

A study into the alliance capability development process

Citation for published version (APA):

Heimeriks, K. H., & Duysters, G. M. (2004). *A study into the alliance capability development process*. (ECIS working paper series; Vol. 200421). Technische Universiteit Eindhoven.

Document status and date:

Published: 01/01/2004

Document Version:

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy

If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.



A study into the alliance capability development process

Koen Heimeriks & Geert Duysters

Eindhoven Centre for Innovation Studies, The Netherlands

Working Paper 04.21

Department of Technology Management

Technische Universiteit Eindhoven, The Netherlands

October 2004

A STUDY INTO THE ALLIANCE CAPABILITY DEVELOPMENT PROCESS

Koen H. Heimeriks

Eindhoven Centre for Innovation Studies
(ECIS)
Eindhoven University of Technology, The Netherlands
✉ PO. Box 513
NL – 5600 Eindhoven, The Netherlands
💻 K.H.Heimeriks@tm.tue.nl
☎ ++ 31 40 247 44 35
Fax ++31 40 246 80 54

Geert Duysters

Eindhoven Centre for Innovation Studies
(ECIS)
Eindhoven University of Technology, The Netherlands
✉ PO. Box 513
NL – 5600 Eindhoven, The Netherlands
💻 g.m.duysters@tm.tue.nl
☎ ++ 31 40 247 39 72
Fax ++31 40 246 80 54

Key words: experience, routines, micro-level mechanisms, capability development, alliances, alliance performance.

ABSTRACT

In order to understand differences in alliance performance and rent generation between firms, we conceptually investigate the capability development process. Given the increasing importance of alliances as a revenue generator and the concomitant need for firms to optimize their alliance performance, this study uses experience, micro-level mechanisms, routines and capabilities as key ingredients of the capability development process. Building on an extensive literature review, a model is introduced which represents the alliance capability development process. From this model, three propositions are derived which relate to the role of experience and capabilities (consisting of micro-level mechanisms and routines) in alliance performance. In doing so, we hope to contribute to the understanding of the process underlying the development of an alliance capability.

INTRODUCTION

Increasingly, scholars are intrigued by the role that capabilities play in the process of creating and sustaining competitive performance (Helfat, 2003). This study builds on theories such as evolutionary economics, the resource-based view and more recently the dynamic capability view and knowledge-based view in order to come up with a better understanding of this important topic¹. These theories suggest that sustained competitive advantage for the firm is dependent on its ability to create and leverage new knowledge and capabilities rather than on a mere reliance on existing resources (Grant and Baden-Fuller, 2002). The overarching aim of related studies is to uncover critical antecedents of consistent heterogeneity in firm performance and rent generation. With respect to the role of knowledge, various scholars suggest that the firm's ability to gather, integrate and leverage organizational knowledge is a primary determinant of long-term survival (Tushman and Nadler, 1978; Grant, 1996).

Recently, the growth in alliances has triggered scholars to investigate the antecedents of alliance performance (Contractor and Lorange, 2002). As firms continue to ally at an increasing rate (Khanna et al., 1998), the relevance of successfully managing these initiatives becomes ever more important. Whereas organizational economics would focus on minimization of transaction costs in alliances, theories such as the resource-based view have allowed scholars to investigate the role of capabilities in explaining performance differences and the extent to which different firms are able to capitalize on their capabilities (Combs and Ketchen, 1999; Makhok and Tallman, 1998).

¹. For a comparison of some of theories, we refer to Rugman and Verbeke (2002).

So far, two streams of research have been proposed that aim to increase our current understanding of how firms can develop their capabilities (Ranft and Lord, 2002). The first stream analyzes capability development by examining knowledge transfer *between* firms (see e.g. Lane et al., 2001; Appleyard, 2002; Zollo et al., 2002). This stream of literature implicitly refers in particular to the transaction cost and game theory logic, thereby proposing exchange and relational factors as key determinants of success (Dussauge and Garrette, 1995; Williamson, 1999). As all firms must rely on capabilities owned by others (Langlois, 1997: 288), these studies have analyzed the acquisition of capabilities through alliances (Dussauge et al., 2000; Inkpen, 1998; Powell et al., 1996). Since alliances are one of the primary sources for external capabilities, extensive attention has been paid to critical factors for successful transfer of capabilities (Tsang, 2002a). Concomitant studies center around the dyadic relationship and the creation of collaboration-specific rents (Madhok and Tallman, 1998) or common benefits (Khanna et al., 1998). These studies tend to investigate the external sources of capabilities (Grant, 1998) or focus on learning outside the firm (Leonard-Barton, 1995).

The second stream of research investigates knowledge transfer *within* the individual firm. Whereas the first stream specifically looks at external sources of learning, the second stream centers on internal sources of capabilities. In particular, it focuses on the way in which experiences can be internalized. Consequently, it analyzes the internal processes that foster knowledge absorption, dissemination and integration. This rather neglected research area aims to improve our current understanding of how firms can leverage their experience and develop an alliance capability. This capability allows a firm to apply its alliance knowledge to its entire alliance portfolio, as opposed to learning in individual alliances which is central to the first stream. In the end, this stream of research suggests that capability differences are an essential antecedent of sustained differences in alliance performance.

Apart from a few exceptions (see e.g. Sivadas and Dwyer, 2000), studies tend to concentrate on either one of the two streams. While these streams rely upon a wide array of theoretical underpinnings, the vast majority builds on the resource-based theory, dynamic capabilities perspective, knowledge-based view and on organizational learning theory. This study builds on the second stream of research and its theoretical underpinnings. Despite significant contributions of both streams of research, neither one of the two streams has been able to describe the way in which experience translates into a capability (Kale et al., 2002). As Tsang (1999: 835) argues 'internationalization itself is a learning process'. Albeit the fact that the internalization process can be critical for the success of a firm's future alliances (Simonin, 1997), little attention has been devoted to understanding the underlying development process

(Thomke and Kuemmerle, 2002). A growing body of literature focuses on the identification of micro-level factors that help explain persistent performance differences among firms (Diericks and Cool, 1989; Sanchez et al., 1996). Fujimoto (2000a), for example, shows that the use of micro-level or intra-organizational mechanisms can aid in the selection and diffusion of experiences within the firm. This can be seen as a critical element of the evolutionary process of the firm. Although these studies provide interesting results with respect to the role of micro-level mechanisms on firm performance, the specific processes and underlying concepts remain rather unclear. Therefore we argue that there is a clear need to study the process underlying the development of an alliance capability. This, however, requires insight into the individual concepts and building blocks of such a capability (Gulati, 1998).

This paper aims to enhance our understanding of the alliance capability development process. In order to accomplish this goal, the paper first introduces a model for alliance capability development. Moreover, having analyzed the process and the individual concepts, this study introduces three main propositions. In doing this, we hope to engender an increased understanding of the critical issues with respect to the alliance capability development process. Eventually we aim to provide firms with critical insights into how they can leverage their experience and how they can develop an alliance capability.

