Exploring the micro-level dynamics of trust, formal contracts and knowledge transfer in corporate investment relationships

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ABSTRACT

Trust, formal contracts and knowledge transfer are key concepts in the alliance governance literature. They have been widely described as constructs interacting on the firm-level. However, in strategic alliances the actual work is done by the firm's employees, rather than the firm itself. The manner in which employees of both alliance partners interact represents a micro-level, underpinning the macro firm-level relationships. The micro-level has been little investigated, yet can provide deeper insights into inter-firm cooperation. This study investigates how employees' interactions affect and are affected by trust, formal contracts and knowledge transfer in strategic alliances. A case study of two corporate investment relationships is described. Inductive methods are then applied to build theory from this case study. It is found that relationships between the three key concepts are mediated by the clarity of the mandate of R&D personnel, the interference of managers in R&D talks, and the focus of R&D talks. These results emphasize the importance of micro-level interactions. It is also found that these interactions have a dynamic nature, wherein the levels of trust, contract complexity and knowledge transfer change over time. A further contribution is that trust and contracts have a non-reciprocal relationship, rather than complementary or substitutive relationships. Finally future research opportunities are identified and managerial advice on managing corporate investment relationships is provided.

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INTRODUCTION

Globalization of the economy over the last 30 years has brought increased world-wide competition (Gulati, 1995; Inkpen & Beamish, 1997; Nooteboom, Berger & Noorderhaven, 1997) and rapid technological development (Nooteboom et al., 1997). These changing circumstances have increased the need for strategic alliances between firms. Indeed, the number of strategic alliances has increased steadily across many industries (Gulati, 1995; Ring & Van de Ven, 1994). Strategic alliances are "inter-firm cooperative arrangements aimed at achieving the strategic objectives of the partners" (Das & Teng, 1998, p. 491). Different types of strategic alliances can be distinguished by their equity configuration: joint ventures, minority equity alliances and non-equity alliances (Das & Teng, 1998).

In a strategic alliance, both partners are at risk by making alliance-specific investments (Nooteboom et al., 1997), that can be treated opportunistically by the alliance partner (Alvarez & Barney, 2001; Das & Teng, 1998). These risks result in comparatively high failure rates for strategic alliances (Das & Teng, 1998; De Laat, 1997; Inkpen & Beamish, 1997). Strategic alliances' growing importance and popularity, yet disappointingly high failure rates, have drawn interest from the scientific community. The alliance governance literature has extensively studied the strategic alliance phenomenon (Doz, 1996; Koza & Lewin, 1998).

Trust, formal contracts and knowledge transfer are key concepts in this body of literature on strategic alliances (Inkpen & Curall, 2004). Trust is the expectation that the alliance partner has a benevolent attitude towards the own firm in a risky strategic alliance (Das & Teng, 1998). Formal contracts are the formalization of promises and obligations

between the alliance partners to perform particular actions in the future (Poppo & Zenger, 2002). Both trust and formal contracts raise the expectation that an alliance partner will behave as desired (Das & Teng, 1998), and can thus increase the likeliness of cooperation in the strategic alliance. Knowledge transfer is the process of learning about the partner's technological knowledge (Faems, 2006). Alliances have proven highly useful for knowledge transfer (Hagedoorn, 1993; Koza & Lewin, 1998). In strategic alliances focused on R&D, successful knowledge transfer often is the goal of both partners.

In the literature there is an ongoing discussion about how trust, formal contracts and knowledge transfer interact (e.g. Inkpen & Curall, 2002; Ring & Van de Ven, 1994). Important topics are whether trust and formal contracts are substitutes or complements, and whether the alliance success is determined by the alliance's initial design or ongoing changes.

Existing literature thus often discusses the relationships between the firm-level constructs. However, in practice an organization's work gets done via the actions of individual employees. These individual actions underpin and mediate their firm-level antecedents and outcomes. For example, if a firm would change its strategy (a firm-level antecedent), this new strategy would be expressed through adapted behavior of employees (an individual-level mediator), which would result in adjusted firm performance (a firm-level outcome).

Since the firm level is an aggregate of employees (among other resources), we can categorize the firm-level as a "macro" level and the individual level as a "micro" level. Foss (2007) emphasizes the importance of exploring the 'micro-foundations' of macro level relationships, because they provide much explanatory power and are often missing in existing literature. Applying Foss' (2007) thinking, it is found that the alliance governance literature on trust, formal contracts and knowledge transfer work focuses on firm-level rela-

tionships. The issue of how the employees of both firms in the strategic alliance interact is mostly left untouched. Yet these employees actually execute contracts, affect the level of trust and engage in knowledge exchange. The lack of attention to micro-level interactions thus is an important omission.

Aiming to resolve this knowledge gap, this thesis aims to explore how micro-level interactions between employees mediate the relationships between trust, formal contracts and knowledge transfer. The setting in which these are explored is an inductive case study of two corporate investment (CI) relationships. CI relationships are created when an incumbent firm uses its corporate venturing capital to take a minority equity stake in an innovative start-up, creating a strategic alliance for strategic and possibly financial purposes (Chesbrough, 2002; Dushnitsky & Lenox, 2005a; Van de Vrande, Lemmens & Vanhaverbeke, 2006). Incumbent firms creating CI relationships experience increased patent output, which is an indication of high innovation performance (Dushnitsky & Lenox, 2005b). Innovative start-ups engaging in CI relationships can receive significant financial and manufacturing benefits (Katila, Rosenberger & Eisenhardt, 2008), which helps to 'cross the chasm' in their development. CI relationships are of particular interest because their popularity is relatively new and is subject to severe fluctuations (Chesbrough, 2002).

Analyzing the cases, it is found that micro-level interactions such as the mandate for R&D personnel, the interference of managers and the focus of R&D talks explain the firm-level relationships they underpin. These results vindicate the need to investigate the micro-level. The results also point out the dynamic nature of strategic alliances, and the non-reciprocity of the relationship between trust and formal contracts.

This thesis is organized in the following way: first the theoretical background is provided. The concepts of trust, formal contracts and knowledge transfer are described. The relationships between them are explained, and the gap in the literature is identified.

The research questions are then formulated. Next, the methodology of the inductive case study is described. Consequently the results of the case study are given. Onwards a model of trust, formal contracts and knowledge transfer on the micro-level in CI relationships is proposed. The contributions of this thesis to the literature are then discussed. Finally, the epilogue provides managerial advice and additional findings of interest. A self-reflection on the writing of this thesis is added as appendix.

THEORETICAL BACKGROUND

In this section the existing body of literature on trust, formal contracts and knowledge transfer is described. First the definition and nature of each concept in isolation is provided. Next the relationships between the concepts at the macro firm-level are discussed. Consequently it is explained what the micro-level interactions of these relationships are, why they are relevant and why they deserve attention. Finally, research questions on the missing micro foundations in the existing literature are formulated.

CONCEPTS

The concepts and dimensions of trust, formal contracts and knowledge transfer are described in order.

Trust

The importance of trust in strategic alliances has been stressed in the alliance governance literature over the last thirty years. Theorists have described many positive effects of trust in strategic alliances, such as: increased cooperation, more open and efficient negotiations, and improved interpersonal interaction (Malhotra & Murnighan, 2002). Trust has been found to stimulate repeated strategic alliances between the same partners (Gulati, 1995).

In their cross-disciplinary review of trust, Rousseau, Sitkin, Burt & Camerer (1998) identify a definition of trust broadly shared in the literature: “Trust is a psychologi-

cal state comprising the intention to accept vulnerability, based upon positive expectations of the intentions or behavior of another" (p. 395). This definition reveals that there are three pre-conditions for trust: (a) uncertainty about the future, (b) a risk of losing something, and (c) a reliance (interdependence) on the relationship partner regarding this potential loss (Parkhe, 1998; Rousseau et al., 1998). It is notable that trust is a psychological state of mind, not a form of behavior or a cognitive decision (Rousseau et al., 1998). Trust can vary from low to high, and changes over time (Rousseau et al., 1998).

Laymen often associate trust with interpersonal relationships (Gulati, 1995), as described by the field of psychology (e.g. Rotter, 1980). The interpersonal view of trust describes trust as being held by an individual towards a relationship. However, trust has been linked to firms and inter-firm relationships as well (Rousseau et al., 1998). For example, Ahuja (2000) describes how a firm can grow trust by building partnerships with firms that are interconnected to each other. In the alliance governance literature trust is often defined as a firm level construct (e.g. Das & Teng, 1998; Poppo & Zenger, 2002).

Trust has two dimensions in the alliance governance context: (a) competence trust is the perceived *capability* of the alliance partner to contribute to the alliance as expected, and (b) intentional trust is the perceived *intention* of the alliance partner to refrain from opportunistic behavior (Das & Teng 1998; Nooteboom et al., 1997).

Although there is a fair amount of agreement on the definition of trust in the literature, it has been measured in various ways. Gulati (1995) measures trust using relationship history, counting the number of previous alliances two firms have had together. Alternatively, trust can be measured as a perception in a survey. Malhotra & Murnighan (2002) operationalize the perception of inter-personal trust as two questions: "How much did you like [the other person]?" and "How much did you trust [the other person]?" (p. 546). Nooteboom et al. (1997) formulated six items measuring trust in customer relationships, such

as “In this relation the strongest side is expected not to pursue its interest at all costs.” (p. 337). Muthusamy & White (2005) used a 17-item scale of trust, divided among three subsets measuring different dimensions of trust.

Formal contracts

Formal contracts are a prominent and widely used tool for organizing strategic alliances (Dyer, 1997; Malhotra & Murnighan, 2002). A formal contract is defined as a set of written statements containing legal obligations to perform particular actions in the future (Poppo & Zenger, 2002). Formal contracts serve two purposes: (a) they are a mechanism to prevent opportunistic behavior by the alliance partner (Gulati, 1995; Malhotra & Murnighan, 2002) and (b) act as a coordinating guide for executing the strategic alliance (Faems, Janssens, Madhok & Van Looy, 2008; Gulati, 1995). Usually, a contract is designed during a negotiation period, signed, and then used for a longer yet limited amount of time.

The design of formal contracts varies along the dimension of complexity. Contract complexity is defined as a contract’s number of uncertainty avoiding clauses. These clauses can be both safeguards against the partner’s opportunistic behavior (Parkhe, 1993) and agreements on how to manage and coordinate the relationship (Klein Woolthuis, Hillebrand & Nooteboom, 2005). Note that these two types of clauses mirror the opportunism prevention and coordinating goals of a contract. The number of uncertainty avoiding clauses is measured by counting them in contracts. Besides their number, their specificity is also relevant. The more specific the uncertainty avoiding clauses, the higher contract complexity. Examples of uncertainty avoiding clauses are: regular reports of the partner’s relevant actions, provisions for conflict resolution, and limitations of freedom to work with third parties (Klein Woolthuis et al., 2005; Parkhe, 1993).

A number of effects have been attributed to highly complex contracts: lower uncertainty, lowered risks for partner opportunism, reduced role conflict and role ambiguity for managers, and better alliance performance (Luo, 2002). A high contract complexity thus seems to be beneficial. However, the level of contract complexity can be limited by bounded rationality, when both parties are unable to think of all possible future risks while designing the contract (Luo, 2002).

A problem of the contractual complexity construct is that it has had mixed results when investigated together with trust in the alliance governance literature (Faems et al., 2008; Klein Woolthuis et al., 2005). It has been suggested that not the presence of particular uncertainty avoiding statements matters, but their specific content does. This contract content is referred to as the nature of a contract. The nature of a contract can vary despite having similar contractual complexity (Faems et al., 2008). Looking carefully at the nature of a contract can reveal the intent of both partners (Klein Woolthuis et al., 2005). Not much information is available yet on how to measure a contract's nature. Klein Woolthuis et al. (2005) applied an inductive technique. A distinction between narrow and broad contractual interface structures is proposed by Faems et al. (2008, p. 1069):

> *"A narrow contractual interface structure is characterized by a mutually exclusive task division, an absence of obligations to exchange information, and monitoring mechanisms that are mainly performance-oriented. In contrast, a broad contractual interface structure is characterized by an overlapping task division, the presence of obligations to exchange information, and mechanisms that provide opportunities for not only performance but also behavior monitoring."*

The design of formal contracts can thus be described in terms of its complexity and nature. However, a contract's effects are also mediated by how strictly the contract is applied within the relationship. Both partners' managers can either enforce the contracts rigidly, or allow more flexibility. This strictness of the contract application has significant effects on the alliance on both managerial and operational levels (Faems et al., 2008). A

flexible application of contracts makes them more adaptable to changing circumstances, which can have important practical benefits (Bell, den Ouden & Ziggers, 2006).

