Governance and asset specificity as facilitators and sources of innovation and value creation

The performance implications of formal, and relational governance mechanisms, project specific investments, and the interaction between governance and project specific investments in inter-firm innovation projects

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ABSTRACT

Drawing on transaction cost theory and relational exchange theory, this dissertation examines the different performance effects of *formal and relational governance mechanisms*, *project specific investments*, and the *interaction* between governance and project specific investments in inter-firm innovation projects. The following four performance dimensions are studied: *goal attainment, value creation potential for the customer and the contractor*, and *innovative performance.*

The model and hypotheses were developed and empirically tested on a sample of 320 inter-firm innovation projects in the Norwegian petroleum industry. Data was collected based on a survey of approximately 800 project managers on the supplier side of the dyad. The oil companies operating on the Norwegian Continental Shelf (NCS) were the customers in all projects.

Generally, most of our hypotheses were supported. First, the interaction effects of formalization and project specific investments on all kinds of performances were positive, thus highly supportive of transaction cost theory. In this respect, *our results indicate that as the level of project specific investments increase, the positive safeguarding effects of formalization increase more than the potential negative effects related to 'bureaucratization' costs, resulting in increased value creation potential and innovative performance.* Second, the interaction effects of relational norms and project specific investments on performance were more ambiguous; some hypotheses were *not* supported, and others only partially supported. That is, the safeguarding properties of relational norms seem to be marginal or insignificant, resulting in inferior performance. Third, the direct effects of both relational norms and project specific investments on all kinds of performance are generally positive. The direct effects of formalization, on the other hand, are more complex and highly contingent on the performance dimensions. In particular, formalization seems to be effective in relation to 'goal attainment' and correspondingly ineffective in relation to innovative performance.

Finally, theoretical and managerial implications are discussed and suggestions for future research are indicated.

ACKNOWLEDGEMENTS

I would like to use this opportunity to thank a number of people who have supported me and my work on this dissertation. However, first I want to tell the story of how I ended up studying governance of inter-firm innovation projects conducted in the Norwegian Petroleum industry. When I attended the Ph.D. programme in August 2003, my intentions were to study change processes such as privatization and outsourcing in public organizations! However, meeting Associate Professor Svein Ulset was a turning point in that respect. He enthusiastically presented a number of highly interesting research opportunities within the Norwegian Petroleum industry. One of these research opportunities was related to the relationships between the oil companies and the contractors operating on the Norwegian Continental Shelf (NCS), in particular, the *governance* of these relations. Fortunately, my interest in this industry went a long way back, thus I was not too difficult to persuade - in retrospect, a choice I have never regretted for a second.

Consequently, I am heavily indebted to my supervisor, Associate Professor Svein Ulset. His enthusiasm, sharp and constructive comments, patience and general support during these four years have been outstanding and invaluable – he was always there when I needed feedback on miserable drafts and hopeless ideas. Thank you Svein! I would also like to thank the other members of my dissertation committee, Professor Sven Haugland and Professor Nicolai J. Foss, for reading and commenting on the several drafts of this dissertation. Furthermore, I am grateful to the members of the evaluation committee, Professor Bent Petersen and Professor Torger Reve, for their contribution as opponents.

Some of my Ph.D. colleagues have contributed significantly to this dissertation. Mons Svendsen has been an invaluable discussion partner through all four years – your knowledge of the literature is truly impressive! Jon Bingen Sande helped me with LISREL programming, and Søren Wenstøp read and commented on earlier drafts, and in addition, provided moral support!

This study would not have been possible without the contributions from numerous managers in the industry (informants). Through answering the questionnaire, through interviews, and answering hundreds of phone calls, you all have provided me with a unique insight into how you do business, as well as valuable insight into your industry in general.

The service and general support from the administration at the Department of Strategy and Management has been generous. There were no problems that you could not fix! Finally, I wish to thank all my Ph.D. colleagues for contributing to an inspiring working atmosphere: none mentioned, none forgotten.

Finally, to my family: my dear Elisabeth, and my two sons Jon Anders (4) and Ole Jakob (3) have all contributed indirectly to this dissertation. Conducting the research and writing the dissertation has not come without personal costs. As a partner and a father I have not always been there for you, and when present, my thoughts were often elsewhere. My highest wish is to spend more time with you all in the years to come.

Bergen, August 2007   Per Anders Sunde

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PART I

1 Introduction

1.1 Introduction to the study

To our knowledge, different performance effects of governance mechanisms *aligned* with the level of project specific investments have not yet been sufficiently studied. To address this gap in the literature, we have developed a theoretical framework and testable hypotheses, which have been subject to empirical testing on inter-firm innovation projects in the Norwegian petroleum industry.

Consequently, the goal of this dissertation is to study the performance effects of: 1) *formal* and *relational* governance mechanisms, 2) *project specific investments*, and 3) the *interaction* between governance and project specific investments. Governance mechanisms employed in projects, and business relationships in general, are important to study because they are argued to: 1) influence the level of transaction costs, and 2) provide incentives that increase investments in value creating assets (i.e., specialized investments), and thus influence the level of performance (Dyer 1996; Dyer 1997). In this dissertation, the following performance dimensions are included: *goal attainment, the customer value creation potential, the contractor[1] value creation potential* and *innovative performance.*

1.2 Positioning of the study and research question

Governance of inter-firm projects and long-term relationships has been studied by many academic disciplines and in many empirical contexts. However, until recently, research within the inter-organizational field has focused mostly on factors, or antecedents, which leads to the selection of governance mechanisms such as formal and relational contracts in inter-firm relationships. Surprisingly few empirical studies have tested the normative predictions of the

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[1] In this study, the term 'contractor' is used for simplicity reasons. By 'contractor', we mean the company or institution that conducted the work on behalf of an oil company. Other equivalent terms to 'contractor' are supplier, vendor, partner, etc. However, the term 'contractor' seems the most appropriate because our focus is on 'contracts,' and the implications of contractual governance.

transaction cost framework (Rindfleisch and Heide 1997; David and Han 2004); that is, how governance mechanisms *ought* to be organized to achieve enhanced performance. Most previous empirical studies are limited to a descriptive examination of whether transaction cost logic has been followed or not, rather than examining *how* firm governance decisions affect *performance* (see literature review in Chapter 3)[2]. Namely, in most descriptive studies that apply transaction cost theory, firms are only *assumed* to follow the normative decision rules of transaction cost theory (Rindfleisch and Heide 1997: 47). Hence, repeated calls have been made to promote more research exploring the performance effects and implications of different governance mechanisms (Rindfleisch and Heide 1997; Cannon, Achrol et al. 2000; David and Han 2004; Foss 2007). The performance implications of efficiently *aligned* governance are more or less unexplored and represent an exciting opportunity for future research. Given the lack of research in this respect, this study has the potential to contribute significantly to the literature.

Furthermore, when empirical studies have included performance implications, the focus has generally been on efficiency and effectiveness. It is and has been common to measure performance as firm/alliance profits, sales level, market share, and attitudinal measures such as satisfaction, etc. (Park and Ungson 2001; Olk 2002; Arino 2003). The various effects of different governance mechanisms on processes such as learning and innovation have not previously been studied (Cannon, Achrol et al. 2000: 191). In more precise terms, incorporating the logic of transaction cost theory, the different performance implications of governance mechanisms *aligned* with the level of transaction specific investments have not yet been sufficiently studied (see literature review in Chapter 3). Such studies are needed to advance the body of knowledge in this respect. Accordingly, this research is positioned as an extension of Cannon, Achrol et al. (2000)[3].

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[2] In order to position the dissertation in the research literature we conducted an extensive review of both conceptual and empirical literature. In Chapter 2, we account for the relevant theoretical perspectives, and in Chapter 3, we provide an overview of the most significant empirical studies conducted in relation to our research question. Chapter 3 may also be seen as an independent contribution in this respect.

[3] This dissertation may also be seen as a contribution to the literature within project management Kolltveit, B. J., J. T. Karlsen, et al. (2007). "Perspectives on project management." International Journal of Project Management **25**: 3-9.

In accordance with the discussion above, a theoretical model has been built to answer the following research question:

How do formal and relational governance mechanisms, project specific investment, and the interaction between governance and project specific investment, influence performance dimensions such as goal attainment, the customer value creation potential, the contractor value creation potential, and innovative (project) performance?

