, 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. The dependent variable i.e. alliance portfolio performance was calculated as a dichotomous measure. In order to be able to be able to address the effect of learning mechanisms on alliance performance, we defined a low (0-40%) and high-performing (61-100%) firm category. The respondents having an alliance performance lying between 41 and 60% were left out as this is considered to be the average level of performance in alliances (see Park and Ungson, 2001).

*Controls*

In order to verify the validity of our results, we controlled for a number of variables: industry-related variables (using ICT-related and service-related sectors) and a firm size variable (using sales revenues). The two industry-related controls were controlled for because these are dominant groups and are typically known to be very active in alliances. ICT-related sectors consist of ICT and ICT-

service sectors (43% of the total sample). Service-related sectors were defined as ICT-services, financial services, other services and public sectors (55% of the sample). With respect to firm size, sales revenues were defined as the total worldwide sales of the parent firm in 2000 (measured as categorical variable).

**Results**

Several statistical techniques were used to test our hypotheses. We used a logistic regression model to test hypothesis 1 and 2 (see model I, II, IV and V) and then applied an ordinary least squares regression model to test hypothesis 3 (see model III) since in that case the dependent variable is 'alliance capability' which is metric rather than dichotomous. For all other models, logistic regression was used because we deal with a categorical dependent variable 'alliance performance'. A first analysis of the data showed that the independent variables seemed to be highly correlated with the interaction term. This is a recurring problem in extended models containing mediating variables (Mason and Perreault, 1991). In order to solve this problem, we centered our data in order to overcome the problems associated with multicollinearity (see e.g. Aiken and West, 1991). 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 2 provides the descriptive statistics and the correlation matrix. As alliance performance is represented as a categorical variable in the logistic regression analysis, it is not included in the correlation matrix (Hair et al., 1998).

-- insert table 2 about here --

In order to test this study's hypotheses, we analyzed different models (see table 3). Using the five models helps us not only to examine the hypotheses defined but also to verify whether the inclusion of additional variables increases the variance explained. This is reflected by an increase in the Nagelkerke R-squared. Moreover, following these steps, we can test for mediation (Baron and Kenny, 1986). First of all, the control variables were regressed on the dependent variable. Our findings are listed in table 3, model I. From the results presented in this model, it follows firm size (measured by the firm's sales volume) does not yield any significant results nor do industry controls. Therefore, we do not find any support for differences that pertain to firm size or sector. Thereafter, we tested a model containing experience as the independent variable to verify if experience positively influences alliance performance (H1). The results in model II show that this variable is significant at the 1% level and has a coefficient of 0.914. Second, in order to verify whether our model (as represented in figure 1) is correct, we tested whether alliance capability mediates between experience and alliance performance. Following a procedure suggested by Baron and Kenny (1986), we find that indeed alliance capability is a mediating variable. For this purpose, we used ordinary regression instead of logistic regression as formula two of this procedure involves a metric dependent variable. This procedure tests the following formulas: $Y_{success}$ = fn (experience), $Y_{mechanisms}$ = fn (experience) and $Y_{success}$ = fn (experience, mechanisms). First, from the regression results in model III, it shows that experience is a significant variable explaining alliance capability. Second, the results of model IV show that the coefficient of experience as well as its significance decreases if we include mechanisms in the analysis. Third, the residual variance decreases, which is reflected by an increase in the Nagelkerke R-squared (Cote, 2001; Baron and Kenny, 1986). From these results,

we can conclude that alliance capability is a partially mediating variable. Alliance capability is a *partially* mediating variable because –upon including alliance capability as a predictor- the effect of alliance experience on alliance performance is not totally ruled out (Kenny et al., 1998). These results confirm that, following the procedure by Baron and Kenny (1986), a firm's alliance capability mediates between its alliance experience and performance.

Moreover, model IV also shows that both alliance experience and capabilities are positively related to alliance performance. In line with Lenox and King (2004) who find that information provision is positively related with activity adoption, we find that mechanisms which transfer alliance-related knowledge have a positive impact on performance. This implies that exposure to and provision of knowledge enhances the adoption of such knowledge in practices and activities.

