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A Psychological Contract Perspective on R&D Alliance Projects: Learning from a Close-to-Failing Case

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A Psychological Contract Perspective on R&D Alliance Projects: Learning from a Close-to-Failing Case[1]

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Abstract: The aim of this article is to illustrate how the process model for collaborative ventures (Ariño and de la Torre, 1998) and psychological contract theory could function as analytical frameworks for investigations of R&D alliance projects. To empirically illustrate this, we have used as example an analysis of a dyadic R&D alliance, which was close to failure. Findings reveal the following results: (i) that the process model for collaborative ventures is also valid for dyadic R&D alliance projects; (ii) that the concept of psychological contracts presents an alternative perspective when describing collaboration in R&D alliance projects; (iii) that critical incidents is a common denominator in both theoretical approaches; and (iv) that, in contrast to transactional contracts, relational psychological contracts relate to a successful outcome. The managerial implication of the study is that, either manifested as points for contract re-negotiation (process-oriented alliance theory) or as violations (psychological contract theory), critical incidents are vital to manage in order to secure a successful outcome of the alliance.

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1. Introduction

In the wake of core competence thinking (Prahalad and Hamel, 1990), firms today live in a contractual environment where the dependency upon suppliers and partners has increased. A consequence is that this affects R&D and project management practices. Accordingly, management scholars have paid close attention to the specific preconditions as well as leadership challenges of how to manage R&D alliance projects (e.g. Holt, Love and Li, 2000; Gerwin and Ferris, 2004; Kaulio and Uppvall, 2009). In contrast to in-house projects, R&D alliance projects face a number of specific challenges. First, they are embedded in two or more organizations, each with its specific business goals, practices, and culture. Second, R&D alliance projects are typically managed by traditional governance techniques; however, the informal relations in the project are identified to be more important than in a traditional project setting (Kaulio and Uppvall, 2009). Third, alliance projects can be assumed to follow the cyclic process of learning (re) negotiation as described by Doz (1996) and Ariño and de la Torre (1998): a conceptualization that contrasts the traditional sequential project management process. Lastly, although not always articulated, mutual expectations can be assumed to exist between the parties. Such expectations could be investigated: for example, through the lens of psychological contract theory (i.e. Rousseau, 1989; 1995; Koh et al. 2004; Conway and Briner, 2005; George, 2009).

In this paper, a case study of an R&D alliance project is presented in order to illustrate challenges in the leadership of R&D alliance projects. The overall aim is to increase our understanding of procedural governance of R&D alliance projects. More specifically, the research questions posed are as follows:

 i. Is the learning (re) negotiation model that Ariño and de la Torre (1998) presents applicable to R&D alliance projects?
 ii. How can the concept of psychological contract extend our understanding of how to manage R&D alliance projects?
 iii. What implications do these answers have for project managers in this context?

The paper contributes to research in the intersection of R&D management, alliance theory, and psychological contract theory. From an *R&D Management* point of view, great interest has been given to different types of inter-organizational arrangements such as open innovation (Chesbrough, 2003; Chesbrough and Crowther 2006 and Enkel, et al., 2009), outsourced innovation (Quinn, 2000; Cui, et al., 2009), outsourced R&D (Hsuan and Mhanke, 2010), and

Outsourced Engineering (Zirpoli and Becker, 2011). Although the labels differ in the aforementioned approaches, they all share some similarities in that the intention is to mainly exploit other firms' resources through contractual arrangements. Finding new concepts and approaches that increase the governability of collaborative processes is desirable. Within the area of *alliance research,* calls have been made for more studies on how alliance processes develop (Ring and Van de Ven, 1994; Salk, 2005; Kaulio and Uppvall, 2009). By adding yet another case to this stream of research, this article can contribute to further developing how the alliances unfold: how the alliance process can be described and managed. *Psychological contract theory* could benefit from an extension of this: mainly Human Resource Management dominated theory to the area of inter-organizational relations and R&D management. Finally, relating psychological contract theory to alliance research could potentially cross-fertilize both streams of research, generating new insights into a complex phenomenon.

The paper develops as follows: First, process-oriented alliance theory and psychological contract theory are presented in the theoretical framework. An illustrative case study is then presented in the research methodology. Thereafter a description of how the process of the alliance project unfolded over time is presented in light of the two theoretical frameworks. Lastly, conclusions, areas for future research, and managerial implications are presented.