Knowledge transfer

Learning from other firms is an increasingly important process (Hagedoorn, 1993), making learning the core goal of many strategic alliances (Koza & Lewin, 1998). The most cited form of learning from other firms is knowledge transfer. In this process, one partner's existing knowledge is transferred to the other partner (Faems, 2006). If knowledge transfer takes place in an alliance, both partners have more 'overlap' and similarities of their technological knowledge afterwards (Mowery, Oxley & Silverman, 1996).

Hamel (1991) states that successful knowledge transfer has three determinants: (a) intent, meaning that the firm and its employees need the desire to learn, (b) transparency, meaning the partner firm needs to be open and accessible, and (c) receptivity, meaning that the firm needs the capability to absorb the knowledge passed to it. If either intent, transparency or receptivity is lacking, knowledge transfer is hampered.

Knowledge transfer can go both ways in an alliance, potentially creating a "race to learn" among the partners: a competition to outpace the learning rate of the other partner (Hamel, 1991, p. 88). Particularly start-up partners are at risk of being outpaced in the race to learn (Katila et al., 2008). If one of the partners considers to have an unfair disadvantage in the learning race, the relationship risks being dissolved (Ariño & de la Torre, 1998).

Knowledge transfer has been described using inductive instruments. Ariño & de la Torre (1998), Faems, Janssens & Van Looy (2007), and Hamel (1991) all used in-depth interviews with key actors and archival data to measure knowledge transfer. None of them used a 'a priori' coding scheme for the measurement.

A quantitative measure of knowledge transfer uses patents. Patent texts cite references of earlier patents, much like scientific articles reference earlier articles. When two

firms form an alliance and knowledge is transferred from the partner, the chance the one firm's new patents cite the other firm's patents is increased. Mowery et al. (1996) calculate knowledge transfer as the 'cross-citation rate' in the patents filed after alliance creation. This ratio is the number of citations of the partner firm's patents, divided by the total number of patent citations.

Knowledge transfer has also been measured using surveys. Muthusamy & White (2005) used a 4-item scale filled out by managers to measure how successful knowledge transfer was. An example item they used is "Our firm has developed new ideas or skills because of the strategic alliance with this partner" (p. 436).

RELATIONSHIPS

The relationships between trust, formal contracts and knowledge transfer are described in the literature. They are depicted in Figure 1. Each numbered relationship is discussed below.

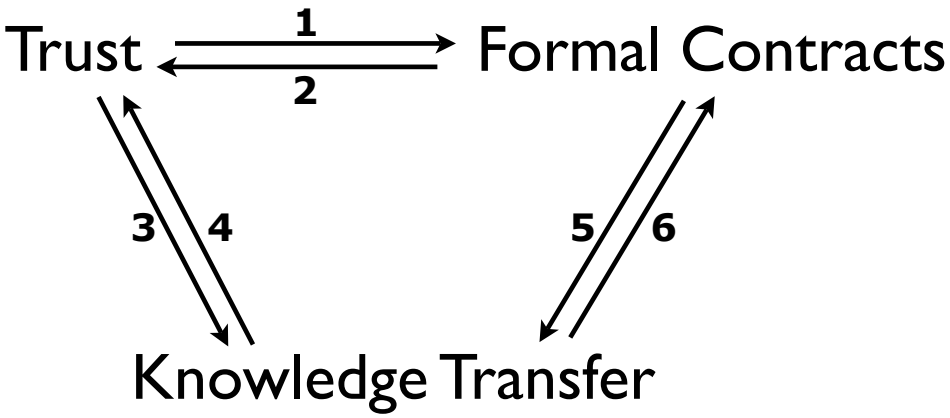

Figure 1: the relationships between trust, formal contracts and knowledge transfer.

1. Trust's effect on formal contracts

The relationship between trust and formal contracts has received a lot of attention recently (e.g. Faems et al., 2008; Klein Woolthuis et al., 2005; Poppo & Zenger, 2002). Regarding the manner in which trust influences formal contracts, the literature provides opposing views. One view is that when trust exists between two partners, there is

less perceived risk of opportunistic behavior, and thus less need for complex formal contracts. Trust thus negatively influences formal contract complexity, making trust and contract complexity substitutes (Gulati, 1995; Inkpen & Curall, 2004). Luo (2002) finds that a high level of trust increases the capability to adapt to unforeseen contingencies, which are not covered by the formal contract. In that case, a high level of trust averts the need for a very complex contract.

An opposing view is that a high level of trust provides both partners with the perception that the relationship will have mutually beneficial outcomes. This perception will make them inclined to enter an extensive relationship, which will result in higher contract complexity in order to define that more extensive relationship (Poppo & Zenger, 2002). Trust thus has a positive influence on formal contract complexity, making trust and contract complexity complements.

Recently scholars have not only examined the impact of trust on contract design, but also on contract application. For example, it has been found that a high level of trust will increase the chances of flexible contract application (Faems et al., 2008), meaning there is more room to adapt to unforeseen contingencies during the relationship.

2. Formal contracts' effect on trust

Contract theory states that since contracts put sanctions on opportunistic behavior, the likelihood of opportunistic acts drops. For example, if a Non Disclosure Agreement is signed within a relationship, disclosing information can be heavily penalized, and thus that form of opportunism becomes unattractive. Complex contracts will thus positively influence trust after the contract is signed (Klein Woolthuis et al., 2005).

However, it is also argued that contracts have a negative effect on trust. A complex contract can imply that the contract is very important to avoid opportunism, meaning the partner is not found trustworthy (Inkpen & Curall, 2004). The contract itself can thus

be interpreted as a sign of distrust. Also, if a partner behaves in a good, non-opportunistic manner, this positive behavior may be attributed to the complex contract rather than the partner's trustworthiness (Inkpen & Curall, 2004; Malhotra & Murnighan, 2002). Non-opportunistic behavior will thus be attributed to the *temporary* contract, rather than the partner's *more permanent* nature. Lastly, active use of a complex contract may be a source of conflict and self-defensive behavior, lowering trust (Klein Woolthuis et al., 2005).

Aside from contract complexity, the nature of contracts has also been found to influence trust. Faems et al. (2008) describe the concept of broad and narrow contract interfaces. A broad contract interface organizes the relationship so that the task division between the partners is overlapping, there are obligations to exchange information, and it contains not only performance based but also behavior based measures of partner input. In contrast, a narrow contractual interface has an exclusive task division, no obligations to exchange information, and solely performance based measures of partner input. A broad contractual interface has been found to increase joint sense making of unforeseen problems, which in turn positively influences trust (Faems et al., 2008).

Besides the contracts' design, their manner of application also affects trust. It has been found that flexible contract application boosts trust, while a strict interpretation hurts it (Faems et al., 2008; Klein Woolthuis, 2005).

3. Trust's effect on knowledge transfer

A high level of trust broadens the scope of the alliance, boosts the intent to transfer knowledge and encourages intense contact between employees across the firms, (Kale, Singh & Perlmutter, 2000; Muthusamy & White, 2005). Since intent to transfer knowledge and transparency are increased, this contributes to knowledge transfer. Trust thus has a positive effect on knowledge transfer.

4. Knowledge transfer's effect on trust

In R&D alliances, successful knowledge transfer can be regarded as a positive alliance outcome. Positive alliance outcomes will increase trust (Ring & Van de Ven, 1994). Successful knowledge transfer will thus increase trust. Repeated transactions during an alliance will also increase the level of trust, as partners get to know each other better (Inkpen & Curall, 2004). It can thus be expected that the more often knowledge is transferred, the higher trust will rise.

However, knowledge transfer can also threaten trust. If knowledge transfer is unevenly divided between both partners, i.e. one partner receives much more knowledge than the other does, the latter will become more dependent on the first partner. This will lower the dependent partner's trust (Inkpen & Curall, 2004).

Knowledge transfer thus has a positive effect on trust, on the condition that both partners perceive its distribution as fair.

5. Formal contracts' effect on knowledge transfer

After both partners commit to a formal contract by signing it, it is consequently put into effect (Ring & Van de Ven, 1994). Managers at both partners tell their subordinates to start doing the actual work. In a R&D alliance, knowledge transfer is started along the rules and plans written in the formal contract. The formal contract thus has a coordinating effect on shared R&D activities, and subsequently affects knowledge transfer.

Formal contracts are described as both having positive and negative relationships with knowledge transfer. An example of a positive relationship is provided by Faems et al. (2007), who found that the presence of highly specific contractual clauses on knowledge transfer increases knowledge transfer. This relationship appears to be mediated by trust, since the explanation provided is that highly specific contractual clauses lower expectations of partner opportunism.

An example of a negative relationship between formal contracts and knowledge transfer is the narrow contract interface, described above. A contract with a narrow interface will instigate less joint sense-making of unexpected technical problems between partners (Faems et al., 2008). This lowers knowledge transfer between both partners.

6. Knowledge transfer's effect on formal contracts

Over time, alliance partners get to know each other better. The knowledge on how to cooperate efficiently can then be stored in the formal contract, making it more complex and a stimulus for better alliance performance (Mayer & Argyres, 2004). Reflecting on the past act of knowledge transfer thus has a positive effect on formal contract complexity.

If knowledge transfer between both partners is unevenly divided, the disadvantaged partner may perceive the other partner as behaving opportunistically, and thus press for more contract complexity (Inkpen & Curall, 2004).

Knowledge transfer thus has a positive effect on contract complexity, particularly if a partner perceives the knowledge transfer distribution as unfair.

THEORY GAP

Foss (2007) points out a major gap in organizational and knowledge management research. Researchers often discuss relationships between firm-level concepts, such as formal contracts and knowledge transfer. However, there are almost no conceivable mechanisms that directly connect these firm-level concepts (Foss, 2007). For example, a formal contract between two firms for R&D exchange will not directly lead to knowledge transfer. Instead, the signing of the formal contract will set employees into motion to start interacting with employees of the partner firm. Knowledge is then transferred between individual employees, which then aggregates to firm-level knowledge transfer.

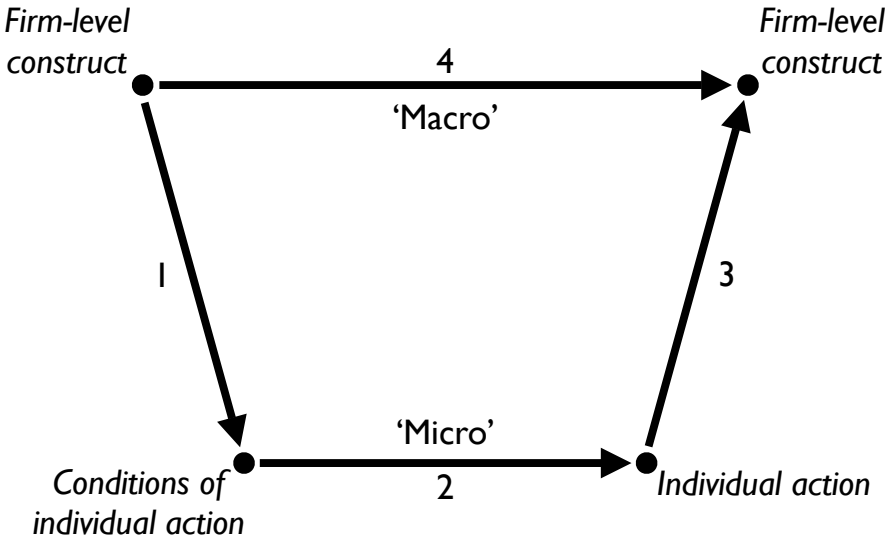

Figure 2: The macro and micro level of a CI relationship. Adapted from Foss (2007).

