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Alliance Coordination, Dysfunctions, and the Protection of Idiosyncratic Knowledge in Strategic Learning Alliances

Dirk Müller

Abstract

In high technology industries firms use strategic learning alliances to create value that can't be created alone. While they open their interorganizational membrane to gain new skills and competences, generate new products and services, accelerate development speed, and enter into new markets their idiosyncratic knowledge base may be impaired when knowledge related dysfunctions like the unintended knowledge transfer, asymmetric learning speed or premature closing occur. Within a value approach we examine the interplay of alliance coordination activities that enhance value creation, emerging knowledge related dysfunctions, and formal and organizational protection measures which shall safeguard firms intellectual crown jewels. We tested our hypotheses with a sample of 111 strategic alliances of young technology based Enterprises (YTBEs) with competing partners in high and key technology industries. Our findings suggest that a focal firm's alliance management is well advised to intensely coordinate the alliance and to be aware of dysfunctional tendencies that erode alliance value. Since organizational protection measures could exaggerate dysfunctional effects they should be deployed very deliberately on a modest level. Formal protection measures, in contrast, seem to aggravate coordination activities' value creation effect by setting behavioral guidelines. Moreover, an unsuccessful negotiation process of formal protection agreements may allow a deselection of partners that would not obey others intellectual property interests. Finally, we highlight theoretical and managerial implications that arise from these findings.

1 Introduction

In the last two decades strategic alliances have become a pivotal element of technology firms' competitive and innovation strategies (Contractor and Lorange 2002; Lavie 2007). Cooperating firms intend to reduce and share costs and risks (Dyer and Singh 1998), enhance their flexibility (Young-Ybarra *et al.*, 1999), sharpen their competitive edge, enter new markets, and combine otherwise barely attainable resource endowments or gain access to synergistic know how (Gulati, Nohira and Zaheer 2000; Dyer and Singh 1998). The underlying motive of all these purposes is to achieve an above average value creation position that can't be reached alone (Borys and Jemison 1989; Madhok and Tallman 1998; Dyer and Singh 1998). Yet expectations contrast with alliances' outcome. Researchers and practitioners report alliance failure and termination rates from 30-70 % (e.g. Kogut 1989; Park and Russo 1996; Dyer, Kale and Singh 2001; Lunnan and Haugland 2008). Especially learning alliances entail a high risk since predominantly competitive partners may gain access to firms' intellectual crown jewels in such arrangements (e.g. Hamel 1991; Larsson *et al.* 1998). Consequently, these relationships in many cases have resulted in value destruction for the companies that have engaged in them (Kale, Dyer and Singh 2001). On the other side it is known from a variety of perspectives that strategic alliances can be highly beneficial.

Scholars have begun to examine the conditions under which value is created and appropriated efficiently. Recent studies highlighted more and more alliance management concerns and identified the fulfillments of alliance coordination tasks as a key driver for collaborative value creation (e.g. Gulati and Singh ; Park and Ungson 2001; Reuer, Zollo and Singh 2002; White 2005). On the other side an ongoing discussion has extended Hamel's (1991) argumentation on dysfunctional knowledge-related phenomena impairing value creation and appropriation in strategic learning alliances (Bresser 1988; Khanna, Gulati and Nohria 1998; Larsson *et al.* 1998; Das and Rahman 2002; Inkpen and Currall 2004; Norman 2004). Knowledge-related dysfunctions, such as unintended knowledge transfer to the partner, asymmetrical learning and unidirectional informational closing, can change an alliance from a win-win into a win-lose or lose-lose-arrangement. Practitioners try hard to avert these threats with formal and organizational protection mechanisms. Knowledge protection is one of the key variables for a successful learning process (Inkpen 2002), but for this topic a systematic research is still lacking (Das and Rahman 2002) and, notwithstanding its theoretical and empirical

import, empirical evidences have occurred only with limited extent. We want to close some of the gaps that have emerged by answering with our study these questions: Which effects do alliance coordination activities, knowledge-related dysfunctions and protection mechanisms have on the value of strategic alliances? How do the interactions between alliance coordination activities, knowledge-related dysfunctions and protection mechanisms influence the value of the alliances? May protection measures moderate effects of knowledge-related dysfunctions? How do alliance coordination measures and protection measures interact? Do they interfere or complement? And do the effects vary for the different protection mechanisms?

By addressing these issues concerning value creation, value appropriation, knowledge-related dysfunctions and the protection of key knowledge in learning alliances this study augments prior research on strategic alliance management. We advance this research through the theoretical distinction between formal and organizational protection as two significant mechanisms that firms implement to secure their idiosyncratic knowledge against unintended transfer and unauthorized use. Formal mechanisms base on property rights and contractual agreements that are established ex-ante within bidirectional negotiations between alliance partners while organizational protection mechanisms are implemented clandestinely and unidirectional. We draw a differentiated empirical picture of their interlinkages with alliance coordination measures and value eroding dysfunctional occurrences which underpins this delineation and extends the comprehension of the complex interdependencies within a system of alliance management activities. By doing this, our study especially contributes to the growing body of literature that advances a value orientated view of strategic alliances (e.g. Contractor and Lorange 1988a; Zajac and Olsen 1993; Dyer 1997; Dyer, Singh and Kale 2008; Madhok 1997; Madhok and Tallman 1998; Anand and Khanna 2000; Sarkar, Echambadi and Harrison 2001; Kale, Dyer and Singh 2001; White and Siu-Yun Lui 2005; Das and Kumar 2007; Lavie 2007; Lavie 2009; Sarkar, Aulakh and Madhok 2009; Li, Zhou and Zajac 2009; Aggarwal and David H. Hsu 2009; Gulati, Lavie and Singh 2009). We discuss and analyze the above mentioned management instruments and the corresponding issues within a value framework. Further on, we adopt a performance measure that captures alliance success in value terms and integrates both - disadvantageous as well as beneficial - aspects of the collaboration. Therewith we correspond to Barringer and Harrison's (2000) request to assess alliance performance with a probabilistic rather than an economic assessment. In addition, this

study extends alliance learning literature (e.g. Lubatkin, Florin and Lane 2001; Simonin 1993; Simonin 1999a, 2004) and sets a counterpoint to the conventional view that predominantly highlights conditions fostering cooperative learning. We examine the influence of measures that should protect firm's idiosyncratic knowledge and are per se expected to aggravate interorganizational learning. Moreover, this study may contribute to the emergent research stream on alliance management capability (e.g. Kale, Dyer and Singh 2002; Schreiner, Kale and Corsten 2009) since it shows that a value optimized implementation of protection measures is highly contingent on the anticipated collaborative situations. Then a firm's ability to customize its protection activities to specific alliances may be interpreted and should be integrated as another constituent dimension of the higher-order construct alliance management capability. Eventually, our findings add to the increasing research on strategic alliances between competitors because our testing sample consists exclusively of such cooperative arrangements (Hamel 1991; Khanna, Gulati and Nohria 1998; Dussauge, Garrette and Mitchell 2000).

In the following we firstly set the cornerstones for our analysis and describe a framework of value creation and appropriation in strategic alliances. We examine the value effects of firms' alliance management activities and knowledge-related dysfunctions on alliance success from the view of the focal firms. Firms' task and relationship coordination activities are essential elements of mutual value creation within the alliance arrangement. On the contrary, dysfunctional phenomena exacerbate value creation, let erode or misappropriate value that has been created, or finally destroy the alliance when it is the expression of an underlying opportunistic propensity of at least one partner. Firms anticipate these potential developments and try prevalently to diminish its consequences with formal and organizational protection activities. The former premises on bidirectional contractual agreements and negotiational processes while the latter predominantly bases on unidirectional activities that should prevent unintended knowledge transfer across the interorganizational boundaries. Further on, we suppose that these variables affect alliance value not only directly but show intertwined and contingent effects and therefore we examine their interaction effects. We test our hypotheses in a dual key informant approach with a comprehensive sample of strategic alliances with competing partners of German young technology based firms (YTBE) in high and key technology industries.

2 Theory and hypothesis

2.1 Value creation and capturing in strategic learning alliances

The creation and sharing of value is the *raison d'être* of collaborative relationships (Anderson 1995) and many scientists have contributed to amend and sharpen the comprehension of value in cooperative arrangements. However, until today an explicit, monolithic and widespread accepted value concept is missing in strategic management research. Supplementary some confusion about the meaning and use of different value-related terms is noted (Lepak, Smith and Taylor 2007; Priem 2007). Lepak *et al.* (2007) state a conceptual mix of value creation and value capture (e.g. Anderson 1995), and a difficulty emerging from the ambiguous use of value creation as the content and the process of new value creation, which both may have its origins in the multidisciplinary nature of management research. Additionally some authors subsume exclusively beneficial aspects which define value while a majority apprehends value as a difference or ratio of benefits and Costs respectively sacrifices accruing from business-related and especially co-operational endeavours (Contractor and Lorange 1988a; Madhok and Tallman 1998).

Nevertheless there is a broad accord about the relevance of some distinct characteristics of value, value creation and value appropriation in strategic alliance research: value which is created in and through strategic alliances normally is multifaceted and may be tangible or intangible; its valuation depends on subjective perceptions and is contingent (Ramirez 1999). Various value components reflecting the initial motives of knowledge-based interorganisational cooperation are of significance in learning alliances and are aimed to directly or indirectly gain competitive advantage (Newbert 2008). In technology-driven alliances new products, services (Kotabe and Swan 1995; Rothaermel and Deeds 2004) and instantaneously applicable knowledge and capabilities (Harrigan 1985 ; Hamel 1991; Khanna 1998; Mowery, Oxley and Silverman 1996; Muthusamy and White 2005; Inkpen 1998, 2000, 2002, 2007) that evolved out of a resource and capability combining process of co-specialization (Mowery, Oxley and Silverman 2002; Doz and Hamel 1998) unfold their value increasing effects more manifestly and ocularly than the sharing of R&D-costs (Bayona, García-Marco and Huerta 2001) and risks (Contractor and Lorange 1988a; Contractor and Lorange 1988b; Glaister and Buckley 1996), a decreased time-to-market (Schilling and Hill

1998) and thereby a faster return on investment, the shaping of the competitive landscape (Glaister and Buckley 1996) or the cooptation of partners ties to otherwise unreachable buyers and suppliers (Contractor and Lorange 1988a; Starr and MacMillan 1990). The total created value of the alliance is - on the outcome side as well as on the input side - regularly a mixture of miscellaneous tangible or intangible constituents. By way of example developing a technological product, e.g. active pharmaceutical ingredients, fuel cell components, software, etc., yields not only tangible benefits like patents, sales, profits, market shares and growth. Furthermore it may entail intangible benefits as new technological and managerial capabilities and skills (Kogut 1988; Parkhe 1991; Simonin 1997; Anand and Khanna 2000; Kale and Singh 2007), an enhanced access to network resources or the completion of a product line. Marketing (Zeithaml 1988) and management (Bowman and Ambrosini 2000) research have adapted the idea of value as a subjective concept originated in the Austrian schools of economics and sociology, in which the value of a resource emanates from, and depends upon, individual preferences, demands and uses. Than money reflects the economic value of an asset, resource or matter and allows the objectivation of the subjective values (Simmel 1900). These fundamental considerations suggest the differentiation into *use value* referring to a special quality of a resource, product or service as perceived by users in relation to their needs, and *exchange value* (Smith 1776; Vargo and Lusch 2004, Lepak, Smith and Taylor 2007). Lepak *et al.* (2007) mention that the latter targets at the monetary amount which can be realized at a certain point in time for the delivering of either the use value or the new goods, services, products or resources. However, Ramirez (1999) points out that value is rather contingent than subjective. Teece and Sherry reveal some contingencies evidently for innovations (Teece 1986) and intellectual property rights (Sherry and Teece 2004). They argue that the value of these knowledge-comprising resources can dramatically change over time due to technological or commercial reasons. Technologies and the related property rights may become obsolete or less valuable when a new substituting technology arises or markets increase when buyers alter their requirements or collapse in consequence of legislative amendments. Afuah (2000) shows that the value of an alliance diminishes when the partner's technological capability renders obsolete and deteriorates the performance of a focal firm.