2. Theoretical Background

Descriptions of project processes typically fall into one of two categories: the first is referred to as the normative (Engwall, 2003) or the task approach (Koltveit et al. 2007), where the project process passes through a number of defined stages, each of which needs to be optimized. The second conceptualization stresses learning and argues that it is not possible to plan everything in advance, as learning takes place during the evolution of the project (Holt, et al., 2000; Koltveit et al. 2007). For the case of R&D alliance projects, yet a third conceptualization is, indeed, possible: namely that of *the alliance process*. What is remarkable is that, although there has been great interest in different types of inter-organizational arrangements in R&D, the cross-fertilization between the areas of alliance research and R&D management research has been limited. A summary of process-oriented alliance theory and psychological contract theory will be presented in the following paragraphs, which make up the point of departure for this study.

2.1 Process-Oriented Alliance Theory

A small yet influential stream of alliance research can be labelled *process-oriented alliance theory*. The origin is the article by Ring and Van de Ven (1994), which theoretically outlines a model for cooperative inter-organizational relationships. This model is further developed by Doz (1996) and Ariño and de la Torre (1998). In contrast to project management models, which follow a sequential logic and process-oriented alliance, this theory is based upon the distinction between *initial conditions* and *process of development* (Doz, 1996). In the initial phase, the partners' choose to cooperate; this phase is most often referred to as "partner selection", where the cooperation is outlined and a contract is formulated. What follows is the execution of the alliance (i.e. the operative work of joint development of the product or system in the R&D case) that includes continuous changes and re-negotiations. Therefore, innovation processes, which include aspects of learning, are, difficult to define in specific detail (Ring and Van de Ven, 1994; Doz, 1996; Ariño and de la Torre, 1998). This dialectic nature of an alliance, where a formal contract governs an emerging collaborative process, is a characteristic that makes the alliance a difficult organisational unit to manage.
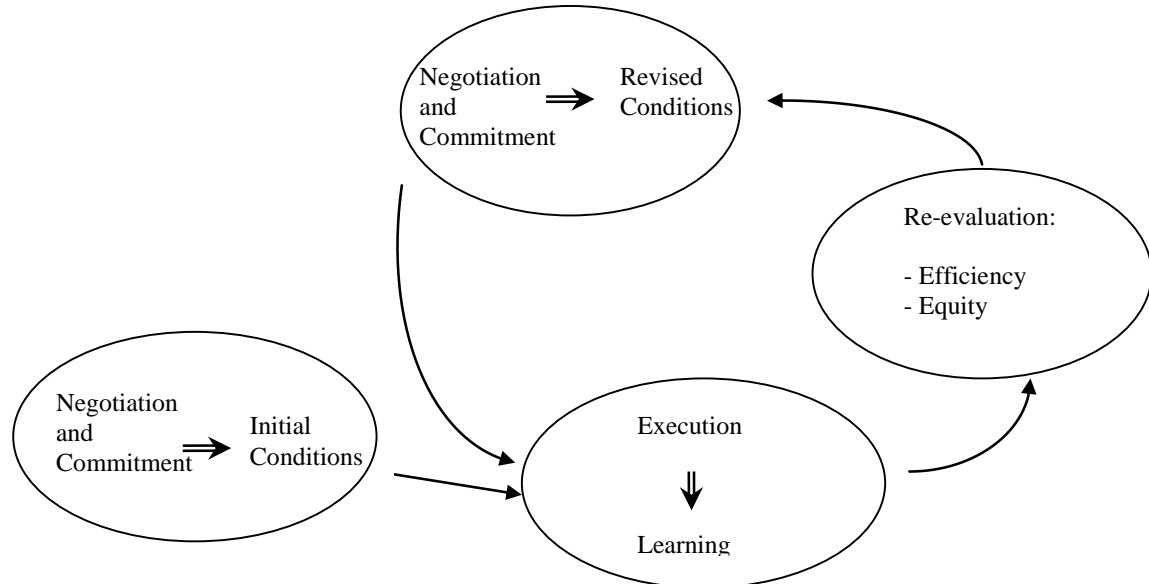

Figure 1. The process model for collaborative ventures (from Ariño and de la Torre, 1998)