An adapted version of Foss' model is depicted in Figure 2. The literature often describes arrow 4, the relationship between two firm-level constructs. This is called the 'macro' level. However, to explain this macro relationship, the interactions between employees must be considered. This employee interaction is named the 'micro' level. At the micro level, firm-level antecedents setup the conditions for how individual employees can behave (arrow 1). For example, a formal contract can define which role behavior is expected from individual employees (Ring & Van de Ven, 1994). Next, the conditions of individual behavior affect how the employees actually behave (arrow 2). For example, if the formal contract states that an employee can not share newly transferred knowledge with colleagues working on different projects, the employee will probably not discuss his new ideas to those colleagues. Finally, the individual behavior of employees influences firm-level outcomes (arrow 3). For example, if an employee does not share newly gained knowledge with colleagues, knowledge transfer may be hampered.

The micro-level's three relationships (arrows 1, 2 and 3) can explain the macro level relationship (arrow 4). These micro-level relationships can be considered the foundations of the macro-level relationship.

To investigate the micro-level dynamics of the discussed theoretical concepts, the following research questions are formulated:

Research question 1: how do the firm-level constructs trust, formal contracts and knowledge transfer influence employee actions?

Research question 2: how do employee actions influence the firm-level constructs trust, formal contracts and knowledge transfer?

This thesis aims to resolve the gap in the literature on trust, formal contract and knowledge transfer literature on the micro-level interactions underpinning these firm-level relationships.

METHODOLOGY

The purpose of this thesis is to find insights into the micro-level foundations of trust, formal contracts and knowledge transfer in strategic alliances. Given the lack of existing knowledge on the subject, it is difficult to apply existing theories and measures. It is thus necessary to build theory to complement the existing theory base. An excellent instrument for building theory is an inductive case study (McCutcheon & Meredith, 1993; Eisenhardt, 1989, p. 548):

> *"There are times when little is known about a phenomenon, current perspectives seem inadequate because they have little empirical substantiation, or they conflict with each other or common sense. (...) In these situations, theory building from case study research is particularly appropriate because theory building from case studies does not rely on previous literature or prior empirical evidence."*

Case studies are in-depth empirical inquiries of contemporary phenomena where the researcher has little or no control over events (McCutcheon & Meredith, 1993; Yin, 2003). In a case study in the organizational sciences, typically a considerable volume of data on a phenomenon is gathered within an organization (McCutcheon & Meredith, 1993).

An inductive case study is a particular type of case study, wherein the goal is specifically to build new theory (Eisenhardt, 1989). Inductive case studies offer many advantages. Firstly, case studies can provide paradoxical evidence leading to new insights, which would not have been found via logical deduction (Eisenhardt, 1989). A second strength is that the newly created theory is highly likely to be empirically valid, because the theory-building process is intimately tied with the growing evidence (Eisenhardt, 1989). Another advantage of this intimate tie is that resulting theory is likely to be highly testable, because its constructs have been repeatedly verified during the inductive case study (Eisenhardt, 1989).

CASE SELECTION

An inductive multiple case study of two strategic alliances was conducted. These alliances were corporate investment relationships, wherein usually a large incumbent firm invests a minority equity stake in small innovative start-up (Schildt, Maula & Keil, 2005; Wadwha & Kotha, 2006). These two firms in the relationship will hereafter be referred to as the 'incumbent partner' and 'start-up partner' respectively. Both relationships had the same incumbent partner: Alloy, a large European technology firm. The start-up partners were Cord and Plane, both young high-tech companies. Cord and Plane were not related to each other.

The Cord and Plane cases have been picked during the research design phase using theoretical sampling. Theoretical sampling aims to either replicate previous cases or extend theory via opposite cases (Eisenhardt, 1989; Faems, 2006; Pettigrew, 1990). The Cord and Plane cases were similar in many aspects such as timeframe and technology, yet Alloy managers had perceived their development as very different. In the Cord relationship trust had decreased, contractual complexity had increased and knowledge transfer was mostly unsuccessful. Contrarily, in the Plane relationship trust had increased, contractual

complexity had decreased and knowledge transfer was mostly successful. Since the research questions relate to those concepts, these two cases were deemed suitable for theoretical sampling.

DATA COLLECTION

To build stronger theory, using multiple sources of data for triangulation purposes is advised (Eisenhardt, 1989). This study uses interviews with key actors and archival analysis. Data collection was only performed at the incumbent partner (Alloy), not at the innovative start-up partners. Due to the sensitivity of these relationships, contacting the start-up partners could have damaged the relationships, and was therefore deemed an unacceptable risk.

Date was collected in a retrospective way. Both the relationships still existed at the time of research, but the Alloy's interest in them had shifted from strategic to financially-oriented shareholder.

In preparation for the interviews, two documents which summarized the start-up partners and their websites were analyzed. An interview protocol was written for the first round of interviews. This protocol was unstructured, listing questions only for the purpose of covering all key topics known to the researcher. This approach allowed the interviewee to explore areas that come to light during the interview (McCutcheon & Meredith, 1993). After the first round of interviews, a more elaborate semi-structured interview protocol was written to extend the data and fill in gaps. The use of this semi-structured protocol allowed the researcher to ask the same question to multiple interviewees, making the answers more reliable (Cardinal, Sitkin & Long, 2004). This protocol followed the chronological history of the CI relationships. After the second round of interviews, the interview protocol was further refined before the third round. Adapting data collection methods to

growing insight is an important tool in theory building case study research (Eisenhardt, 1989).

When interviewees provided general statements on the relationships, they were asked to describe concrete events and examples to elaborate on the general statement. This technique improves the validity of retrospective reports (Miller, Cardinal & Glick, 1997). However, in practice sometimes interviewees responded they could not remember a concrete example during the interview, yet reiterated the general statement.

Eleven venturing and R&D managers at Alloy were interviewed, for a total of thirteen interviews. Both venturing managers and R&D managers were interviewed. Venturing managers' role is more focused on negotiation and contracting, while R&D managers' role is focused on knowledge transfer. Informants have been found to be most reliable when talking about matters directly related to their work roles (Bagozzi & Phillips, 1982).

Interviews were individual, face-to-face, and lasted between 30 and 150 minutes. As stated before, the interviews were based on a protocol. They were performed in either the interviewee's mother tongue or primary work language. All interviews were recorded. One interview was deemed irrelevant to the study, and another one was not transcribed due to poor sound recording quality. The 11 other interviews were transcribed. Afterwards, the transcripts were e-mailed to the interviewee for verification and clarification purposes, as advised by Keil, McGrath & Tukiainen (2009).

To add and triangulate interview data, archival documents were investigated. This consisted of 19 presentations, which had 547 sheets, and 3 text documents containing 6 pages. The archival data both added to and confirmed data from the interviews. The author did all data collection.

An important question in case study research is when to stop adding data. Ideally, data collection should be stopped when nothing new is learned from more observa-

tions, because all the 'new' data has been seen before. This state is known as 'theoretical saturation' (Eisenhardt, 1989). However, the author is limited by the timeframe of the thesis research as defined by the University of Twente. Since data collection turned out to be very time consuming, arguably data collection was halted before theoretical saturation was reached. This however is a constraint commonly encountered by researchers (Eisenhardt, 1989).

DATA ANALYSIS

All interview transcripts and archival data were coded for sections of interest, to limit the volume of the data. This is a necessary step in case study research, because there is a continuous danger of "death by data asphyxiation" (Pettigrew, 1988 in Eisenhardt, 1989). This threat was felt by the author, as the volume of data grew to hundreds of pages with little structure. Coding the data made it more manageable.

It is customary to start data analysis 'within-case', treating each case separately. Afterwards, cases are compared via 'cross-case analysis' (Eisenhardt, 1989). To start within-case analysis, after each interview round case descriptions were rewritten and expanded using the coded data. Subsequent interviews further added to these case descriptions. Great care was taken to make these case descriptions independent of each other, avoiding the use of cross-comparisons. Case descriptions are written in chronological order. A chronological order is advantageous, because any presumed causal relationship has to occur linearly over time (Yin, 2003). The within-case analysis had two goals: to find features unique to each case, and to make the author highly familiar with each case in preparation for cross-case analysis (as suggested by Eisenhardt, 1989).

For cross-case analysis it is important to look at the data in many different ways, for example by choosing to view the data through different theoretical perspectives (Eisenhardt, 1989). The author has contemplated the cases using several theories, such as stake-

holder theory (Rowley, 1997), real option theory (Folta & Miller, 2002), uncertainty removing techniques (McGrath, 1997), benefit distribution between partners (Khanna, Gulati & Nohria, 1998), contrasting process theories of organizational change (Van de Ven, 2007), and new product development theory (Hart & Baker, 1994). These theories were tested by drawing the data from both cases into structures matching the theory, sometimes revealing novel characteristics of the data (Miles & Huberman, 1994). This was accompanied by the use of logical analysis: looking for logical relationships between events (McCutcheon & Meredith, 1993). However, it was found that the concepts of trust, formal contracts and knowledge transfer were most vividly present in both cases, and also had striking differences between both cases. The author then decided to pursue investigating that field of theory, rather than the other leads mentioned.

It is notable that, unlike deductive research, the theoretical base of this study was mostly made during and after data collection, rather than before it. Comparative case studies often show this iterative and sometimes messy process (Pettigrew, 1990). Yet this thesis is written in the order of a deductive study with the theoretical framework upfront, to match the standard structure used in the literature and make the thesis easier to comprehend.

Having chosen to further investigate the data with the concepts of trust, formal contracts and knowledge transfer, data analysis moved on to the next step. Theoretical propositions are formulated to explain the patterns found. To provide causal explanations, these propositions have to be causal, linear in time and logically congruent.

RESULTS

RESEARCH SETTING

Throughout the 1980's Alloy, a large European technology company, developed competencies in thin-film coating technologies. This technology enabled Alloy to put very

thin metal coatings on materials. Originally, this technology was meant to serve customers' rising performance demands in one of Alloy's existing business units. Developing these competencies took many years, which is not unusual in Alloy's industry, which has relatively long innovation trajectories of ten to twenty years. Near the end of the 1980's alternative technologies proved to be more cost-effective for that business. Alloy then decided to scan for other market opportunities to be exploited using the coating technology:

> *"Alloy has developed adhesive coatings for years, developing basic competences in the [new coating] technology. However, at the end of the 1980's we found alternative solutions for adhesion that were less costly. We thus started searching for other applications of the [new coating] technology." - Venturing Manager*

Several thin-film coating businesses were developed during the 1990's using this new coating technology. However, these businesses were relatively small in size compared to Alloy standards. Alloy's new coating technology is build on a production technique which is suitable for mass production, more so than commonly used batch manufacturing techniques. Over time Alloy has become proficient in this technology.

Near the end of the 1990's, Alloy started a project to search for substantial new business opportunities using its new coating technology. This project included ventures in a variety of fields of technology. All these ventures were aimed to apply the new coating technology. Together they formed a portfolio of coating manufacturing opportunities.

In the early 2000's, among others, two applications were identified: a micro-electronics component and an advanced construction material. Market research indicated that both could become a multi-billion dollar industry in the future, which makes the opportunities substantial according to Alloy's standards. As Alloy's new coating manufacturing technology suitability for mass production fitted the large expected size of the market:

> *"Among other activities, the analysis mentioned [the micro-electronics component] and [the advanced construction material] as a possible fit [with Alloy's portfolio]. Both activities have thin film coatings as a key component. An impor-*

tant aspect was high future volumes, so [our coating] manufacturing could be applied. And the market potential was huge. (…) External market [research] firms reported that these markets could become billions to tens of billions in size." - Venturing Manager

Both opportunities thus seemed to fit in with Alloy's existing portfolio of coating manufacturing. This perceived fit led to the creation of the Cord and Plane CI relationships, aiming to manufacture the micro-electronics component and advanced construction material respectively.