This attributes have impeded the assignment of value-based measures to ascertain the performance in and of interorganizational alliances. Some further aspects complicate

the assessment of alliances' value. Ohmae (1989) notes that the financials don't capture the real data of an alliance, while Barringer *et al.* (2000) mention that the valuation in monetary terms of intangible benefits like positive reputational effects, a broadened social network or new skills may be nearly impossible. Doz *et al.* (1998) advert to the strategic character of learning alliances. Many of their ultimate consequences are enfolded in the long-term and thereby cannot be anticipated with precision.

Nevertheless value-based performance measures have become decision criteria of utmost and increasing relevance for practitioners (e.g. Stanek 2004) and scientists to appraise distinct alliances (Madhok and Tallman 1998), to compare or to select between alternative alliances (Madhok and Tallman 1998; Ulaga and Eggert 2006) and to manage alliances (e.g. Spekman *et al.* 1998; Ford and McDowell 1999; Revilla, Acosta and Sarkis 2005) and alliance portfolios (Lavie 2007; Ford and McDowell 1999; Sarkar, Aulakh and Madhok 2009; Parise and Casher 2003).

As we have adumbrated above, value shows different faces dependent on the assumed contingencies and views on and in an alliance. Our argumentation draws on the seminal work of Madhok and Tallman (1998). They define value as the net rent earning capacity of tangible or intangible assets or resources. Understanding relationships as resources, they point out that such value of an alliance reflects with respect to cost-effectiveness the partners' ability to earn rents over and above what would be achievable in alternative organizational arrangements. Enunciated in algebraic terms the value of a relation equals the difference of the relation-specific rents or benefits on the one and relation-specific costs, expenditures or sacrifices on the other side.

We will also rely on Madhok and Tallmans (1998) crucial distinction between the *potential value* and the *realized value* of a relationship. The potential value characterizes the theoretical synergistic potential of a relationship. It caps the maximal achievable value which can emerge from the optimal combination of complementary resources and capabilities in a specific organizational form. While this is an idealistic and more theoretical concept the realized value regards the realities and imperfectness of co-operational arrangements and depicts the obtainable value within a managerial regime of an alliance. The realized value comprises collaborational slack arising on the firm level from incompatibilities, incomplementarities, safeguarding activities, and frictions occurring instance due to the change of strategies or the replacement of employees. Fading commitment originated in conflicts, misunderstanding and perceived uncer-

tainty adds accessorially inefficiencies on the relationship level. Since the realized value marks the upper limit of the pie partners can share, it is worthwhile for them to understand how to minimize the difference between the potential and the realized value through an adequate alliance management (e.g. Ariño and de la Torre 1998; Inkpen 2007; Sampson 2005; Kale and Singh 2007) and the amelioration of their relational quality (Ariño, de la Torre and Ring 2001; Ariño, de la Torre and Ring 2005).

Madhok and Tallman (1998) focus on the creation of value on an interorganizational level. For this reason we will add the terms *appropriated value* and *captured value* to firstly delineate between the creation and the capturing process, and secondly to apprehend on the firm level the value which a focal company can attain as alliance outcome. The retention of the benefits and the partitioning of alliance-specific costs and sacrifices define the value that a focal firm can appropriate when the mutually created value is distributed between alliance partners. The allocation is influenced by contractual agreements (Gulati and Singh 1998), made alliance-specific investments (Dyer 1997; Dyer, Singh and Kale 2008;), power relations (Lavie 2009), factual interdependencies (Khanna, Gulati and Nohria 1998; Dyer, Singh and Kale 2008), and the degree of fairness (Luo 2008), respectively opportunism (Parkhe 1993) established between alliance partners.

Firms capture value when they sell the outcomes of the alliance and allocate exchange value (Priem 2007) or exploit the benefits they have maintained otherwise. Predominantly the benefits firms gain out of a learning alliance are not exploited mutually. Rather, they are combined and refined with firm-specific capabilities and resources to adapt offerings to special customer requirements and thereby to improve the exploitable value of use. In consequence, alliance management influence on the value captured fades out and is dominated by the impact of specific firm capabilities, skills and resources (Coff 2010; Makadok 2001; Newbert 2008). Hence we will focus on value creation and appropriation and neglect exploitation concerns.

Alliance management has some setscrews to influence the size and the share of the pie that a focal firm can appropriate (Madhok and Tallman 1998). It can close the gap between the potential and the realizable value by improving the value creation process, and it may extend or abate the collaboration. Further, it can affect the allocation of the benefits gained and the costs shouldered by the partners. Unfortunately the influencing variables are intertwined and the change of a factor often induces not anticipated side

effects. At instance saving some relation specific investments will not only lower a focal firm's effort but reduce also the jointly realizable value of the alliance. In the following section we discuss the effects of certain alliance management instruments and activities on value creation and appropriation.

2.2 Cooperative imperative vs. protection imperative

The management in learning alliances addresses a major challenge. On the one side it has to establish interorganizational structures, processes, routines and personnel relationships to open the organization to the partner in order to enable and foster mutual value creation. On the other side it feels the need to protect its idiosyncratic resources against partner's dysfunctional behavior and opportunistic propensity to reduce own sacrifices and especially minimize the unwillingly transferred knowledge. White *et al.* (2005) denote this antagonism (Ariño 2001; Das and Teng 2000; De Rond and Hamid 2004) which alliance management research treats predominantly as two separated approaches, namely as the imperative to cooperate and the imperative to control. The cooperation imperative is theoretically entrenched in the resource based view and its derivatives. Conceptual arguments and empirical findings illumine the significance of the effective coordination of interdependent tasks (Kumar and Seth 1998; Gulati and Singh 1998), sharing of control and information, and overcoming interorganizational differences and managing conflicts (Mohr and Spekman 1994) for cooperative value creation. The reasoning of the control imperative has its fundamentals in institution economic deliberations. In the following, we examine the value concerns of the management activities addressing these imperatives. We will discuss these topics within the value perspective and highlight the consequences on the perceived value from the viewpoint of an YTBE as a focal firm. Our argumentation will draw on five logical lines:

We assume that the perceived alliance value is leveraged when on the alliance level (1) the potential value of the special alliance is extended. This happens, for instance, when partners broaden the collaborative scope (Khanna 1998). Additionally, partners can close the gap between the potential value and the realized value by an excellent alliance management, which (2) enlarges the commonly created benefits or (3) reduces alliance related costs (Madhok and Tallman 1998). While these arguments focus on value creation, the following treat value appropriation. Assuming a distinct level of cooperatively created benefits, the perceived alliance value for the focal firm rises

when the firm appropriates a relatively greater share of the pie (and vice versa). This situation occurs when in the wake of situational factors, alliance configuration, or management efforts the firm (4) reaps a larger proportion of the benefits or (5) bears a smaller amount of alliance costs as was ex-ante stipulated or expected. Since this rationality uses a quasi-linear arithmetic the reverse argumentation is also applicable.

Additionally we adopt the perspective that alliance managers follow an optimization approach in their decision making (e.g. Zajac and Olsen 1993; Madhok 2000; Das and Rahman 2002; Bowman and Ambrosini 2007; Reuer and Ariño 2007). Zajac *et al.* (1993) delineate that following interorganizational strategies could induce significant transaction costs on the one side, but could be outweighed by the substantial value created by the partners on the other side. By way of example managers must weigh the value losses they would experience from dysfunctional incidents with the additional costs of negotiating safeguards into their alliance contracts ex-ante (Reuer and Ariño 2007).

2.3 Alliance coordination and alliance value

Value creation in strategic learning alliances, where firms combine their specific skills, competencies and resources to gain mutual benefits, needs at least a minimum of coordination (White 2005). Sivadas *et al.* (2000) declare that “no alliance can succeed unless the partners can coordinate their activities competently”. Gulati *et al.* (1998) note, coordination considerations are extensive in alliances and rise with increasing degrees of interdependence, while Park *et al.* (2001) point out that strategic alliances require excessive effort to coordinate and integrate two independent organizations which could result in a high level of managerial complexity and uncertainty. Further on, an expanding use and complexity of integrative coordination mechanisms is documented when the degree of strategic interdependence between partner organizations has increased (Kumar and Seth 1998). Besides Reuer *et al.* (2002) argue, partners must develop coordination mechanisms within as well as between activities when partners’ cooperative responsibilities are overlapping. Zollo *et al.* (2002) found support for the enhancing role of interfirm coordination and cooperation routines on collaborative agreements, and Kale *et al.* (2001) stress, that companies which invest in structures and systems to coordinate alliance activity reap benefit in a number of ways.

Following Sivadas *et al.* (2000), we comprehend coordination as the "specification and execution of roles with minimal redundancy and verification and refers to the extent to which different 'units' function according to the requirements of other units and the overall system." Causes for certain coordination activities than derive from two sources of interorganizational coordination needs (White and Siu-Yun Lui 2005). A primal research stream highlights the positive effects of rather task-driven coordination efforts on joint alliance success. Activities, mechanisms and routines of information sharing (Dyer 1997; Dyer and Singh 1998; Kumar and Nti 1998; Anderson and Narus 1990), intensive and proactive communication (Mohr and Spekman 1994; Lee 2007; Young-Ybarra and Wiersema 1999; Kale, Dyer and Singh 2001; Sivadas and Dwyer 2000; Sheng *et al.* 2006), managing conflicts (Kale, Singh and Perlmutter 2000) and finding compromises (Lin and Germain 1998), controlling the compliance of agreements (Ancona and Caldwell 1992), the alignment of interests and actions of different departments and actors (Hughes and Weiss 2007; Ancona and Caldwell 1992) which are affected by the alliance internally and across the interorganisational boundaries (Ancona and Caldwell 1992), are found to stimulate and foster cooperative value creation.

Other Authors place special emphasis on the stabilizing and value creating functions of social ties in alliance relationships. Ring *et al.* (1994) suppose that "personal relationships increasingly supplement role relationships when alliances develop over time", and reliance and trust, emerging out of personal relations, may compensate or substitute formal contracts. Dyer (1997) accent, especially face-to-face-contact would lead to friendship and trust and thus reduce transaction costs. In learning alliances dialogue-based face-to-face-communication provides managers a platform to improve their mutual understanding of cooperative best practices to carry out alliance-related tasks at hand, and to share beneficial data and know-how (Kale and Singh 2007). Dyer *et al.* (2006) note that the quality of products is heightened through knowledge sharing in face-to-face-situation, while Cäker (2008) mentions, social coordination mechanisms would enhance alliance' flexibility. Moreover, personal contact reduces behavioral uncertainty and is seen to be an antecedent of interorganizational trust since trust can only reside on an interpersonal level (Adobor 2006). Nevertheless, as Adobor (2006) delineates, interpersonal relations entail a dysfunctional potential. During alliance life time the loyalty to the firm of some individuals may decrease and, when cooperation is intense and interpersonal ties are strong, shift to co-workers on the partner's side. Then

information and know-how are eventually transferred which would, from the viewpoint of a focal firm, better be protected and left undisclosed. The alliance is not longer led by firms' interests but by personal self-interests (Park and Ungson 2001) and success gets tied to personal relationships (Anderson and Jap 2005). Poppo *et al.* (2008) state that overembedded social ties can be vulnerable to opportunism and effective adaptation, which lead to lower level of trust. By controlling social interactions and relations, a firm may be able to protect against such unwanted scenarios (Porter Liebeskind 1997). Consequently, Madhok (2000) claims that a relationship has to be actively managed in order to benefit from the premium attached by a better quality of the relationship and the pattern of interactions of cooperating partners. And appraising these management measures from the total alliance value perspective (Zajac and Olsen 1993; Madhok and Tallman 1998; Madhok 2000; White and Siu-Yun Lui 2005) they, all in all, reduce the gap between the potential and the realized value, by extending the latter.