The current synthesis of this theory could be said to be Ariño and de la Torre's model (1998). This model suggests that the initial conditions are the result of preliminary negotiation and commitment that occurs during the formation of the alliance, resulting in a formal agreement. However, when commitments are executed during the process, learning occurs where the initial conditions are re-evaluated in relation to two criteria: efficiency and equity (see Figure 1). *Critical events* are central in this process, as they are triggers for (re) negotiations[3]. Efficiency here refers to a situation where the alliance is regarded as the best option in relation to other organisational solutions (i.e. one's own investments in R&D, the use of consultants, or the acquisition of an entire company). This means that an alliance is considered the most cost-effective way of reaching the business aim. In contrast, equity should be understood as "fair dealing" or "fainess" (Ariño and Ring, 2010). Here, it is seen not as an exact equivalence in terms of commitment, but as a perceived satisfactory mutual contribution - necessary in order to progress work in the alliance. Additionally, initial distribution rules must be set so as to provide incentives for each partner to behave in a manner that is expected of them. Changes in any of the dimensions that determines the value of the alliance to the respective parties would lead to changes in either how one (or both) parties perceive the efficiency or equity (fair dealing) of the relationship. The strength of the model is that it captures inter-partner dynamics in the alliance and sheds light upon the "black box" (i.e. the process) between initial conditions and outcome. However, the model provides limited insight into a number of issues such as the characteristics of successful versus unsuccessful processes, the content of equity and efficiency, consequences of sequences of events, the fostering or erosion of trust, as well as managerial measures useful for governing cooperative processes. Shenkar and Yan (2002) have highlighted some of the aforementioned stated issues in their study of how the failure in an international collaborative venture unfolded. They also traced critical events along the life cycle of an international collaboration in the hotel industry. In addition, also building upon critical incident data, Kaulio and Uppvall (2009) found that in order to build trust, informal relations among and across the participating organisations is a key area for misunderstanding. Taking this in account, in contrary to a normal project, an alliance simultaneously involves the culture of the participating organizations, something that increases the complexity of managing this type of project.

2.2 Psychological Contract Theory

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[3] Note that the term critical event is used in alliance theory, while the term critical incident is used in psychological contract theory. In this paper, they are synonymous.

The classical concept of psychological contract, originally developed by Human Resource Management scholars (e.g. Argyris 1960; Schein, 1965; Rousseau, 1989; 1995), describes *mutual obligations* between employers and employees in organizations. In its original context, it was mainly related to social exchange theory. When the concept was later more operationalized, it mainly became a concept used to describe employment relationships (Cullinane and Dundon, 2006). Rousseau (1989, 1995) provides a common definition of psychological contracts as the employee's *beliefs regarding the promises of the reciprocal exchange agreement between the employee and the organization*. The psychological contract is typically discussed in terms of mutual beliefs, perceptions, and obligations between two parties. Herriot, Manning, and Kidd's (1997) seminal investigation is an example of a study that aims to define the *content* of a psychological contract. Using data on critical incidents along with the hypothesis that there is a general agreement between employees and the organization as to what are the obligations, they investigated both employees' and managers' perceptions of these obligations within the same organizations. Findings showed that there was a considerable level of agreement between employees and organizations: ideas of what exists in the contract, which is something that might indicate the existence of a psychological contract. Koh et al.'s (2004) investigation of client-supplier relationships in IT outsourcing processes is an extension of this study. In their study they have, through a multi-method approach, identified (psychological) mutual obligations between the client and the suppliers in a business relationship. The approach followed to a large extent the approach used by Herriot et al., (1997) and included the identification of critical incidents as a means to uncover the content of the psychological contract. Given Koh et al.'s (2004) study on a vertical business relation, it seems possible to also apply the concept of the psychological contract to horizontal relations, such as alliances. In this case, however, the contractors will each be part of the alliance: two more or less symmetrical organizational groups, in terms of negotiation power.

Furthermore, a psychological contract can take a variety of *forms*; the distinction between *transactional* and *relational* is the most commonly used (Rousseau, 1989; George, 2009). Transactional psychological contracts typically refer to limited involvement, short-term obligations, monetary compensations, and a relation where the identities of the parties are irrelevant. Conversely, relational psychological contracts emphasize deeper long-term involvement: loyalty as well as an interest in the other party.

2.3 Summary

In summary, we can identify a number of starting points for the analysis of the case. First, the distinction between *initial conditions* and *process of development*, as described in the process model for collaborative ventures (Ariño and de la Torre, 1998), is a conceptualization of an alliance evolution, which contrasts traditional sequential project management models. This appears to be a proper framework to describe the dyadic relationship of an R&D alliance project. Second, psychological contract theory provides yet another perspective on the aforementioned process of alliance projects, as members of two or more organizations constitute them. Accordingly, psychological contract theory here provides a conceptual framework for describing the R&D alliance relationship. From theoretical point of view, *critical incidents* also play a central role. In process-oriented alliance theory, they mark deviations in relation to equity and/or efficiency, and they may trigger re-negotiations. Conversely, in psychological contract theory, critical incidents may manifest violations and/or breaches of the contract. From a methodological point of view, both streams have used critical events (or critical incidents) as methodology to capture re-negotiations and breaches, respectively. Ariño and de la Torre (1998) focused on identifying critical incidents in the alliance process in order to capture the development of the process. Koh et al. (2004) used critical incidents as trigger questions in interviews with outsourcing partners. Therefore, investigating critical events/incidents and interpreting them from both perspectives can be an approach that integrates the two theoretical streams.