In 2004, around the time Alloy invested in Cord and Plane, Alloy started an internal R&D project named "Omega". It consisted of a portfolio of new thin-film manufacturing opportunities. It was more or less a follow-up of the previously mentioned project. In 2005 the project picked up momentum as the team was expanded. The "Omega" project was related to several ventures:

"[Omega] was the research within Alloy that was related to those [Cord, Plane, and other] ventures. The purpose was to acquire technology with the ventures which we could then use to manufacture a product ourselves, a next generation product." - Venturing Manager

A visual representation of the Omega project is given in Figure 3:

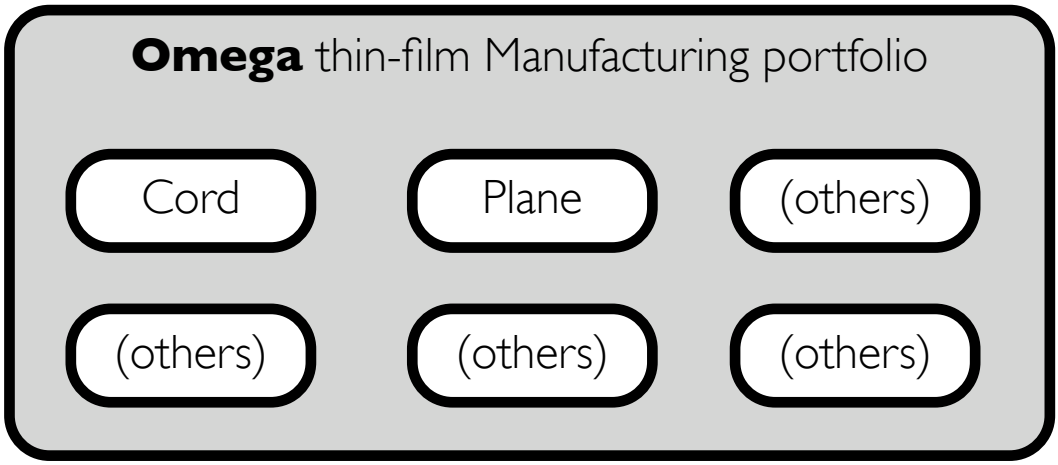

Figure 3: schematic overview of the Omega project.

The Cord and Plane relationships will now be described separately.

CORD VENTURE RELATIONSHIP

Cord is an American company found in 2000. It obtained a license of a particular micro electronics technology developed at a government-funded institute. Cord can be considered a spin-off of earlier research at that institute. This institute had developed this technology since the 1980's. Cord was among five or six other licensees of this technology. The licensed technology was essentially a successful laboratory experiment of the technology, and thus still far from a finished, marketable product. The production method Cord was developing for was batch manufacturing, suited for small scale production runs.

Goals

Alloy learned about Cord through the NTO fund, an VC fund specializing in advanced materials, including thin-film deposition. Since this matched Alloy's technological competences, Alloy invested in NTO and become a limited partner for strategic reasons:

> *"First Alloy invested in NTO. NTO, the materials [oriented] fund, scanned for portfolios that were very narrowly connected to thin film deposition. So that was one of the strategic reasons we decided to invest in it." - Venturing Manager*

In 2001, NTO decided to invest in Cord, making Alloy an indirect investor. This investment was meant to create a prototype product. Cord still was in a "cash-burn" stage: operating at a loss, due to not yet having any marketable products while incurring R&D expenses. In 2003 Cord needed additional funding.

In late 2003, the next investment round was not finalized yet, but Cord was threatened with running out of cash in two weeks time. Alloy then provided Cord with a 'bridge' loan, which is a loan to make the firm endure till the next investment round. The bridge loan was provided while Alloy effectively was only a minor and indirect investor, and thus had little to lose in financial terms. However, if Cord would break down Alloy would suffer a strategic loss:

"At the moment that we were not a [direct] investor yet, we bridged. We had nothing to lose. Of course we were very interested in the business, because it was a potential strategic business to Alloy. We bridged because Cord may have gone broke otherwise." - Venturing Manager

"In 2003 it did not go broke, because we bridged. That would add value via our VC fund NTO. If we would not have bridged, it would have been a serious loss of value for out R&D portfolio. (…) The bridge was purely for strategic reasons." - Venturing Manager

The strategic business opportunity was Alloy becoming Cord's coating manufacturing partner; a configuration in which Cord would develop and market the micro electronics component, while Alloy would be an effective mass producer of the micro electronic components:

"We communicated very clearly that [Cord]'s market is one where Alloy has no activities at all. We would only become a high-volume manufacturing partner. In the end, Cord must have the knowledge to translate the [micro electronic component] into applications, and develop the necessary electronics and knowledge to make the application usable. We would mostly focus on manufacturing good [products] low-cost in high volumes." - Venturing Manager

This partnership combined Cord's competences in the particular micro-electronics technology and market with Alloy's competences in lean manufacturing to support a world-wide manufacturing upscale. A schematic overview of the proposed strategic fit is provided in Figure 4.

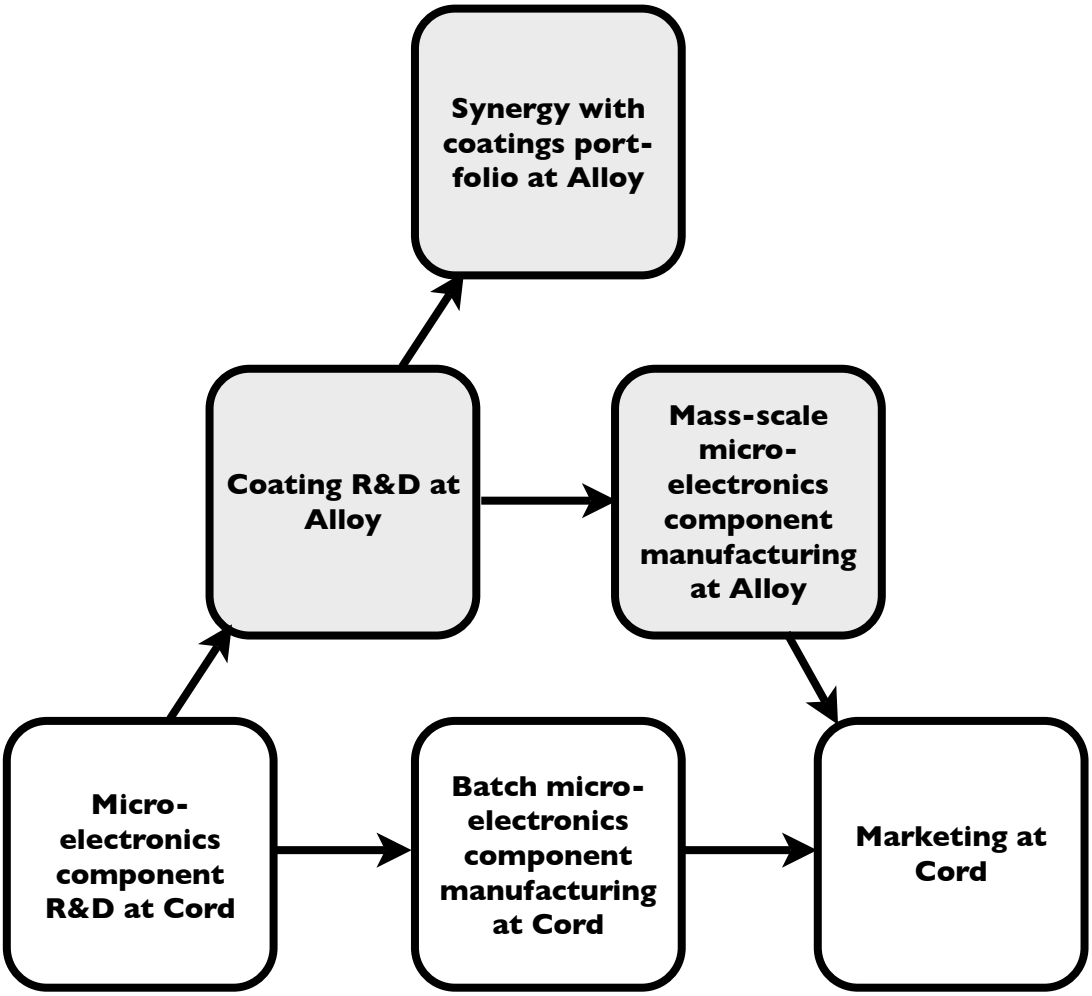

Figure 4: schematic overview of the proposed strategic fit between Alloy and Cord

Negotiation

After providing a bridge loan, Alloy decided to set apart a significant amount of money to invest in Cord, while there was no new consortium of co-investors yet:

> *"We took our [Cord] case analysis to our executives. (…) The decision to invest [in Cord] was made while there was no consortium yet. We already had approval for a large strategic investment, twice the amount we would invest today." - Venturing Manager*

After Alloy's executives had agreed to invest, a three person delegation from Alloy visited Cord for due diligence. Cord permitted full access to Alloy representatives from the very start, because Cord perceived no competitive threat:

"At the very start our due diligence at Cord was very easy. At Cord we were allowed in and could inspect everything that happened. (…) It went fast because we would not become a competitor." - Venturing Manager

While the due diligence turned out favorable, Alloy could not invest yet because co-investors had not finished their own due diligence yet. Because Cord was still nearly broke, Alloy provided a second bridge loan.

Alloy started to negotiate with Cord on the strategic terms of the upcoming investment. Alloy R&D personnel was little involved in these negotiations:

"At the negotiation of the gentlemen's agreement the technological part of Alloy had limited presence. Because we could not make any clear agreements anyway." - R&D Manager

Alloy negotiated about its strategic purposes. It reached a verbal agreement with Cord on developing technology together, which was however not formalized at the time:

"The condition we clearly communicated verbally, yet did not formalize on paper at that time, was that we were interested to cooperate strategically with Cord. A sort of Joint Development Agreement (JDA). We had come to a verbal agreement, but we never demanded that we would only invest if that condition was signed on paper. (…) All parties agreed. They understood its value." - Venturing Manager

Alloy found a verbal agreement acceptable, because it avoided the liabilities involved in a formal JDA. This meant that Alloy would not be committed to delivering the mass-scale manufacturing technique if it turned out to be incapable of doing so:

"We had agreed with our executives not to accept any liabilities. We will not make promises or take liabilities. We would not contractually agree with them that 'we will do the [mass-scale coating] manufacturing for you', because that is a liability under American law. You are then obliged to deliver." - Venturing Manager

The negotiations were considered easy, because Cord and Alloy aimed to form a partnership in the micro electronics value chain. Both parties were complementary to each other.

Being a verbal, non-formalized agreement, it did not provide much detail on the joint development. It is described as being as general as a 'gentlemen's agreement':

> *"First there was what Cord called a "gentlemen's agreement" between Alloy and Cord. When Alloy invested in Cord, the intention to become active as the thin film [micro electronic component] manufacturer was made very clear to Cord." - R&D Manager*

In June 2004, the new investment round was completed. It had turned out NTO was unable to do a follow-up investment, but a different consortium had been assembled. This consortium included financial investors, as had the previous one. However, Alloy then dropped the lead investor role, and another VC fund took over. Both bridges provided to Cord were turned into a part of Alloy's investment into Cord. However, Alloy lost its financial interest (rent) on the bridge loans:

> *"We had provided bridge loans, on which Cord had to pay interest. Next, the lead investor of the investment round demanded that all interest on the bridge would be negated." - Venturing Manager*

Another investment term was that Alloy had a seat on the board of Cord, which was held by an Alloy Venturing Manager. On this person's insistence, a second Alloy Venturing Manager was allowed as unofficial board observer. Alloy's investment provided it with a 20 percent minority share in Cord. Besides the terms mentioned, the investment contained some standard terms, such as a Non Disclosure Agreement.