-- insert table 3 about here --

Thereafter, we defined model V containing all three independent variables: experience, alliance capability and their interaction effects (Heath, 2001). The results show that all independent variables except for the interaction effect between experience and alliance capability are significant at the 5% level. To check for robustness, we also ran the analyses using alternative statistical techniques such as ordered logit and probit. The results were comparable and hence support our previous findings.

The expert interviews, which were performed after the data analysis, allowed us to verify our findings and to nurture a better understanding of the complex nature of alliance management in general. A number of relevant

contributions were made with respect to the different hypotheses. First, the results of the expert interviews demonstrate that alliance experience was considered to be a synonym for learning-by-doing. More specifically, various experts underlined the fact that experience allows firms to improve their understanding of the alliance process, such as partner selection, execution and evaluation. However, different experts also underlined the need to disperse experience in order to be optimally leveraged. In other words, gaining experience was only a first step to improve their firm's alliance capabilities; it required dedicated efforts to disseminate the lessons learned using learning mechanisms to realize sustained alliance portfolio performance improvements. A Vice-President of alliances of a large pharmaceutical company said: *"Process experience ultimately allows you to improve your performance. Learning-by-doing or 'scar tissue', strategy, selection, finding, executing, and operating allows individuals to become much more effective because they know what to not leave undone. It naturally allows you to learn and be more effective in new alliances."*

Second, alliance mechanisms were viewed as an adequate and highly useful representation of a firm's alliance capability. More specifically, one expert indicated that these mechanisms represent 'physical artifacts' of a capability, implicitly representing and referring to an essential element of organizational memory and routines as defined by Moorman and Miner (1997). Not only because they represent a firm's intent to learn, but also because they comprise an essential element to foster a firm's capability development. One expert argued: *"A firm can jumpstart successful alliance management by for instance gathering best practices and going to externally organized trainings"*. Although the academic literature provides various examples of firms developing alliance capabilities in very different ways (e.g. Hill and Hellriegel, 1994; Alliance Analyst, 1994;

Takeishi, 2001), various experts emphasized the fact that *all* of the pre-defined mechanisms were important to develop alliance capabilities. All experts confirmed that the specific contribution of mechanisms was evident from their ability to disseminate experience throughout the firms. This process, they confirmed, induces a potential basis for the creation of repeatable patterns of actions. One of the experts mentioned that: *"… We organically developed our alliance capabilities distilling best practices from individual alliances and use this input to feed network-sharing sessions and our intranet. … Only after multiple people formed a group, this knowledge was consciously institutionalized and shared processes evolved"*. These findings confirm that the mechanisms tested are indeed helpful for firms to transfer experience throughout the organization, which fosters the development of alliance capabilities.

**Discussion and conclusion**

This study was aimed at investigating the role alliance experience and capabilities play in fixed-firm differences in alliance performance. By using a firm's alliance portfolio performance as the dependent variable and by measuring alliance capabilities by a company's learning mechanisms, we were able to direct attention to the micro-level process of alliance capability development (Grant, 1996). Moreover, in this way we were able to empirically differentiate between the role of a firm's experience and a firm's alliance capability obtained via its deliberate learning mechanisms in the alliance capability development process.

The results of our study show that both experience and alliance capabilities are important antecedents of alliance performance. In line with earlier studies (Anand and Khanna, 2000; Hoang and Rothaermel, 2005), we find that experience is indeed an important antecedent of alliance performance. While

the large majority of previous studies focused on individual alliance performance, this study confirms that experience also is an important antecedent of a firm's entire alliance portfolio.

We find support for hypothesis 2, which states that a firm's alliance capability is positively related to a firm's alliance performance. Model II shows that alliance capability is a significant predictor of alliance performance. Also when controlling for a firm's sales, number of employees and industry, we find support at the 5% level. Although one may argue that a positive relationship between a capability and performance is straightforward, the operationalization used provides critical insight into the building blocks of alliance capabilities and hence into how firms can develop alliance capabilities. Thus, this study's results confirm Kale and Singh's (1999) and Kale et al.'s (2002) findings who argue that processes supporting the accumulating, codification and sharing of knowledge are an important determinant of fixed-firm differences in alliance performance.