3. Methodology

The present study is a single case study with an illustrative purpose. Case studies are typically used for conducting process studies (Åhlström and Carlsson, 2009) as well as for inductive theory building (Eisenhardt, 1989). Case studies are normally selected for representative purposes. However, the case study presented in this article follows the path of Ariño and de la Torre (1998) and (Shenkar and Yan, 2002); it presents a close-to failing case as it overruns both time and cost frames. With this in mind, selection of the case study focuses upon identifying critical and unique aspects of the said phenomenon, rather than tries to generate a general model. The starting point for the study was a request from one of the participating companies regarding whether the author could "give a second opinion" on what happened in the project. This second opinion was part of an internal learning process within the company

and followed an organizational development consultant's report on how to proceed in the project. The consultant was hired mid-way into the project when the project became halted. Directly following the project, both partners felt that the project was a failure. Time and cost frames were overrun although, from a technical perspective, the project had delivered an innovative leap in relation to the previous generation of technology. The project also generated a lot of frustration within both organizations, where one side blamed the other; this was also something that contributed to labelling the project a failure. However, later discussions with participants in the firm indicated that the project was actually successful in the long run.

3.1 Research Setting

The companies that participated in the R&D alliance project were the following:

- *The Large Company* – This is a business unit of a large global U.S.-based industrial firm that develops, produces, and markets complex electronics and systems. The conglomerate focuses upon high-growth sectors, mainly through a process of acquisition and development. A set of tools and processes that are referred to as being inspired by Toyota Production Systems are central for the operating strategy; these are continuously used to improve business performance in critical areas such as quality, delivery, cost, and innovation. The system is based upon five cornerstones: teamwork, customer focus, Kaizen, innovation, and shareholder focus.

- *The Research Company* – This is a medium-sized R&D company in the field of optics and electronics. The company has a history stretching back to 1974 offering technology scanning and consulting, product development, and production. The competitive advantage of this company is its core competency in physical and geometrical optics. A project model has been developed around these core competencies, which covers the product life cycle.

3.2 Data Collection and Analysis

Data for the case description includes secondary data, interview data, and data from critical incidents. As aforementioned, the starting point for the analysis was a report from an

organizational consultant who was engaged in the project with the task of finding a solution to amends the infected relations between the partners. This secondary material was complemented with project plans and company presentations. Using this secondary material as a foundation, interviews with representatives from both sides of the alliance were conducted. These interviews included respondents representing both engineering and management. Nine interviews in all were conducted with six respondents, three from each area. Feedback was given to the managers on both sides in order to ensure that the descriptions were correct. A key issue in the interviews where to unfold critical incidents. To do that, the interviews followed the following structure. First, the respondents were asked to describe the alliance in general terms. Then questions followed about the respondent's role and engagement in the alliance. Respondents were then asked to identify specific events (i.e. critical incidents) during the process that had significant influence on the relationship with the partner or on the outcome of the alliance. Each identified critical incident was then further discussed with the intention of outlining the situation, the actions taken, the impact on the relationship, on the progress of the alliance, and the resolution of the event. Both sides' perceptions of how the alliance developed were aggregated in the analysis of the primary data, which lead to a consensus about the main critical incidents that had a major influence upon the process of development. These incidents then functioned as focal points in the case description and theoretical interpretation.

4. Findings

The project process will be described in the following section following the overall structure of initial conditions and process of development. Thereafter follows a description of the project in terms of psychological contract theory.

4.1 Initial Conditions and the Evolution of the R&D Alliance Project

The overall business relationship was a mutual agreement that the Large Company should maintain the relationship with the customer and focus upon system knowledge in combination with specific knowledge about its application and the market. In contrast, the Research Company invested in its internal resources and competencies, developing and capitalizing upon its own core competencies (for example, through alliances). This could be later exploited elsewhere. The R&D alliance project was organised as a *pre-study* and *development project*. The aim of the pre-study was to further develop the initial specification and to make a more detailed plan for a project. Additionally, the Research Company was to take