DEFINITIONS

The concepts involved in describing the process of developing capabilities have been subject to obscurity (Priem and Butler, 2000). Many scholars have used different definitions of concepts such as knowledge, micro-level mechanisms, resources, assets, capabilities and competences in relation to the same theory (for an overview see Bogaert et al., 1994). In order to gain more insight into this process, clear definitions of the different concepts are required. Various scholars have committed to the daunting task of identifying sound distinctions, thereby proposing different approaches (e.g. Dosi et al., 2000; Sanchez, 2001).

Given the need for clarity in this field of study, we would like to define the most important concepts, thereby underlining that these are not universal but suitable and appropriate to this study². Following Bohn (1994) and Glazer (1991), Kogut and Zander (1992), and Zander and Kogut (1995), we define 'knowledge' as information that allows one to either be able to use (know-how) or to understand and create (know-why). 'Resources' are defined as the stock of

available factors (tangible or intangible assets) owned or controlled by the firm (Amit and Schoemaker, 1993; Wernerfelt, 1997). A ‘capability’, however, refers to the capacity to deploy resources (Mahoney and Pandian, 1992; Makadok, 2001). Therefore, building on Kale et al. (2002), we define an alliance capability as the firm’s ability to capture, share, disseminate and apply alliance management know-how and know-why. This ability of the firm refers to the extent to which the firm can ensure that this know-how and know-why becomes embedded in its repeatable patterns of action (Sanchez et al., 1996). Therefore, capabilities are firm-specific, require interactions among resources and are subject to learning (Teece et al., 1997). A ‘competence’ is different from a capability in that it enables the firm to sustain the way in which it deploys its resources in order to achieve its objectives (Sanchez et al., 1996). This refers to a meta-capability or a firm’s ability to develop its capability.

As alliances continue to grow not only in absolute numbers (Duysters et al., 1999), but also in relative numbers (i.e. percentage of revenues coming from alliances) (Harbison and Pekar, 1998), a firm’s ability to enhance alliance success becomes ever more important. In order to increase our understanding of how firms create enhanced alliance performance, most studies have been preoccupied with investigating the role of experience (see e.g. Powell et al., 1996). In addition to experience, some other studies have analyzed the influence of certain mechanisms on performance (Kale and Singh, 1999). For instance, Kale et al. (2002) suggest that an alliance function can significantly improve a firm’s long term alliance performance. An alliance function helps to disperse and leverage alliance knowledge generated within the firm. However intriguing the findings may be, what remains unclear is the interaction between experience, micro-level mechanisms, an alliance capability and performance (King and Zeithaml, 2001; Simonin, 1997).

THEORY ON ALLIANCE CAPABILITY DEVELOPMENT

Experience

Various scholars have investigated the role of ‘experience’ as an antecedent of firm performance from many different theoretical perspectives and empirical settings (e.g. Ingram and Baum, 1997; King and Tucci, 2002). As discussed above, theories such as evolutionary economics and organizational learning provide fundamental guidelines to analyze this link. Some studies have analyzed the role of experience and learning curves in realizing productivity gains and rent generative capacity of firms (Dutton and Thomas, 1984). The majority of these studies suggest a positive relationship between experience and performance,

² . For an overview of definitions and discussions on this topic, we refer to Von Krogh et al. (1998) and

thereby implicitly indicating that experience is an influential variable in the alliance capability development process (Teece et al., 1997; King and Tucci, 2002). For instance, Lei and Slocum (1992) reckon that lack of experience and ignorance are of fundamental concern when it comes to alliance failure. Gaining experience can allow a firm to enhance their problem-solving capacity, as they have to devote less time to solving a particular problem (Bereiter and Scardamalia, 1993, in: Koka and Prescott, 2002, pp. 800). Moreover, it may enable a firm to become more effective at foreseeing and proactive managing the alliance process (Das and Teng, 2002).

In addition to these studies, other scholars investigated firm differences in learning curves thereby mainly referring to organizational learning theories (e.g. Lapré and Van Wassenhove, 2001). In these studies, experience is seen as the primary driver of a firm's learning curve (Stata, 1989). For instance, King and Tucci (2002: 172) differentiate between static and transformational experience. Mukherjee et al. (1998) identify operational and conceptual learning, thereby referring to an understanding related to respectively know-how or input-output stream and know-why or cause and effect relationships. These typologies are essential as they reflect the paradoxical causal effect of experience. On the one hand, experience fosters inertia and routinization (Lorenzoni and Lipparini, 1999) and on the other hand it allows firm to readjust organizational memory and routines in general (Flaherty, 2000). The dual effect of experience is thus likely to lead to routines and foster organizational change (Amburgey et al., 1993).

In line with earlier research, we define alliance experience as the collective body of knowledge generated through a firm's former alliances. This knowledge consists of lessons learned and will have to be absorbed in the minds of employees in order to become an organizational routine that allows a certain task or activity to be performed in a repetitive manner (Nelson and Winter, 1982). The fact that experience is tacit by nature poses a challenge to firms as it requires an awareness of its importance and a conscious commitment to internalize accumulated experiences. For instance, only as experiences are codified in e.g. a best practices handbook can they be spread throughout the firm and used by a larger number of employees in future alliances.

With respect to alliance research, various scholars have studied experience as an explanatory variable of alliance performance (Kale and Singh, 1999; Makino and Chan, 2002). Although mostly positive and constant in nature (Anand and Khanna, 2000), some studies find curve

Sanchez (2001).

linear (Draulans et al., 2002) or inverted U-shaped relationships between experience and alliance performance (Deeds and Hill, 1996; Hoang et al., 2002). Overall, these studies point at a positive relationship between experience and alliance performance. A number of reasons can be found to explain this positive influence. First, experience is said to provide firms with an increased ability to handle and foresee critical issues in alliance management. Simonin (1997) for instance points to the firm's ability to select partners and manage the complex alliance process. Mohr and Spekman (1994) underline the need for firms to foresee and act in case conflict arises. This can be handled better if a firm has prior alliance experience. Therefore, experience can be seen as a facilitator of a firm's ability to both foresee and act throughout the alliance process. This often proves to be an important factor for alliance performance in the end.

A second reason why experience is an important explanatory variable of alliance performance lies in the fact that experience fosters the development of 'common perspectives' (Nonaka, 1994: 24). These common perspectives are important as they influence a firm's ability to absorb new knowledge (Lane and Lubatkin, 1998; Grant, 1996). A firm's absorptive capacity is important since it determines the extent to which a firm can assimilate and exploit new knowledge (Cohen and Levinthal, 1990: 135). As Penrose (1959) stresses that knowledge is a highly important asset of the firm, storing and disposing of knowledge for timely availability and future use is essential (Miller, 2002). Various researchers have looked at the influence of absorptive capacity on the rate of learning in alliances (Hamel et al., 1989; Shenkar and Li, 1999; Lane et al., 2001). In line with these studies, Merali (1997) reckons that for knowledge to be optimally leveraged, it needs to be thoroughly embedded in a firm's routines and practices. As a result, different empirical studies from varying backgrounds have indicated that prior experience is salient in shaping a firm's future capabilities (Helfat, 2000). Consequently, in line with previous work in this area, we suggest that alliance experience is an important predictor of alliance performance.

Proposition 1: Prior alliance experience positively influences alliance performance.