Moreover, the results show that alliance capability is a partially mediating variable in explaining alliance performance. These results provide convincing support for hypothesis 3 and confirm the importance of dispersing gained experience through learning mechanisms in order to create firm-wide routines, thereby fostering the firm's alliance capability (Bamford and Ernst, 2003). This is in line with Gittell (2002: 1423), who finds that coordinating mechanisms and routines improve performance by facilitating interaction among employees in the work process. Being one of the first to empirically test the role of routines and mechanisms (Gittell, 2002: 1423), she finds that mechanisms and routines play a mediating role in the structure, process, outcome model. The results provide convincing support for hypothesis 3 and confirm the importance for firms to cultivate alliance capabilities (Bamford and Ernst, 2003). More

specifically, the results of our study indicate that, in contrast to Simonin (1997), alliance experience can also lead to alliance performance increases directly. This finding is in line with the findings of Kale et al. (2002) and Lenox and King (2004): alliance experience may substitute for the dissemination of knowledge via learning mechanisms. Hence, gaining experience is a first step towards improved alliance performance. We find convincing support for the argument that alliance capabilities mediate between a firm's alliance experience and performance. Deliberate learning mechanisms indeed prove to play an important role in capturing, sharing, disseminating and applying alliance knowledge.

The importance of mechanisms for developing alliance capabilities is supported by the results of the expert interviews. All of the 10 experts considered the mechanisms to be of substantial importance to developing a firm's alliance capabilities. More specifically, nine out of ten experts expect the learning mechanisms to play a very important role in developing alliance capabilities. In order to develop alliance capabilities, these mechanisms are of significant importance because they stimulate the dissemination and availability of critical knowledge gained in prior alliances. Various experts also acknowledged that merely having these mechanisms in place is insufficient, the use and application of these mechanisms is of prime importance. One of the experts added that it would be very difficult for firms to learn without these mechanisms in place, optimization of alliance performance can only be attained when firms are committed to ensure those involved are provided the critical knowledge to make alliances work. Overall, we conclude that these mechanisms are not only an important means for firms to develop their alliance capabilities, but also reflect a serious ambition by the firm to capture, share, disseminate and apply alliance management know-how. This ambition helps develop the firm's higher-order

resource (i.e. alliance capabilities) as it fosters knowledge dispersion and the creation of repeatable patterns of action with respect to alliance management. However, since *"information provision cannot fully replace prior experience"* (Lenox and King, 2004: 343), both experience and mechanisms remain critical antecedents of alliance performance.

Given the asymmetries in firms' alliance capability levels (Anand and Khanna, 2000), this study makes a number of important contributions to the complex issue of alliance capability development. First of all, we find clear evidence of the need for firms to commit to dispersing alliance knowledge in order to optimize their alliance capabilities. While alliance experience is relevant to gain an understanding of alliance management, the development of a firm-wide alliance capability requires the use of deliberate learning mechanisms, such as an alliance department or alliance manager. In this way, experience gained through prior alliances can be seen as an important input into a firm's alliance mechanisms. If firms do not share the lessons learned, they are more likely to fail as critical knowledge only resides in those who have already learned the lessons. Therefore, the results direct attention to how successful firms have learned to manage alliances. These results are in line with a recent study by Gittell (2002), whose study confirmed that mechanisms are critical in transferring experience in the hospital sector. This study has thus been able to extend current wisdom on capability development in firms, which to date is an emerging scientific field. More specifically, firms are given artifacts with which they can improve their alliance management. As trial and error is an essential process in many instances when managing alliances (Lei and Slocum, 1992), these insights may contribute to the way in which prior experience can best be leveraged. This is a very important practical implication for many companies.

Second, the empirical analyses of this study have sought to uncover the process underlying the development of an alliance capability. Leaving exceptions such as Kale et al. (2002) and Sarkar et al. (2004) aside, the vast majority of studies has relied on imperfect proxies as a consequence of which it has fallen short of clearly defining the critical components and their interrelationships which lie at the roots of alliance capability development (Simonin, 1997; Hoang, 2001). At a time when both scholars and practitioners seek for ways to grasp what learning elements enhance alliance capability development, this study relies on a refined set of items thereby using a novel approach which bears insightful results and is of practical interest.