1.3 Research model

To address the gap in the literature and answer our research question, a research model and testable hypotheses were developed and subjected to empirical testing. The research model is presented in Figure 1-1 below. The figure will be used extensively throughout this dissertation to illustrate hypotheses and results.

Figure 1-1: Simplified research model
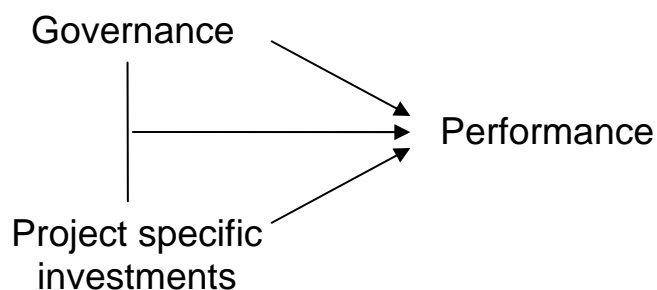
- Arrows indicate direct effects
- T-arrows indicate interaction effects

The performance dimensions

Below, we will briefly present the *four* different performance constructs. A more in-depth examination will be provided in Chapter 2.

Goal attainment measures deviation from goals such as delivery time and cost schedules (i.e., avoid delays and cost overruns), satisfactory quality levels (i.e., avoid failures of quality), and achieving specifications and functions.

Customer value creation potential encompasses benefits to the customer – results like cost reductions, improvements, and 'more efficient operations' are measured. The c*ontractor value creation potential* encompasses benefits to the contractor – results like development of new competences, opening of new markets, and new product lines are measured. These performance dimensions are potential 'end results' in the aftermath of the innovation project.

Innovative performance encompasses the degree of newness related to the direct outcome of the innovation project. That is, how *new* the outcome (i.e., result) of the project is to the contractor, customer, and to the international petroleum industry.

The performance dimensions are claimed to be more or less 'contractible' by nature. In particular, the hypothesized relations between the independent variables and value creation and innovative performance can be argued to be of a more exploratory character (see section 2.3). However, we claim that governance will significantly influence these performances through influencing the level of transaction costs, and by providing incentives that increase investments in value creating assets (i.e., specialized investments), (Dyer 1997). Furthermore, we claim that investments in value creating assets influence each performance dimension differently. These assets are relatively more important when value creation and innovation are the objectives compared to goal attainment, for example.

Furthermore, and of outmost importance, is to account for the relation between the performance dimensions and transaction costs since we heavily rely on the logic of transaction cost theory in our model. We start by defining transaction costs and choose Williamson's definition (1996: 379):

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"**Transaction costs** The ex ante costs of drafting, negotiating, and *safeguarding* an agreement and, more especially, the ex post costs of maladaptation and adjustment that arise when contract execution is misaligned as a result of gaps, errors, omissions, and unanticipated disturbances; the costs of running the economic system"

If contract execution is misaligned, transaction costs and performance gaps increase (Williamson 1996: 379). In this dissertation, we argue that *deviation* from high performance is indicated by comparably higher transaction costs. Hence, when performance increases or decreases in value, this is *reflected* in the level of transaction costs. In accordance with transaction cost theory, we argue that a strong relation exists between reduced (increased) transaction costs and increased (decreased) goal attainment and customer value creation potential. Furthermore, we assume that the level of contractor value creation potential, and innovative performance, to some degree, are also reflected in the level of transaction costs. However, we acknowledge that the relation between the latter performances and transaction costs are probably weaker.

The governance mechanisms – formal and relational contracts

The most common 'tool' for the governance of an inter-firm relationship is to agree on some sort of formal, legal contract. A formal contract is claimed to effectively safeguard transactions against potential opportunistic behaviour and provide fairly good adaptation properties, as well as provide the necessary sanctions (Williamson 1985). Although formal contracts are viewed as the most important safeguarding 'structure' in modern economies, this study also acknowledges and includes *relational contracts.* The two governance mechanisms are *assumed* to be independent governance mechanisms respectively. We acknowledge that substitution and complementary effects might be present (i.e., interaction effects), however, whether formal and relational contracts are substitutes or complements is not tested in this dissertation. Nevertheless, in Chapter 2 we briefly present substitution as well as complementary arguments since these subjects are of some relevance when hypotheses are developed in Chapter 4.

This dissertation integrates formal and relational contracting into a framework of project governance, thus acknowledging that both governance mechanisms are important. Since transaction cost theory and relational exchange theory are integrated into one framework, the assumptions and logic of the two theories need to be addressed, particularly as transaction cost

theory places less emphasis on the *social* side of human nature, an assumption central in relational exchange theory. Therefore, we account for these matters in Chapter 2.

The logic of the research model

In this dissertation, we rely *heavily* on standard transaction cost theory and logic, and argue that enhanced performance will be achieved if the governance mechanisms applied (i.e., formal and relational mechanisms) are *aligned* with the attributes of the transaction. The transaction would then be *efficiently* governed (Williamson 1985). Fundamental in the research model is the importance of 'project specific investments'. Specific or specialized investments are known to be productivity enhancing and rent generating (Alchian and Demsetz 1972; Williamson 1985; Dyer 1996). In addition to productivity, we claim that project specific investments are an important potential *source* of value creation (i.e., customer and contractor value creation) and innovative performance, respectively. Hence, in this respect, we extend the territory of standard transaction cost theory by also including innovation.

However, standard transaction cost theory focuses only on transaction cost minimizing, and leaves little room for performance implications such as value creation and innovation, that is, maximizing transactional value. We can call this theoretical extension transaction value analysis, and *effective*[4] governance since we focus on *value maximization* to both the customer as well as the contractor (Zajack and Olsen 1993). Effective governance may *enable* value creation through either: 1) lowering transaction costs by safeguarding project specific investments (i.e., effective alignment), while simultaneously 2) providing the necessary *incentives* for the parties to further invest in such value creating project specific assets (Zajack and Olsen 1993; Dyer 1997). Hence, we follow Dyer (1997: 538) who states: "The […] choice of governance structure influences the incentives of the transactors to engage in value creation behaviour for 'noncontractibles' such as innovation, quality, and responsiveness". In accordance with this logic, failure to invest in specialized assets, due to the fear of opportunism, is assumed to lead to comparatively inferior

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[4] Generally, effectiveness refers to achieving goals, that is, effectiveness is maximization of the return to the organization. Efficiency, on the other hand, refers to the organization's ability to minimize the costs associated with transforming input to output (Katz, D. and R. L. Kahn (1966). The Social Psychology of Organizations. New York, Wiley). The literature provides us with an array of definitions on effectiveness and efficiency. However, the definition provided in Kolltveit and Reve (2002: 49) suits our purpose well, since it was developed for project organizations: "An effective project organization minimizes the transaction costs (maintaining the internal system and adapting to the external environment) and resources used for achieving the objectives in relation to output".

performance. In summary, effective governance and transaction value analysis focuses on maximizing transactional value through value creating initiatives (Dyer 1997).

Given a potentially value creating investment, how should such an investment be governed to minimize transaction costs and thereby maximize value? Our answer is to employ standard transaction cost reasoning.

1.4 The empirical setting and relevant business problems

Although the research question is of high theoretical relevance – it should also preferably be of high practical relevance! Hence, below we will briefly account for the practical relevance of studying governance mechanisms in inter-firm innovation projects.

Traditionally, most innovation projects were conducted internally, these projects were viewed as a strategic asset and therefore well protected within the boundaries of the organization (Chesbrough 2004). To some degree, the same has also been the case with the oil companies in the Norwegian petroleum industry. Recently, it has become more common to involve partners or contractors in even research and development projects (Chesbrough and Schwartz 2007), or alternatively to leave *all* research and development work to an outside contractor! One of the reasons behind the recent trend is that the actors in the industry acknowledge the great potential for technological innovations when cooperating more closely with their key contractors (NORSOK 1995). However, close co-operation with one or a few key partners involves risks, as well as potential advantages for the parties involved. Hence, *governance* of inter-firm innovation projects is needed to secure that value is created in the project, and that the value that is created is fairly *distributed* or *claimed* by the parties involved in the project (Ghosh and John 2005).