Capabilities

Over the last decades, resources, capabilities and competences have become central issues in strategic management literature (Mahoney and Pandian, 1992; Henderson and Cockburn, 1994). Related theoretical perspectives are the resource-based view (Pfeffer and Salancik, 1978), the dynamic capability view (Eisenhardt and Martin, 2000) and the competence-based

view (Prahalad and Hamel, 1990; Sanchez et al., 1996)³. Studies referring to these perspectives have pointed to experience as an explanatory variable for a firm's capability. Although these studies yielded considerable insights, it generally remains unclear *how* a firm can develop an alliance capability (Kale and Singh, 1999).

With respect to the differences between resources and capabilities, various scholars have separated these two strategic concepts. Following Penrose (1959) who separated management of resources and management as a resource, Hunt and Morgan (1986) differentiated between respectively lower and higher-order resources and Henderson and Cockburn (1994) compared component and architectural competence. Likewise, Fujimoto (2000b) identifies three levels of capabilities: static, improvement and evolutionary capability. The firm's ability to gather capabilities is captured in the terms of evolutionary capability. Overall, as Makadok (2001) reckons, these differences help us understand the difference between the firm's ability to pick resources and its ability to develop capabilities. Picking resources refers to a firm's economic rents generated as a consequence of its resource selection, whereas developing capabilities relates to the deployment of a firm's resources. This is typified by Dosi et al (2000: 2), who underline that capabilities should allow a firm to realize its goals, thereby filling the gap between intention and outcome.

In line with the distinction between resources and capabilities, it is the firm's ability to use or deploy its experience that yields an increment in performance. Thus, experience per se is not sufficient (Kale et al., 2002) and the quality of experience is highly dependent on the underlying learning processes (Tsang, 2002a). Therefore, as Simonin (1997) suggest, firms should actively manage the way in which experiences are used and dispersed. Only if lessons are internalized and transferred can lessons have a significant impact on alliance performance.

Following Kale et al. (2002: 750) and Sanchez et al. (1996), we define an alliance capability as the firm's ability to capture, share, disseminate and apply alliance management know-how and know-why (i.e. knowledge) and its ability to embed this in a stable and repetitive pattern of action. Our definition of alliance capability adds two distinct components to Kale et al's definition. First, in line with the distinction proposed by Makadok, (2001), we add the element of 'application' to the definition. We feel that it does not suffice to merely gather the knowledge. A capability also refers to a firm's ability to use its accumulated experiences. And second, as a consequence of the first aspect and stressed by Sanchez et al. (1996), the accumulated experiences need to be embedded in the organization's practices and routines.

³. For a comparison of these theories, we refer to Teece et al. (1994) and Sanchez (2001).

Different micro-level mechanisms can be used to foster the process of capturing, gathering and disseminating experiences and embedding these in the organization's patterns of behavior (Dyer and Nobeoka, 2000; Zollo and Winter, 2002). In the end, a firm's capability is largely determined by its micro-level mechanisms that help translate its experience into standardized practices and routines. Therefore, in order to understand how firms can develop their alliance capability, it becomes essential to investigate the micro-level mechanisms firms use to disperse their accumulated experiences and to study how they develop routines.

An alliance mechanism is an intra-organizational feature or device which a firm can use to manage its alliance portfolio. It aids in capturing, sharing, disseminating or applying alliance management know-how. Alliance mechanisms can be categorized as functions, tools, control and management processes and external parties⁴. Figure 1 depicts what mechanisms belong to what category.

Figure 1 Alliance mechanisms

Functions	Tools	Control and management processes	External parties
Vice-president of alliances (1) Alliance department (2)	Internal alliance training (7) External alliance training (8)	Responsibility level for alliances (20) Rewards and bonuses for alliance manager (21)	Consultants (27) Lawyers (28)
Alliance specialist (3)	Training in intercultural management (9)	Rewards and bonuses for business managers (22)	Mediators (29)
Alliance manager (4)	Partner selection program (10)	Formally structured knowledge exchange between alliance managers (23)	Financial experts (30)
Gatekeeper or boundary spanner (5)	Joint business planning (11)	Use of own knowledge about national differences in international alliances (24)	
Local alliance manager (6)	Alliance database (12) Use of intranet to disperse alliance knowledge (13) Alliance best practices (14) Culture program (15) Partner program (16) Individual evaluation	Alliance metrics (25) Country-specific alliance policies (26)	

⁴. See Duysters and Heimeriks (2002) for an empirical analysis of the relative impact of different mechanisms.

	(17) Comparison of alliance evaluations (18) Joint evaluation (19)		
--	--	--	--

Source: Duysters and Heimeriks (2002).

Micro-level mechanisms play a critical role in the alliance capability process for various reasons. First, these mechanisms enable firms to internalize its accumulated experiences in a structured way. Not only do these mechanisms act as an information-processor, they also help embed experiences into the organization’s routines. Providing feedback about lessons can enable a firm to leverage the lessons learned (Kale and Singh, 1999) as well as allow a firm to learn in a continuous fashion (Pisano, 2000: 131). Moreover, certain mechanisms serve as a platform for the transfer of experiences (Brown and Duguid, 1991). For instance, using a formalized structured way of knowledge exchange among alliance managers can help to ensure exchange and dispersion of experiences.

Since various studies confirmed that routines and practices aid in realizing productivity and performance gains (Joskow and Rozanski, 1979; Argote, 1993), these mechanisms seem to play an important role in shaping routines or stable patterns of behavior. For instance, Tsang (2002b) argues that sharing experience among alliance managers is an important way to disperse knowledge. Moreover, Fujimoto (2000a: 276) finds that an ‘internal evolutionary mechanism’ helps to ensure the evolutionary process of organizational routines. As employees create short-term solutions to certain problems, they aid in establishing routines and practices and capabilities. In this way, mechanism help to standardize and repeat routines (by creating operational effectiveness and efficiency) and diffuse new routines (creating optimal learning potential). Furthermore, given the rate of depreciation of knowledge in various industries (e.g. due to employee rotation or the turnover rate of employees), routines become critically important to retain and transfer knowledge (Argote and Darr, 2000). Micro-level mechanisms can play a very important role in ensuring adequate dispersion of knowledge to become embedded in a firm’s routines in a timely fashion. This dual function of mechanisms can –when simultaneously applied- help develop a firm’s ability to solve problems (Fujimoto, 2000a: 277) as well as act as a meta-capability to change routines (Amburgey et al., 1993; King and Tucci, 2002), which aids to optimize the learning potential of the firm.

Second, various mechanisms can help to coordinate tasks and responsibilities (Spekman et al., 1999). Installing certain mechanisms can aid firms in assigning clear task and role

responsibility so as to assure a sufficient degree of control (Mintzberg 1983: 4-9). Grant (1996) argues that rules and procedures which support coordination are an important way to integrate knowledge. For instance, the use of alliance metrics allows a firm to measure the extent to which goals are realized.

Third, certain mechanisms can support day-to-day alliance management activities. Increasing the knowledge of employees on particular stages of the alliance life-cycle can enhance performance. Using for instance alliance trainings or an alliance database facilitates access to recurring pitfalls in day-to-day alliance management. Conflict situations may be avoided when firms use joint business planning to align the partners' goals and expectations (Mohr and Spekman, 1994).