responsibility for the subsequent production of the designed product. However, discussions had taken place during several months between the companies and in the final stage of the negotiation (immediately before a contract was signed) the actual decision to start a joint project was made in an atmosphere of "close the deal and fix the details later". (In later interviews, the respondents highlighted this fact as an explanatory factor for why things fell apart later in the process.) From the Large Company's perspective, the motivation for engaging in the alliance was to outsource hardware development and production as the company focused its resources upon software. From the Research Company's perspective, the project fit very well with its business strategy of offering complete solutions within the optics and mechatronics area. These areas included development, production, and product management. Additionally, the Large Company was a client in which the Research Company had long since been interested. A contract was created that contained the following main issues: (i) both the pre-study and the development phase should be delivered at fixed prices, and (ii) the cost for development should be divided depending upon the unit price of each product that the research company. This was a solution that fit both the Research Company's business concept and the Large Company's R&D strategy, where the latter partner saw it as a risk reduction strategy. Fines via a malus system were linked to the development's time plan if the Research Company was late. The long-term intention of the alliance was that the Research Company should be referred to as the "product owner" for the sub-system designed by the Large Company. This included responsibility for the product's design, cost and production, as well as continuous product improvements. A one-week kick-off meeting was held where members of both organisations participated and discussed the project's plan.

A Pre-Study was initiated with the aim of estimating and planning a full project. The focus of this phase was to establish a specification for the product to be developed: the 5th generation of the system. A first critical incident occurred during the later stages of this pre-study.

> *Critical incident 1: Once the pre-study had been completed, a conclusion*
> *was that the initial estimations of the cost of the development project*
> *should been revisited. The cost of development would be higher than*
> *earlier stated estimations.*

A meeting was held to discuss this, where engineers from both organisations participated and where the task was to find ways to reduce project cost. The outcome was that a division of

tasks was decided upon where the Research Company was to be responsible for hardware development and the Large Company was to be responsible for software development. As time-to-market was crucial for the Large Company, the development phase of the project began and work proceeded as planned during the subsequent period of development. During this period, the Research Company worked mainly on its own where their work to a large extent was guided on the basis of a specification developed during the Pre-Study (as decided upon earlier). Interaction between the Research Company and the Large Company was limited to progress reviews with little knowledge transfer, except for what was included in the specification. The relationship between the two partners' engineers was good. However, the following critical incidents radically changed the relationship between the two companies:

> *Critical Incident 2: After 3 months, a hardware prototype was to enter a test phase. The trial was to test the integration function of the hardware and software together; the Large Company developed specific software for this purpose. Upon the basis of these tests, the Research Company found out that it could not guarantee full functionality of the hardware as the software provided only tested parts of the functionality. In contrast, the Large Company argued that the Research Company was responsible for the hardware regardless of the software, which was meant to be used as a tool for testing the hardware, and not to be used as a contract disclaimer for the Research Company.*

As a consequence, the relationship between the partners became infected, thus, resulting in a situation where both parties blamed each other. An extra steering committee meeting was held, and strategies for continuing the work were discussed. No immediate decision was made, however, and this discussion lagged on for another six months without any definite solution. The result was that the project was delayed eight weeks; the project costs had increased. Still, the contract was not re-negotiated.

> *Critical incident 3: A technical problem was found at the point of delivering the prototype; the sound level of the hardware was too high. The Large Company was of the opinion that the Research Company had missed a requirement or hidden the obvious difference in the sound level from the previous version. In contrast, the Research Company argued there was no specification of sound level in the formal specification.*

The Research Company admitted that it had delivered a substandard product; however, it argued that the formal specification was ambiguous. However, it said that if the software had been able to test the full functionality of the hardware, then this problem would have been detected at an earlier stage. At this point of the project, there were no additional resources for improving the product. Nevertheless, the project continued; however, the Large Company was disappointed with both the lack of communication with the Research Company and disappointments during the development process. On the other hand, the Research Company had not succeeded in making any changes in the formal contract where the project manager at the Research Company was responsible for an over-run development budget. Step by step, the intensity of the engineering work reached a very low level. At this point, an organizational consultant got involved in order to shed some new light upon the collaboration. The consultant's task was to provide a "second opinion" on the alliance and how it developed. The recommendation from his report was that, from a strategic point of view, the alliance seems to be an optimal fit between the two partners' competencies in order to create the product. However, the consultant pointed out several areas of improvements related to *how* the project was run: to increase the cooperation between the parties (i.e. make explicit all dependencies between each party in the project); to change the compensation model to include major change requests and form a stronger steering committee. The project continued to slide.

> *Critical incident 4: The project was put on hold and all engineering work stopped. The CEOs of the respective companies now entered the discussion and a process of re-negotiation started; this included the scope, business terms, and engineering tasks.*

The outcome of these re-negotiations was the following: the contract was revisited in which the major change was a new compensation-model based upon an open account, and not a fixed price. The project changed name and the Research Company introduced a new project manager. Based upon these changes, the development restarted; this time, there was a much more intense approach to communication between the two companies. In the re-negotiated contract, the new compensation model stated that the Research Company should only charge hourly engineering costs (with no margins). The consequence of this arrangement was that the Research Company´s engineers were locked into the alliance project until it finished; the research Company covered its costs, but could not be engaged in other more profitable projects. The engineers of the Large Company now worked closely with the engineers at the

Research Company; co-learning about the technical system occurred. The product was delivered a year later than was initially planned. From a mechanical point of view, the developed solution seemed to be a success. An innovative design had been developed. However, from a managerial point of view, and in terms of scheduling and cost, the alliance itself was a failure.