The Norwegian petroleum industry is characterized by huge technological challenges and technological innovations are seen as critical for further development of the valuable resources on the Norwegian Continental Shelf (NCS). Furthermore, the industry is characterized by an intense competition between the actors as they compete in a global market – not only on the NCS. Hence, technological innovations are seen as crucial for the long-term growth, and for the competitive advantage of all actors within this industry.

Today more than 40 oil companies and several hundred contractors are present on the NCS. The contractor industry is highly heterogenic and operates in all segments of the market, for example within design, fabrication and installation, research and development, engineering services/consulting, software development etc. A total of 19 oil companies and 98 contractors are represented in the final sample of this study. The data was collected from a survey of approximately 800 managers of inter-firm innovation projects in the industry. Then, the theoretical model was empirically tested on a final sample of 320 inter-firm innovation projects (i.e., a 40% response rate). Project managers on the contractor side of the dyad were the key informants.

Performance implications; benefits and risks

The oil companies, which are the customers in all of the innovation projects, may achieve several benefits from collaborating closely with a contractor. For example some benefits are: reduction of development costs, reduction in development time, and an increase in product quality. Furthermore, new technology may contribute to several important areas within the industry. Many examples can be mentioned: better technology used in exploration, better and cheaper designs when new fields are developed, better drilling technology etc. Obviously, the potential for reduced costs and increased income due to better technology cannot be overemphasized. However, if a contractor becomes the single source of a specific technology or product, a lock-in situation is created (i.e., switching costs). Hence, the oil company loses bargaining power and may encounter higher rates at contract renewal. In addition to the lock-in effect, the oil company may risk leakage of proprietary information to competitors. However, this issue is not treated in this study.

Much more unexplored are the benefits and the risks of the contractors involved in inter-firm innovation projects (Chung and Kim 2003). Besides the short-term financial return, the inter-firm innovation project could provide exciting opportunities for the contractor. For instance, the key contractor might be able to get valuable knowledge about customer needs through direct and informal contact with the customer. Several studies show that partners are one of the most important sources of new ideas and information that results in innovations (Chung and Kim

2003). Furthermore, the contractor has the opportunity to appropriate new technological capabilities and expertise that might lead to enhanced value creation or innovative performance. For instance, new competencies or other resources can be "co-developed" as a result of the project, thus making the contractor even more competitive in the marketplace. The project may result in innovations that, at a later stage, result in new products, new production lines, and new competencies leading to new markets and/or expansion of the contractor's current market share (Chesbrough 2004; Chesbrough and Schwartz 2007; Chesbrough 2007). Hence, the importance of new technology development is emphasized.

On the down side, contractors risk leakage of proprietary information to competitors. For instance, the customer may leak proprietary information to competitors in order to create a more competitive market (in order to get out of the lock-in situation described above).

To be able to increase the probability of a positive outcome for the innovation project, the customer may encourage the contractor to invest more heavily in the project. Some of these investments will be *specific* to the project, thus representing an asset that must be safeguarded against potentially opportunistic behaviour by the customer. With potentially large values at stake, both the contractor and the oil company should be highly interested in efficient and effective governance of the inter-firm innovation project.

The importance of relational contracts in the empirical setting

The actors operating on the NCS earlier recognized the importance of better cooperation, see for example the NORSOK process, which was initiated in 1993. The NORSOK process aimed at developing new organizational forms and new contractual practices between the actors within the industry. For example, an important goal was to reduce the cost level[5] in projects, and in addition, reduce the time from discovery to production (NORSOK 1995; Osmundsen 1999). The new contractual concepts were based on strong relations and cooperation between the actors. It was of fundamental importance that the contractor's competences and resources should be utilized to a greater extent through close and long-term cooperation. The lesson learned from the

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[5] The prelude of the NORSOK process initiative was the low price level of petroleum in the early '90s. Developing the petroleum on the NCS is rather expensive compared to other regions in the world. Thus, the combined effect of a

NORSOK-process demonstrated that there is a large and unexploited potential in the development of more efficient organizational forms and in the development of stronger relations between the actors. The NORSOK process concluded that a precondition for the development of more value creating processes is that more focus should be dedicated to the development of contractual norms. In particular, mutuality, solidarity (i.e., loyalty to the agreement), and closer and more effective communication (i.e., quantitatively and qualitatively better information exchange) were identified as critical. Unfortunately, the parties involved in the NORSOK process/projects did not manage to develop stronger contractual relations, although the development of these norms and relations were perceived as critical by the parties (Kolltveit and Reve 2002: 108-109).

To sum up, this study has the potential to significantly contribute more knowledge about the inter-firm cooperative processes between the parties operating within this specific industry. As argued above, the industry and the authorities have repeatedly called for better co-operation between the actors in the industry, as well as more insight into these matters. Hence, in this respect, the study answers the appeals put forward in the NORSOK reports (NORSOK 1995), and previous repeated requests from the Ministry of Oil and Energy (2002; 2004).

1.5 Unit of analysis: institutional form and definition

Institutional form and innovation: hierarchy, market or hybrid?

This dissertation studies innovation projects within an inter-firm or business-to-business setting. More precisely, this dissertation studies inter-firm innovation projects where large corporations[6] (i.e., oil companies) use contractors to develop or produce technologically (more or less) innovative products[7]. Hence, the institutional form is either *market* or *hybrid.* Below, we argue that the innovation projects analysed may be characterized as *hybrids* (Williamson 1985).

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low price level and a high cost level forced the actors in the industry to act. The NORSOK process was thus initiated in 1993 by the Minister of Petroleum.
[6] Oil companies that operate on the NCS.
[7] A product is defined widely as for example: a new technology, a new concept, a new service etc.

Traditionally, large companies more or less developed their own products internally, *or* simply bought the innovative entrepreneurial firms when they wanted their patents, knowledge, and expertise. Unfortunately, a side effect of acquiring entrepreneurial firms might be the destruction of the innovative and creative culture of the "integrated" firm. Key personnel often leave soon after these type of acquisitions (Bower and Christensen 1995). It seems as if the bureaucratic features of large corporations may hinder or disable value creation and innovative performance, although some large corporations maintain that innovation can be (and has been) successfully accomplished in integrated hierarchies or bureaucracies (Williamson 1985).

Another promising alternative strategy is to acquire the necessary knowledge or capabilities in the *market*. Large companies, to an increasing degree, rely on close ties to key contractors to accomplish R&D efforts. Commonly, the customer company funds or invests in the contractor company to make sure that the desired technology is developed. To a varying degree, the contractor also invests in *assets* to support the execution of the project. The contractor may give the employees special training, invest in special equipment, invest in personal relations with the customer, or in getting to know the customer representatives more closely. As the complexity and duration of the relationship increase, the fiction of discreteness will be fully displaced as the project takes on the properties of a society with a vast array of norms (Macneil 1980). A long-term and close cooperative relationship may develop, which is far from the *discrete* market transaction – the result is *hybrid* form of governance (Williamson 1985).

Defining the unit of analysis – the transaction

This section defines the unit of analysis, which is the transaction, and furthermore, defines the object of analysis, which is the inter-firm innovation project. There are a number of different theoretical perspectives within the field of project management[8] and 'project management'

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[8] Several project management perspectives can be identified within the research literature. Following the work by Kolltveit, Karlsen et al. (2007), I will briefly account for six of the main perspectives, which are most widespread and most extensively used in the academic literature. 1) The **activity or task perspective** – this perspective has dominated the project management literature for several years, but is declining in importance. Focus is set on the project object, which is to be delivered according to specifications, on time, and within budget. 2) The second most widespread perspective is the **leadership perspective** – this perspective focuses on the leadership aspect of project management. 3) Next, is the **system perspective**. This perspective focuses on the project organization as a rational 'natural' system, which is established to achieve specific goals. 4) The **stakeholders' perspective** focuses on the stakeholders' views, interests, and expectations with departure in political theories. 5) The **business by projects perspective** – the companies' business is executed through projects focusing on investments and benefits, and

involves several basic academic disciplines (Kolltveit and Reve 2002; Kolltveit, Karlsen et al. 2007). Consequently and not surprisingly, the existing research literature does not concur on the definitions of what 'project management' is, and what 'project management' encompasses.