The coordination activities discussed above, that are stimulating, enabling and enhancing value creation, are not for free (Porter 1990). Consequently, Gulati *et al.* (1998) put the spotlight on coordination costs as a management decision criterion in strategic alliances. As Park *et al.* (2001) reason, strategic alliances sometimes fail due to the excessive effort to coordinate independent organizations and integrate otherwise unconnected tasks, and the resulting managerial complexity and uncertainty. The effort to coordinate depends on the specific structural and processual configuration of the collaboration as well as on the concrete task which has to be performed (Kumar and Dissel 1996). Coordination costs rise with the anticipated interdependence of alliance partners (Gulati and Singh 1998), asset specificity and environmental uncertainty (Artz and Brush 2000), the complexity of information processes (Park and Ungson 2001; White and Siu-Yun Lui 2005), the number and heterogeneity of involved firms (Okamuro 2007), and the size of the partner interfaces (White and Siu-Yun Lui 2001).

These factors alleviate the realizable value of the alliance, but on the other side, alliance logic implies that partners create substantial value, which should outweigh alliance costs (Zajac and Olsen 1993; Park and Ungson 2001). Management normally will strive a level of coordination activities made to fulfil cooperative task with respect to the optimization of anticipated profits, or at least, as Park *et al.* (2001) formulate, "the gains from specialization override the costs of coordination".

Hypotheses 1: There is a positive relationship between alliance coordination and the perceived alliance value for the focal firm.

2.4 Knowledge related dysfunctions and alliance value

Learning is one, if not the key function in YTBEs strategic alliances. This is documented in widespread literature streams on interorganizational learning (e.g. Lane and Lubatkin 1998; Kumar and Nti 1998; Larsson et al. 1998; Lubatkin, Florin and Lane 2001; Kale and Singh 2007), R&D-cooperation (e.g. Brockhoff 1992; Oxley and Sampson 2004; Sampson 2004; Faems *et al.* 2006; Sampson 2007), new product development (e.g. Kotabe and Swan 1995; Deeds and Hill 1996; Rothaermel and Deeds 2004; Gerwin and Ferris 2004; Kalaignanam, Shankar and Varadarajan 2007), and knowledge transfer (e.g. Simonin 1993; Simonin 1999a; Mowery, Oxley and Silverman 1996; Muthusamy and White 2005; Inkpen 2007). Learning with partners in alliances promises the share of R&D costs and risks and the reduction of uncertainty, the access to complementary resources and skills, the shortening of development times, the improvement of the own resource and competence base, as well as the efficient deploy of extant resources and the capture of knowledge spillovers (Caloghirou, Hondroyiannis and Vonortas 2003). Moreover, cooperative learning can have an indirect impetus and amend the access to markets, increase market power or facilitate the establishment of technical standards (Caloghirou, Hondroyiannis and Vonortas 2003).

But where is much light, there is a strong shadow. Severe hazards lurk as quasi-antipodes to these potential benefits. A major concern that YTBEs face in strategic learning alliances is the threat of their unique knowledge and technology positions. Researchers explicated *asymmetric learning pace* (Hamel 1991; Khanna, Gulati and Nohria 1998), the *unwanted transfer of knowledge, skills and competencies* (Bresser 1988; Hamel 1991), and the *premature closing of the cooperation* (Khanna, Gulati and Nohria 1998) as three learning and knowledge related dysfunctional syndromes, which have tremendous impact on alliance success for a focal firm.

These dysfunctions have attracted researchers' interest. Especially transaction cost theory based argumentations assume opportunistic propensity and behavior as the vital cause of knowledge related dysfunctions. However, opportunism, defined by Williamson (1975) as "self-interest seeking with guile", is a fragment of but not the whole matter and *Learning Races*, *Outlearning* and the *Withdrawal of Information* are rele-

vant but not all the essential facets. The notion of guile, described by Williamson (1985) as "lying, stealing, cheating, and calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse", separates opportunism from the standard economic assumption of self-interest-seeking behavior (Wathne and Heide 2000). Though knowledge related dysfunctions do not necessarily need an actor's intent to shirk or cheat. They often result from incomplete information, information asymmetries, misjudgment or misunderstanding, that are owed to dynamic situations, turbulent environments and complex decision making processes which are typical conditions for strategic alliance in high technology industries.

Since the conceptual delineation of one partner's intended and unintended accepting advantage has not been stated clearly (Wathne and Heide 2000), we adapt the term *dysfunctions* from system theory (Merton 1968) which covers both, situations where the dysfunction is part of an aggressive and opportunistic partner strategy as well as situations where these misdirecting phenomena appear unintended. Dysfunctions occur either in a combined or in an isolated and pure form. When they appear intertwined, they augment their destructive force and affect the cooperation pertaining to stability, outcome and allocation of benefits and costs.

Asymmetric learning speed: The difference in learning capability and strategic intent for learning between the partners is one of the key process variables in managing an alliance (Lane and Lubatkin 1998; Park and Ungson 2001). Asymmetric learning is often established by the time cooperation is initiated since during the negotiation phase future partner lack information about each others absorptive capacity, learning skills and intents and hence misvalue or misjudge their interorganizational fit. When cooperation endures for a longer time then often differences spread as partners strive for changed individual strategies (Hennart, Roehl and Zietlow 1999; Zeng and Hennart 2002), lose or gain key persons, or the technological capabilities of a partner become obsolete due to technological development (Afuah 2000). Firms that force a race to learn additionally try to aggrandize their learning advantages to ameliorate their relative value appropriation position. However, asymmetric learning and the subsequent asymmetric dependence derogates alliance stability and affects the distribution of alliance costs and benefits (Hamel 1991; Inkpen and Beamish 1997; Khanna, Gulati and Nohria 1998; Park and Ungson 2001). Khanna *et al.* (1998) stress that a faster learning party can appropriate a higher share of the cooperatively created value when it acts strategically. In turn this means that in learning alliances the lagging party has to re-

veal more and more of its proprietary knowledge to hold its attractiveness (Hamel 1991; Park and Ungson 2001). If learning differences exceed beyond a critical level partner tend to renegotiate the allocation of expenditures and benefits (Ariño and de la Torre 1998). This comprises the potential for escalating conflicts and destabilizes the cooperation (Kumar and Nti 1998). Das *et al.* (2002) and Inkpen *et al.* (2004) mention, the disadvantaged partner could react opportunistically when it feels controlled or dominated. Park *et al.* (2001) point out the disadvantaged partner may leave the alliance, not only because he is more vulnerable to actions taken by the dominant partner, but its survival may depend on overall alliance outcome. But even when the alliance stays stable costs of bargaining (Williamson 1991) and conflict solution lower the realizable value of the alliance. Further on, relative to a symmetric learning situation, in particular in a learning race, a focal firm gains fewer benefits and carries higher expenditures when it is the laggard partner.

Loss of knowledge: Acquiring and internalizing knowledge, competencies and skills are key issues in learning alliances (Hamel 1991). Therefore firms open their boundaries and give each other partial access to proprietary, often tacit and otherwise not available knowledge (Inkpen 1998; Inkpen and Dinur 1998). As long as this process is bidirectional, reciprocal, and accepted, mutual value creation is invigorated and both partners enhance their individual knowledge bases (Dutta and Weiss 1997). Yet the unilateral transfer of knowledge frequently exceeds an agreed-upon-level and is then conceived as a loss. Different causes can precipitate this loss. The disclosure may be induced by the negligence of the transferring firm's staff. This is mainly uncritical. But when the acquiring party is alleged to follow a hidden agenda and behave opportunistic severe consequences can occur. As Gulati *et al.* (1998) emphasize, the concerns about free-riding and possible appropriation of key technology can be provoked and exacerbated by the difficulties to "circumscribe, bound, monitor, and codify the knowledge to be included within the alliance". The case of opportunistic knowledge appropriation of actual and potential competitors is widely discussed in alliance literature (e.g. Hamel 1991; Larsson et al. 1998; Khanna, Gulati and Nohria 1998) and feared by practitioners. Grievous conflicts (e.g. Park and Ungson 2001), eroding incentives to cooperate (Ariño 2001) and the dissolution of the alliance are observed (Hamel 1991).

From the view of a focal firm the loss of knowledge has implications pertaining to the creation and appropriation of alliance value. Firstly, opportunity costs emerge, since

the focal firm could have demanded a consideration for the transferred knowledge. Secondly, the loss lowers the firm's attractiveness for the partner, so it has to increase its own efforts to stay in the race. Thirdly, when the loss is suspected to be the outcome of opportunistic partner activities, mistrust appears and the potential as well as the realized value will be cut if the focal firm reduces alliances scope or dissolves the cooperation. Fourthly, the resolution and reconciliation of resulting conflicts needs time and management capacities. Both are bound to costs. Fifthly, when the partner is or wants to become a competitor he presumably uses the knowledge to contest the focal firm's competitive position in their common target markets (Hamel 1991). A loss of market shares and reduced prices in consequence of increased competition will lower the firms' profit.

Informational Closing: Uni- or bidirectional withholding of information and data (John 1984; Deeds and Hill 1999) is a major complicacy in learning alliances and often causes or signals the dawn of cooperation's dissolution. But even when the alliance remains stable the informational closing reduces the joint learning (Larsson et al. 1998) and induces conflicts and frustration (Jordan and Lowe 2004). Informational closing has different origins. Some authors emphasize that some firms use the closure of information as part of their alliance strategy. Williamson (1985) claims that incomplete disclosure of information would refer to opportunism. Hamel (1991) describes Japanese firm's efforts to plan the amount of information flowing across the collaborative membrane to leave European or American partners in a worse strategic position. Khanna *et al.* (1998) highlight another competitive aspect. They point out, that a firm which finishes learning sooner than the partner is free to leave the alliance and to deny partners access to its knowledge. Thereby the faster firm can gain greater benefits and defray lower costs (Alvarez and Barney 2001). Hughes *et al.* (2007) refer partner would withhold information such as significant testing data in order to conceal evidences of their incompetence or poor performance. Hennart (1988) invokes that the ex-ante-appraising of tacit knowledge is problematic; a partner whose expectations are dashed may reevaluate its contributions and then exploit contract incompleteness and in turn withhold own knowledge (Ariño and Doz 2000). Other authors mention causes of informational closing which forbear from intended or opportunistic behavior. Singh *et al.* (1996) mention that organizations shut down sometimes due to economical failure. Hennart *et al.* (1999) report the change of ownership or alliance key persons could shift internal politics (Park and Ungson 2001) as well as firm's cooperative goals and

strategies, while Gerwin *et al.* (2002) cover that in an multinational alliance intercultural misunderstanding led to the withdrawal of alliance members, and the withholding of information and ideas. Anderson *et al.* (2005) allude that the misinterpretation of harmless partners activities can lead to mistrust and, consequently, informational closing in order to protect the firm against the supposed opportunistic behavior of the partner. Thereby a spiral of suspicion could be ushered which annihilates the alliance.

No matter if intended or not, informational closing has implications for the creation and allocation of alliance value. On the alliance level, the shortening of the disposable knowledge, information and data aggravates and constrains the joint learning (Larsson *et al.* 1998), and hence reduces the total realizable value and the shareable benefits. Additional effects occur on the firm's level. When the closure is a brick of an outlearning strategy the effects mentioned above will ensue. Otherwise the focal firm faces accessory costs either because it reaches out for its individual goals alone (Singh and Mitchell 1996), or raises its coordination efforts to avoid alliance severance, resolute potential conflicts and improve mutual understanding (Ariño and Doz 2000).

Hypotheses 2: There is a negative relationship between knowledge-related dysfunctions and the perceived alliance value for the focal firm.