Fourth, the use of micro-mechanisms can spread a signal throughout a firm that alliances are deemed important. They reflect a dedication on the part of the firm. As commitment is highly important to optimize performance (Spekman et al., 1999), employees are more likely to recognize the importance of sound alliance management and adopt related routines.

The other aspect of an alliance capability is inherent in a firm's routines⁵. Micro-level mechanisms form an essential antecedent of routines (Florida and Kenney, 2000). The combination of mechanisms and routines fosters the development of an alliance capability. Routines can vary from firm to firm and therefore contribute to our understanding of why differences in firm performance tend to persist (Coriat, 2000: 216). Mechanisms allow a firm to both develop and change routines as new experiences can be transferred through its mechanisms to adapt its routines. Moreover, the fact that routines can be seen as the equivalent of individual skills (Nelson and Winter, 1982: 73) suggests that knowledge can be applied in an efficient manner when dispersed via micro-level mechanisms.

Within the context of this study, routines are defined as the higher-organizing principles through which knowledge is captured, shared, disseminated and applied. They provide the basis for repetitive patterns of actions in alliances. For various reasons, routines play an important role in the alliance capability development process. First, a routine contains a problem-solving or learning aspect and a control-oriented aspect (Coriat, 2000). As firms capture, share, disseminate and apply alliance-related knowledge, they are basically involved in a learning process. When doing this, lessons are derived from experience and spread to others in the firm. The control-oriented aspect of routines is related to the fact that firms

should control for the effectiveness of the adoption of knowledge in the learning process. The combination of learning and control creates a dynamism in a firm's routines, which can help overcome organizational inertia (Hannan and Freeman, 1984). Although repeated practices can enhance a firm's alliance capability as it translates experiences into routines, the firm can remain strategically flexible when it learns from new experiences and adopts new routines (Eisenhardt and Martin, 2000). In this way, it can both exploit existing practices while at the same time explore newly generated insights which are transferred via its mechanisms. This cyclical process is reflected in figure 2, the alliance capability development process, by the loops that are depicted between experience, mechanisms and routines.

Second, as a result of the first reason, routines are essential building blocks of capabilities (Dosi et al., 2000: 4). The firm's set of repeatable patterns of actions consist of technical and social skills (March, 1994), which ensures a smooth functioning of the organization (Coriat, 2000: 214). These are embedded in the firm's organizational memory and are critical to the creation of efficiency one the one hand and leaning on the other hand. Thus, we posit that a firm's alliance performance depends on the mechanisms it has in place that help capture, share, disseminate and apply its alliance knowledge in repeatable patterns of actions.

Proposition 2: A firm's alliance capability is positively related to a firm's alliance performance.

Interaction between experience and capabilities

The third relationship this study wishes to address concerns the interaction effects between experience and capabilities. As both a firm's experience and its capabilities are posted to have a significant influence alliance performance, firms that simultaneously gain experience and successfully process this via its micro-level mechanisms are expected to have a performance advantage over those firm's that do not. Although experience may positively influence alliance performance, it depends on a firm's ability to integrate these experiences whether or not it can develop an alliance capability (Simonin, 1997). Therefore, we expect that the interaction effects between experience and capabilities significantly influence a firm's alliance performance.

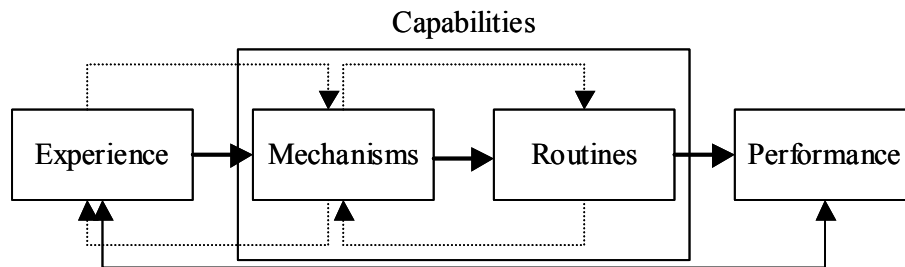
Proposition 3: Alliance experience and alliance capability reinforce each other's effect on alliance performance. Therefore, the interaction effect among alliance experience and alliance capability is likely to be positive.

⁵. For an extensive overview of the concept 'routines', I refer to Nelson and Winter (1982), Prahalad

ALLIANCE CAPABILITY DEVELOPMENT PROCESS

Following the logic above and inspired by Zollo and Winter (2002: 340), we propose the following model to link the different concepts. In the model, experience is the primary antecedent of a firm's alliance capability. A firm's alliance capability then is a critical moderating variable of its alliance performance.

Figure 2 A model of the alliance capability development process



As in previous studies, this model proposes experience to be a primary driver of an alliance performance. However, we do not merely expect a direct relationship between experience and performance, but suggest experience to be a key driver of the alliance capability process. As a result, a firm's alliance capability is proposed to be a moderating variable. As we expect that reality is more complex than merely gaining a lot of experience in order to be able to improve alliance performance, this model represents a more subtle process. Using experience as a sole explanatory variable of alliance performance would underestimate the complexity involved in alliance management. Given the complex nature of alliance management (Park and Ungson, 2001) and learning in alliances (Inkpen, 2002), this model does not pretend to be full-grown. However, it does aim to provide a better understanding of the factors involved in creating insight in the alliance capability development process.

We expect the alliance capability development process to be subject to iterations. The model suggests a link between experience via capability to performance. However, as learning is an interactive and highly volatile process, we expect various loops to be relevant as well (Argyris, 1977). Trial and error and learning-by-doing are highly relevant concepts when it comes to developing capabilities. Consequently, the capability development process tends to be consist of incremental improvements (Fujimoto, 2000a). Not only is experience likely to

and Hamel (1990) and Coriat (2000).

be an important input for the micro-level mechanisms, but these will also provide new insights that in-turn will influence experience. For instance, an alliance manager's experience can be highly relevant input for an alliance database. We also expect that the use of the database provokes exchanges of other employees involved that may lead to new insights for the alliance manager at hand. Overall, the complexity of the alliance capability development process is evident and this study intends to create increased understanding of this process.

In principle, the model suggests three relationships. First, alliance experience is expected to influence a firm's alliance capability. Second, alliance capability is said to influence a firm's alliance performance. Third, alliance experience and alliance capability are expected to be related, which implies that interaction effects could significantly influence alliance performance. Besides these primary relationships, we also expect a direct relationship between experience and performance to be of importance. Especially in the case when firms have low experience levels, we reckon that accumulated experience may have a positive effect on performance. However, in general, we expect knowledge generated through experience to positively influence alliance performance as a result of the dispersion and leveraging of that knowledge. Moreover, alliance performance can eventually also provide highly relevant information, which can be seen as an important input for experience. After all, gaining insight from earlier alliances and their performance lies at the very heart of the development of an alliance capability.