This study employs an 'economic approach' to the governance of projects (i.e., a transaction cost perspective). Hence, the project is appropriately viewed as an economic transaction (Ulset 1996; Kolltveit and Reve 2002; Kolltveit, Karlsen et al. 2007). In this dissertation, the project is simply defined as an *economic transaction* with a *stated goal(s)*, executed within a given resource framework, and as part of an *innovation process*. The definition chosen has been adapted from Kolltveit and Reve (2002)[9]. Below, the individual elements of the definition are briefly elaborated.

A project is defined as '*an economic transaction,*' which is executed between legally independent business firms. Typically, products are developed and/or produced by a contractor and delivered to a customer in *exchange* for money paid by the customer. The selection process of projects included in the sample insured that the projects, on the whole, had only *one* customer and only *one* contractor[10]. Furthermore, the contractor conducted the project *on behalf* of the customer. Hence, some economic *exchange* must be assumed to take place between the two focal parties. Whenever *exchange* takes place, we use the term '*transaction*' or '*economic transaction*'. John R. Commons claimed, as early as in 1934, that the 'transaction' should be regarded as the proper unit of analysis when economic organizations are studied (Commons 1934). Relying on Commons' view, Williamson defined a transaction in the following way: "A transaction occurs when a good or service is transferred across a technologically separable interface" (Williamson 1985: 1). According to this definition, the object of analysis (i.e., the project) should be regarded as many transactions and not only as one. However, for our purpose (i.e., theory and hypotheses development) it is most convenient to define the project as only *one* separate transaction, and not as a process of multiple-transactions. Hence, we follow the transaction cost perspective of project management (Kolltveit, Karlsen et al. 2007).

Furthermore, we assume that the projects in this study are conducted to achieve certain *goals*. Relevant goals in innovation projects typically are the fulfilment of specifications, functions,

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finally 6) the **transaction cost perspective** – based on the assumption that a project can be defined as an economic transaction. This dissertation is based on the transaction cost perspective.
[9] The definition is translated from Norwegian to English.

quality requirements, and, cost and time schedules. Furthermore, performance dimensions such as the customer and contractor value creation potential and innovative performance should also be included (Sadeh, Dvir et al. 2000)[11]. The multi-dimensional nature of performance will be accounted for more in-depth in Chapter 2.

According to the project definition, a project should be executed within a given '*resource framework*'. Since governance is the focus of this dissertation, it is important to distinguish between *generic* and *specific* resources or investments. This distinction is important and will be treated more thoroughly in Chapter 2.

All innovation projects are defined as being part of *'an innovation process'*. Hence, some degree of innovation is presumed in all projects included in this study. The result of the innovation process could be everything from 'nothing new' to innovations that are more radically new. For instance, the construction of a unique oil producing facility is included in the study. The main reason is that these facilities are tailored to the customer's needs, and are therefore unique and to some degree 'new'[12]. By defining the inter-firm innovation project broadly, this dissertation has been able to include a large number of projects executed on the NCS during the last few years.

1.6 Outline of the dissertation

This dissertation is divided into five parts. The first part (Chapter one) introduces, positions, and justifies the choice of the research agenda. First, the dissertation is positioned within the research literature, then a research question is specified, and the research model is outlined. Then the institutional form of the unit of analysis is defined, and finally, the innovation project is defined within an economic framework.

The second part (Chapters two, three, and four) provides the theoretical foundations applied in the dissertation, and testable hypotheses are developed. Transaction cost and relational exchange theory are accounted for, and important assumptions of the theories are discussed. Finally, the

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[10] Some projects do not have just one customer, but two or three. In these few cases the informant was asked to base his answers on his relationship to the largest customer and/or the customer who he had most contact with during the execution of the project.

[11] In Chapter 2, the choice of performance variables is discussed and justified.

importance of project specific investments in relation to enhanced value creation potential and innovative performance is elaborated. In Chapter four, testable hypotheses are developed from the theoretical perspectives introduced and elaborated on in Chapter two.

The third part (Chapter five) includes a presentation and argumentation for the choice of research design, and presents and argues for the methodological choices in the empirical study.

The fourth part (Chapters six and seven) contains the statistical analysis of the empirical data and the results are discussed. Furthermore, theoretical implications and implications for managers are discussed.

Finally, the fifth part (Chapters eight and nine) contains relevant references and appendices.

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[12] In Chapter 2, the innovative performance variable is discussed and justified.

PART II

2 Theoretical background

The governance or organization of inter-firm exchanges has become increasingly important in recent decades, in both commerce and the research literature. In parallel with this development, theoretical work has been developed by researchers within several distinct streams of research, for example (new) institutional economics (Williamson 1985), organization theory (Pfeffer and Salancik 1978), and contract law (Macneil 1980). In accordance with my research question, we rely heavily on two of these theories: transaction cost theory in the study of *formal contracts* (Williamson 1985; Williamson 1991), and relation exchange theory in the study of *relational contracts* (Macneil 1974; Macneil 1978; Macneil 1980). In this respect, the study acknowledges the importance of *both* contractual and relational (social) mechanisms when governance of projects is studied (Cannon, Achrol et al. 2000; Lambe, Spekman et al. 2000; Poppo and Zenger 2002). Hence, we are responding to the repeated requests in the literature to include both the formal *and* the social sides of inter-firm exchange. As Cannon, Achrol et al. put it: "Many scholars have criticized the inadequacies of legal contracts as mechanisms for governing exchange, especially in the face of uncertainty and dependence. Other scholars argue that it is not the contracts per se but the social contexts in which they are embedded that determine their effectiveness" (2000: 180).

First, project governance is defined (Section 2.1). Second, an integrated theoretical framework is developed based on transaction cost theory and relational exchange theory (Section 2.2). Then the two theories are briefly accounted for, and the assumptions and logic of the two independent theories are critically evaluated. Finally, in Chapter 3, we present empirical studies and findings, which are relevant in relation to the positioning of the study, research question, and later hypotheses development.

2.1 Governance defined

'Governance' between and within organizations does not only consist of the price mechanisms in the market (Hayek 1945) and through control and authority relations within the hierarchy (fiat) (Coase 1937; Williamson 1975). According to Mintzberg (1979; 1989), organizations use an array of mechanisms to coordinate work (i.e., govern transactions). Hence, it seems appropriate to define what is meant by governance in this dissertation. In the inter-organizational literature, governance is defined, for example, as 'a mode of organizing transactions' (Williamson and Ouchi 1981), or "a shorthand expression for the institutional framework in which contracts are initiated, negotiated, monitored, adapted, and terminated" (Palay 1984: 265)[13]. Indeed, the above definitions are too wide for my purpose; in any case, they illustrate the array of mechanisms described in the literature (Mintzberg 1979). However, we prefer a more specific and narrow definition since governance of *projects* is studied. The definition chosen is adopted from Kolltveit and Reve (2002: 215): project governance is the "deliberate measures undertaken to increase the possibility of achieving goal(s)". The latter definition contains two important insights: firstly, that *governance* involves the implementation of *deliberate* measure(s) such as the implementation of a formal contract to regulate the project, and secondly, the recognition that projects and *project goals*, to a varying degree, are uncertain by nature. The nature of project goals and the multi-dimensional nature of performance will be elaborated in Section 2.3.

2.2 Theoretical perspectives – transaction cost and relational exchange theory

Although transaction cost theory and relational exchange theory are integrated into one framework, our research model relies *mainly* on the logic of transaction cost theory. The 'main' focus is on transaction cost theory and the *formal contract* as the principal governance mechanism because of the *rational or deliberate* choice explanation that underpins project governance (Ghosh and John 2005). Although the *conscious* and *deliberate* choice of formal contract terms is quite natural, it is more difficult, but not impossible, to imagine that implicit governance modes, such as relational contracting, can be consciously designed (Zenger, Lazzarini et al. 2002; Ghosh and John 2005). Nevertheless, relational contracting is considered

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[13] Translated into English from Norwegian

highly valuable and will be included in the research model as an independent governance mechanism.

In this dissertation, we treat formal and relational mechanisms as individual and independent governance mechanisms. However, whether formal and relational governance mechanisms function as complements or substitutes is both theoretically and empirically interesting. In some contexts, the two governance mechanisms may function as complements leading to enhanced performance, in other contexts one of the mechanism may be redundant, or in the worst case, they may act as substitutes leading to inferior performance (Cannon, Achrol et al. 2000). Since both substitution and complementary arguments, to some degree, are used in Chapter 4 (i.e., when hypotheses are developed), we find it appropriate to *briefly* present some substitution and complementary arguments to demonstrate the complexity of these matters.