2.5 Protection of idiosyncratic knowledge

2.5.1 Formal and organizational protection

The knowledge-related hazards we have highlighted in the preceding section arise from the specific characteristic of valuable knowledge and the paradox situation in learning alliances (Jordan 2004). Since knowledge creation is costly and can be shared without losing its value-in-use firms perforate their organizational boundaries to combine their knowledge with an alliance partner and gain otherwise unattainable abnormal rents. Simultaneously they fear the uncontrolled diffusion of their idiosyncratic knowledge, competencies and skills through the interorganizational membrane (e.g. Hamel 1991; Baughn and Stevens 1997; Heiman and Jack A. Nickerson 2004). Especially when the partner is an actual or potential competitor who could use the so acquired knowledge to intensify market competition for the focal firm, managers feel the

need to avoid an imbalanced knowledge transfer and protect their intellectual assets against an involuntary access (Hamel 1991; Baughn and Stevens 1997).

This imperative to control and protect is broached in studies from different theoretical perspectives. Authors who argue from a transaction cost background emphasize the deterrence of partner's opportunistic behavior. They predominantly discuss the general efficacy of non-recoverable investments (e.g. Parkhe 1993), contractual safeguards (e.g. Deeds and Hill 1999; Lui and Ngo 2004), equity-swaps (e.g. Mitchell, Dussauge and Garrette 2002), and governance structures (e.g. Oxley 1997) in suppressing and curtailing opportunistic incidents. Other studies draw on social exchange theoretical arguments and stress the supremacy of self-enforcing safeguards like relational norms, trust or commitment (e.g. Kale, Singh and Perlmutter 2000). Some researchers strive to compare and combine these approaches (e.g. Dyer 1997; Achrol and Gundlach 1999). Resource based theorists, on the contrary, don't assign the assumption of opportunism a decisive role. Instead, they point at irreducible knowledge differences between individuals and organizations (e.g. Conner and Prahalad 1996).

However, while opportunistic behavior in an alliance context is widely examined, the protection of valuable knowledge against loss and unbalanced transfer has received limited empirical research despite its theoretical and practical import (Norman 2002; McEvily, Eisenhardt and Prescott 2004) and lacks a systematic approach (Das and Rahman 2002). Beside grounded theory development (Hamel 1991), analysis using interview data (Porter Liebeskind 1997; Baughn and Stevens 1997; Norman 2001) and some case studies (Roehl and Truitt 1987; Yoshino and Rangan 1995; Galvin and Rice 2008) only few quantitative studies provide empirically founded insights which address the interlinkages of knowledge protection and alliance outcome (Norman 2004; Lee *et al.* 2007; Nielsen 2007). Nielsen (2007) found, that while the building of relational equity, financial success and learning was negatively affected by partners' protectiveness, the efficiency of the cooperation was not influenced. In addition Nielsen *et al.* (2009) gave evidence that knowledge protectiveness is negatively related to trust learning and innovation in international strategic alliances. In contrary, Lee *et al.* (2007) state that knowledge protection fosters relational quality and knowledge ambiguity and thereby indirectly alliance performance, and Norman (2004) showed that the focal firm's knowledge loss increased with its knowledge protection efforts. These contradictorily and at least partially counterintuitive findings require further analysis.

Firms use a mixture of different protection mechanisms to secure their knowledge in interorganizational learning arrangements. In an ex-ante literature and field research we have identified *formal protection mechanisms* and *organizational protection mechanisms* as the two categories of mechanisms which alliance management uses predominantly. Formal protection mechanisms rely on legalistic norms and contractual agreements and set the boundaries between partners' different specific intellectual property rights positions. Organizational protection mechanisms are used to configure and adjust the compound of structures, processes, rules and management decisions allowing the transfer of knowledge across organizational boundaries which Hamel (1991) calls the interorganizational membrane. We will focus on these mechanisms since the protection function lies on the core of both of these sets. Other measures like the above mentioned exchange of equity shares or the development of relational quality address primarily different aims and evolve their protective weight only as a side-effect. By doing this, we revert to Norman's (2001) overview and adapt her distinction of protection mechanisms.

Formal protection mechanisms: The formal protection of firms' knowledge in learning alliances bases on the two pillars of ensured intellectual property rights (IPR) which are entitled within national IPR-regimes and contractual agreements between the partners. Hertzfeld *et al.* (2006) note that patents are the most frequently used intellectual property protection mechanisms in research partnerships and protect both background as well as foreground knowledge. With reference to the protective relevance they are followed by trade secrets, copyrights and trademarks. Baughn *et al.* (1997) state that the registration of IPRs sends a clear signal to partners regarding proprietary intent, but, as Jordan *et al.* (2004) mention, patents would be a necessary but not sufficient means of protecting core knowledge. Moreover, only a fraction of a firm's valuable knowledge is protectable through IPRs (Porter Liebeskind 1996). We suppose that this is one reason why partner employ legal contracts in which they can codify their specific protection needs and agreements. Norman (2001) refers that alliance partner specify proprietary information, data and knowledge to sketch the ex-post ownership structure, and detail which information and capabilities should and which should not be shared within their cooperative arrangement. This delineation is not only a signal to the partner that opportunistic knowledge acquisition would result in a lawsuit (Hannah 2005). It serves also as an intrafirm-guideline for members who are concerned with the transfer and protection of knowledge. Teng (2007) depicts non-disclosure agreements

as commonly used contracts to obligate partners to not disclose shared intellectual property to third parties. The required confidentiality is an essential brick in securing legal protection for trade secrets. Zander *et al.* (1995) have shown that the turnover of key employees by competitors significantly reduces their imitation times. Especially competitive partners establish non-enticement clauses to counteract the temptation of hiring away employees who have incorporated tacit knowledge (Porter Liebeskind 1996; Porter Liebeskind 1997), and auxiliary penalty or compensation clauses are stipulated for the case that problematic intellectual property practices occur and are detected (Teng 2007; Norman 2001).

Legalistic mechanisms aim at the ability to behave opportunistic behavior (Madhok 2000; Das and Rahman 2002) and the obviation of misunderstandings that occur in volatile and dynamic settings (Carson, Madhok and Wu 2006). When the potentially cooperating firms aren't well acquainted they may stretch a quasi-safety-net which lets competitive parties dare to open to each other and develop a willingness to cooperate. Further on, they serve as guidelines during the operation stage which allow to distinct between acceptable and unacceptable behavior.

Organizational protection mechanisms: Organizational protection mechanisms are employed when legalistic protection mechanisms don't suffice. Typically a considerable body of knowledge that is valuable to a firm cannot be legally protected by patents, trade secrets, copyrights or other IPRs (Porter Liebeskind 1997). Therefore partners in interorganizational learning arrangements, where the exchange of not codifiable, tacit, complex and specific knowledge is essential or meaningful, apply a wide variety of active measures to limit and adjust their transparency (Hamel 1991). In such scenarios a rival firm can only acquire tacit knowledge through learning-by-doing and therefore quite extensive interactions have to take place between a rival partner's employees and those of the target firm (Porter Liebeskind 1997). Hamel (1991) describes that firms which tend to override prohibitive safeguards disperse their offensive information requests on different and independent target individuals, to gain a holistic understanding and to stay undetected. To prevent these creeping leakage of valuable knowledge Porter Liebeskind (1997) suggests to establish rules governing the social interaction between different cooperating actors and to prohibit certain contacts. And Norman (2001) argues, that the fulfillment of protecting management tasks as well as processes, structures and rules that allow for the exclusion of certain information and data, provide an effective shield to secure valuable knowledge that shouldn't be dis-

closed. Normally, the effective knowledge exchange is determined some levels below where the deal was signed by day-to-day interactions of engineers, marketers, and product developers (Hamel, Doz and Prahalad 1989). In such cases top management has to ensure that knowledge protection concerns are considered at these hot spots. Hamel (1991) describes an alliance where as a countermeasure all partner requests for information and access were processed through a small collaboration department, and (Norman 2001) reports the limitation of information flows across firm boundaries on few actors like gatekeeper or communication stars. Baughn *et al.* (1997) suggests to brief interface personnel in what skills can and cannot be shared and exemplify to them the strategic costs and benefits of collaboration. Maurer *et al.* (2000) notice, that physical protection is an antecedent to attain legally protection of trade secrets, since courts would require reasonable and active steps to protect them. Therefore some authors suggest to wall-off relevant activities and deny partners access to distinct facilities and non-alliance personal (Porter Liebeskind 1997; Norman 2001).

The implementation of these countermeasures requires top-management decisions and support (Norman 2001). Senior managers have to identify the knowledge, competencies and skills which must be protected. Then they have to raise individuals' awareness of protective needs on the operational stage, where the exchange, transfer and leakage of relevant knowledge occur, and determine the modalities of protection procedures. Further on, the alliance management has to provide the needed resources and to place safeguarding responsibilities on dedicated members of the staff (Norman 2001). Eventually, the accomplishment of the assigned measures, the compliance of the specified rules and the adequate behavior of firm and partner employees have to be monitored (Das and Rahman 2001; Das and Rahman 2002).

2.5.2 Effects of protection measures on the alliance value

Within the value framework protection mechanisms have to be appraised by their effects on value creation and appropriation dynamics. Protection mechanisms function as collaborative antecedents within a strategic alliance (Lee et al. 2007) since they allow companies to open their doors ajar for their partners and to control the spill over of their specific knowledge while they must not fear the complete loss of their intellectual assets. They enable interorganizational value creation but don't work as value creation mechanisms themselves. While positive direct effects on the alliance value can hardly

be formulated, value shrinkage (Das and Rahman 2002) which is induced by protective efforts is documented. Some authors argue that protection measures would lower the ability to learn since they increase the ambiguity (Coff, Coff and Eastvold 2006; van Wijk, Jansen and Lyles 2008) and thereby the transferability (Simonin 2004; Lee et al. 2007) of knowledge. Moreover, the structural isolation and contractual exclusion of relevant knowledge reduce the disposable knowledge and constrain the realizable value (Porter Liebeskind 1997). Norman (2004) points out that partners often respond to each other's limiting of information sharing by further reducing their own sharing, and Simonin (1999b) states extreme protectiveness likely leads to irreparable conflicts between partners and the early termination of the alliance. Other authors mention that operational protection mechanisms reduce partners' flexibility (Salbu 1997), decrease the quality of intra- and interfirm interactions (Madhok 2000), hinder the trust building process (Das and Rahman 2002), may be burdensome, since they have to be deployed on an ongoing and periodic basis (Das and Rahman 2002), and can reduce the mental and emotional willingness and capability to cooperate ((Porter Liebeskind, 1997)). These benefit-related-effects reflect only one side of the coin. In addition the appliance of protection measures induces direct and indirect costs that can absorb much of the expected benefit from the alliance (Parkhe 1993). The setting and maintaining of formal and organizational protection increases transaction costs because managers expend greater time and effort to bargain (Ariño and Reuer 2004; Reuer and Ariño 2007), monitor (Porter Liebeskind 1997) and enforce the cooperative arrangement (White and Siu-Yun Lui 2005). Additional coordination costs arise when the design of information access and flows focuses more on protection issues than on task fulfillment. Especially when people can not meet face-to-face, must communicate via gate-keeping instances, or have to undergo extensive approval routines, coordination activities become more difficult, and the likelihood of informational slack, delays and inefficient outcomes increases (Porter Liebeskind 1997). Moreover, Norman (2004) found that a firm's knowledge protection efforts based on restrictive rules for information access and communication behavior increases the focal firm's knowledge loss. Thus we hypothesize the following:

Hypothesis 3: There is a negative relationship between formal protection and the perceived alliance value.

Hypothesis 4: There is a negative relationship between organizational protection and the perceived alliance value.