4.2 A Psychological Contract Perspective

Turning to psychological contract theory, the same incidents as described using the framework of process-oriented alliance theory could also be described using psychological contract theory. Then, as mentioned, the critical incidents become manifestations of psychological contract violations. The four critical incidents presented earlier are summarized here in Table 1.

Table 1. An overview of the critical incidents in the process

Critical Event	Description of the Incident(s)
#1 Missed cost estimates by the Research Company	The Large company lost trust in the competence of the Research Company (i.e. one- sided competence violation). Minor adjustments were made in work processes.
#2 Test software not ready: Large Company's responsibility	The Research Company lost trust in the Large Company's commitment to the joint project (i.e. one-sided competence violation).
#3 "Sound level" too high: Not specified in the specification (Research Company's claim). Violation to Engineering standards (Large Company's claim)	Both sides considered (and blamed) the other for the following: (a) not having specified the product in detail or (b) not fulfilling basic engineering standards. As a consequence, distrust between the two parties grew (i.e. mutual competence violation).
#4 Halt and Re-negotiation	The development process ground to a halt (manifested through an extensive use of formal and written communication), and neither side wanted to open and re-arrange its position in order to find a way out of this locked situation (i.e. process violations by both sides).

Looking at Table 1, a first observation that could be made is that the critical incidents (described in Table 1.) differ in terms of the following:

- If the violations where one-sided (where only one party notified a violation) or mutual (where both parties simultaneously notified violations)
- What were the bases for the violation: competence or process

Critical incidents #1 and #2 represented *one-sided violations,* where one party shows disappointment with what the other party has delivered. In incident three, the situation is then more critical as both parties express disappointment (i.e. *mutual violation*). Hence, a tentative finding from this study is that psychological contract violations (manifested in critical incidents) could be either *one-sided* or *mutual*. Critical incident #1, #2 and #3 can all be related to distrust in the partners' *competence* or were related to how the process was (or was not) developed. Accordingly, this type of violation could be labelled *competence violation*, referring to *not fulfilling/delivering what the other party took for granted and/or expected*. For example, in Critical incident #1 (cost estimations), the Large Company expected that the Research Company had experts in the field of technology, and held the ability to specify the cost for this type of development work, accordingly. The large Company became disappointed when this was not the case, as a competence they assumed existed did not actually exist in this specific situation. In a similar vein, a similar process of trust erosion occurred Critical Incident #2 (the test software), however, from the Research Company's side in this case. With these two incidents in the past, Critical incident #3 ("the sound level") marked a situation of *mutual competence violation.* The Large Company saw this incident as a violation against "good engineering professionalism" (i.e. competence); the new product should not be worse in any sense than the existing one. However, the sound level was not included in the Research Company's specification (i.e. competence) and specifications are crucial in outsourced R&D processes, thus, indicating immature competence in the Large Company regarding how to run a cooperative R&D. In addition, as the "sound level incident"-incident (Critical incident #3) was easy to demonstrate for colleagues, it was not strange that this issue escalated in the Large Company. Consider then that this was a proceeding mistake made after the two other incidents, which nurtured a process of *escalation of distrust*. The re-negotiation (Critical incident #4) marked here only a consequence of the previous ones. Therefore, the re-negotiation became a natural step for the Large Company to re-structure the

project. In a similar vein, the re-negotiation incident also became an opportunity for the Research Company to re-negotiate the contract: something they had wanted to do for a long time. Previous reasons for re-scheduling the time plan of the project had existed (for example, when the test software was not ready); however, nothing had been formally done until this halt. The solution of the locked situation was to involve top management, who sat down and created a new (legal) contract. This contract incorporated a number of changes (including a new name for the project, a new project leader in the Research Company, and a new compensation model). With these changes in place, the project then took off again.

Turning to the character of the pre and post-breach situation (before and after the breach), the psychological contract could be characterized as a *transactional* and *relational psychological contract*, respectively (see Table 2). The establishment of the transactional psychological contract stemmed from Critical incident #1, where work was divided as consequence of cost saving efforts.