The research literature treats formal and relational mechanisms mostly as substitutes. The first claim is that formal contracts are *unnecessary*, because governance based on relational norms and values are *sufficient* for governing an exchange (Macaulay 1963) and comparably more efficient (Gulati 1995). Furthermore, some researchers argue that reliance on formal contracts might even destroy 'trust' and the development of more informal elements (Ghoshal and Moran 1996). Hence, the excessive use of formal elements is seen as potentially dangerous, and might undermine the development of trust, social norms and values.

As stated above, our position is that formal and relational contracts are independent governance mechanisms, however, the two 'mechanisms' might work together to reinforce and support each other *particularly when hazards are severe* (Zenger, Lazzarini et al. 2002). For instance, we argue that the two mechanisms are different in their safeguarding and adaptive properties. Furthermore, we argue that there are 'limits' to the adaptive properties of formal contracts when confronted with high levels of uncertainty. Relational norms do not have such limitations and are preferred as *additional* and maybe *complementary* (i.e., supportive) mechanisms to the formal contracts. We contend, in line with Cannon et al. that "exchange can be best understood as embedded in a complex matrix, of economic, social […] structures and that governance of exchange relations more often relies on combinations of market, social, and authority-based mechanisms than on any one other category exclusively" (2000: 184). See also Bradach and Eccles (1989).

Nevertheless, it should be recognized that the issue of formal and relational governance mechanisms functioning as complements (Cannon, Achrol et al. 2000; Poppo and Zenger 2002), or substitutes (Macaulay 1963; Gulati 1995) has not yet been sufficiently explored and understood. We *assume* that formal and relational governance mechanisms are independent, but *may* function as substitutes and complements depending on the level of hazard and the multi-dimensional nature of performance (i.e., the context).

2.2.1 Inquiry into transaction cost theory

Transaction cost theory is extensively used to explain the existence and boundaries of firms. The theoretical framework belongs to the "New Institutional Economics" paradigm, which may be regarded as a useful and complementary paradigm to the neo-classical economic view of the firm as a production function (Williamson 1975). Ronald H. Coase (1937) was one of the first to acknowledge the importance of transaction costs, and viewed the firm and the market as alternative *governance structures*, with different costs associated with each. Given certain contingencies, the cost of conducting transactions in the market will exceed the cost of organizing the transaction within a firm, hence the market 'breaks down' (Rindfleisch and Heide 1997). More specifically, "[t]ransaction costs are the economic equivalent of friction in a physical system" (Williamson 1985: 19). For example, these are the costs incurred from drafting and negotiating contracts (i.e., establishing safeguards ex ante), and those such as re-negotiation, monitoring, and enforcing agreements (i.e., ensuring compliance ex post). In other words these are: "the costs of running the economic system" (Arrow 1969: 48). In addition, we have 'opportunity costs', the costs associated with making inferior governance decisions. For instance, "[w]ithout appropriate safeguards, firms face the risk of expropriation (ex post), or productivity losses resulting from the failure to invest in specialized assets (ex ante)" (Rindfleisch and Heide 1997: 46). Hence, potential value creating transactions may not be undertaken due to the absence of appropriate safeguards, that is, an inferior governance structure (Zajac and Olsen 1993; Rindfleisch and Heide 1997). Thus, a firm's governance decision not only influences the cost level, but is also an important determinant of value (Zajac and Olsen 1993; Foss and Foss 2005). The fundamental unit of analysis in transaction cost economics is the *transaction*. Transactions

take place across markets and within hierarchies – 'the location' is a question of cost minimization including both production and transaction cost.

To sum up so far, the transaction should be regarded as the basic unit of analysis. According to Williamson, any problem that can be formulated as a contracting problem can be investigated in transaction cost economizing terms. "Transaction cost economies are realized by assigning transactions (which differ in their attributes) to governance structures (which are the organizational frameworks within which the integrity of the contractual relation is decided) in a discriminating way" (Williamson 1985: 41). Hence, the attributes of the focal transaction need to be identified first, and second, the incentive and adaptive properties of alternative governance structures (or mechanisms) need to be described Williamson (1985: 41).

Behavioural assumptions: bounded rationality and opportunism

The transaction cost framework rests upon two basic assumptions about human behaviour: *bounded rationality* and *opportunism*. The concept *bounded rationality* originates from Herbert Simon (1957; 1961), and acknowledges the limits on human cognitive capacity, and limits on their rationality. Economic actors are assumed to be "*intendedly* rational, but only *limitedly* so" (Williamson 1985: 45 original emphasis). Human decision makers strive or 'intend' to make rational choices (i.e., they are 'intendedly rational'), but are hampered by limited cognitive capacity (i.e., capacity to receive, store, and organize information). The assumption of boundedly rational economic actors has several implications for the contracting parties, as will be elaborated in the sections below. In short, it is impossible for *boundedly rational* actors to write exhaustive contracts that foresee all possible future contingencies *ex ante* (Williamson 1985). However, bounded rationality will only pose a problem in environments, or for transactions, that are characterized by *uncertainty and/or complexity*. The problem of bounded rationality becomes especially problematic for highly uncertain and/or highly complex transactions. Consider the case where an oil company wants to purchase a new drilling system from a contractor. Consider further that the drilling system needs to be adapted or tailor-made to the specific needs of the customer. A contract needs to be worked out and signed by the parties. The specifications in the contract should ideally be clearly defined, that is, the contract document should be exhaustive and encompass all possible future contingencies. On the other hand, writing an exhaustive contract document under these circumstances is very difficult due to the high level of

technological uncertainty attached. Several uncertainties can be identified, for example, how much it will cost to develop the drilling system or tailor the system to the customer's needs and how much it will cost to produce/manufacture the highly complex system. These elements are just two out of many examples that show the level of *uncertainty/complexity* that an oil company faces when purchasing a complex/sophisticated drilling system from a contractor.

Critical dimension of the transaction: uncertainty and complexity

Uncertainty (combined with bounded rationality) between contracting parties in exchange situations creates information problems (Williamson 1975). Without sufficient information, the parties will not be able to write complete contracts that encompass all future contingencies, hence incomplete contracts result[14] (Williamson 1996). Two main forms of uncertainty emerge when reviewing the literature: 1) environmental uncertainty (external), and 2) internal uncertainty due to task ambiguity (Cannon, Achrol et al. 2000)[15]. The empirical literature is highly divergent regarding the importance of *environmental* uncertainty on governance structures (Rindfleisch and Heide 1997; David and Han 2004). In fact, the studies reviewed by Rindfleisch and Heide (1997) and David and Han (2004) showed that environmental uncertainty was positively, negatively, *and* not at all related to governance.

However, since innovation projects are focused upon in this study, *internal* uncertainty is considered to be the most relevant. *Internal uncertainty, due to ambiguity,* makes writing contracts challenging. Furthermore, it becomes difficult or even impossible to *monitor behaviour and measure outcome* ex post (i.e., measure performance). We often use the concept task ambiguity, or just ambiguity, in this dissertation. *Task ambiguity* is defined as the difficulty in obtaining or understanding *information* regarding a contractor's tasks or functions (Simonin 1999; Cannon, Achrol et al. 2000; Poppo and Zenger 2002). The concept encompasses, for

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[14] Incomplete contracting is defined as: "Contracts are effectively incomplete if: (1) not all the relevant future contingencies can be imagined, (2) the details of some of the future contingencies are obscure, (3) a common understanding of the nature of the future contingencies cannot be reached, (4) a common and complete understanding of the appropriate adaptations to future contingencies cannot be reached, (5) the parties are unable to agree on what contingent event has materialized, (6) the parties are unable to agree on whether actual adaptations to realized contingencies correspond to those specified in the contract, and (7) even though both the parties may be fully apprized of neither, in which event costly haggling between bilaterally dependent parties may ensue" Williamson, O. (1996). The Mechanisms of Governance. Oxford, Oxford University Press. (p368).