2.6 Interactions of alliance coordination, dysfunctions and protection mechanisms

2.6.1 Moderating effect of formal protection on alliance coordination

The functional and developmental differences between the formal and organizational protection mechanisms sketched above result into divergent joint effects with occurring dysfunctional phenomena and coordination activities. The ex-ante identification and solving of problems and the forming of relational behavior during the negotiation of formal protection mechanisms affect the coordination activities bifurcately. Firstly, if partners have mitigated or solved potential breaking points beforehand and feel safe to maintain their knowledge, they can concentrate on the essence of their alliance (Das and Rahman 2002). Coordination activities may then be focused and adjusted on the fulfillment of tasks and interorganizational learning which leverages their coordinative force. Ex-ante-problem-solving also reduces conflicts in terms of frequency and intensity and diminishes the friction losses which accompany disputes and dissensions. When protection mechanisms avoid the occurrence of conflicts partners generally can accelerate their processes, increase the deterioration of coordination instruments, reduce the staffs frustration and raise cooperative behavior (Das and Rahman 2002). The bargaining costs for the formal protection agreements can be overcompensated by the emerging positive value creating effects and the saving of the otherwise needed resources to manage conflicts and limit their destructing momentum (Ariño and Reuer 2004). Secondly, as partners agree on formal protection mechanisms they reduce information asymmetry, develop mutual understanding, meliorate their appreciation and enhance relational quality (Poppo and Zenger 2002; Ariño and Reuer 2004; Larsson et al. 1998). Potentially mistakable action than do not cause conflict spirals since allies trust each other, presume reciprocal fairness and have heightened their perception threshold for hazardous partner behavior. In such a basically cooperative atmosphere a

firms coordination activities can fully enfold their value creating force without spuriously being misinterpreted as pure self interest seeking. Thus:

Hypotheses 5: The positive relationship between coordination activities and the perceived alliance value will be stronger when formal protection is more intensive.

2.6.2 Moderating effect of organizational protection on alliance coordination

Coordination and organizational protection activities have to be simultaneously accomplished during alliance lifetime to run the cooperative process and effectively protect essential intellectual property against loss. The in-situ-coordination-effects of organizational protection mechanisms, which are intended to shield certain knowledge, sometimes collide with those of the coordination instruments that aim on the creation of joint value. We want to highlight three mechanisms that let erode coordination instruments effects: Firstly, a firm that communicates with its partner only via few gate-keeping persons may exactly allot the transfer of disclosable knowledge, but at the same time will have to deal with the communicational slack, namely information losses and distortions as well as time-lags, that this structure causes (Porter Liebeskind 1997). The partner may misconstrue these symptoms either as signals of the firm's incapability, unwillingness to collaborate or opportunistic propensity and reduce its alacrity to cooperate or counteract with increased self interest seeking. A focal firm's coordination power then will at least dissipate partially. Secondly, the design of communication structures and flows is often more oriented at protection than at coordination objectives. However, since they are less adapted to for coordination issues, the protective in-situ-coordination dilutes task coordination activities to some extent (Carson, Madhok and Wu 2006). Thirdly, a partner perceives to be mistrusted and fears to be overreached when he detects that relevant and necessary knowledge and staff is unspokenly walled-off through rules, routines or physical isolation (Das and Rahman 2002). As a countermeasure he will reduce his relational openness and close the informational membrane on his part (Norman 2004; Larsson et al., 1998). Since the partner's acceptance to cooperate is decreased and the available knowledge base for learning and joint value creation is contracted (Porter Liebeskind 1997) the focal firm's coordination efforts will be less effective.

Hypotheses 6: The positive relationship between coordination activities and the perceived alliance value will be weaker when organizational protection is more intensive.

2.6.3 Moderating effect of formal protection on knowledge-related dysfunctions

Partners in learning alliances will sooner or later face some symptoms of knowledge-related dysfunctions. In collaborative arrangements that are embedded in dynamic and technologically challenging environments preventing mechanisms can't foreclose all eventualities. The costs of completely comprehensive knowledge protection – if not impossible by definition – would probably exceed the expected returns of the alliance (Das and Rahman 2002). Further on, the flexibility and openness partners need to create value in such uncertain and ambiguous situations would be undermined. But the agreed-on formal protection agreements offer different bearing points to curtail dysfunctions negative influence on the creation and appropriation of value. Carson *et al.* (2006) explicate that parties which ex-ante have gone through an extensive negotiation process are better disposed to interpret their environment and partners behavior ex-post. Formal protection agreements facilitate discerning between acceptable and not-acceptable behavior and interpreting it as intended or not-intended. A correct appraisal of the specific situation contingent to the severeness, intendedness and continuance of the dysfunctional incidents enables the parties to react appropriately on the emerging conflicting issues. Subsequently the formally fixed agreements provide a frame for discussions and solutions of potential conflicts (Gulati, Khanna and Nohria 1994). Their construction can resolve misunderstandings and ease the occurring tensions between the partners. The de-escalation of the conflicted situation stabilizes or even augments the collaborative relationship and allows continuing mutual value creation. In cases of weighty knowledge loss or opportunistic behavior formal protection agreements may help partners to find an amicable and extrajudicial consent. They can renegotiate the distribution of the mutually created value in the light of the dysfunctional incidents and compensate for the transferred intellectual property and thereby avoid the costs of an otherwise unfriendly dissociation. When the conflicting partners fail to reconcile in consequence of blatant opportunism and dissolve the alliance, the stipulated protection covenants limit the potential loss of value. They serve as the fundament for compensatory payments in an out-of-court settlement or to succeed when

legal proceedings have to be started (Poppo and Zenger 2002; Das and Rahman 2002; Carson, Madhok and Wu 2006).

Hypotheses 7: The negative relationship between knowledge-related dysfunctions and the perceived alliance value will be weaker when formal protection is more intensive.

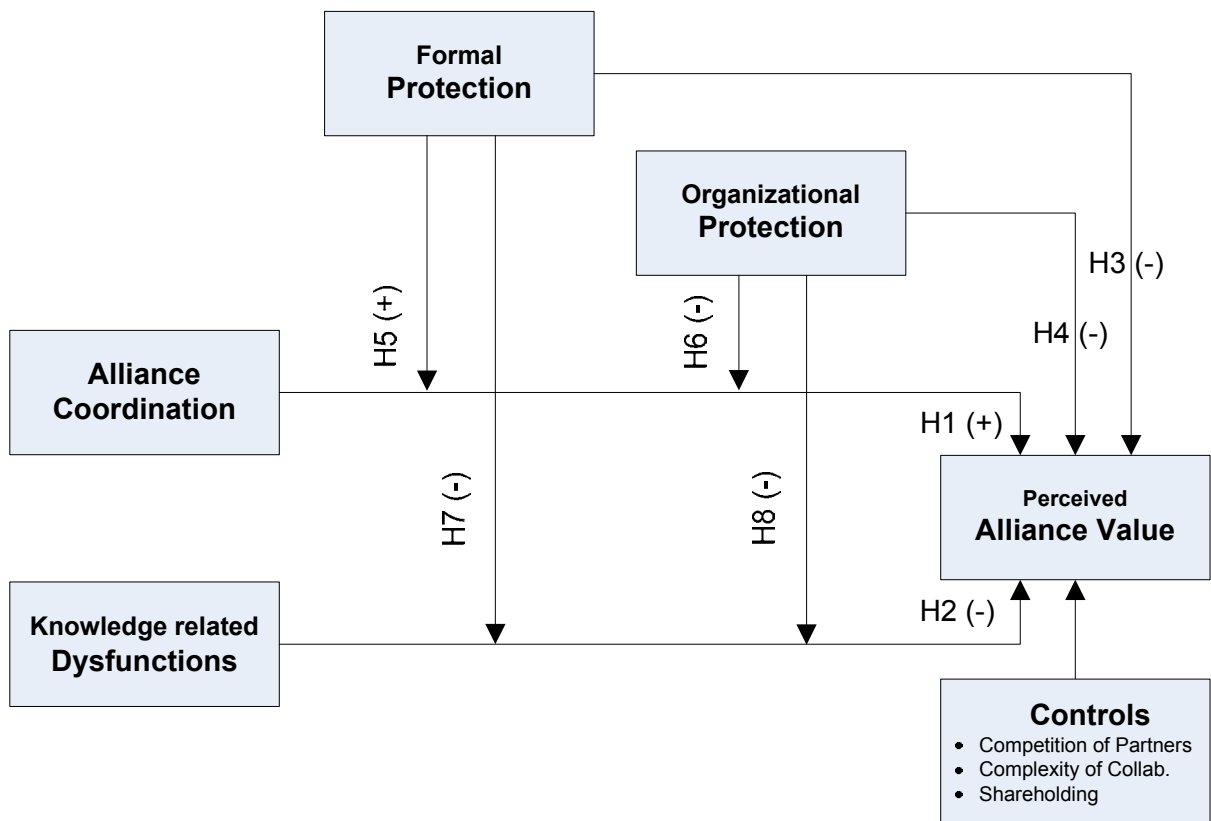
2.6.4 Moderating effect of organizational protection on knowledge-related dysfunctions

Organizational protection mechanisms are effective when formal mechanisms fail to secure firms essential knowledge. The physical walling-off of knowledge-bearing resources as well as the control of information flows by distinct rules or by gatekeeping persons effectively limits the partner's knowledge acquisition even when he acts unfair. Ideally the acquired knowledge is useless since important pieces of the knowledge puzzle remain covered and secret. The partner then is unable to enhance the competitive rivalry to the focal firm with its own knowledge. He has to stay within the alliance when he wants to accomplish his cooperative aims while the focal firm can hold its technological or knowledge-related edge and in turn can go for its own goals within the alliance (Hamel 1991). Construing this arguments within a value perspective the above described mechanisms constrain the losses and costs when dysfunctional incidents occur, allow to create further value, and amend the focal firms position to appropriate its share of the value.

Monitoring of the partners behavior and the collaborative development of the alliance is one of the key operational instruments to manage dysfunctional tendencies (Das and Rahman 2002). This task that is often performed by gatekeepers helps to detect and appraise dysfunctional symptoms (Das and Rahman 2002). The cognition of the disturbing influences permits the focal firm to react. Once the firm has learned of the misleading evolution it has the freedom of choice to choose and use adequate countermeasures to secure and gain the highest appropriable value. Depending on the specific situation the firm can elucidate misunderstandings, reduce the scope of the alliance, dissolve the cooperation, demand compensation, or do nothing (Dutta, Bergen and John 1994), when this approach improves the firms position or raises the attainable value.

Hypotheses 8: The negative relationship between knowledge-related dysfunctions and the perceived alliance value will be weaker when organizational protection is more intensive.

Figure 1: Full Model



3 Research Methods

3.1 Research design and data collection

We chose strategic alliances of young technology based enterprises with their actual or potential competitors in high- and key-technology industries since this empirical setting satisfies our central requirements. Firstly, knowledge is a keystone in these alliances because interorganizational learning and the symbiotic exchange and combination of firm specific knowledge bases are the pivotal reasons for these collaborative

arrangements. Secondly, idiosyncratic knowledge is mostly YTBEs dominant asset. A dysfunctional exchange or unintended transfer of this asset may be aggravating but beside missed payments it doesn't really hurt in a non-rivalrous relationship. By contrast, in an alliance between competitors these incidents may substantially erode firm's competitive edge, diminish competitive advantages and threaten its economic development and viability. Thirdly, the organizational setting is commonly less complex in strategic alliances of small and medium enterprises than of big enterprises. Therefore, dysfunctional incidents and protection measurements become clearly apparent and are not covered by other obfuscating influences.

We tested our hypotheses in a double-key-informant approach with survey data gained in face-to-face interviews. Guided by theoretical considerations and field interviews we developed a survey questionnaire. In a first phase we held ten extensive semi-structured interviews, each enduring between 60 and 165 minutes, with CEOs and alliance or R&D managers that were well experienced in managing such alliances. These interviews confirmed that in such alliances the protection of valuable competencies and knowledge is a mayor management issue. In our field studies we also found strong evidence for the challenging managerial antagonism to hinder the occurrence of knowledge related dysfunctions and not to disturb value creation at the same time. On this fundament we developed a questionnaire which was then cross-checked by other academics that have a strong expertise in the field of empirical business relationship research. Afterwards we pretested the questionnaire for instrument validity with seven CEOs in YTBEs of different high technology industries to ensure its applicability in varying environments. Their feedback helped us to identify any revealed ambiguities in terms, concepts or issues and led to some minor changes of wording.