Third, in spite of the inherent complexity of the topic, the insights gained allow firms to take action at the micro-level (Johnson et al., 2003). Relying on the logic introduced by Kale et al. (2002) and Knott (2003), we have tried to nurture fresh insights by verifying what practical management literature, in such writings as Freidheim (1998) and Harbison and Pekar (1998), has long proclaimed: successful alliance firms institutionalize alliance experience using learning mechanisms. These findings might induce other firms to start developing alliance capabilities on a much larger scale.

In spite of these important contributions, there are, of course also some limitations in this study. In spite of the many advantages of using an alliance portfolio as a unit of analysis we must point at a specific caveat of this approach that is associated with the fact that we deal with averages. The use of e.g. average performance might filter away certain specific circumstances or cases that might be worthwhile to explore in detail. In similar vein, we like to address the fact that the use of the number of alliances as a proxy for experience might provide a limitation to this study. Experience is not only dependent on the

number of alliances, but might also be dependent on other issues, associated with, among other things, the timeframe and intensity of these alliances. Furthermore we would like to mention the issue of measuring capabilities. This difficulty of measuring capabilities has already been addressed in the academic literature (e.g. Dosi et al, 2000). In spite of these possible caveats, we are however confident that the proxy's used in this study are the best representation available for the variables used.

**Opportunities for future research**

Despite the potential contributions of this study with respect to the process of alliance capability development, it is only a first step towards a more thorough understanding of alliance capability development. First of all, future research may embark on additional intra-firm insights with respect to how (alliance) capabilities come about by investigating how the precise role mechanisms and routines play in this process. Moreover, future research can complement to the field of study by investigating to what extent certain mechanisms are adopted and to what extent their adoption moderates its impact on alliance performance.

Second, in line with arguments provided by Grant (1995), Simonin (1997) and Tsang (2002a), having certain deliberate learning mechanisms in place does not necessarily guarantee successful dissemination of knowledge. For instance, different organizational barriers, such as departmentalization structures, exist which limits the ability to transfer information across the intra-organizational barriers. Therefore, it becomes critical to also ensure proper measurement of the efficiency of learning mechanisms to integrate and transfer knowledge. As Pfeffer and Sutton (1999) legitimately argue, there is a difference between having knowledge in-house and making effective use of it. Similarly, different aspects

required to successful manage alliances may be more or less interesting to routinize. Despite the fact that this study describes and tests the alliance capability development process, it does not verify the extent to which mechanisms are used and are functioning as presumed (i.e. able to indeed transfer knowledge) and, consequently, the extent to which they help establish routine-like behavior. In line with Kale et al. (2002), this study presumes that the presence of a certain mechanism reflects a commitment to using it. This implies that the presence and use are assumed to be linked, while obviously management does not always function as it should. It would therefore be interesting to investigate the influence of an additional variable reflecting the actual usage of a certain learning mechanism. This is an area in which future studies can make highly relevant contributions.

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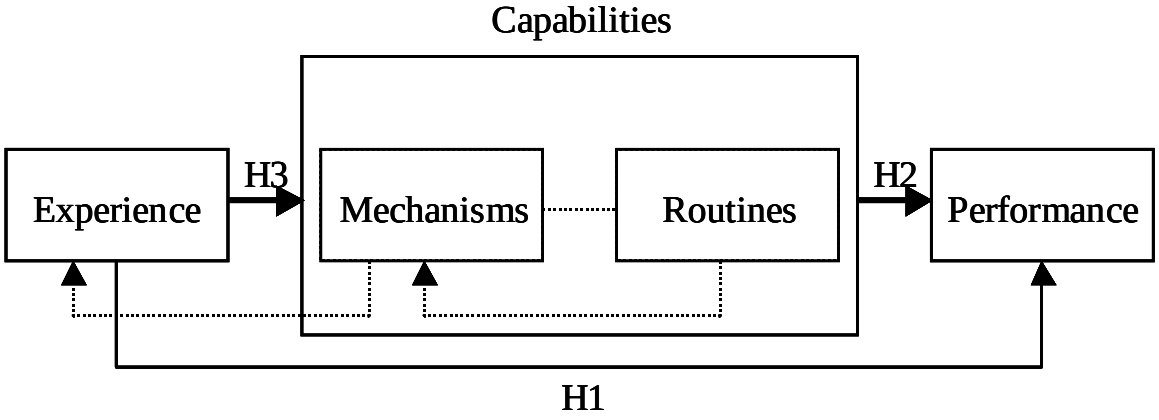
Figure 1 Alliance capability development process