In early 2005, Alloy sent a JDA draft to Cord. This draft proposed a structure for the knowledge exchange:

> *"In March or April 2005 a document was handed to Cord describing the general outline of the Joint Development Agreement. What we would do, what its scope should be, what the obligations and agreements were regarding the exploitation of results, and about the IP-rights." - Venturing Manager*

Cord responded that there still was too much uncertainty to agree to a JDA:

> *"The reasoning Cord gave for waiting so long to sign the JDA was 'we do not know our processes well, so it is to early to attach ourselves to a JDA'. They said*

so themselves. When we signed the JDA later, they may not have solved everything, but they obviously were more in control." - R&D Manager

The actual JDA was not signed until 2007. The final version was a lot like the 2005 draft:

"An intense cooperation started in late 2004, early 2005. For two years work was done in the spirit of the Joint Development Agreement. However, it took quite long to effectuate the Joint Development Agreement… While the final version is very similar to the draft in 2005. Very little had changed." - Venturing Manager

Knowledge exchange

Alloy strived for two goals during the R&D exchange: learn about Cord's technology to become their manufacturing partner, and help Cord with its own development to increase the value of the Cord equity stake:

"The focus was on two matters. At the start [the focus] was technical support for Cord, since we have a lot of coating-technology knowledge available. (…) The other goal we had early on was to become Cord's manufacturing partner. (…) We wanted to learn which knowledge they had developed. Because it makes little sense to start [mass-scale coating] manufacturing activities if you don't have the knowledge to improve the manufacturing process." - R&D Manager

"Of course, we always had two objectives. We naturally had to help Cord. We are the largest individual shareholder. If Cord is successful, Alloy will do well." - Venturing Manager

The knowledge exchange between Cord and Alloy started in an open manner, which was appreciated by Alloy:

"At the start we thought 'Cord is easy going'." - R&D Manager

"We noticed quickly that in the technological field we had an open communication with many experts at Cord." - R&D Manager

A roadmap for R&D activities had been designed, but it was based on little actual information:

"A schedule [for knowledge exchange] had been written, but it was not detailed. It was something like 'first year [do] this, second year [do] that. That is very vague." - R&D Manager

"At Cord there was a roadmap, but in hindsight it was based on too little information. I wonder if it was a nonsensical roadmap. (…) The roadmap was relatively clear and simple, but the information on which it was based was insufficient." - R&D Manager

Also Cord was still facing many challenges itself:

"Cord had many challenges towards the development of the product. Everything they still had to do, the specifications etcetera. It was not 'you take it and are now capable or reproducing it' transfer. They were very needy to solve problems." - Venturing Manager

However, this good knowledge exchange soon turned for the worse, in the early summer of 2005. Alloy R&D personnel sensed that Cord's management felt threatened by the knowledge transfer to Alloy:

"In May or June 2005 the interaction, which was very open earlier, was suddenly halted. (…) After a short while we noticed that Cord became critical of Alloy's internal activities. We sensed that Cord's management feared that too much knowledge was being transferred to Alloy. Despite that we always said that we viewed ourselves as Cord's manufacturing partner, there was a clear fear that if too much knowledge was transferred Alloy would start its own development independent of Cord. It became very clear that during 2005 the cooperation started of very well, and then became more difficult. Information exchange became tougher." - R&D Manager

"There was informal contact with [a former Cord R&D employee] after he had left Cord. He confirmed the flow of information to outside the company was viewed very critically." - R&D Manager

"The flow of information from them to us was limited." - R&D Manager

Opinions vary on whether or not Alloy was meanwhile being of much strategic value to Cord:

"I think Cord received a lot information about our internal development. We briefed them regularly. We also successfully improved their process and communicated that very clearly to them." - R&D Manager

"We did certain process developments and could prove some minor advantages. Cord was interested, but we did not improve their process or help directly." - R&D Manager

"We have never been able to create [their micro-electronic application]. A functional [component], so we would have had something to offer Cord. A relationship needs to be earned; it is taking and giving, not just giving. Especially when you are just a minority owner." - Venturing Manager

Alloy and Cord were also working on different matters. While Cord focused on the problems with its micro-electronics component, Alloy was more concerned with a 'next generation' of manufacturing. At that point Cord may not have cared much for next generation manufacturing if their current batch manufacturing had problems. If Alloy had focused on Cord's immediate issues, it might have captured more knowledge according to one venturing manager:

"There only was a working prototype [at Cord]. Certain layers were too thick, making them crack. They did not know how to solve that. If you have a product, that product has a technical issue, and somebody else says 'I want to capture this to develop the next generation manufacturing', will you mind that or not? (...) At that moment Alloy had to capture [knowledge], and help Cord solve their problem as much as possible. Because if we help them solve the problem, we capture the knowledge how to do it ourselves." - Venturing Manager

Cord's management always attended the knowledge exchange meetings. During meetings there were ongoing discussions about the scope and nature of the cooperation, besides discussing technological matters:

"At Cord we were very often discussing the goals, the approach, the organization of the cooperation and etcetera." - R&D Manager

The attendance of Cord management to R&D meetings also hindered information exchange, because it was very sensitive to creative engineer ideas outside the strategic scope of the relationship:

"At Cord the management was always involved. It was very difficult to bypass them. It would have been more efficient if we had [bypassed management].

With the [R&D personnel] you can come up with and discard ideas without trouble. You can do so much more, there is more freedom. (…) Because Cord management always attended, certain statements always were interpreted strategically. You had to weigh your words very carefully." - R&D Manager

Cord also could not deliver market information to Alloy, prompting Alloy to investigate the market itself:

"At the start we had to stimulate Cord to deliver [market] information. As time passed we started stating 'look, we're working on it' and we to state market information." - R&D Manager

In 2007, Cord needed money again. In a new investment round, Alloy attached the JDA as a condition for the new investment. Cord agreed and signed the JDA, but the knowledge exchange hardly improved:

"The JDA was important to remain 'on speaking terms'. Earlier the information exchange was not in a very coordinated manner. They were ad hoc contacts between engineers on either side. But after the JDA was signed we had a monthly conference call, and regular face-to-face contact. (…) But I did not sense that the quality [of the knowledge exchange] improved. Cord still was very careful about what they told, and the contact still was mostly via their management. The relationship did not improve as we had hoped. The information exchange still was very difficult." - R&D Manager

Cord tried to convince Alloy to change the R&D's course to a type of manufacturing Cord preferred. However, Cord refused to give detailed information on its own manufacturing process:

"Cord gave more information about the general manufacturing-flow. (…) They used that to communicate to us why we should work on a different manufacturing process. That clearly was new information they gave us. But I was missing detailed information for each process step, which we would have needed to setup a new generation [mass-scale] manufacturing. You have to understand why their process is setup like that, and what the critical issues are. We asked for that explicitly at the start, and that request has been explicitly denied. (…) I am certain that we would have learned more if we could have walked around in their plant." - R&D Manager

Outcomes

The lack of knowledge transfer hindered Alloy's internal research. Ultimately, Alloy failed to produce a prototype of the mass-producible micro electronic component:

> *"We have received very little information from Cord. (…) The technological progress in that project halted because we got to little technical information from them. It was trial and error. I also think that they had problems with their own system." - R&D Manager*

> *"I have never seen a working Alloy [micro-electronic component like Cord's]." - Venturing Manager*

> *"We have never been able to deliver [Cord's micro-electronic component] for high volume manufacturing." - Venturing Manager*

Alloy's Omega project was stopped in 2008. However, Alloy still holds an equity share of Cord. No spin-offs have been created, and there is no apparent new use for the knowledge gained. Alloy can still use the equity share for financial purposes, Cord is expected to have a very successful future.

The relationship with Cord is regarded as mediocre:

> *"I am not very dissatisfied with Cord, but I think we learned many lessons for the future." - Venturing Manager*

> *"[On a scale of 1 to 10 of trust] the relationship with Cord was a 3." - R&D Manager*

PLANE VENTURE RELATIONSHIP

Plane is an American company found in 1989. It develops and produces an advanced construction material. For a long time it has been financed by government research grants and angel investors. However, around 2004 Plane choose to attract outside investors. At this point, Plane was already producing small-sized products on a small scale for a single customer.

Goals

Alloy learned about Plane in 2003 through Innotia, a Venture Capital fund where Alloy was a limited partner. Innotia informed Alloy about Plane. Innotia was not interested in investing itself, since it considered Plane to be too 'early stage'. However, Plane was of interest to Alloy because these advanced construction materials are an application of thin-film coating technology similar to Cord's micro-electronics component, and Alloy already had a successful business in a related advanced construction materials industry:

> *"[Plane's] coatings are in fact [a] thin film micro electronics [component like Cord's]. They're highly similar, highly comparable. The difference is [minor]." - Venturing Manager*

> *"Alloy has a market channel [for Plane's technology], because we are [one of the largest] manufacturers of [a highly similar application] worldwide." - Venturing Manager*

The opportunity was Alloy adopting Plane's technology for use in its own market:

> *"So there is a new [advanced coating materials technology] coming up, let's analyze if that technology can be developed on [our own substrate]. (...) It was a clear next generation product for [Alloy's existing business]." - Venturing Manager*

This opportunity was potentially huge, since the use of this type of construction material is widespread. The new technology offers significant advantages in financial costs, environmental costs and end-user comfort.

A schematic overview of the proposed strategic fit is provided in Figure 5:

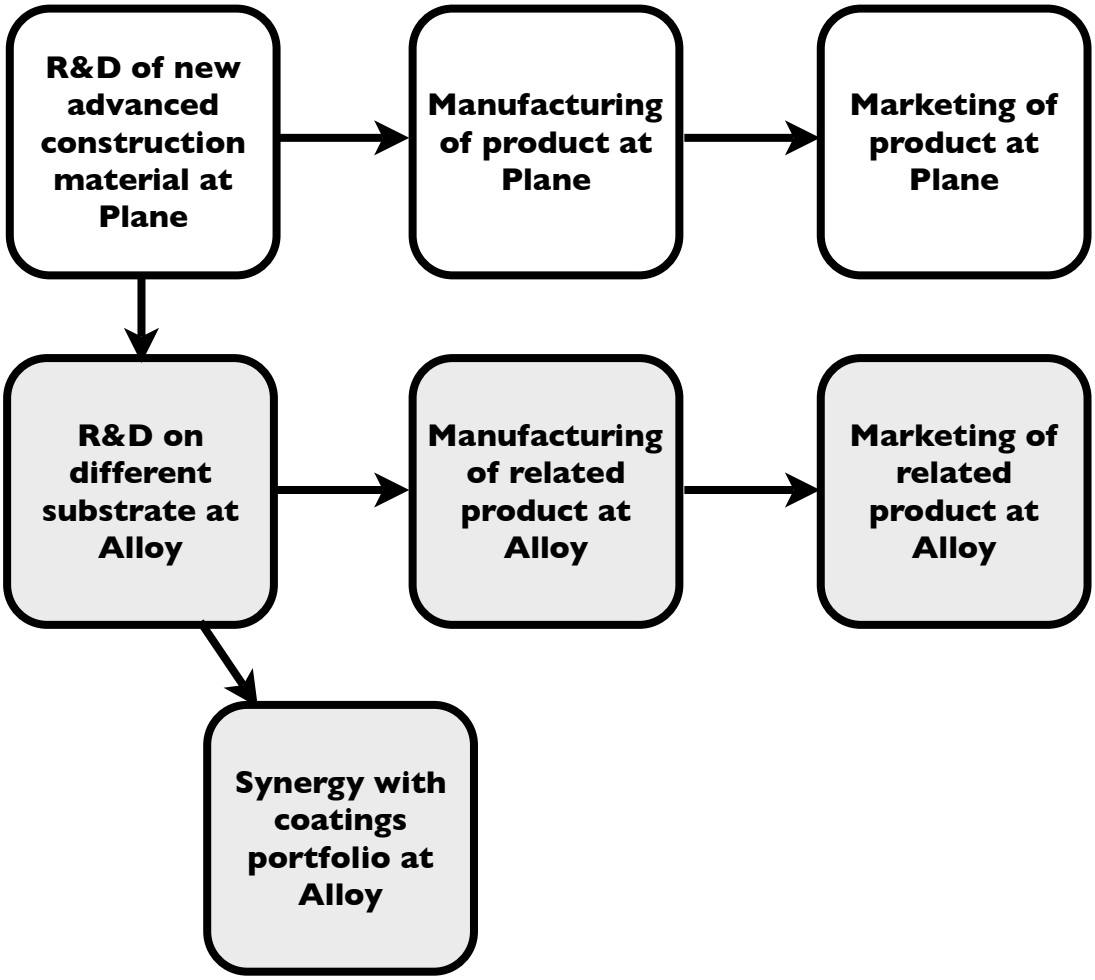

Figure 5: schematic overview of the proposed strategic fit between Alloy and Plane

Negotiation

Plane's management was more technology than finance oriented.