We compiled a list of approximately 2750 enterprises that develop and apply nano- and microsystem technology, biotechnology, information and communication technologies, renewable energy-technologies, chemistry and process engineering and advanced automation engineering in different industrial sectors. In an internet based preliminary screening we winnowed companies that didn't match our criteria in terms of their underlying technology focus, age and organizational independency. Whenever it was procurable we identified CEOs, business development or R&D-directors as potential respondents namely before we contacted them by phone. During an initial call we explicated the research project and identified the most knowledgeable informant to minimize the key informant bias (Kumar and Stern 1993). We ensured that the partner

was in charge for at least some of the company's strategic alliances. We also checked for the technological focus, age, and the organizational independency to secure the companies' fit to our criteria. When the interlocutors consented to interviews at their companies' place of business we provided them with additional information and referred to the German Research Foundations project support to emphasize our trustworthiness.

We collected data from two key informants in each queried company as dependable sources of reliable and valid information (Campbell 1955; Kumar and Stern 1993; John and Reve 1982). This approach minimizes common method bias concerns (Podsakoff *et al.* 2003) that occur when dependent and independent variables are measured by the same source (Bagozzi, Yi and Phillips 1991). To meet the Campbell-Fiske (Bagozzi, Yi and Phillips 1991) criterion we selected carefully one respondent of the top management level who was in charge for the underlying strategic alliance and one respondent who was accountable and involved in the operational management (Phillips 1981) and interviewed them separately (Podsakoff *et al.* 2003). The top-level managers were questioned about the strategic embeddedness and the configurative arrangement of the alliance, alliance goals and alliance outcomes and also provided information about the dyadic interorganizational rivalry, aspects of relational quality, organizational and financial linkages and industry specifics. To operations-level managers, which are normally extreme apparent of alliance activities on a day-to-day basis (Baughn and Stevens 1997), we addressed questions about the concrete interorganizational coordination, occurring knowledge related dysfunctions and the corresponding formal and organizational protecting countermeasures. While the appropriateness and reliability of the first respondents' answers were secured by their roles and responsibilities we checked for the second respondents' functions within the companies and the focal strategic alliances. We additionally cross-checked if the affiliations with their companies were consistent with alliance-life-times. Additionally we followed up by phone when the described facts or circumstances seemed to be non-distinctive, values were missing or data promised remarkable evidences. 207 of the 883 contacted companies participated in the survey. This is equal to a response rate of 23.4 % for the basic sample. 57.0 % (118) of these YTBEs agreed on interviews with two respondents. We dropped another seven cases since they did not match our requirements concerning the quality of data or key informants. The remaining qualified set of 111 YTBEs corresponds to a total response quote of 12.6 % (see Table 1).

Table 1: Response

<i>RESPONSE</i>			
Contacted Firms	883	1st key informant	207 (23.4%)
Selected Firms	N = 111 (12.6 %)	2nd key informant	118 (57.0%)

3.2 Measurement

3.2.1 Dependent variable

The perceived alliance value measures the overall performance of the strategic alliances. It addresses the advantages and disadvantages and captures the trade off between all the benefits and efforts of the specific strategic alliance for the focal firm (Ulaga and Eggert 2006). We wanted to integrate the shadow side of cooperative performance effects into the performance measure since our independent variables can induce positive as well as negative impulses. We adapted and extended the measure of Blankenburg Holm *et al.* (1999) and used their value-based holistic perspective to overcome the limitations of more focused approaches like the achievement of financial or technological goals. The perceived value implicitly encompasses these measurement approaches and moreover ascertains the firm's success in the underlying alliance (Madhok and Tallman 1998) as subjectively perceived by the management. Relying on manager evaluation of alliance success is appropriate when, like in our study, respondents represent top management (Olk 2002). Like the other scales it was measured with a seven-point Likert scale (1 = very low; 7 = very high). The measure is reliable at a Cronbach's alpha of 0.86. An overview of our items is located in the Appendix.

3.2.2 Independent variables

Our conceptual approach of the used independent variables reflects the notion that "in many cases, indicators could be viewed as causing rather than being caused by the latent variable measured by the indicators" (MacCallum and Browne 1993). Following these measurement perspective (e.g. Diamantopoulos and Winklhofer 2001; Jarvis *et al.* 2003) we attended the guideline provided by Diamantopoulos *et al.* (2001) and constructed indexes based on formative indicators. All the items were measured with a seven-point Likert scale (1 = strongly disagree; 7 = strongly agree) unless it is specifi-

cally indicated otherwise. We adopted well established indicators whenever they were available. Additional indicators were developed following Rossiter's C-OAR-SE-procedure (Rossiter 2002). The measurement items are reported in the appendix.

3.2.3 Alliance coordination

Diamantopoulos *et al.* (2001) line out that specifying the construct domain by providing a conceptual definition of the construct has to be the first step of index construction. According to existing literature the management of strategic alliances addresses the coordination of joint task fulfillment (e.g. Gulati and Singh 1998; White and Siu-Yun Lui 2005) as well as the coordination of the underlying relationship (e.g. Dyer 1997; Ring and van de Ven 1994). The scope of the coordination construct captures the underlying nine activities that pertain to these conceptual aims: Aligning alliance activities (Hughes and Weiss 2007; Ancona and Caldwell 1992) on an (1) intraorganizational and (2) interorganizational level; (3) monitoring if sub-goals are achieved (Ancona and Caldwell 1992) and the compliance of bidirectional agreements (Ancona and Caldwell 1992); (5) compromising (e.g. Mohr and Spekman 1994; Lin and Germain 1998; Kale, Singh and Perlmutter 2000; Ancona and Caldwell 1992); (6) informational connectedness to top-level-management (Ancona and Caldwell 1992); (7) appropriate internal and external informational portrayal (Ancona and Caldwell 1992); (8) development of personal relationships (Ring and van de Ven 1994) and (9) establishing face-to-face contact across (Dyer 1997) the interorganizational boundaries.

3.2.4 Knowledge-related dysfunctions

Our construct covering the dysfunctional syndromes *asymmetric learning pace* (Hamel 1991; Khanna, Gulati and Nohria 1998), *unwanted transfer of knowledge, skills and competencies* (Bresser 1988; Hamel 1991), and *premature closing of the cooperation* (Khanna, Gulati and Nohria 1998) is spanned by eight indicators: (1) withholding of knowledge (Hamel 1991; Khanna, Gulati and Nohria 1998); (2) premature termination of the alliance (Khanna, Gulati and Nohria 1998); (3) renegotiation of terms (Khanna, Gulati and Nohria 1998); loss of (4) technological, (5) marketing and (6) production knowledge (Hamel 1991; Norman 2004); (7) progressive informational retention (Hamel 1991); and (8) unidirectional closing of the interorganizational membrane (Khanna, Gulati and Nohria 1998).

3.2.5 Knowledge protection

We outlined the conceptual distinction between formal and organizational knowledge protection in a previous section. The dissimilitude of these both protection measures becomes more apparent in the light of the respective indicators that shape the constructs. The constructs seize on suggestions made by Norman (2001) and Porter Liebeskind (1996; 1997).

Formal Knowledge Protection: Formal knowledge protection is constituted by six facets that describe alliance management activities concerning (1) the contractual claiming of intellectual property, (2) the exclusion of unshareable information and data, and the specification of (3) non-disclosure agreements, (4) contractual penalties, (5) anti-enticement clauses, and (6) acquired respectively applied intellectual property rights.

Organizational Knowledge Protection: Organizational knowledge protection is covered by alliance management activities that ensure (1) the provision of resources needed to protect the focal firm's knowledge, and (2) the accountability of appointed persons for protection measures, or control (3) the interorganizational information flow, as well as the access to (4) information and data, (5) rooms and facilities, and (6) the relevant staff.

3.2.6 Collinearity and validity

Indicator collinearity is an issue under formative measurement, since the stability of the indicator coefficients is affected by the sample size and strength of the indicator intercorrelations (Diamantopoulos and Winklhofer 2001). Excessive collinearity would complicate the separation of the distinct influences of the individual indicators. First, this would aggravate the assessment of indicators' validity. Second, almost perfect linear combinations of indicators are likely to contain redundant information and therefore their exclusion of the index could be indicated (Bollen and Lennox 1991; Diamantopoulos and Winklhofer 2001). The variance inflation factors (VIF) appraises the possible presence of collinearity of each indicator. The VIFs of all used indicators are less than 4.8 (see Appendix). Within the single constructs the VIFs did not exceed above 3.3. This indicates for negligible multicollinearity concerns since most researchers consider VIFs up to 10 as acceptable (Chatterjee and Hadi 2006; Chatterjee and Price 1977).

Table 2: Criterion validity of formative constructs

	Standardized parameter estimate			
	Coordination	Dysfunction	Formal Protection	Org. Protection
	Coordination	Dysfunction	Formal Protection	Org. Protection
	→	→	→	→
	Satisfaction	Trust	Satisfaction	Communication
Path	0.49	- 0.64	0.36	- 0.34
t-value [one-tailed(two-tailed)]	2.06** (*)	- 2.88*** (**)	2.20** (*)	- 2.08 * (*)
<i>Measures of fit</i>				
χ^2 (df, p) [p > 0.05]	34.65 (29, 0.22)	23.94 (16, 0.09)	46.20 (29, 0.02)	22.70 (12, 0.03)
CFI [> 0.9]	0.99	0.99	0.97	0.96
GFI [> 0.9]	0.95	0.96	0.93	0.96
AGFI [> 0.8]	0.86	0.84	0.80	0.84
RMSEA [< 0.08]	0.04	0.07	0.07	0.09

^t p < 0.10; * p < 0.05; ** p < 0.025, *** p < 0.001

The formative constructs should correlate with other theoretically associated constructs to provide evidence of external validity (Bagozzi 1994). Consistent with the alliance literature we relate coordination to satisfaction (Mohr and Spekman 1994), dysfunctions to trust (Parkhe 1998; Delerue-Vidot 2006), formal protection again to satisfaction (Ring 2002), and organizational protection to communication (Porter Liebeskind 1996). The resulting statistics confirm the external validity of the tested constructs. The coefficients are significant and indicate the correct direction (see Table 2: coordination $\gamma = 0.49$, dysfunction $\gamma = - 0.64$, formal protection $\gamma = 0.36$, organizational protection $\gamma = - 0.34$). The fit indices CFI and GFI are above 0.9, AGFI above 0.8 for all models. RMSEA is below 0.08 for three of the four models and 0.09 for the model that references to organizational protection, but RMSEA can be misleading when the degrees of freedom are small and sample size is not large (Chen *et al.* 2008). Overall, the external validity of our constructs is supported by the statistics.

3.2.7 Control variables

We controlled for several variables that were identified as relevant by prior research.

Table 3: Bivariate Correlations

Variable	Mean	SD	1	2	3	4	5	6	7
1 Perceived Alliance Value	5.09	1.26	-						
2 Alliance Coordination	41.60	9.29	0.36 ***	-					
3 Knowledge-rel. Dysfunctions	15.25	8.63	-0.33 ***	-0.36 ***	-				
4 Formal Protection	32.99	10.35	0.02	0.36 ***	-0.03	-			
5 Org. Protection	23.51	7.68	-0.01	0.20 *	0.07	0.42 ***	-		
6 Competition	10.99	5.49	-0.02	-0.04	0.03	0.04	0.01	-	
7 Complexity of Collaboration	1.92	1.00	0.16 †	0.02	0.06	-0.11	-0.05	-0.06	-
8 Shareholding	0.08	0.27	0.20 *	0.18 †	0.01	0.08	-0.04	0.05	0.06

n = 111; *** p ≤ 0.001; ** p ≤ 0.01; * p ≤ 0.05; † p ≤ 0.1 (two-tailed).