Table 2. The character of the psychological contract before and after the breach

	Phase of Process	
	Before Breach and Negotiation	**After Breach and Negotiation**
Formal Contract	Fixed price Initial division of risk	"Discounted charge by hour" Risk sharing
Psychological Contract	Transactional contract • Individual, coordinated tasks • Handovers • Fulfilment of specification • Little interaction	Relational contract • Teamwork • Co-operative learning • Adaption

Accordingly, the pre-breach communication process was formally held by the Research Company's project manager in order avoid changes in the specification (and, thereby, save costs). However, a much more open dialogue was expected in the Large Company even after the re-structuring or work tasks (Critical incident #1). In the described case study, a re-negotiation of the formal contract was needed in order to unlock the transactional mode of communication used by the Research Company.

From a psychological contract perspective, critical incidents manifest *asymmetries in expected performance and/or deliveries* in cooperative development work. Such violations can be *one-sided* or *mutual* and based upon *competence* and *process* related issues. Repeated violations in an R&D alliance project seem to lead to an *escalation of distrust*. In addition, as illustrated in the pre and post-breach analysis, the character of psychological contract (described as transactional and relational) also influences how the process was conducted. A finding from this case study is that a *transactional psychological contract* (i.e. a psychological contract that includes dialogue and learning) is crucial in order to create a fruitful knowledge transfer and effective process.

5. Discussion

This paper has highlighted the micromanagement of an R&D alliance process. The research questions posed in this article were the following: (i) Is the learning (re) negotiation model that Ariño and de la Torre (1998) presents applicable to R&D alliance projects? (ii) How can the concept of psychological contract extend our understanding of how to manage R&D alliance projects? (iii) What implications do these answers have for project managers in this context? The findings to these research questions will be discussed in the following section.

5.1 The Process Model

A first finding from this study is that the process model for collaborative ventures is also applicable for R&D alliance projects. As shown in the case study, too rigid initial conditions (such as fixed prices and specifications) lead to one partner's inflexible behaviour. In turn, this led to a situation of eroding trust between the partners when the first partner was unwilling to adapt to needs of the second. For example, the fixed price deal seems to limit the behaviour of the Research Company's engineers. In order to avoid additional functionality requirements of the product, communication with engineers at the Large Company decreased. The other partner did not expect this behaviour, which lead to a situation where the expectations of one partner were open communication and the behaviour of the other partner was formal communication. In other words, initial conditions affected the process of development as stated by the model. The case study also confirms the model in the sense that it included a "full loop": a re-negotiation and re-commitment of the contract, project scope, cost, and tasks. An interesting observation for project management scholars is that the alliance

did not follow the simple linear plan-execute model of a project, simply because an alliance simultaneously should fulfil the multiple business-related goals, and ensure that the alliance is based upon resources from two (or more) different organisations with different competencies and cultures. Moreover, as the model states, change is likely to occur during the alliance process. Learning takes place both regarding how to cooperate and relate to the product that is to be developed. Changes and/or technical difficulties in the product will automatically lead to new and/or additional deployments of cost to one or both partners. This led to the re-evaluation of the alliance: a process that initiates another re-negotiation loop. To summarize this, the present case study supports that which process-oriented alliance theory implies: there is a relationship between the initial conditions and process of development, and a process of learning and (re) negotiation took place.

5.2 Psychological Contract Theory and R&D Alliance Projects

A second finding from this study is that psychological contract theory seems appropriate to describe R&D alliance projects: particularly, the relationship between the participating organizations. R&D alliances are contractual arrangements (i.e. they are guided by legal structures). In parallel to this "formal organization", psychological contract theory implies that an informal structure co-exists, parallel to the legal one. This idea is not new. For example, Koh et al. (2004) has already used the concept of psychological contract to supplier-client relationships in IT-outsourcing. The contribution of this paper is affirming that the psychological contract is made explicit and, therefore, embodies something that can be managed during the execution phase. More specifically, the critical incidents manifested here situations where mismatches in the psychological contract existed. When compared to process-oriented alliance theory, the same critical incidents that are described using the framework of process-oriented alliance theory, could be seen as manifestations of psychological contract violations. The critical incidents here play a key role; sequences of events led to a breach in the psychological contract that, in turn, led to a breach in the formal contract. With this in mind, psychological contract theory extends our view of the role of critical incidents; it also provides indications on how to manage them. Moreover, findings also indicate that the character of the interaction process (characterized as a transactional or relational psychological contract) between the partners is related to the successful outcome of the cooperation. The finding from this study is that a relational character of the process is linked to success. Furthermore, the content of the psychological contract has not specifically been the focus of this study; however, an observation is that violations in the said case study

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were related to eroding trust in the partners' competencies, as well as in the character of the interaction process. This finding is an interesting one, especially for process-oriented alliance theory, as it indicates the type of processes that are related to success: an issue not touched upon in alliance theory.