*Source: (adapted from) Zollo and Winter (2002).*

Table 1 Distribution of respondents

| | N | % |
|---|---|---|
| **(1) Number of employees**[a] | | 1.3 (don't know) |
| 1 - 500 | 69 | 45.7 |
| 500 - 1000 | 6 | 4.0 |
| > 1000 | 74 | 49.0 |
| **Total** | 151 | 100 |
| **(2) Sales revenues (in US$)**[b] | | 0.7 (don't know) |
| Less than 1 million | 39 | 25.8 |
| 1 - 100 million | 37 | 24.5 |
| 100 million - 1 billion | 20 | 13.2 |
| 1 - 50 billion | 49 | 32.5 |
| > 50 billion | 5 | 3.3 |
| **(3) Nationality** | | |
| Europe | 75 | 49.7 |
| United States | 72 | 47.7 |
| Others | 4 | 2.6 |
| **Total** | 151 | 100 |

[a] Two cases 'don't know'

[b] One case 'don't know'

Table 2 Descriptive statistics and correlation matrix

| | Mean[c] | S.D. | (1) | (2) | (3) |
|---|---|---|---|---|---|
| Alliance performance[a] | 3.10 | 1.48 | 0.31*** | 0.28*** | -0.18 |
| (1) Alliance experience | 2.55 | 0.79 | 1 | | |
| (2) Learning mechanisms[b] | 11.34 | 4.52 | .32*** | 1 | |
| (3) Interaction effect (1*2) | 29.75 | 17.19 | 0.21 | -0.13 | 1 |

*** $p<0.01$

[a] Categorical variable representing alliance success

[b] Learning mechanisms = metric variable with value ranging from 0 to 30 (see appendix 1)

[c] Mean and standard deviation are uncentered, while correlations are given for centered variables.

Table 3 Results of (logistic) regression analysis (model III uses OLS)

| | Model I | Model II | Model III† | Model IV | Model V |
|---|---|---|---|---|---|
| Experience | | 0.914*** | .406*** | 0.723** | 0.734** |
| | | (0.310) | (0.430) | (0.323) | (0.334) |
| Learning mechanisms | | | | 0.153** | 0.136** |
| | | | | (0.062) | (0.065) |
| Interaction effect | | | | | -0.111 |
| | | | | | (0.071) |
| Service-related sectors (control) | 0.124 | | | | 0.124 |
| | (0.485) | | | | (0.485) |
| ICT related sectors (control) | -0.640 | | | | -0.640 |
| | (0.496) | | | | (0.496) |
| Firm size - sales (control) | 0.050 | | | | 0.050 |
| | (0.190) | | | | (0.190) |
| Adj $R^2$ | | | 0.159 | | |
| Nagelkerke $R^2$ | 0.042 | 0.132 | | 0.241 | 0.267 |
| Number of observations | 99 | 99 | 99 | 99 | 99 |

*SE in parentheses; *p<.10; **p<.05; ***p<.01*

† *Please note that model III uses OLS regression to test the effect of alliance experience on alliance capability. So, in contrast to model I, II, IV and V, which have alliance performance as a dependent, model III has alliance capability as a dependent (Baron and Kenny, 1986).*

Appendix 1 Deliberate learning mechanisms

| | Deliberate learning mechanisms |
|---|---|
| **Functions** | (1) Vice-President of alliances, (2) alliance department, (3) alliance specialist, (4) alliance manager, (5) gatekeeper, (6) local alliance manager |
| **Tools** | (7) internal alliance training, (8) external alliance training, (9) training in intercultural management, (10) partner selection program, (11) joint business planning, (12) alliance database, (13) use of intranet to disperse knowledge, (14) best practices, (15) culture program, (16) partner program, (17) individual alliance evaluation, (18) comparison of evaluations, (19) joint evaluations |
| **Control and management processes** | (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 |
| **External parties** | (26) consultant, (27) lawyer, (28) mediator, (29) financial expert |

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