Competition: Interorganizational competition may raise the tension between the partners, accelerate conflicts escalation and influence the severeness of knowledge transfer (Hamel 1991; Park and Russo 1996; Dussauge, Garrette and Mitchell 2000; Park and Ungson 2001). Thereby alliance benefits may erode. Since our sample consists of strategic alliances between competing firms we controlled for interorganizational competition with a three-item-construct.

Complexity of the Collaboration: We also controlled for the complexity of the alliance by integrating a variable that captured the number of the firm's functional divisions involved in the collaboration. Complexity enhances management efforts (i.e. coordination costs) (Park and Ungson 2001) and facilitates an alliance-based targeted skimming of relevant partner knowledge (Hamel 1991).

Shareholding: Scholars have shown that equity agreements between the partners affect the alliance outcome. The functioning of equity and nonequity alliances is influenced by different underlying governance properties (e.g. Gulati and Singh 1998; Oxley 1997; Pisano 1989; Zollo, Reuer and Singh 2002). Equity arrangements are particularly effective at aligning partner incentives. Hence they foster greater interfirm knowledge transfers than contractual ar-

rangements (Kogut 1988; Mowery, Oxley and Silverman 1996). A nominal variable indicated whether or not the alliance encompasses an equity agreement.

4 Analysis and results

The Pearson correlation matrix and some descriptive statistics for all variables are displayed in Table 3. The correlation coefficients in column 1 suggest that coordination is positively correlated while knowledge-related dysfunctions are negatively correlated with the perceived alliance value. Compared to this the both protection variables seem to be not correlated with the performance measure.

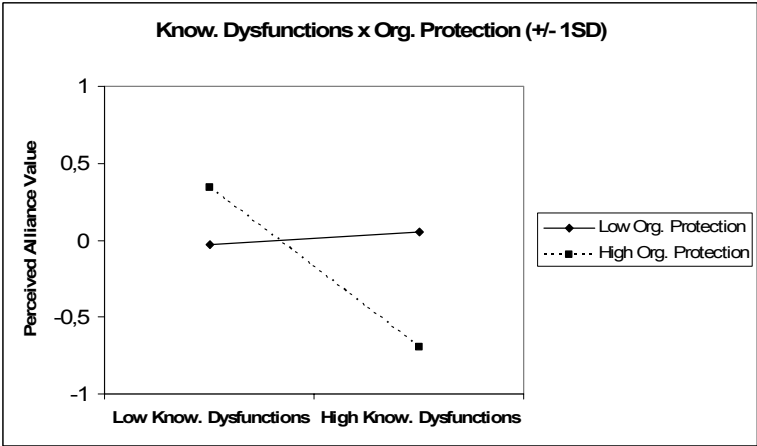
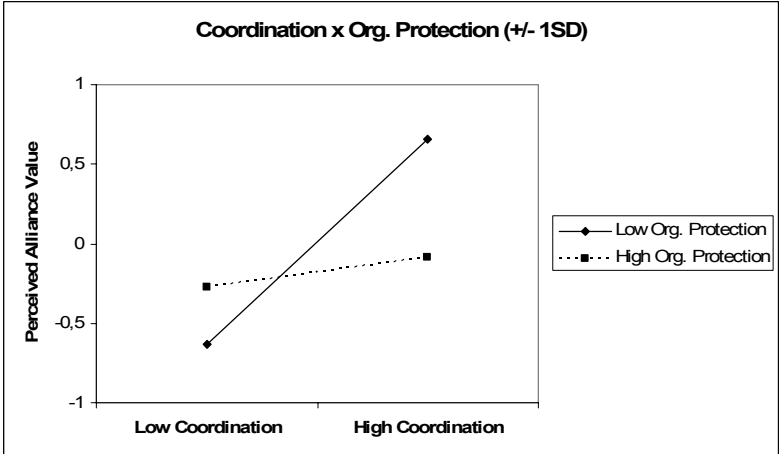
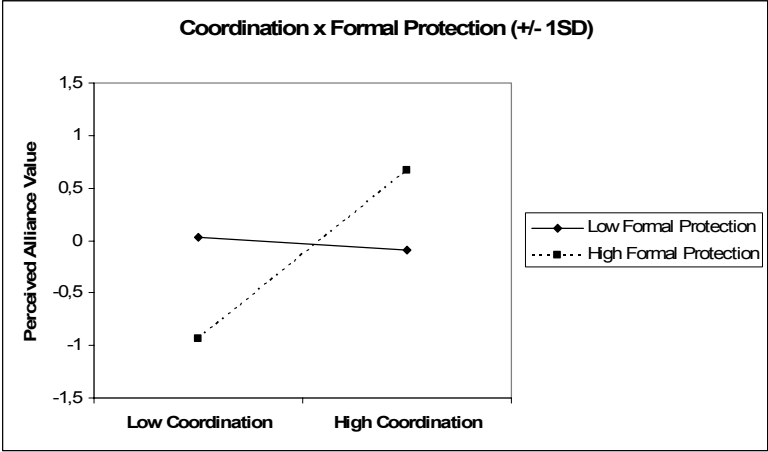
Following Aiken *et al.* (1991) we conducted a hierarchical and moderated regression analysis to test the main and moderating effects of the dysfunctions and the firms coordinating and protection activities on alliance value. We verified the variance inflation factor (VIF) scores in all models to ensure the reliability of the analysis. VIF-scores from 1.05 to 1.94 in the full model (see Table 4) indicate the absence of multicollinearity between the independent and control variables. The models testing hypothesis 1 to 4 show the positive and significant effect of firm's alliance coordination activities ($\beta = 0.369$, $p < 0.001$ in the full model) and the negative and significant influence of knowledge-related dysfunctions ($\beta = -0.240$, $p < 0.01$ in the full model) on the perceived alliance value. As expected coordination efforts foster while dysfunctional phenomena dilute or preclude alliance success. These findings are stable and replicable over all tested models and give strong support to hypothesis 1 and 2. By contrary, the results of protection activities direct influences on the performance measure remain insignificant. There is no evidence for the assumed negative effects. As long as the direct influences are considered firms seemingly anticipate the potential detrimental impacts and find an ostensibly non-disturbing balance of protective and cooperative needs. These findings are likewise stable over all tested models and reject hypothesis 3 and 4.

The moderating effects of the protection activities are also presented in Table 4. We applied Aiken and West's (1991) procedure and centered the moderating variables around their mean to remove the inherent multicollinearity between interaction terms and the predictor variables they include. The interaction of the formal protection with coordination has a strong positive effect on the perceived alliance value ($\beta = 0.433$,

Table 4: Regression Results

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7	Step 8	Step 9	VIF
	St. Beta	St. Beta	St. Beta	St. Beta	St. Beta	St. Beta	St. Beta	St. Beta	St. Beta	
(Intercept)	0.00	0.00	0.00	0.00	0.00	-0.10	-0.10	-0.10	-0.08	
<i>Main Effects</i>										
Alliance Coordination		0.33 ***	0.23 *	0.24 *	0.26 *	0.34 ***	0.38 ***	0.37 ***	0.37 ***	1.56
Knowledge-rel. Dysfunctions			-0.26 **	-0.26 **	-0.25 **	-0.22 *	-0.22 *	-0.23 *	-0.24 **	1.28
Formal Protection				-0.02	0.01	-0.03	-0.02	-0.03	-0.10	1.52
Organizational Protection					-0.08	-0.07	-0.06	-0.07	-0.05	1.45
<i>Interactions</i>										
Alliance Coordination x Formal Protection						0.27 **	0.42 ***	0.40 ***	0.43 ***	1.94
Alliance Coordination x Organizational Protection							-0.23 *	-0.23 *	-0.28 **	1.79
Knowledge-rel. Dysfunctions x Formal Protection								-0.06	0.03	1.51
Knowledge-rel. Dysfunctions x Organizational Protection									-0.22 †	1.66
<i>Controls</i>										
Competition	-0.02	-0.01	0.00	0.00	0.00	0.04	0.03	0.03	0.02	1.05
Complexity of Collaboration	0.15	0.15 †	0.17 †	0.17 †	0.16 †	0.16 †	0.16 †	0.15 †	0.16 †	1.05
Shareholding	0.19 *	0.13	0.15	0.14	0.15	0.15 †	0.16 †	0.17 *	0.15 †	1.08
Adjusted R Square	0.04	0.14	0.19	0.18	0.18	0.24	0.27	0.27	0.28	
R Square	0.06	0.17	0.23	0.23	0.23	0.30	0.33	0.34	0.36	
R Square Change	0.06	0.11	0.06	0.00	0.01	0.07	0.04	0.00	0.02	
F	2.37 ***	5.32 ***	6.12 ***	5.06 ***	4.41 ***	5.40 ***	5.62 ***	5.05 ***	4.96 ***	
dF	2.37 †	13.32 ***	7.95 **	0.06	0.62	9.72 **	5.45 *	0.30	3.01 †	
Dependent Variable:	N = 111	level of significance for two-tailed test								
Perceived Alliance Value		t: p < .10, *: p < .05, **: p < .01, *** p < .001								

Figure 2: Plotting the Interactions



$p < 0.001$, full model) while the interaction of organizational protection activities on coordination induces a negative effect ($\beta = -0.277$, $p < 0.01$, full model). The interaction between dysfunctions and formal protection shows no significant influence on the alliance outcome. This implies that hypothesis 7 is not supported. Compared to this the slightly significant interaction between dysfunctions and organizational protection impairs the alliance value ($\beta = -0.223$, $p < 0.1$, full model). This suggests that hypothesis 8 is not supported.

We find evidence for the opposite: organizational protection activities can strengthen the negative association between dysfunctions and alliance success. These findings suggest that protection activities do not independently affect alliance success but do moderate the link between coordination activities and dysfunctions with the alliance performance. Additionally these results give a first evidence for the assumed differing effectivenesses of the both protection variables.

We further validated the depicted moderating effects with a plot analysis. Therefore we plotted the slopes of the regression lines that show the relation of the moderated variable to the dependent variable (perceived alliance value) when the moderator changes from low (mean - 1 SD) to high (mean + 1 SD). The results reveal that the positive effect of coordination activities on the alliance success is much stronger when formal protection measures are intense (Figure 2, Cell 1). In contrary, intense organizational protection activities weaken the promoting influences of coordination activities on the perceived alliance value (Figure 2, Cell 2). The converse directions of the both protection variables influences become apparent. Similarly, the negative link between knowledge-related dysfunctions and alliance outcome is amplified when organizational protection activities are stronger (Figure 2, Cell 3). Especially when severe dysfunctions occur, substantial organizational protection may evidently derogate more than they benefit. These findings are consistent with the above statistics. Recapitulatory, the results of our analysis lends support to Hypothesis 5 and Hypothesis 6. However, we found a reverse and significant effect for Hypothesis 8.

5 Discussion

The explanatory nature of this study requires a brief discussion of its main findings and contributions. We used learning alliances of YTBes with their competitors as em-

pirical setting to examine the link between knowledge-related dysfunctions, alliance coordination and knowledge protection activities with alliance success within a value approach. Alliance coordination activities lever the arrangements' cooperative potential and strongly enhance the alliance value for the focal YTBE. Knowledge related dysfunctions show an antagonistic effect and let erode alliance value substantially. Formal as well as organizational protection activities are not directly linked to alliance success but enfold their influences within the interplay with dysfunctions and coordination activities. The joint effect between alliance coordination and formal protection activities forcefully drives alliance value. In contrast, intense organisational protection activities significantly lower the value stimulating influence of alliance coordination, whilst restrained organizational protection enables coordination to enfold its beneficial value creating potential. Formal protection activities, remarkably, do not moderate the detrimental relationship between knowledge-related dysfunctions and alliance performance. However, high organizational protection activities amplify dysfunctions negative impact on alliance value whereas low organizational protection does not moderate this relation.