[15] Note that Williamson mainly focuses on external disturbances, not on external and internal uncertainty. However, we find the distinction between external and internal uncertainty useful.

example, practical problems such as ambiguity related to evaluation of business offers, ambiguity related to the contractor's products and services, ambiguity related to objectively assess the contractor's behaviour during project execution, and finally, ambiguity related to the outcome of the project (i.e., performance ambiguity). Below, we account for some of the causes of *ambiguity*. According to Simonin (1999), task ambiguity will vary with the level of technological *complexity* and the level of *tacitness*. Furthermore, Simonin identifies 'experience' as a factor negatively related to ambiguity. *Complexity* refers to the number of inter-dependent technologies, routines, individuals and resources. That is, the more complexity, the more ambiguity is introduced into the project; hence, information problems and (internal) uncertainty increase. *Tacitness* refers to the level of implicit and noncodifiable accumulation of skills (Reed and DeFillippi 1990). That is, the more *tacit* knowledge and competencies the contractor possess, the more ambiguity is introduced into the project; hence information problems (i.e., information asymmetry) and (internal) uncertainty increase.

Based on the above arguments, we argue that *ambiguity* is a natural component in all innovation projects due to the implicit information problems (Butler and Carney 1986). Thus, it is difficult or even impossible for the parties to develop a complete contract where all possible future contingencies are spelled out ex ante (Simonin 1999; Cannon, Achrol et al. 2000). Previous research has "suggested that there are limits to the amount of uncertainty that can be managed through formal organizational arrangements […] extreme levels of uncertainty could lead to information processing problems of such magnitude that the loose coupling afforded by market governance becomes preferable" (Rindfleisch and Heide 1997: 49). See also Shelanski and Klein 1995. To recap so far, internal uncertainty caused by task ambiguity will make it more challenging to *specify outcomes* ex ante and *measure performanc*e (i.e., behaviour and outcome) ex post (Alchian and Demsetz 1972; Simonin 1999; Cannon, Achrol et al. 2000).

According to Williamson, bounded rationality and uncertainty (i.e., the presence of incomplete contracts) *may* lead to *opportunistic* behaviour by the 'agent'. The second behavioural assumption in transaction cost theory is that of *opportunistic*[16] actors. Williamson defines opportunism as "interest seeking with guile" (Williamson 1985: 47). Opportunistic behaviour, according to Williamson, is lying, stealing, and cheating, but it is also more "subtle forms of

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[16] Knight acknowledged as early as 1965 the importance of studying human nature as we know it. Knight especially identified the 'moral hazard,' to which economic actors must pay attention. Knight, F. H. (1965). Risk, Uncertainty, and Profit. New York, Harper and Row.

deceit" (Williamson 1985: 47). Williamson has been heavily criticized for having a too pessimistic view on human nature (see Ghoshal and Moran 1996). However, Williamson does not assume that everybody will or is inclined to behave opportunistically at all times; he only assumes that *some* people *may* behave opportunistically at *some* point in time, and that it is difficult or even impossible (in any case costly) to know *ex ante* who is honest and who is dishonest (Williamson 1979: 234). This view is also echoed by Barney (1990).

Opportunistic behaviour might be a serious problem if a customer is in a situation that is called small numbers exchange (Williamson 1975), for instance, due to investments in specific assets (Williamson 1985). If opportunistic behaviour is observed in a well functioning market (i.e., many contractors), and the level of asset specificity is nontrivial, opportunism would not be a problem. The customer would change contractors with marginal costs at contract renewal. However, in a small number exchange situation, the customer has no alternative. He will purchase the product from the contractor, but at a higher cost. Transaction costs are incurred because the customer will have to take precautions, that is, try to disclose possible private information and set up more extensive and complex contracts (Douma and Schreuder 2002). In summary, a situation involving bounded rationality, uncertainty/complexity, opportunism, and small numbers exchange due to asset specificity will inevitability lead to higher transaction costs. Vertical integration into the hierarchy might result (Williamson 1975).

Dimensions of transactions

Williamson (1985) stated three critical dimensions that describe the characteristics of the *transaction*: asset specificity, uncertainty and complexity, and frequency. The dimension *asset specificity* is accounted for below, while *uncertainty and complexity* were accounted for in the previous paragraph, where it was established that the assumption of *bounded rationality* is only problematic in the face of *uncertainty and complexity.* Because we study innovation projects, which are transactions with finite time spans, the dimension of *frequency* is not relevant, and will not be discussed further.

The *asset specificity* of a transaction refers to the extent to which the transaction needs to be supported by *transaction specific assets* (Williamson 1985). According to Cannon et al. (2000:

181) *transaction specific adaptations* or *asset specificity* are defined as "investments made to modify processes, product technologies, or procedures to the specific needs and/or capabilities of an exchange partner". The key point is that transaction specific investments represent 'sunk costs' in relation to alternative transactions when *asset specificity* is high, and that these involve risk. Examples of these investments are: 1) site specificity, 2) physical asset specificity, 3) human asset specificity, 4) dedicated assets, 5) brand name capital, and 6) temporal specificity (Reve and Lewitt 1984; Williamson 1985; Williamson 1991). The *transaction specific investments* or specific adaptations create a dependency relationship and a 'lock-in' effect to one specific partner. Dependence is created because specific investments have significantly less value within alternative relationships. In other words, switching costs arise in the relationships.

These are some of the main implications of the points above: *Bounded rationality, risk of opportunism,* and the presence of *uncertainty and complexity* in combination with *transaction specific investments* make contracting difficult and exchange hazards more threatening. A result is that non-standard contracting easily appears (Williamson 1985). As the presence of exchange hazards increases, (e.g., the level of transaction specific investments due to the risk of opportunistic behaviour) the hierarchy (i.e., vertical integration, internal organization etc.) is predicted to be a more efficient form of governance than the market. The hierarchy, according to Williamson, possesses superior safeguarding mechanisms, adaptive capabilities and monitoring abilities (Williamson 1985). In an inter-firm setting, the equivalent of integration into a hierarchical governance structure will be an increase in the formal elements in the contract structure.

Formal contracts typically involve detailed obligations, responsibilities, and private ordering systems for both of the contracting parties. Stinchcombe (1985) identified five *hierarchical* elements often included in formal contracts: 1) command structures and authority systems, 2) incentive systems, 3) standard operating procedures, 4) dispute resolution procedures, and 5) pricing of performance. Of these hierarchical mechanisms, we have chosen to study the level of formalization in the contract. That is, we focus on rules, procedures, standard operating procedures, and dispute resolution procedures that are implemented in the contract. Hence, we follow established research within the literature (see for example, Haugland and Reve 1994; Moenaert, Souder et al. 1994; Lusch and Brown 1996; Cannon, Achrol et al. 2000; Haugland, Reve et al. 2002). Furthermore, the *formal contract* is defined as the degree to which the project

is regulated by rules and procedures, fixed policies (e.g., dispute solution mechanisms), and, to what degree the project team members follow the rules and procedures agreed upon during the execution of the project, for example in decision making (Moenaert, Souder et al. 1994; Lusch and Brown 1996; Cannon, Achrol et al. 2000; Haugland, Reve et al. 2002).

2.2.2 Inquiry into relational exchange theory

Governance of inter-firm innovation projects is challenging and formal contracts may not be adequate to govern relations efficiently and effectively. These projects are typically technically complex, there is often a high degree of uncertainty, goals and work processes are ambiguous etc. As a response to the inadequacies of formal contracting, the development of more relation based "contracts" has been witnessed both conceptually and empirically. In the subsequent sections, different contractual perspectives on governance of exchange are presented.

The theoretical point of departure is 'the relational theory of the law of contract', or 'relational exchange theory', developed by Ian Macneil (1974; 1978; 1980), among others. This stream of research can be traced back to the early works of Macaulay (1963). Macaulay observed to his surprise the large extent of non-contractual behaviour in business relations in that "businessmen often fail to plan exchange relationships completely, and seldom use legal sanctions to adjust these relationships or to settle disputes" (Macaulay 1963: 55). Macneil opposed the more traditional definitions of contract[17]. He defined contract as: "by contract I mean no more and no less than the relations among the parties to the process of projecting exchange into the future" (Macneil 1980: 4). The term *exchange* in Macneil's definition includes *all* types of exchange and applies to *all* societies (Macneil 2001: 48). Furthermore, Macneil defines the very idea of exchange as "giving up of something in return for receiving something else" (Macneil 1986: 567).