DISCUSSION & CONCLUSION

Alliances continue to play an increasingly important role for firms. Being aware of the asymmetries in firms' capability acquisition in alliances (Mowery, 1988) and rates of organizational learning (Pisano et al., 2001), this study has tried to uncover the intra-organizational factors that underlie the capability development process. Given the complexity of the nature of capabilities and the obscurity surrounding related terminology (Dosi et al., 2000), recently extensive research has been conducted to uncover the role of capabilities in explaining differences in performance and rent generation among firms. Whereas former studies tended to focus on only one of these aspects, this study tries to pinpoint how a firm can develop an alliance capability. The proposed conceptual model (see figure 1) depicts the process that incorporates different constructs which are found to be relevant in a variety of studies. Our model suggests that experience and capabilities, which consist of mechanisms and routines, are key variables in this process. Three relationships are derived from the model, which provide the basis for three propositions representing the relationships between the main explanatory factors of alliance performance.

So far, various theoretical perspectives and empirical settings have served to investigate the role of experience in explaining persistent performance differences among firms. Studies building on organizational learning theory and evolutionary economics helped to gain insight into experience and divergent learning curves in organizations. Similarly, alliance research has enhanced our understanding of the critical role of experience in improving alliance performance. However, a direct relationship between experience and alliance performance seems highly unlikely and a more subtle process seems to underlie this relationship. Consequently, various scholars suggested experience to be a predominant variable for capability development (Hoang et al., 2002; Kale et al., 2002). Not only is experience an essential aspect in the alliance capability development process because it helps firms to become aware of recurring pitfalls in alliances, but also because experience or lessons can prove useful as a firm engages in new alliances. Moreover, shared experience ease the adoption of new knowledge through the creating of common perspectives (Nonaka, 1994), thereby increasing a firm's rate of learning.

As experiences are a critical input to create routines (Nelson and Winter, 1982) and micro-level mechanisms serve to transfer experience, a capability is the set of repeatable patterns of actions that result from a firm's mechanisms. Consequently, mechanisms and routines are the two components that underlie the process of developing a capability. Mechanisms are essential in the capability process as they help integrate experiences and knowledge. Moreover, they can help coordinate tasks and responsibilities as well as support day-to-day alliance management activities. In addition, these mechanisms represent a dedication and commitment on behalf of the firm to pay attention to alliance management.

In essence, micro-level mechanisms represent 'physical artifacts', implicitly referring to an essential element of organizational memory and routines as defined by Moorman and Miner (1997). They represent 'an intent to learn', thereby referring to a firm's dedication to develop an alliance capability (Hamel, 1991). Investing in these mechanisms will stimulate knowledge articulation and codification, underlining a firm's commitment to deliberate learning (Zollo and Winter, 2002). And, as Nonaka (1994: 17) argues, 'commitment is one of the most important components for promoting the formation of new knowledge within an organization'. For instance, when a firm has an alliance department this indicates a deliberate and conscious commitment to integrate, internalize and disperse relevant knowledge.

Obviously, the mere existence of these mechanisms will not be sufficient to develop an alliance capability. This requires an additional condition, which is the effective use of these

mechanisms so as to embed prior experiences in organizational routines. Capturing, sharing, disseminating and applying this knowledge will result in repeatable patterns of action, which creates both efficiency gains and learning opportunities for a firm.

Mechanisms in turn are an essential antecedent of routines, because these repeatable patterns of behavior create the basis for efficiency gains. As experiences are translated into the organizational memory via micro-level mechanisms, a firm will be better able to handle recurring problems in alliances. Moreover, the average skill level of a firm's employees will be raised as new experiences are consciously dispersed and shared among them. This will enable a firm to adopt new experiences in their routines and create a basis for organizational learning.

Overall, experience, micro-level mechanisms and routines are prominent concepts in the alliance capability development process. However, as presented in our model, this is not merely a linear process. As shown in the model, enhanced alliance performance revolves around a learning process which involves various loops. Furthermore, we are aware of the fact that environmental changes can render obsolete a firm's set of routines which at the same time can limit its ability to adapt (Levinthal and March, 1993). Incremental improvement and continuous updating of mechanisms and routines are thus required if firms want to spread experiences on a continuing basis so as to gain sustained alliance performance in the end.

REFERENCES

- Amburgey TL, Kelly D, Barnett WP. 1993. Resetting the clock: the dynamics of organizational change and failure. *Administrative Science Quarterly* **38**(1): 51-73.
- Amit R, Schoemaker PJH. 1993. Strategic Assets and Organizational Rent. *Strategic Management Journal* **14**(1): 33-46.
- Anand BN, Khanna T. 2000. Do firms learn to create value? The case of alliances. *Strategic Management Journal* **21**(3): 295-315.
- Anderson E. 1990. Two firms, one frontier: on assessing joint venture performance. *Sloan Management Review* **31**(2): 19-30.
- Appleyard MM. 2002. Cooperative knowledge creation: the case of buyer-supplier co-development in the semiconductor industry. In *Cooperative Strategies and Alliances*. Contractor FJ, Lorange P (eds). Elsevier Science, *in press*.
- Argote L. 1993. Group and organizational learning curves: individual, system and environmental components. *British Journal of Social Psychology* **32**: 31-51.
- Argote L, Darr E. 2000. Repositories of knowledge in franchise organizations: individual, structural, and technological. In *The Nature and Dynamics of Organizational Capabilities*. Dosi G, Nelson RR, Winter SG (eds). Oxford University Press: Oxford, New York: 51-68.
- Argote L, Ingram P. 2000. Knowledge transfer: a basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes* **82**: 150-169.
- Argyris C. 1977. Double loop learning in organizations. *Harvard Business Review* **15**(5): 115-125.
- Arino A. 2003. Measures of collaborative venture performance: an analysis of construct validity. *Journal of International Business Studies* forthcoming.
- Bogaert I, Martens R, Van Cauwenbergh A. 1994. Strategy as a situational puzzle: the fit of components. In *Competence-Based Competition*, Hamel G, Heene A (eds). John Wiley & Sons: Chichester: 57-74.

- Bohn RE. 1994. Measuring and managing technological knowledge. *Sloan Management Review* **32**: 61-73.
- Brown JS, Duguid P. 1991. Organizational learning and communities-of-practice: toward a unified view of working, learning and innovation. *Organization Science* **2**: 40-57.
- Cohen WM, Levinthal DA. 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly* **35**: 128-152.
- Combs JG, Ketchen DJ jr. 1999. Explaining interfirm cooperation and performance: toward a reconciliation of predictions from the resource-based view and organizational economics. *Strategic Management Journal* **20**:867-888.
- Contractor FJ, Lorange (eds). 2002. *Cooperative Strategies and Alliances*. Elsevier Science, *in press*.
- Coriat B. 2000. The 'abominable Ohno production system'. Competences, monitoring, and routines in Japanese Production. In *The Nature and Dynamics of Organizational Capabilities*, Dosi G, Nelson RR, Winter SG (eds). Oxford University Press: Oxford, New York: 213-243.
- Das TK, Teng B-S. 2002. The dynamics of alliance conditions in the alliance development process. *Journal of Management Studies* **39**(5): 725-746.
- Deeds DL, Hill CWL. 1996. Strategic alliances and the rate of new product development: an empirical study of entrepreneurial biotechnology firms. *Journal of Business Venturing*, **11**: 41-55.
- Dierickx I, Cool K. 1989. Asset stock accumulation and sustainability of competitive advantage. *Management Science* **35**(12): 1504-1511.
- Dosi G, Nelson RR, Winter SG. 2000. *The Nature and Dynamics of Organizational Capabilities*. Oxford University Press: New York.
- Draulans J, De Man A-P, Volberda HW. 2002. Building alliance capability: management techniques for superior alliance performance. *Long Range Planning* *in press*.