At the very start, Plane allowed Alloy little access, fearing Alloy would run of with Plane's knowledge. Alloy had to be careful not to scare of Plane, since there was little trust originally:

> *"At Plane it took very long before we could at last see it for real. But when we won their trust, it worked. It's typical for small companies that not everybody is allowed to go there. Only [another venturing manager] and me were allowed to go there. A little later [an R&D manager] was allowed too. Trust was hanging by a silk thread. You only have to say something wrong and it can be [ruined] completely. (…) In Plane's case it was borderline, but when we had an agreement it went rapidly. Originally it was more difficult to take that step. They were very fearful that we would walk off with their technology. That our R&D personnel would go to [an external academic institute] right away. That we*

would show them how Plane produces its product. That is all their knowledge, all their value would be gone." - Venturing Manager

Negotiation was considered difficult, because Alloy would become a potential competitor in the value chain:

"We were a potential competitor, because we would produce a product that is an alternative to theirs." - Venturing Manager

In 2004, Alloy proposed a Technology Evaluation Agreement (TEA) to Plane. This type of agreement would provide Alloy with access to Plane's technology, but with no legal rights to exploit the knowledge gained from that access:

"Fairly quickly we send Plane our proposal: 'you are developing technology on [Plane's substrate], that is interesting. We would like to evaluate if that technology is also applicable to [Alloy's substrate]. (…) We would like a Technology Evaluation Agreement, so we gain access but no rights to your technology for a predefined period of time." - Venturing Manager

From the start, Alloy and Plane made a clear distinction in the markets they were targeting. This was important, because Alloy's product could become an alternative for Plane's product. Plane would continue developing for the 'OEM' market, where the advanced construction materials were treated during their manufacture, before on-site installation. This was typical in Plane's target market. Alloy would develop for the 'retrofit' market, where the construction material would be treated after it was already installed. This was typical for Alloy's existing market.

Plane and the other investors responded favorably to Alloy's TEA offer, but demanded a financial commitment of Alloy to tie Alloy's interests to Plane's. Alloy agreed to this term:

"Plane had a positive attitude towards the TEA offer, and only demanded one condition that we agreed to. They said 'we would like the TEA, but we want to ensure you're bound to us, more than just contractually. If we agree on the TEA, we would like a financial participation from Alloy in Plane to show commitment, as a tie between Alloy and Plane'." - Venturing Manager

Alloy thus participated in investment round A, along with a consortium of angel investors and one other strategic investor. Alloy took a careful approach to the negotiation table, avoiding the lead investor role and communicating that Alloy's investment was not a 'done deal' yet:

> *"We then said: 'yes, we want to do the financial investment, but we won't be the lead investor.' We want to join an existing investor, and won't negotiate about the details of the [investment] deal. We just want to know how much we have to pay, and then we will ask our executives whether or not we want to spend that." - Venturing Manager*

The actual investment transaction happened in 2005. It was a relatively small participation. The financial investment was tied very closely to the TEA:

> *"The investment and the Technology Evaluation Agreement were signed on the same day. We would only invest money if the TEA was signed at the same time." - Venturing Manager*

The terms of the investment also included a board observer, but not a regular board member. There also was an attempt to do part of the investment in Alloy machinery Plane could use, but that did not work out because Plane rather wanted money.

The TEA itself was a simple document:

> *"The agreement with Plane was very simple. We had split the market. Plane had all rights regarding [their substrate], we had all the rights for [our substrate]. (...) It was not even specified that we were limited to retrofit [applications]." - R&D Manager*

The relative ease of the TEA negotiation is attributed to not using lawyers, since there were no financial investors yet:

> *"The TEA was quickly agreed upon, because even Plane did not contract a legal advisor. They just did it themselves. That went very rapid." - R&D Manager*

> *"There was a consortium with a strategic investor, there was no financial investor yet. So agreeing to a TEA was easier at that time, if trust was won." - Venturing Manager*

If Alloy would have wanted exploitation rights on the knowledge transferred later, a licensing and royalty agreement would have to be agreed upon by Alloy and Plane.

After Alloy invested, Plane also bought some materials from Alloy related to the production of thin film layers. This client - customer relationship was detached from the R&D cooperation.

Knowledge exchange

The knowledge exchange was handled by Alloy's Omega project. The TEA included a short R&D roadmap: Alloy would adopt Plane's technology in the first year, and evaluate whether a transfer to Alloy's substrate was feasible after the second year:

> *"The only thing specified was that we forecasted that Alloy would have learned the technology on [their substrate] after a year. After the second year we would evaluate of we could transfer to [our substrate]. More details were not in the TEA." - R&D Manager*

As agreed on in the TEA, Alloy started by replicating Plane's technology. Plane structured this knowledge exchange, to the point of planning at a weekly level. This approach made sense, because Plane naturally knew its on knowledge best:

> *"From 2005 onwards there were good agreements with Plane on which steps to take in technology transfer. (…) It was very specifically defined. For example, we first discussed what was the proper equipment, measure methodology and etcetera. We took two months to do that. The next step was the first layer [of the coating]: what is it made of and how do we get it right. That was very specifically defined." - R&D Manager*

> *"Plane really took the lead in 'how do we do the transfer'. What was logical, because they knew the subject and what needed to be transferred. So at the start of the cooperation, when we had little expertise, they pointed out 'try to realize that, and we will discuss the results'. And that was a few weeks', a month's job." - R&D Manager*

Plane took measures to made control the knowledge exchange. The Alloy personnel with access to Plane technology was limited and known to Plane. Their files and other work-related material were kept strictly separated from other Alloy activities.

As the knowledge transfer progressed, Alloy's R&D employees started taking more initiative in the relationship:

> *"We had good people working there. So they fairly quickly started taking initiative. At a certain point we started discussing together 'what is the next step'. We would then execute that step, en discuss the results. That's how the ball kept rolling. That had not been formalized." - R&D Manager*

Meanwhile, Alloy had little knowledge to offer Plane in return, because of little expertise. It was however agreed that if Alloy would find anything relevant, that knowledge would be shared with Plane:

> *"At first the idea was not 'Alloy will help [Plane]'. We had little expertise. The only agreement made was that if we would develop knowledge applicable to glass during the cooperation, Plane could use that." - R&D Manager*

The adoption of Plane's technology went well, Alloy successfully replicated it after a year. In 2006 Alloy turned its attention to developing the coating on Alloy's substrate for its retrofit market. It turned out that this was extremely difficult technically:

> *"The transfer to [Plane's substrate] had succeeded, so that was very successful. We then started on [our substrate]. (...) We have had technical problems for a very long time there." - R&D Manager*

> *"It turned out very quickly that the technical hurdles were extremely difficult." - Venturing Manager*

Around this period, Alloy turned its attention to market opportunities, to investigate if there were relatively short paths to commercialization:

> *"In [2006] we gave more attention to commercializing the product. We had found that a [retrofit] product would take years. Our people actively went looking 'can we work in such a way to realize business activities quickly. So we would not only communicate the message 'have 10 years of patience and we will have something' to the executives, but we would get something proven and operational earlier." - R&D Manager*

It was found that there may be an opportunity using Alloy's substrate as an OEM pre-installed application instead of retrofit, because that eliminated many technical prob-

lems. Alloy could then aim to manufacture the advanced construction material for markets it was familiar with, while Plane was aiming at a different market. In 2007 Alloy and Plane discussed entering Plane's existing market together using the new technology, and were trying to formalize a JDA agreement:

> *"[The JDA] was very specifically aimed at a cooperation between Alloy and Plane for a [OEM] product [using Alloy's substrate] in the [Alloy's markets]." - R&D Manager*

The negotiations took over a year's time, and the JDA was ultimately not signed. The JDA negotiation had been troublesome for several reasons.

Firstly, the TEA had a clear distinction between Alloy's and Plane's substrates, while the JDA was about a more cooperative product. This made the division of profits and markets less obvious.

Secondly, Plane had meanwhile gotten financial investors, who delayed the negotiations by demanding the use of a legal advisor. The risk-averse legal advisor stretched the negotiation for over a year, while meanwhile R&D personnel was already working on the project. The high level of trust between Plane and Alloy meant the work could be done without the contract.

> *"It were the financial investors who put us on the long term. They said 'there needs to be a lawyer involved'. When the financial investors joined Plane, they took the lawyers with them, accidentally the same [lawyers] we had experienced earlier. So no JDA. That does not mean we have not done [knowledge exchange]." - Venturing Manager*

Thirdly, when the JDA was agreeable to all parties at last, the work had already been done, and Alloy had decided to drop the opportunity. The JDA had thus become irrelevant.

Outcomes

The originally envisioned retrofit product using Alloy's substrate was not realized, due to technical difficulties involved. Alloy has investigated the possibility of becoming Plane's manufacturing partner, but this opportunity was not viable enough yet. Spin-offs for niche markets were considered, but none were realized due to a too small potential market, too long time to market and personal unwillingness to become an entrepreneur instead of an employee. Alloy's R&D has halted because the Omega project has been cancelled. Alloy still holds an equity share in Plane, and is still selling materials to it as a supplier.

The relationship with Plane is praised:

> *"To me, Plane is the example of how [a venture relationship] should be." - Venturing Manager*

> *"[On a scale of 1 to 10 of trust] the relationship with Plane was an 8 or 9. Several people went to their plant for several weeks. They worked and cooperated on the production floor. They could see everything, talk to the personnel. Total freedom." - R&D Manager*

DISCUSSION

Drawing on the findings above, a model of trust, formal contracts and knowledge transfer dynamics within both relationships was developed. It is depicted in Figure 6. Based on the model of Ring & Van de Ven (1994), three sequential stages of a strategic alliance are distinguished: negotiation, commitment and execution. In the negotiation stage, both partners enter a bargaining and sense-making process to develop joint expectations of the relationship. During the commitment stage the partners reach an agreement, and establish the formal terms of the relationship in a contract. In the execution stage the planned exchange is put into effect, resources are put into place, and whatever else needs to be done is executed. While in reality these three stages are overlapping and recurrent, separating them is useful for analytical purposes (Ring & Van de Ven, 1994).

It is found that in the negotiation and commitment stages, few employees are involved in the relationship at both the Cord and Plane cases. Venturing managers mentioned that that was a conscious choice, as involving many employees at that stage hurts trust development. During the execution stage, R&D personnel became involved to execute the R&D activities. Thus the focus of the micro-level analysis is on the execution stage, as more employees are involved and more informants provided relevant data.