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[17] A more traditional definition in classical contract law was common, for example, "A contract is a promise or set of promises for the breach of which the law gives a remedy, or the performance of which the law in some way recognizes as a duty". Further, "Under it any relation, no matter how full of exchange, not potentially giving rise to *legal remedies* or *legal recognition* of duties is not a contract" Macneil, I. R. (1980). The New Social Contract: An Inquiry into Modern Contractual Relations. New Haven and London, Yale University Press. I conclude that the traditional definition is quite narrow.

At the heart of Macneil's work is the acknowledgement of society and the implications for contracting in an attempt to construct a social philosophy of exchange. Here is his starting point: "We shall start at the beginning. In the beginning was society. And ever since has been society. This surely must be the most forgotten fact in the modern study of contracts, whether in law or in economics" (Macneil 2001: 127). Consequently, Macneil insists on studying the contract and behaviour of man *in society* and not using models that are based on man *outside society* (a holistic view). Hence, the discrete exchange does not exist; there has always been and will always be society. The view that all contracts are embedded in a social matrix has been acknowledged earlier by Karl Llewellyn. Llewellyn defined contracts as "a framework highly adjustable, a framework which almost never accurately indicates real working relations, but which affords a rough indication in which relations vary, an occasional guide in case of doubt, and a norm of ultimate appeal when relations cease in fact to work" (Llewellyn 1931:737).

As a consequence of "accepting" the existence of society and relations between human beings, the classical behavioural assumption of man as only an entirely selfish creature[18] should be revised. "The foundation [...] is the fact that men are individuals born and dying one by one, each suffering his or her own hunger pains and enjoying his or her own full stomach, yet each individual absolutely requiring other human beings even to exist physically and psychologically […] The consequence is that humans are – cannot otherwise be – inconsistently selfish and socially committed at the same time" (Macneil 2001: 90). As such, we conclude that almost all contracts are influenced by society and personal relations to some degree, hence, a pure discrete transaction is virtually impossible to envision in practice.

The governance of contractual relations has one purpose: to facilitate *exchange* in a broad sense (Macneil 1974). Classical contract law (with which Macneil takes issue) may be described as "sharp in by clear agreement, and sharp out by clear performance" Macneil (1974: 738). The transaction or exchange, within classical contract law, is considered as *discrete* and fully '*presentiated*' at the time of contract[19]. These implicit assumptions and their implications need to be explicated.

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[18] In economic terms, utility seeking and selfish actors are labelled "opportunistic" c.f. Williamson, O. E. (1985). The Economic Institutions of Capitalism. New York, Free Press.
[19] Discreteness and presentation are classified as common contract norms.

First the discreteness norm: 'discreteness' implies that the identity of the parties to an exchange is treated as irrelevant[20], for example exchange conducted at a stock exchange approximates the condition of *discreteness* – no 'relation' or personal contact apparently exists between the parties. Second, the distinction *'presentiation'* involves that all aspects of the future exchange can be fully described at present time. Third, remedies for failure to perform are fully prescribed in the contract. According to Macneil, the above assumptions are highly unrealistic. Central to Macneil's work is the argument that discrete exchanges are relatively rare compared to relational exchange. Although 'the discrete exchange' paradigm has served both economics and law well, there is an increasing awareness that many contractual relations are not of this well-defined kind (Williamson 1985). This is especially apparent in relations characterized by long-term cooperation and uncertainty. Hence not all exchange fits into the classical contract category.

Neoclassical contracting is characterized by the acknowledgement that contracts are necessarily incomplete in that not all future contingencies can be identified at the outset[21]. Central in neoclassical contracting is also the use of third party assistance (arbitration) in resolving disputes (i.e., litigation is the last resort). As the length and complexity of a relation increase even neoclassical contracts have been displaced as means of adjustment and the relation take on the properties of a "minisociety with a vast array of norms" (Macneil 1978: 978), that guide, control and regulate behaviour (Macneil 1980) – *the relational contract result*. The characteristics of a 'relational contract' and a 'relational exchange process' may be described as interactive processes where commitments are given and outcomes are observed. If the outcome of the interactions meet or exceed the expectations, further investments are made. Hence, a mutual understanding develops, which may result in a common language and mutual knowledge. Future patterns of behaviour are thus taken for granted. After recurrent interaction, it is fair to assume that the actors share common expectations about behaviour in the relationship (Macneil 1974; Macneil 1978; Macneil 1980; Haugland 2003).

The (incomplete) contract may be seen as agreements that are intentionally left incomplete, the aim being to leave the actors enough flexibility to adapt to changes in environmental conditions (Macneil 1978; Haugland 2003). Due to the incompleteness of most contracts, *norms* have the

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[20] The assumption of *discreteness* corresponds exactly to the concept of an ideal market transaction in economics. Ideal markets are characterized by prices acting as 'sufficient statistics'; the price contains all the information needed on which to base a decision.

[21] Bounded rational actors and uncertainty are assumed.

potential to become alternative and complementary governance mechanisms of the relation (i.e., safeguards). Norms are defined in several ways in the literature, for example Scott (2001: 54) claims that "norms introduce a prescriptive, evaluative, and obligatory dimension into social life", and further, "A norm is a belief shared to some extent by members of a social unit as to what conduct *ought* to be in particular situations or circumstances" (Gibbs 1981: 7). Normative control mechanisms typically involve the consideration of both parties' needs and mutual acceptance of norms governing the behaviour of the relationship. Hence, norms may function as independent governance mechanisms by guiding behaviour *ex ante* and controlling behaviour *ex post* (Macneil 1980).

Guiding behaviour ex ante, "the prescriptive dimension": Shared norms and values are regarded as the basis of a stable social order. Norms generally specify how things should be done, which goals are legitimate, and define legitimate means to pursue these goals. Thus, norms may guide behaviour *ex ante* through their prescriptive dimensions.

Controlling behaviour ex post, "the evaluative dimension": According to the definition, norms introduce an evaluative dimension into the relation. Thus, norms are considered to have a capacity to control behaviour *ex post*. The *ex post* dimension of norms serves an evaluative function as to what degree the performance of the contracting parties is in accordance or in conformity with the prevailing norms in the relation and in the society in general. Hence, the norms serve as 'reference points' for the evaluation of behaviour. Any deviant behaviour will be sanctioned if recognized by the contracting parties. Some relevant sanctions may be for example, the implementation of more control routines, and less 'freedom' due to the reduction of trust in the relationship. Furthermore, these sanctions are presumably relatively well-known *ex ante* and are therefore tacitly accepted by the parties engaged in the relation or an inter-firm project, for example.

For instance, *if* strong relational norms have been developed between the contracting parties, these norms have the potential to reduce exchange hazards associated with for example, the execution of a project. In particular, according to Williamson (1985), transaction specific investments, uncertainty, and performance measurement difficulty are critical. Expectations of

future exchange[22] and expectations of continuity of the relationship provide strong incentives that effectively *safeguard* project specific investments. Furthermore, relational norms also provide motivation or incentives that facilitate *additional* investments in specific assets (Poppo and Zenger 2002). Likewise, expectations of future exchange *also* influence and reduce the need for *performance measurement* during project execution. The contracting parties are less willing to behave opportunistically due to the risk of losing future contracts, thus the contracting parties *trust* each other to perform in accordance with the agreement. Highly developed and strong norms of *flexibility, solidarity,* and *mutuality* facilitate adaptation in the project; hence, hazards associated with uncertainty are reduced. The safeguarding and adaptive properties of relational norms will be elaborated in Chapter 4 when the hypotheses are developed.