Dussauge P, Garrette B, 1995. Determinants of success in international strategic alliances: evidence from the global aerospace. *Journal of International Business Studies* 6(3): 505-530.

Dussauge P, Garrette B, Mitchell W. 2000. Learning from competing partners: outcomes and durations of scale and link alliances in Europe, North America and Asia. *Strategic Management Journal* 21(2): 99-126.

Dutton JM, Thomas A. 1984. Treating progress functions as a managerial opportunity. *Academy of Management Review* 9: 235-247.

Duysters G, Man de A-P, Wildeman L. 1999. A network approach to alliance management. *European Management Journal* 17(2): 182-187.

Duysters GM, Heimeriks KH. 2002. The Influence of Alliance Capabilities on Alliance Performance: An Empirical Investigation. Paper presented at SMS Conference Rotterdam.

Dyer JH, Nobeoka K. 2000. Creating and managing a high-performance knowledge-sharing network: the Toyota case. *Strategic Management Journal* 21(3): 345-367.

Eisenhardt KM, Martin JA. 2000. Dynamic capabilities: What are they?. *Strategic Management Journal* Special Issue 21(10-11): 1105-1121.

Fiol CM, Lyles MA. 1985. Organizational learning. *Academy of Management Review* 10(4): 803-813.

Flaherty MT. 2000. Limited inquiry and intelligent adaptation in semiconductor manufacturing. In *The Nature and Dynamics of Organizational Capabilities*. Dosi G, Nelson RR, Winter SG (eds). Oxford University Press: New York: 99-123.

Florida R, Kenney M. 2000. Transfer and replication of organizational capabilities: Japanese transplant organizations in the United States. In *The Nature and Dynamics of Organizational Capabilities*. Dosi G, Nelson RR, Winter SG (eds). Oxford University Press: New York: 281-307.

Fujimoto T. 2000a. Evolution of manufacturing systems and ex post dynamic capabilities: a case of Toyota's assembly operations. In *The Nature and Dynamics of Organizational*

Capabilities. Dosi G, Nelson RR, Winter SG (eds). Oxford University Press: New York: 244-280.

Fujimoto T. 2000b. Reinterpreting the resource-capability view of the firm: a case of the development-production systems of the Japanese auto makers. In *The Dynamic Firm: The Role of Technology, Strategy, Organization, and Regions*. Chandler AD jr, Hagstrom P, Solvell O (eds). Oxford University Press: New York: 15-44.

Geringer JM, Hebert L. 1991. Measuring performance of international joint ventures. *Journal of International Business Studies* **22**(1): 41-62.

Glazer R. 1991. Marketing in an information-intensive environment: strategic implications of knowledge as an asset. *Journal of Marketing* **55**: 1-19.

Grant RM. 1996. Toward a knowledge based theory of the firm. *Strategic Management Journal* Special Issue **17**: 109-122.

Grant RM. 1998. *Contemporary Strategy Analysis: Concepts, Techniques, Applications* (3rd edn). Basil Blackwell: Cambridge, MA.

Grant RM, Baden-Fuller C. 2002. The knowledge-based view of strategic alliance formation: knowledge accessing *versus* organizational learning. In *Cooperative Strategies and Alliances*. Contractor FJ, Lorange P (eds). Elsevier Science, *in press*.

Gulati R. 1998. Alliances and Networks. *Strategic Management Journal* **19**: 293-317.

Hamel G. 1991. Competition for competence and interpartner learning within international strategic alliances. *Strategic Management Journal* **12**: 83-103.

Hamel G, Doz Y, Prahalad C. 1989. Collaborate with your competitors and win. *Harvard Business Review* **67**(1): 133-139.

Hannan M, Freeman J. 1984. Structural inertia and organizational change. *American Sociological Review* **49**: 149-164.

Harbison JR, Pekar P jr. 1998. *Smart Alliances, A practical guide to repeatable success*. San Francisco: Jossey-Bass Publishers.

- Helfat C. 2000. Guest editor's introduction to the special issue: the evolution of firm capabilities. *Strategic Management Journal* Special Issue **21**: 955-959.
- Helfat C. 2003. *The SMS Blackwell Handbook of Organizational Capabilities*. Blackwell: Oxford.
- Henderson R, Cockburn I. 1994. Measuring competence?, Exploring firm effects in pharmaceutical research. *Strategic Management Journal* Special issue **15**: 63-84.
- Hoang HT, Rothaermel FT, Simac S. 2002. Alliance experience and collaborative R&D performance in the pharmaceutical industry. Paper presented at the SMS Conference, Paris.
- Hunt SD, Morgan RM. 1996. The resource-advantage theory of competition: dynamics, path dependencies, and evolutionary dimensions. *Journal of Marketing* **60**(4): 107-114.
- Ingram P, Baum JAC. 1997. Opportunity and constraint: organizations' learning from the operating and competitive experience of industries. *Strategic Management Journal* Special Issue **18**(7): 75-98.
- Inkpen AC. 1998. Learning and knowledge acquisition through international strategic alliances. *Academy of Management Executive* **12**(4): 69-80.
- Inkpen AC. 2002. Learning, knowledge management and strategic alliances: so many studies, so many unanswered questions. In *Cooperative Strategies and Alliances*. Contractor FJ, Lorange P (eds). Elsevier Science, *in press*.
- Joskow, PL, Rozanski GA. 1979. The effects of learning by doing on nuclear operating reliability. *Review of Economics and Statistics* 161-168.
- Kale P, Dyer JH, Singh H. 2002. Alliance capability, stock market response, and long term alliance success: the role of the alliance function. *Strategic Management Journal* **23**(8): 747-767.
- Kale P, Singh H. 1999. Alliance Capability and Success: A Knowledge-Based Approach. working paper, Wharton School, University of Pennsylvania.

- Khanna T, Gulati R, Nohria N. 1998. The dynamics of learning alliances: competition, cooperation, and relative scope. *Strategic Management Journal* **19**: 193-210.
- Killing JP. 1983. *Strategies for Joint Venture Success*. Praeger: New York.
- King AW, Tucci CL. 2002. Incumbent entry into new market niches: the role of experience and managerial choice in the creation of dynamic capabilities. *Management Science* **48**(2): 171-186.
- King AW, Zeithaml CP. 2001. Competencies and firm performance: examining the causal ambiguity paradox. *Strategic Management Journal* **22**: 75-99.
- Kogut B, Zander U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science* **3**: 383-397.
- Koka BR, Prescott JE. 2002. Strategic alliances as social capital: a multidimensional view. *Strategic Management Journal* **23**(9): 795-816.
- Lane PJ, Lubatkin M. 1998. Relative absorptive capacity and interorganizational learning. *Strategic Management Journal* **19**(5): 461-477.
- Lane PJ, Salk JE, Lyles MA. 2001. Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal* **22**(12): 1139-1161.
- Langlois RN. 1997. Transaction-cost economics in real time. In *Resources, Firms and Strategies, A Reader in the Resource-Based Perspective*, Foss NJ (ed). Oxford: Oxford University Press: 286-305.
- Lapré MA, Van Wassenhove LN. 2001. Creating and transferring knowledge from productivity improvement in factories. *Management Science* **47**(10): 1311-1325.
- Lei D, Slocum JW jr. 1992. Global strategy, competence-building and strategic alliances. *California Management Review* **31**(1): 81-97.
- Leonard-Barton D. 1995. *Wellsprings Of Knowledge*. Harvard Business School Press, Mass: Boston.