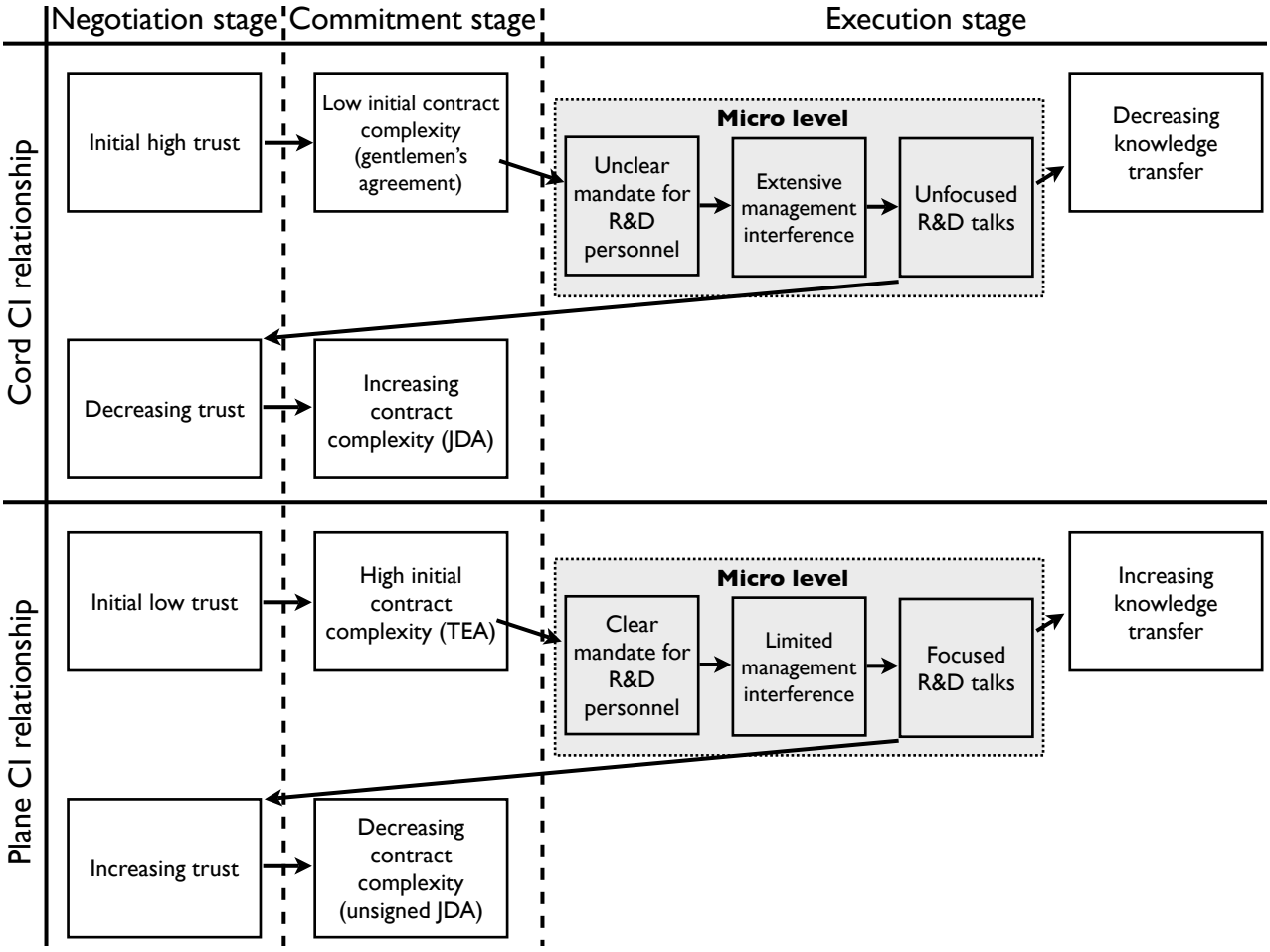

Figure 6: process models of the Cord and Plane venture relationships

To answer the first research question - on the impact of firm-level concepts on employee actions - a lot of evidence is found in the data.

The relationship with Cord started with a low contract complexity. Besides some standard agreements (e.g. NDA), there were no specific written legally enforceable clauses. Instead, there was the unwritten gentlemen's agreement. This low contract complexity led

to a unclear mandate for the R&D personnel. Involved employees at both Alloy and Cord did not know exactly what was expected of them. Alloy R&D personnel had two different goals, meetings were irregular, and the planning of R&D exchange was not of much value.

Contrary to the Cord relationship, the relationship with Plane started with a relatively high level of contract complexity. The TEA included specific clauses on the commercialization of the relationship's outcomes and the management of the transferred knowledge. This high contract complexity led to a clear mandate for R&D personnel. Plane personnel knew exactly what knowledge needed to be transferred. They carefully planned a schedule to transfer the knowledge step-to-step to Alloy.

Contrasting the Cord and Plane cases, it is found that the level of contract complexity, a firm-level antecedent, determines how clear the mandate of R&D personnel is. This mandate represents the conditions of individual behavior, as described before in the theoretical gap section.

> ***Proposition 1:*** *in corporate investment relationships, a high (low) level of contract complexity set a clear (unclear) mandate for the R&D personnel involved in knowledge exchange.*

The clarity of the mandate for R&D personnel affects the behavior of the start-up partner's managers, even while they do not execute the R&D exchange themselves. At Cord the unclear mandate worried its managers. Because there was no clear definition of what knowledge would be transferred, they feared that knowledge Cord would rather keep to itself would 'leak' away to Alloy. Cord management thus always attended the conference calls between Alloy and Cord, and closely watched other forms of communication between the firms too.

Plane's managers felt comfortable with the R&D talks. The TEA provided safeguards against Alloy opportunism. Plane's managers were also more technologically knowledgeable than their Cord counterparts, providing Plane managers with a clear idea of

what knowledge was being transferred. They did not insist on always attending meetings, nor did they divert R&D discussions to relationship management matters.

Comparing Cord and Plane, it is found that the clarity of the mandate for R&D personnel influences how the start-up partner's managers behave. A clear mandate will provide managers with insight into what knowledge is transferred between R&D personnel. This reduces the risks of transferring knowledge that is not supposed to be transferred. Managers thus feel more at ease, and let R&D personnel do their work freely without interfering. Contrary, when the mandate is unclear, managers will interfere in the R&D discussions.

> ***Proposition 2:*** *in corporate investment relationships, a clear (unclear) mandate for the R&D personnel will reduce (increase) the perceived risk of unwanted knowledge transfer, letting managers interfere less (more) in R&D discussions.*

In the relationship with Cord the manager's interference in R&D talks proved to hinder knowledge transfer. R&D personnel felt that it had to discuss matters in a careful, conservative manner, rather than the creative way they prefer. Also a lot of time was spent on talking about the relationship, instead of actual R&D matters. The lack of focus and creative leeway in the R&D discussions between Cord and Alloy left Alloy R&D personnel annoyed.

In contrast, the limited interference of managers in the relationship with Plane made R&D talks between Plane and Alloy highly productive. Alloy R&D personnel regarded these talks as much better than with Cord.

The interference (or lack thereof) of managers affects the focus of the R&D talks. When managers have limited interference, R&D personnel can communicate effectively and freely. This results in more focused and creative R&D discussions. Contrary, extensive manager interference will derail the R&D talks, causing loss of focus.

Proposition 3: *in corporate investment relationships, when managers have limited (extensive) interference in R&D talks, these R&D talks become more focused (unfocused) on R&D matters.*

Turning to the second research question, on the impact of employee actions on firm-level concepts, there is an intuitive finding. In the Cord relationship, the unfocused R&D talks led to a faltering knowledge transfer. Alloy R&D personnel felt they could have learned much more if there would have been more focus. In contrast, Alloy R&D personnel felt they had learned greatly from Plane, due to having very effective R&D talks without much management interference.

When R&D discussions are focused and have creative leeway knowledge transfer will increase. Vice versa, when R&D discussions are hindered by management interference, knowledge transfer will drop.

Proposition 4: *in corporate investment relationships, when R&D talks are focused (unfocused), knowledge transfer is increased (decreased).*

In the Cord relationship, the unfocused R&D talks had negative influences beyond decreasing knowledge transfer. Alloy R&D personnel reported unsatisfactory input from Cord, and the ongoing discussion about the relationship's goals (rather than R&D matters) brought attention to possible opportunism. As a result, trust between Alloy and Cord decreased. In contrast, the successful R&D talks in the Plane relationship increased trust between Alloy and Plane. It is thus found that focused R&D talks increase trust.

Proposition 5: *in corporate investment relationships, when R&D talks are perceived as focused (unfocused), trust between both partners is increased (decreased).*

The decreased level of trust in the Cord relationship prompted Alloy and Cord to draft and sign a JDA. The JDA was a formal written document with more specifics on knowledge transfer, thus being a much more complex contract than the original gentlemen's agreement.

The increased level of trust in the Plane relationship took away the need to sign an additional contract after the original TEA expired. Even though Plane was pressured by some of its shareholders to draft a JDA with Alloy, Plane and Alloy continued their R&D cooperation while the JDA was put off. Contract complexity thus decreased, as the TEA expired and was not formally replaced.

Increasing trust thus leads to decreasing contract complexity, and vice versa.

> ***Proposition 6:*** *in corporate investment relationships, an increasing (decreasing) level of trust will decrease (increase) contract complexity.*

Surprisingly, when propositions 1, 2, 3, 5 and 6 are reviewed together as a development of the CI relationship over time, it is revealed that contract complexity has a self-defeating pattern. In order of causality, a high initial contract complexity leads to a clear mandate, limited management interference, focused R&D talks, increasing trust, and ultimately a decreasing level of contract complexity. Vice versa, a low initial contract complexity leads to an unclear mandate, extensive management interference, unfocused R&D talks, decreasing trust and finally an increasing level of contract complexity. The relative level of contract complexity at the relationship's start thus seems to reverse itself over time.

> ***Proposition 7:*** *in corporate investment relationships, a high (low) level of contract complexity at the relationship's start will inverse to low (high) over time.*

CONCLUSION

It is widely recognized that the firm-level concepts trust, formal contracts and knowledge transfer are interrelated. This study contributes to alliance governance literature by describing how these relationships are underpinned by interactions among employees. This section describes how the findings in this study concur and contrast with the existing body of knowledge.

FIRM- TO MICRO-LEVEL DYNAMICS

Propositions 1, 2 and 3 describe how contract complexity influences the micro level of the corporate investment relationship. Specifically, contract complexity (a) clarifies the mandate for R&D personnel, (b) limits management interference in R&D talks, and ultimately (c) provides focus in the R&D talks. To the author's knowledge, these findings are groundbreaking in the alliance governance literature.

The process of formal contracts creating a mandate for employees has been described before. Ring & Van de Ven (1994) argued that a formal contract can designate specific roles to constrain the behavior of involved employees. However, reiterating the theoretical framework, a contract has two purposes: opportunism prevention and coordination. The role behaviors described by Ring & Van de Ven serve as coordinating mechanisms, setting guidelines for employees on how to behave and act as an agent of their employer. Role behaviors are not described as being related to preventing opportunistic behavior. Contrastingly, the mandates described in this study serve as opportunism prevention mechanisms, as the formal contracts that instigated them were focused on opportunism prevention (rather than coordination). The mandates found in this study thus differ from Ring & Van de Ven's designated role behaviors.

The interference of management in R&D talks has been described by other theorists. Faems et al. (2008) distinguished between the managerial and operational level in exploratory R&D alliances. They found that when managers interfered in R&D operations by rigidly applying a formal contract, the amount of knowledge transfer decreased because R&D personnel had less opportunities for joint sense-making. In other words, when management actively enforces the mandate set by the formal contract, knowledge transfer suffers. This leads to a seeming contradiction: while having a complex contract limits man-

agement's interference, management can use that same complex contract to interfere in R&D talks.

To understand this contradiction, yet again the purposes of a contract must be distinguished. In Faems et al.'s (2008) study, the management's rigid application of the contract focused on adherence to deadlines. This is a coordinating mechanism, where the mandate is a guide to execute the alliance, and thus limits R&D personnel's leeway. In this study, the formal contracts are focused on preventing opportunism, detailing legal penalties in case of abuse of knowledge transfer. This type of formal contract limits the usage of transferred knowledge, rather than the transfer of knowledge itself. R&D personnel thus has a mandate that maintain their leeway, and management only needs to interfere if the partner's abuse of the relationship is established. Revealingly, the formal contracts and the actual knowledge transfer in this study have been described as 'two separate worlds, one of lawyers, one of engineers'. The formal contracts in the Cord and Plane relationships were hardly applied. It was their presence, rather than their application, that influenced the relationships.

Summarizing this point, it is argued that a mandate based on a contract limiting the *use* of transferred knowledge will increase the quality of R&D talks. However, a mandate based on a contract coordinating *how* to transfer knowledge can lead to decreasing R&D talk quality when management rigidly applies the contract. This concurs with the study of Faems et al. (2007), who found that the presence of detailed contractual clauses on *what* knowledge to transfer - rather than *how* to transfer it - positively influences knowledge transfer. This emphasis on the function of a contract is also emphasized by Kleinwoolthuis et al. (2005): assessing which functions are prevalent in a contract is essential to understand the contract's influence on the organizational relationship.

MICRO- TO FIRM-LEVEL DYNAMICS

Heading back from the micro-level to the firm-level, proposition 5 describes that a high level of focus in R&D talks will lead to increasing knowledge transfer. However intuitive this finding may be, it is an important finding because it completes the loop from firm-level antecedent, via micro-level mediators, to firm-level outcomes. It thus represents an example of how a firm-level relationship is underpinned by the micro-level, as suggested by Foss (2007). Together with propositions 1, 2, 3 and 4, this finding provides an extensive and complete causal explanation for a positive relationship between formal contracts and knowledge transfer. This confirms to previous findings in the literature.