5.3 Implications

A number of managerial implications could be drawn from the study.

A first implication that bears repeating is the importance of initial conditions. As stated in earlier research (Doz, 1996; Ariño and de la Torre, 1998) and clearly illustrated in this case study, *initial conditions play a crucial role in how the alliance project evolves*. Therefore, to foresee in which direction an R&D alliance could develop and to take adequate measures in re-negotiation processes this is a core competence for the alliance manager. The presented learning (re) negotiation model could be a practical guideline. A second managerial implication is linked to the governance structure of the alliance. Since the contractual issue (i.e. initial conditions) is often the responsibility of the CEO, there is a need for an articulated shared leadership model where the division of responsibilities are clear between the managerial and the engineering level (i.e. the business and the technical level). Business issues (related to cost, priorities, and initial conditions) must be managed on a (top) managerial level, while issues related to engineering and technical development could be the responsibilities of the technical project leaders.

A third managerial implication is that an articulate psychological contract, in parallel to the legal contract, could be a useful management tool for governing the alliance. By defining the content of such a contract early on, a new mediating object can be introduced to support team discussion within, as well as between, the parties. Accordingly, the crafting of, as well as the maintenance of, this psychological contract will be a key issue for an R&D alliance project manager. Fourth, this study has demonstrated that critical incidents need attention from R&D alliance project leaders in the R&D alliance. One-sided or mutual psychological contract violations must be rapidly managed. The underlying bases for a violation also need attention.

6. Conclusions and Future Research

This article has presented a dual perspective on the process of R&D alliancing. Two new conceptual lenses are introduced that could be used for governing future research as well as for guiding management. This is particularly the case for scholars who are interested in open R&D strategies; this contribution is valuable as it addresses the process of micro-management of dyadic relationships. From the perspective of the process-oriented alliance theory, this study largely confirms this theoretical thread including the usefulness of the learning (re) negotiation model (i.e. Ariño and de la Torre, 1998). The described case study conducted a full-loop of re-negotiation leading to a revisited formal contract and a re-start of the alliance. As theory implies, critical incidents, which emerge as an outcome of learning during the alliance process, played a central role for how the R&D cooperation developed. Nevertheless, more integration of existing theories with relevant cases is needed in order to fully confirm the learning (re) negotiation model as a general model with a strong explanatory power for describing R&D alliance project processes. From the perspective of psychological contract theory, this study has demonstrated the usefulness of this theory as a theoretical lens for analysing (and managing) R&D alliances.

The presented study does, however, have several limitations. First of all, it is a single case study; from that, it is hard to generalize. However, as the aim has been to illustrate the application of two theoretical approaches to analysing R&D alliance projects, it can be argued that the suggested findings here are valid to knowledge-intensive contractually based partnerships, such as R&D alliance projects. Second, the presented case is a "close-to-failure" case in that it missed time and cost frames, but technically it was successful. What is noteworthy, however, is that important studies of alliance processes (i.e. Ariño and de la Torre, 1998; Shenkar and Yan, 2002; Ariño and Ring, 2010) are based upon cases of failure. Accordingly, the findings focus more on recovery and the management of disturbances than upon the identification of key factors. With these limitations in mind, a final contribution of this research is outlining a set of future research areas.

One potentially fruitful approach for future research is multiple longitudinal case studies, including the analysis of critical incidents as indicators of project deviations. The process model and its applicability could be further investigated, as well as identifying key success factors. Another promising research stream would be to continue focusing upon failure cases.

Providing industry with relevant findings is a key issue for applied research areas, such as R&D management. Learning from failures – and learning fast – is then crucial for firms to have the possibility of exploiting inter-organizational challenges in a global environment. Access to failure cases is always an issue; however, failure cases are generally good learning grounds, which could trigger new theoretical discoveries. Legal arrangement and its influence on project and process success is an area that begs much more attention. A few studies address this issue; however, much more is needed in today's outsources and networked business environment. Yet another promising area would be looking more deeply into R&D alliances, that is to say, from a psychological contract perspective. Here, a potentially fruitful approach would be one similar to that of Koh et al. (2004) who measured the content of the psychological contract. This methodology seems appropriate for the case of the R&D alliance as well as Outsourced R&D relationships. Lastly, how critical incidents are managed and the pace at which they are resolved, as well as how this "coping process" influences the character of the relationship between the parties is an area with both theoretical and practical implications. Increased knowledge on this crucial issue would be beneficial for both process-oriented alliance theory and psychological contract theory, as well as for practicing managers.

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