- Levinthal DA, March JG. 1993. The myopia of learning. *Strategic Management Journal* Special Issue **14**: 95-112.
- Lorenzoni G, Lipparini A. 1999. The leveraging of interfirm relationships as a distinctive organizational capability: a longitudinal study. *Strategic Management Journal* **20**(4): 317-338.
- Madhok A, Tallman SB. 1998. Resources, transactions and rents: managing value through interfirm collaborative relationships. *Organization Science* **9**(3): 326-339.
- Mahoney JT, Pandian JR. 1992. The resource-based view within the conversation of strategic management. *Strategic Management Journal* **13**(5): 363-380.
- Makadok R. 2001. Toward a synthesis of the resource-based and dynamic-capability views of rent creation. *Strategic Management Journal* **22**(5): 387-401.
- Makino S, Chan CM. 2002. Interorganizational imitation and foreign ownership strategy. In *Cooperative Strategies and Alliances*. Contractor FJ, Lorange P (eds). Elsevier Science, *in press*.
- March JG. 1994. *A Primer on Decision Making: How Decisions Happen*. New York: Free Press.
- Merali Y. 1997. Information, systems and dasein. In *People, Organizations, and Environment*, Stowell F (ed). New York: Plenum.
- Miller KD. 2002. Knowledge inventories and managerial myopia. *Strategic Management Journal* **23**(8): 689-706.
- Mintzberg H. 1983. *Structure in Fives: Designing Effective Organizations*. Englewood Cliffs, NJ: Prentice-Hall.
- Mohr J, Spekman R. 1994. Characteristics of partnership success: partnership attributes, communication behavior and conflict resolution. *Strategic Management Journal* **15**: 135-152.
- Moorman C, Miner AS. 1997. The impact of organizational memory on new product performance and creativity. *Journal of Marketing Research* **34**(2): 91-106.

- Mowery DC (ed). 1988. *International Collaborative Ventures in U.S. Manufacturing*. Ballinger, Cambridge, MA.
- Mowery DC, Oxley JE, Silverman BS. 1996. Strategic alliances and interfirm knowledge transfer. *Strategic Management Journal* Special Issue **17**: 77-91.
- Mukherjee AS, Lapré MA, Van Wassenhove LN. 1998. Knowledge driven quality improvement. *Management Science* **44**(11): S35-S49.
- Nelson R, Winter S. 1982. *An Evolutionary Theory of Economic Change*. Cambridge, Mass: Harvard University Press.
- Nonaka I. 1994. A dynamic theory of organizational knowledge creation. *Organization Science* **5**(1): 14-37.
- Olk P. 2002. Evaluating Strategic Alliance Performance. In *Cooperative Strategies and Alliances*. Contractor FJ, Lorange P (eds). Elsevier Science: 119-143, *in press*.
- Park SO, Ungson GR. 2001. Interfirm rivalry and managerial complexity: a conceptual framework of alliance failure. *Organization Science* **12**(1): 37-53.
- Parkhe A. 1993. Strategic alliances structuring: a game theoretic and transaction cost examination of interfirm cooperation. *Academy of Management Journal* **36**(4): 794-829.
- Penrose ET. 1959. *The Theory of the Growth of the Firm*. Oxford: Oxford University Press.
- Pfeffer J, Salancik GR. 1978. *The External Control of Organizations: A Resource Dependence Perspective*. Harper & Row: London.
- Pisano GP. 2000. In search of dynamic capabilities: the origins of R&D competence in biopharmaceuticals. In *The Nature and Dynamics of Organizational Capabilities*, Dosi G, Nelson RR, Winter SG (eds). Oxford University Press: Oxford, New York; 129-154.
- Pisano GP, Bohmer RMJ, Edmondson AC. 2001. Organizational differences in rates of learning: evidence from the adoption of minimally invasive cardiac surgery. *Management Science* **47**(6): 752-768.

Powell WW, Koput KW, Smith-Doerr L. 1996. Interorganizational collaboration and the locus of control of innovation: networks of learning in biotechnology. *Administrative Science Quarterly* **41**(1): 116-145.

Prahalad CK, Hamel G. 1990. The core competence of the corporation. *Harvard Business Review* (May): 79-91.

Priem RL, Butler JE. 2000. Is the resource-based 'view' a useful perspective for strategic management research?. *Academy of Management Review* **26**(1): 22-40.

Ranft AL, Lord MD. 2002. Acquiring new technologies and capabilities: a grounded model of acquisition implementation. *Organization Science* **13**(4): 420-441.

Rugman, AM, Verbeke A. 2002. Edith Penrose's contribution to the resource-based view of strategic management. *Strategic Management J.* **23**(8) 769-780.

Sanchez R. 2001. Building Blocks for Strategy Theory: Resources, Dynamic Capabilities and Competences. In *Rethinking Strategy*. Volberda HW, Elfring T (eds). Sage Publications: London: 143-157.

Sanchez R, Heene A, Thomas H. 1996. *Dynamics of Competence-Based Competition: Theory and Practice in the New Strategic Environment*. Oxford: Elsevier Pergamon.

Shenkar O, Li J. 1999. Knowledge search in international cooperative ventures. *Organization Science* **10**: 134-143.

Simonin BL. 1997. The importance of collaborative know-how: an empirical test of the learning organization. *Academy of Management Journal* **40**(5): 1150-1174.

Sivadas E, Dwyer RF. 2000. An examination of organizational factors influencing new product development in internal and alliance-based processes. *Journal of Marketing* **64**(1): 31-49.

Spekman RE, Isabella LA, MacAvoy TC. 1999. *Alliance Competence, Maximizing the value of your partnerships*. John Wiley & Sons: New York.

- Stata R. 1989. Organizational learning- the key to management innovation. *Sloan Management Review* **30**(3): 63-74.
- Teece DJ, Pisano G, Shuen A. 1997. Dynamic capabilities and strategic management. *Strategic Management Journal* **18**(7): 509-533.
- Teece DJ, Rumelt R, Dosi G, Winter S. 1994. Understanding corporate coherence: theory and evidence. *Journal of Economic Behavior and Organization* **23**(1): 1-30.
- Thomke S, Kuemmerle W. 2002. Asset accumulation, interdependence and technological change: evidence from pharmaceutical drug discovery. *Strategic Management Journal* **23**(7): 619-635.
- Tsang EWK. 1999. Internationalization as a learning process: Singapore MNCs in China. *Academy of Management Executive* **13**(1): 91-101.
- Tsang EWK. 2002a. Acquiring knowledge by foreign partners from international joint ventures in a transition economy: learning-by-doing and learning myopia. *Strategic Management Journal* **23**(9): 835-854.
- Tsang EWK. 2002b. Sharing international joint venturing experience: a study of some key determinants. *Management International Journal* **42**(2): 183-205.
- Tushman ML, Nadler DA. 1978. Information processing as an integrating concept in organizational design. *Academy of Management Review* **3**: 613-624.
- Von Krogh G, Roos J, Kleine D (eds). 1998. *Knowing in Firms, Understanding, Managing and Measuring Knowledge*. London: Sage Publications.
- Wernerfelt B. 1997. A resource-based view of the firm. In *Resources, Firms and Strategies, A Reader in the Resource-Based Perspective*. Foss NJ (ed). Oxford: Oxford University Press: 117-130.
- Williamson OE. 1999. Strategy research: governance and competence perspectives. *Strategic Management Journal* **20**(14): 1087-1108.