It is notable that in this study the micro-level conditions for increasing knowledge transfer were set by an opportunism preventing, rather than a coordinating contract. The findings concur with Faems et al.'s (2007) findings that a contract with specific opportunism preventing contractual clauses increases knowledge transfer. Ring & Van de Ven's (1994) proposition that the coordinating aspect of contracts boost knowledge transfer is not supported by this study's findings. The contracts described in this study had very few coordinating aspects, because the high uncertainty made it very hard to plan ahead of time. Perhaps the benefits of coordination via contracts are valid, but formalized coordination was little used in these corporate investment relationships.

Another relationship between the micro- and macro-level is described in proposition 6. Focused R&D talks will lead to increasing trust between both partners. This is a surprising finding that does not show up in existing theory. As described in the theoretical background section, it is accepted in the literature that a high level of knowledge transfer leads to increasing trust. However, the literature's lack of attention to the micro-level may have lead to the use of (firm-level) knowledge transfer as a proxy for (micro-level) focused R&D talks. Informants in this study referred to the focus of R&D talks, rather than the

amount of knowledge transfer, to explain the changing level of trust. This is a sensible explanation for two reasons. Firstly, the way in which the partner behaves in R&D talks is a much more visible concept than knowledge transfer. It is quite difficult to estimate what an organization has learned from a relationship, while assessing the quality of R&D meetings is much easier. Secondly, the partner's behavior in R&D talks can be clearly attributed to the partner. In contrast, the level of knowledge transfer is attributable to both the partner and the own firm, since successful knowledge transfer requires receptivity (the ability to absorb) at the receiving side. Summarizing, it is proposed that the (micro-level) focus of R&D talks may be a more relevant antecedent of trust than (firm-level) knowledge transfer.

TRUST AND FORMAL CONTRACT DYNAMICS

The finding in proposition 7 is a surprising one: a high level of contract complexity at the relationship's start will inverse to low over time, and vice versa. This particular dynamic has to the author's knowledge not been found previously in the literature.

Theorists often frame the relationship between trust and formal contracts around the question of whether they substitute for or complement each other (Kleinwoolthuis, 2005; Luo, 2002; Poppo & Zenger, 2002). This question assumes that trust and formal contracts affect each other in a reciprocal manner, whether positive (complementary) or negative (substitutive). This study's findings indicate something else: trust's effect on formal contracts is negative, while formal contract's effect on trust - mediated by micro-level dynamics - is positive. There thus are two different relationships between trust and formal contracts, rather than two similar reciprocal relationships.

The non-reciprocal nature of trust and formal contracts may often have been overlooked because such a dynamic is inherently unstable, and can thus only be measured over time. Many researchers framing the issue in 'substitutes or complements' terms have

used cross-sectional, non-longitudinal data (Luo, 2002; Poppo & Zenger, 2002) or were situated in different domains than organizational relationships (Malhotra & Murnighan, 2002). Their research designs thus prevented them from detecting this dynamic. However, researchers that did use longitudinal data have commented on the complexities of trust and formal contracts interaction (Faems et al., 2008; Kleinwoolthuis et al, 2005).

FUTURE RESEARCH AND LIMITATIONS

Heeding the suggestion of Foss (2007) to examine the micro-level dynamics underpinning firm-level relationships, this study found interesting dynamics between employees in corporate investment relationships. It is found that the micro-level can provide deeper insights into inter-firm relationships. Future research on the micro-level seems to be necessary. Particular topics of interest are suggested below.

An advantage of theory building case studies is that the resulting theoretical propositions are often highly testable (Eisenhardt, 1989). An interesting follow-up to this study would thus be testing the propositions found in this study on a larger number of CI relationships. For the firm-level concepts of trust, formal contracts and knowledge transfer there are several quantitative measures available. The micro-level concepts of mandates to R&D personnel, management interference and the focus of R&D talks are also likely to be readily measurable, because they have been constructed from direct evidence. A likely candidate for measurement is survey scales.

However, to effectively test the propositions in this study, the data collection will have to be different from many previous studies in the alliance governance literature. Firstly, because the relationships have a dynamic nature - they change over time - longitudinal data collection is necessary. This differs from the many cross-sectional survey studies employed before. Secondly, it is important to analytically separate management and operational levels, since dynamics happen between them. This distinction has received little at-

tention in the alliance governance literature, bar a few exceptions (e.g. Faems et al., 2008; Ring & Van de Ven, 1994). Thirdly, attention has been drawn to the dual purposes of contracts: opportunism prevention and contracts. In this study emphasis was mostly on the first, foregoing the latter. Distinguishing between them is highly important, since they have different effects.

A limitation of this study is that all data collection has been conducted by the author. This contrasts to Eisenhardt's (1989) advice to use teams of multiple investigators. However, having a single investigator is a limitation of this study, which is performed with the framework of the MSc.'s thesis at the University of Twente. Another limitation is that the researcher only had access to Alloy personnel and documents. No data was collected directly from Cord or Plane. Data gathering at the start-up partners could have provided more and less biased insights. Also, there were third parties with influences on the relationships, such as financial co-investors demanding risk-avoiding contracts. Gathering data about them would strengthen the data, but it would represent a very large amount of work.

A third limitation is that data have been gathered from corporate investment relationships, while building on theory of the more general alliance governance literature. This raises the following question: are the findings idiosyncratic to CI relationships, or can they be generalized to other governance modes of strategic alliances? The author thinks it is likely that the results are generalizable beyond CI relationships to the broader domain of R&D alliances, because past studies have noted similarities across alliance governance modes. For example, the study of Faems et al. (2007) found similar trust, contracting and knowledge transfer mechanics across R&D alliances with joint venture, corporate investment and non-equity governance modes. Since this study deals with the same concepts, it is plausible that this study's finding apply to other R&D alliance governance forms as well.

EPILOGUE

The original premise of this study was to learn about how to manage CI relationships. While the inductive nature of this study has diverted its focus to a more theoretical discussion on trust, formal contracts and knowledge transfer, a lot was learned on how to manage CI relationships from data and theory. This section will first present findings of possible interest to the scientific community outside the focus of the study, and then present managerial advice for managing CI relationships.

FINDINGS OF INTEREST

Some data in this study revealed potential interesting phenomena, yet were not further investigated due to data and time constraints. Firstly, the start-up partners were very early stage firms, and thus went through rapid changes. A change over time perceived as highly relevant by Alloy venturing managers was the composition of the shareholders of the start-up. At the very start, the start-up companies future success is highly uncertain, and their expected time-to-market can be over seven years. Since these characteristics are perceived as too volatile and long-term even by venture capital funds, the only willing investors are angel investors and strategic investors (initiating CI relationships). When the start-up firm grows over time, uncertainty is removed and the expected time to market drops. This makes financial investors such as venture capital funds interested, who will consequently join and become shareholders together with the strategic investors. These financial investors are perceived as having very different goals than the strategic investors and having more anxiety for opportunism by incumbent partners in the venture's CI relationships. Their reasoning is that the strategic investors get the same financial benefits as the financial investors, but also a strategic bonus such as knowledge transfer. The result is that once financial investors become involved, CI relationship contract negotiations are hampered by partaking risk-avoiding lawyers representing the financial investors' inter-

ests. This is a interesting phenomenon that is idiosyncratic to CI relationships, and deserves more research.

A second interesting phenomenon is the change from strategic investor to financial investor. During this study, Alloy lost its strategic interest in both Cord and Plane. This may be a common occurrence in CI relationships: due to innovation's highly uncertain nature, planned strategic fits may not be realized. However, Alloy still owns an equity stake in the start-up, which was needed during the CI relationship. Alloy thus has become a financial investor. While this has possible benefits - if a start-up firm succeeds, its stock will skyrocket - Alloy does have venturing capital stuck in a financial investment. It would rather reinvest its capital for strategic purposes. Unfortunately, it is very hard to sell of the start-ups stock, since the start-ups are still in cash-burn. Any new investor will buy new rather than existing stock of the start-up, so more money is fed into the start-up (rather than the former investor). Effectively, when a CI relationship loses its strategic value, the incumbent partner has capital locked away that it would rather spend elsewhere. Solving that problem is on Alloy's mind, and could be an interesting topic to explore for theorists.

MANAGERIAL ADVICE

The Omega project was designed as a portfolio project, wherein many corporate venturing projects would together shape a platform of coating technologies and businesses. This portfolio approach implies that the value of the whole set of projects was more than the sum of value of its parts. The key to success of these ventures would thus be spill-over between the projects, such as knowledge sharing and mass production efficiency. The scientific literature has found that the main contribution of venturing is often transferring key capabilities from the venture to the incumbent firm. It has been found - based on a recent study of 37 internal ventures - that a venture's commercial success is mostly independent from the knowledge learned by the incumbent firm (Keil et al., 2009).

This means that it is important to foster the knowledge gained from ventures, even if they are deemed unsuccessful. Though the Omega project has been cancelled by Alloy executives for strategic reasons, it is advisable to keep looking for new applications of the new knowledge within Alloy. This can be facilitated by storing information on the venture in venture reviews, or sometimes called *post-mortems* after venture discontinuation (Keil et al., 2009). This has been used by a large European electronics company for all its internal venturing projects. One of their managers is quoted as saying:

> *"When we screen ideas through venturing, at every stage we have the option to discontinue it for good reasons. Then we try [to] document why the decision was done. Why did we kill it? Was it because it can't be done? Or is the market not there? The approach is right but the market is not there yet? This way we can utilize what was created. Or we can could (sic) come back and take the venture from the archives." (Keil et al., 2009, p. 13)*

The planned large scale of the Omega's coating platform means that to be successful, significant investments are needed to 'cross the chasm' to mass production. In effect, the Omega project itself is a large venture, which could operate independently of Alloy to attract external investors. To create an independent venture out of the Omega project, some Alloy employees would need to spin-out with it. Their participation is necessary because they have much tacit knowledge that is hard to codify and inter-personal relationships with business partners that are hard to transfer. However, informants have stated that very few employees are willing to make the career move from employee to entrepreneur. For future ventures that may need to spin-out of Alloy, it may be useful to stimulate entrepreneurial behavior, or select employees more inclined towards it to work on the project. The large European electronics company mentioned above used internal training to stimulate entrepreneurial behavior:

> *"The [New Ventures Division] also sponsored a customized internal learning program for high-potential venture staff. The first module focused on learning about taking risks, managing uncertain initiatives, and specific content around*

> *venturing. (…) Appropriate reaction to disappointment was also a class theme. It was common for course designers to bring respected leaders in the company to talk to the participants, not about their successes, but about how they failed in an intelligent way." (Keil et al., 2009, p. 13)*

The venture relationships have proven to be vulnerable to lose of trust. Trust is often build within personal relationships: great care is taken to contact the ventures via the same few persons, and introducing new persons to ventures has been met with defensive reactions. Alloy has even gone as far to keep an employee who had worked with the ventures before in these relationships for a long time, even after the employee had moved to another division working on unrelated matters. Of course, it may sometimes be unavoidable to change the employees contacting the ventures, such as when an employee leaves Alloy. When the relationship is expected to exceed the tenure of employees working in it, it is advised to turn his or her informal understandings with the venture into formal agreements (Ring & Van de Ven, 1994).

The findings of this study indicate that the formal contracts in the venture relationships must emphasize opportunism prevention. This is accomplished by writing detailed contractual clauses on the (few) rights the incumbent partner has with the knowledge transferred from the start-up partner. A highly specific contract that allows for a lot of knowledge transfer, but little use is expected to perform best. An example of this is the Technology Evaluation Agreement between Alloy and Plane.

Another finding is the detrimental effect of start-up partner's management interference during R&D talks. This disturbed the knowledge exchange process. It is advised to separate management's strategic and operational R&D talks as much as possible. This can be achieved by planning different meetings for either, and having different employees discuss either topic.

Finally, it was found that informants sometimes had strikingly different views on the relationships. For example, R&D managers thought that Alloy had been more useful to the start-up partner then venturing managers thought, and venturing managers were not aware of some important turns of events perceived by R&D managers. There does not seem to be a fully functional shared framework to monitor the venture relationships. However, corporate investment relationships are still fairly new to Alloy (or anywhere else), and Alloy seems to be learning how to manage them better over time. Since there is a clear build-up of knowledge on how to manage CI relationships, Alloy's performance with CI relationships is expected to increase over time.

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