Our study makes a number of contributions to strategic alliance management research. First, we enrich the growing body of strategic alliance literature that comprehends and researches alliances within a value perspective (Contractor and Lorange 1988a; Zajac and Olsen 1993; Dyer 1997; Dyer, Singh and Kale 2008; Madhok 1997; Madhok and Tallman 1998; Anand and Khanna 2000; Sarkar, Echambadi and Harrison 2001; Kale, Dyer and Singh 2001; White and Siu-Yun Lui 2005; Das and Kumar 2007; Lavie 2007; Lavie 2009; Sarkar, Aulakh and Madhok 2009; Li, Zhou and Zajac 2009; Aggarwal and David H. Hsu 2009; Gulati, Lavie and Singh 2009). This approach theoretically allows integrating beneficial (e.g. achievement of alliance specific goals or financial success ratios) as well as disadvantageous (e.g. knowledge loss, alliance or alliance management specific costs and efforts) consequences and effects of complex issues. Some studies employed changing market or share values to catch alliances success. But most previous studies concentrated either on alliances dark or bright sides and therefore used monidirectional value measures. Both methods are less suitable for research questions focusing on the effectiveness of alliance management concerns that may induce advantageous as well as disadvantageous outcomes. These situations require a comprehensive measure that allows capturing the potential trade-off in a compensatory manner. Our study enriches the emerging progress of value-guided alliance

research since, to the best of our knowledge, it is one of the few (e.g. Blankenburg Holm, Eriksson and Johanson 1999) that integrates both views in a encompassing alliance value measure. Therefore it permits the holistic appraisal of alliance management activities and instruments.

Second, our study further enhances the discussion on protection mechanisms for idiosyncratic knowledge in strategic alliances (e.g. Hamel 1991; Larsson et al. 1998; Kale, Singh and Perlmutter 2000; Dussauge, Garrette and Mitchell 2000; Norman 2001, 2002; Das and Rahman 2002; Mitchell, Dussauge and Garrette 2002; Reuer and Ariño 2002; Ariño and Reuer 2004). We identified two definable protection mechanisms with predominant relevance in practical alliance management. Then we examined their interactions with knowledge-related dysfunctions and alliance coordination measures and tested their efficacy within the value perspective. Both mechanism neither increase nor decrease perceived alliance value directly. Apparently, focal firms at least do not overprotect palpable. This suggestion seems to be not unlikely since YTBEs normally experience a limiting lack of resource and management capacities.

The diverging characteristics of the both protection mechanisms become obvious in the interaction analyses. They interact differently with alliance coordination as well as with knowledge related dysfunctions. The positive link between coordination and formal protection sheds some light on research which emphasizes the relation-developing character of contractual negotiations (Ariño, de la Torre and Ring 2001, 2005) and lends further empirical foundation. On the contrary, intense organizational protection impairs alliance coordination effects while low protection measures do not induce a significant diminution. Moreover, modest organizational protection does not moderate dysfunctional influences, while high level activities aggravate the derogating impact. These findings suggest that overdrawing may be an issue. A careful implementation of organizational protection mechanism seems to be advisable, especially, because these indirect effects are not immediately visible. We got no empirical evidence for our suggestion that formal protection would extenuate the value derogating impact of the dysfunctional phenomena. This results complements Deeds *et al.* (1999) who found no guarding relationship between contractual protection mechanisms and dysfunctional tendencies in R&D-alliances. All in all these findings are somehow disillusioning, since both of the most accepted and widely adopted protection measures against unregulated knowledge transfer seem to be inefficient.

Third, this study also contributes to and stimulates research on alliance management capability (e.g. Kale, Dyer and Singh 2002; Kale and Singh 2009). This research stream explains “key outcomes in an alliance both at the dyadic and firm level” (Schreiner, Kale and Corsten 2009) with certain capabilities of alliance management. Actually most studies within this framework stress the “positive link between alliance management capability and a fulfillment of various firm goals [...] that enables a firm to realize and expand the value creation potential from that alliance” (Schreiner, Kale and Corsten 2009). The integration of a distinct protection capability should enhance this approach, especially when its fostering and disturbing potential we have shown above is considered under respect of alliance failure rates.

Forth, our results draw some attention on the research stream on learning alliances with competitors (e.g. Hamel 1991). Due to our sample we expected ex-ante a strong influence of interorganizational competition between the partners on some of the constructs and their relationships within our models. Interestingly we found no evidence for this suggestion. This corresponds with many of the statements we got from the respondents in our qualitative prestudy. We underline that alliance between competitors are everything else than trivial. But we have reason to believe, interorganizational competition between partners may be a little bit overrated by scholars. The growing number of these alliances indicates that practitioners may have found a way to deal with the specific requirements of these arrangements.

5.1 Limitations

The central aim of this study was to examine the complex effects and interdependencies of alliance coordination and protection activities in strategic learning alliances. We understood the comprehension of this interwoven management tasks as a key to alliance success and the avoidance of alliance failure from the view of cooperating YTBEs. Therefore we did not address overall alliance performance and neglected the partners’ perspectives. This limitation is owed to the sensibility of the requested data. Many firms that gave us an openly response neither allowed us to contact their partners nor disclosed their identities. This is regrettable especially since some of our respondents declared freely that they themselves behaved sometimes intentionally dysfunctional. Another limitation lies in the studies single-country-design and its lack of longitudinal results. Although we gathered data from two points in time of each alliance conclusions on the dynamic evolution of the alliances are constrained. Ideally a

longitudinal and cross-national setting would allow a larger sample and enhance the studies generalizability but seems to be a significant practical challenge. Finally this study is limited by its selection of some of the many variables out of the entirety of factors influencing alliance processes and success. By way of example it would be very interesting how relational aspects or third party influences would extend the picture. This opens the door for further research to explore these questions in greater detail.

5.2 Implications for business professionals

Our findings offer some implications for business professionals. First of all, alliance coordination is the key for alliance success. Firms and alliances which align their internal and interorganizational activities to the stipulated goals, which monitors if these goals and milestone are achieved and agreements are kept, and also establish and coordinate stable personal relationships across firms boundaries are much more successful than those which don't. Second, alliance partners should beware and be aware of dysfunctional tendencies and phenomena. They impair value creation and reduce the value of the alliance significantly. Note, that when the genie left the bottle there is only a poor chance to catch him again. The established protection mechanisms won't do. So the issues about the protection of idiosyncratic knowledge have to be concerned before the operative collaboration starts. Third, therefore alliance managers are well-advised to use the ex-ante negotiations of these matters to check if the potential partner respects firm's knowledge and interests, and to build a common understanding about dealing with firms' critical knowledge and intellectual property rights. Then they should write down contractual guidelines how sensible knowledge, information and data have to be handled and explicate red lines which are not to be exceeded. Especially when dysfunctional activities, processes or behaviors are not intended they then can be revised and adjusted. Forth, organizational protection mechanisms - like the walling-off of information, facilities and staff or the exceeding curtailing of information flows - are best established on a modest level. A cautious proceeding sensibilizes the personnel, provides them with explicit and implicit behavioral rules and gives them certainty when they are dealing with this topic.

Further on, focal firm's reasonable protection measures may signalize the partner that on the one hand the value of idiosyncratic knowledge is understood and respect to this

matter is expected. Coevally this may suggest that in return the partner's knowledge related interests are respected as well.

In conclusion, fifth, YTBE's alliance managers should not concentrate solely on fulfilling collaborative tasks and achieving alliance goals. They better keep the whole picture in mind, integrate protection concerns into their view, and consider the particular interdependencies between the certain management measures. Especially, when learning alliances are a strategic option, the development of a distinct knowledge protection capability seems to be advisable.

6 Appendix

Questionnaire Items

	<i>Construct / Variable / Item</i>	<i>VIF</i>
a)	Alliance Coordination [1=very low; 7=very high / formative measurement model; Informant 2]	
1)	In the course of the co-operation it is checked regularly, whether the agreements between the partners are observed.	2.12
2)	The activities of the involved employees of all partners are aligned to the stipulated objectives.	1.96
3)	The activities of the employees of all partners in the different functional ranges (e.g. R&D, sales, etc.) are aligned to the stipulated objectives of the co-operation.	2.06
4)	When different opinions between the involved employees and other actors of the alliance partners occur, compromises are regularly agreed.	1.84
5)	It is monitored, whether sub-goals of the co-operation are achieved.	2.24
6)	The executive level of the alliance partners are regularly informed on the progress of cooperation.	1.52
7)	The circulation of information is coordinated, to ensure an appropriate internal and external representation of the co-operation.	1.95
8)	We coordinate deliberately the development of personal relationships to employees of the partner.	1.11
9)	Employees, who are directly involved in the cooperation, work across the partners' interorganisational borders frequently with an immediate contact.	1.18
b)	Knowledge related Dysfunctions [1=very low; 7=very high / formative measurement model; Informant 2]	
1)	The partner has tried to withhold knowledge from us which was/has been necessary to achieve the agreed cooperation objectives of our enterprise.	2.06
2)	After the partner had achieved its objectives, he has finished the relationship, without we had reached our objectives in the agreed extent.	2.89
3)	After the partner had reached the partial objectives of the collaboration faster than we, he wanted to renegotiate the conditions of the cooperation to his advantage.	2.68
4)	We have lost valuable marketing and sales knowledge to this partner.	1.91
5)	We have lost valuable technological knowledge to this partner.	2.57
6)	We have lost valuable production knowledge to this partner.	2.89
7)	In the course of the co-operation the partner has increasingly withhold relevant information.	3.03
8)	In the course of the co-operation the partner has become increasingly closed.	2.67
c)	Organizational Protection [1=very low; 7=very high / formative measurement model; Informant 2]	
1)	The flow of information between us and the partner is regulated clearly in every respect.	1.35
2)	There are clear rules and instructions which information are not to be made accessible to the partner.	1.67
3)	The partner solely gets access to rooms in which he can gain experience of our special knowledge only to the extent which is tolerated by us.	1.53
4)	We deny the partner access to our staff which are not directly involved in the co-operation.	1.55
5)	We provide all necessary resources for the protection of our core competencies.	1.68
6)	The responsibility to co-ordinate the protection of our competencies in this partnership we have delegated to a distinct person.	1.48

(continued overleaf)

d)	Formal Protection [1=very low; 7=very high / formative measurement model; Informant 2]	
1)	In the agreements with the partner we have exactly stipulated the use of the cooperative outcome (distribution, utilization, rights).	2.21
2)	In our agreements with the partner we have defined which information and data are our property.	3.21
3)	In our agreements with this partner we have defined, which information and skills we want to share with each other.	2.70
4)	In our agreements with this partner we have defined, which information and skills we do not want to share with each other.	1.40
5)	We have stipulated comprehensive confidentiality obligations with the partner.	1.35
6)	In our contracts with the partner we have particularized and comprehensively regulated sanctions for contract violations.	1.78
7)	The knowledge that we have brought in this cooperation with this partner we have completely secured by patents and other protective rights.	1.30
8)	The enticement of our company's employees by the partner we have widely excluded by contract.	1.28
e)	Perceived Alliance Value [1=very low; 7=very high / reflective measurement model; Informant 1]	
1)	Considering all advantages and expenditures associated with this cooperation: how would you assess the value of this relationship?	
1)	How do you assess the value of this relationship compared to other alternative relationship?	
2)	How highly do you rate the value of all achievements/benefits that are sourced by this partner?	
3)	How do you assess the financial benefit of the cooperation with this partner?	
f)	Competition [1=very low; 7=very high / formative measurement model; Informant 1]	
1)	We were in direct competition with this partner.	
2)	We considered the partner as a very strong actual competitor.	
3)	We considered the partner as a very strong potential competitor.	
g)	Complexity of the Collaboration [0=false; 1=true / formative measurement model; Informant 1]	
	The alliance with this partner is mainly categorized in this area:	
	1) R&D 2) Marketing 3) Sales 4) Production 5) Procurement 6) Other alliance aims	
h)	Shareholding [1=very low; 7=very high / formative measurement model; Informant 1]	
1)	We were/are financially involved in the partner.	
2)	The partner was/is financially involved in our company.	

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