Zander U, Kogut, B. 1995. Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test. *Organization Science* **6**(1): 76-92.

Zollo M, Reuer JJ, Singh H. 2002. Interorganizational routines and performance in strategic alliances. *Organization Science* **13**(6): 701-713.

Zollo M, Winter SG. 2002. Deliberate learning and the evolution of dynamic capabilities. *Organization Science* **13**(3): 339-351.



Eindhoven Centre for Innovation Studies

WORKING PAPERS

Ecis working papers 2003 / 2004:

- 03.01 A. Nuvolari
Open source software development: some historical perspectives
- 03.02 M. van Dijk
Industry Evolution in Developing Countries: the Indonesian Pulp and Paper Industry
- 03.03 A.S. Lim
Inter-firm Alliances during Pre-standardization in ICT
- 03.04 M.C.J. Caniëls & H.A. Romijn
What drives innovativeness in industrial clusters? Transcending the debate
- 03.05 J. Ulijn, G. Duysters, R. Schaezlein & S. Remer
Culture and its perception in strategic alliances, does it affect the performance? An exploratory study into Dutch-German ventures
- 03.06 G. Silverberg & B. Verspagen
Brewing the future: stylized facts about innovation and their confrontation with a percolation model
- 03.07 M.C. Caniëls, H.A. Romijn & M. de Ruijter-De Wildt
Can Business Development Services practitioners learn from theories on innovation and services marketing?
- 03.08 J.E. van Aken
On the design of design processes in architecture and engineering: technological rules and the principle of minimal specification
- 03.09 J.P. Vos
Observing Suppliers observing Early Supplier Involvement: An Empirical Research based upon the Social Systems Theory of Niklas Luhmann
- 03.10 J.P. Vos
Making Sense of Strategy: A Social Systems Perspective
- 03.11 J.A. Keizer & J.P. Vos
Diagnosing risks in new product development
- 03.12 J.M. Ulijn, A. Fayolle & A. Groen
European educational diversity in technology entrepreneurship: A dialogue about a culture or a knowledge management class?

- 03.13 J.M. Ulijn, S.A. Robertson, M. O’Duill
Teaching business plan negotiation: How to foster entrepreneurship with engineering students
- 03.14 J.E. van Aken
The Field-tested and Grounded Technological Rule as Product of Mode 2 Management Research
- 03.15 K. Frenken & A. Nuvolari
The Early Development of the Steam Engine: An Evolutionary Interpretation using Complexity Theory
- 03.16 W. Vanhaverbeke, H. Berends, R. Kirschbaum & W. de Brabander
Knowledge management challenges in corporate venturing and technological capability building through radical innovations
- 03.17 W. Vanhaverbeke & R. Kirschbaum
Building new competencies for new business creation based on breakthrough technological innovations
- 03.18 K.H. Heimeriks & G.M. Duysters
Alliance capability as mediator between experience and alliance performance: an empirical investigation into the alliance capability development process
- 03.19 G.M. Duysters & K.H. Heimeriks
Developing Alliance Capabilities in a New Era
- 03.20 G.M. Duysters, K.H. Heimeriks, J. Jurriëns
Three Levels of Alliance Management
- 03.21 B. Verspagen & C. Werker
The invisible college of the economics of innovation and technological change
- 03.22 W. Vanhaverbeke, B. Beerkens, and G. Duysters
Explorative and exploitative learning strategies in technology-based alliance networks
- 03.23 S.J. van Dijk, G.M. Duysters & A.J.M. Beulens
Transparency dilemmas, information technology and alliances in agriculture and food industry
- 03.24 S.J. van Dijk & M.P.C.D. Weggeman
Knowledge sharing in technology alliances
- 03.25 C. Castaldi & A. Nuvolari
Technological Revolutions and Economic Growth: The “Age of Steam” Reconsidered
- 03.26 A. Nuvolari, B. Verspagen and N. von Tunzelmann
The Diffusion of the Steam Engine in Eighteenth-Century Britain
- 03.27 L. Wang & A.S. Szirmai
Technological Inputs and Productivity Growth in China’s High-Tech Industries
- 04.01 B. Nooteboom & V.A. Gilsing
Density and strength of ties in innovation networks: a competence and governance view
- 04.02 A. Nuvolari
Collective invention during the British Industrial Revolution: the case of the Cornish pumping engine
- 04.03 C. Meister & B. Verspagen
European Productivity Gaps: Is R&D the solution?
- 04.04 J.J. Berends, J.D. van der Bij, K. Debackere, M.C.D.P. Weggeman
Knowledge sharing mechanisms in industrial research

- 04.05 J.J. Berends, K. Debackere, R. Garud, M.C.D.P. Weggeman
Knowledge integration by thinking along
- 04.06 M.H.C. Ho
Differences between European Regional Innovation Systems in terms of technological and economic characteristics
- 04.07 F.E.A. van Echtelt, J.Y.F. Wynstra, A.J. van Weele van,, Duysters, G.M
Critical processes for managing supplier involvement in new product development: an in-depth multiple-case study
- 04.08 H.A. Akkermans, I.S. Lammers, M.C.D.P. Weggeman
All ye need to know? Aesthetics from a design perspective
- 04.09 V. Gilsing & B. Nooteboom
Co-evolution in innovation systems: the case of pharmaceutical biotechnology
- 04.10 J.E. van Aken
Co-evolution in innovation systems: the case of pharmaceutical biotechnology
- 04.11 J.E. van Aken
Valid knowledge for the professional design of large and complex design processes
- 04.12 J.E. van Aken
Organising and managing the fuzzy front end of new product development
- 04.13 C. Werker & T. Brenner
Empirical calibration of simulation models
- 04.14 J. Jacob & C. Meister
Productivity gains, intersectoral linkages, and trade: Indonesian manufacturing, 1980-1996
- 04.15 B. Verspagen
Innovation and Jobs: a Micro-and-Macro Perspective
- 04.16 V. Gilsing & B. Nooteboom
Density and strength of ties in innovation networks: an analysis of multimedia and biotechnology
- 04.17 G. Silverberg & B. Verspagen
The size distribution of innovations revisited: an application of extreme value statistics to citation and value measures of patent significance
- 04.18 J. Jacob
Late industrialisation and structural change: the Indonesian experience
- 04.19 C. Garavaglia
"History Friendly" Simulations for Modelling Industrial Dynamics
- 04.20 K.H. Heimeriks, G.M. Duysters, W.P.M. Vanhaverbeke
The evolution of alliance capabilities
- 04.21 K.H. Heimeriks & G.M. Duysters
A study into the alliance capability development process