According to Macneil (1980), there are several norms that "govern" a relationship. Macneil identifies and discusses a total of 28 norms. These partially overlap and have been reduced by academic scholars to between three and seven contractual norms (Kaufmann and Stern 1988; Noordewier, John et al. 1990; Gundlach, Achrol et al. 1995; Cannon, Achrol et al. 2000). In this dissertation we mainly follow Cannon, Achrol et al. (2000) who identify five norms that are particularly relevant as social *complements* to formal contracts in co-operating arrangements such as innovation projects. These norms are; flexibility, solidarity, mutuality, harmonization of conflict, and restraint in the use of power. Other normative control mechanisms worth mentioning are: the trade off between long-term and short-term profit opportunities (long-term orientation norm), the degree to which the other parties interests are taken into account in decision making (fairness norm), and the nature and quantity of proprietary information exchanged in the project (openness norm). Heide and John (1992) identify and propose three norms of special interest: flexibility, solidarity, and information exchange. The previous norms are especially common in empirical studies that have been conducted in distribution channel research (see for example Lusch and Brown 1996; Haugland, Reve et al. 2002; Ivens 2002; Poppo and Zenger 2002; Bello, Chelariu et al. 2003). We concluded that the literature on relational norms is divided, and chose to follow the acknowledged work by Heide and John (1992), Cannon, Achrol et al. (2000) and Poppo and Zenger (2002). Hence, in close cooperative

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[22] This dissertation places emphasis on the socially developed norms and values that have the potential to informally 'govern' a project. However, we are fully aware of the more calculative mechanisms involved in exchange. Contracting parties *will* continuously calculate the cost of opportunistic behaviour against future expectations; in other words, the future casts a shadow on the present. Axelrod, R. (1984). The Evolution of Cooperation. New York, Basic Books. However, this study does not examine the mechanisms behind relational governance. The focus will be on the implications of relational governance.

arrangements such as innovation projects, the following norms should be of utmost importance according to the literature:

Information exchange: the attitude that critical information is provided by the parties if necessary to meet business needs. Thus, information sharing facilitates adaptation and problem solving because the parties are willing to share information about plans, goals, technical systems, and other proprietary information etc. (Poppo and Zenger 2002).

Solidarity: The attitude that success comes from cooperating, not competing, and that the parties stand by each other in the volatile marketplace (ups and downs), (Cannon, Achrol et al. 2000). We rely on Poppo and Zenger (2002) and define solidarity as: "Solidarity promotes a bilateral approach to problem solving, creating a commitment to joint action through mutual adjustment." (Poppo and Zenger 2002: 710).

Flexibility: The attitude that the agreement could, and should be modified as the relationship evolves and develops. Hence, flexibility provides adaptation to unforeseeable future events (Poppo and Zenger 2002).

Harmonization of conflict: Conflicts in the relationship are solved in the spirit of future cooperative ends (Cannon, Achrol et al. 2000). That is, the attitude that conflicts and unforeseen contingencies will be handled in good faith.

Restraint in the use of power: The attitude that power asymmetry and dependency in the relationship should not be opportunistically exploited. Use of power may trigger conflict situations, undermine solidarity and mutuality, and even lead to opportunistic behaviour (Cannon, Achrol et al. 2000).

Mutuality: The attitude that one cannot succeed on the cost of the partner; success is a function of the partner's success and vice versa. Success is dependent on joint responsibility (Cannon, Achrol et al. 2000).

The chosen relational norms all reflect important dimensions of a 'relational contract'. Hence, they are all retained and will be used in the analysis in this dissertation.

In summary, a thorough literature review was conducted, although the most attention was given to the early work of Macneil and his 'relational exchange theory'. Afterwards, empirical studies within the inter-organizational literature were reviewed, which formed the foundation for the operationalizations of the most important cooperative norms: *flexibility, solidarity, mutuality, harmonization of conflict, restraint in the use of power, and information exchange.* The norms chosen have a foundation and background in the highly acknowledged work of Ian Macneil on relational contract law. In Chapter 5, we develop a scale that aims to include some of the most relevant dimensions of Macneil's relational contract.

2.2.3 Transaction cost theory and relational exchange theory: Basic logic and assumptions

Before relational exchange theory and transaction cost theory are integrated into one framework, we wish to discuss the main assumptions of the two theoretical frameworks more closely. At the outset, the two theories appear fundamentally different both in their assumptions regarding human nature and in the way their core logic works.

Assumptions

As elaborated in previous chapters, Williamson argues that transaction cost theory studies "human nature as we know it," and defines human nature basically as opportunistic and boundedly rational. Boundedly rational actors are also assumed in Macneil's work (Macneil 2001). In other words, the two theoretical frameworks concur on the assumption of bounded rationalistic actors. Regarding the assumption of opportunism, the story is somewhat more ambiguous. Transaction cost theory is "clear," as stated above; human nature is seen as opportunistic. On the other hand, relation exchange theory presumes man to be *both* a self-interest seeking individual (i.e., close to opportunistic) *and* an actor embedded in, and influenced

by *society* (Macneil 1980). The position taken by this dissertation is that man is both opportunistic *and* social at the same time. This point of view is argued in the subsequent sections, see also previous work by Svendsen on this topic (Svendsen 2005).

Opportunism - an endogenous variable

Williamson defines opportunism as "interest seeking with guile" (Williamson 1985: 47) and assumes that *some* people *may* behave opportunistically at *some* point in time. It is thus difficult or even impossible (in any case costly) to know *ex ante* who is honest and who is dishonest (Williamson 1979). As the contracting parties are economic actors, that is, independent business parties (and not a relationship between family, friends or lovers), these assumptions about human behaviour seem appropriate. Implicitly, Williamson contends that opportunism, although a part of human nature, will vary with the 'atmosphere' of the relationship, see for example Williamson (1985). Hence, opportunism may more appropriately be viewed as an endogenous variable. John (1984) empirically studied the antecedents to opportunism in marketing distribution channels and also found that opportunism may be more appropriately studied as an endogenous variable. John observed that opportunism in the inter-firm relationship varied over time, and that opportunism was evoked by certain conditions in the relationship. We conclude that it is reasonable to assume, 1) the nature of mankind *is* opportunistic, and 2) that mankind is *not* opportunistic *all the time* (John 1984). Mechanisms must be in place to prevent him from exploiting opportunities in an opportunistic manner. Which mechanisms, then, are needed to regulate the behaviour of man?

First, Williamson (1993: 456) states, "Calculativeness is the general condition that we associate with the economic approaches". Although economic actors are boundedly rational (i.e., *intendedly* rational, but *limitedly* so), it is fair to assume 'calculativeness' in decision-making. Assuming that efficient and transparent markets enable the operation of reputation effects, the focal party will 'calculate' the potential disadvantages associated with opportunistic behaviour, compared to the advantages of exploiting short-term opportunities. Opportunistic behaviour will negatively affect the value of past investments in reputation; hence economic actors will fear the effects of the "shadow of the future" (Axelrod 1984). Consequently, potential "shadow of the future effects" will reduce the danger that one party will exploit opportunities (e.g., short-term

economic gains) in an opportunistic manner. The above arguments are entirely 'calculative' and 'economic' in nature and have nothing to do with the notion of 'trust' (Williamson 1993).

Although Williamson is critical about notions like 'trust' and the effect of social norms, he contends that "trading hazards vary not only with the attributes of the transaction, but with the trading environment of which they are a part as well (Williamson 1993: 474). Hence, "the need for transaction specific safeguards varies systematically with the institutional environment within which the transactions are located" (Williamson 1993: 476). Williamson lists six kinds of embeddedness attributes: societal culture, politics, regulations, professionalism, networks, and corporate culture. In relation to relational exchange theory, we focus on the societal embeddedness (e.g. customs, norms, and habits) between independent business parties based on their relational history. Beyond doubt, man is social in nature, and is guided by the social values and norms of the society in which he is embedded (Granovetter 1985). Ouchi (1979; 1980) developed Williamson's framework further, to include a wider set of governance forms. In addition to markets and hierarchies, 'clan-governance' was introduced, thereby acknowledging the importance of socialization processes, such as the role of common values and beliefs. Individuals who socialize within the same culture develop common values and norms that guide what is seen as appropriate behaviour. In the 70s, Mcneil developed his relational exchange theory based on the early work of Macaulay. Macneil suggests that human behaviour in society is influenced by norms and codes of conduct in business. Furthermore, Macaulay (1963) made the observation that man conducted business in *informal ways*. Formal contracts were seldom used, and business parties relied heavily on 'a handshake,' or a man's word when doing business. Macaulay states:

"Businessmen often prefer to rely on 'a man's word' in a brief letter, a handshake, or 'common honesty and decency' – even when the transaction involves exposure to serious risk" (Macaulay 1963: 58).

One example of the importance of social influence is 'conscience'. A business partner may not engage in opportunistic behaviour because this type of activity will plainly make him feel bad (!). A 'bad conscience' is strongly related to the culture and the socialization process. We conclude that man is sometimes dominated by the desire to follow social norms, codes of conduct accepted in the society and/or in the specific industry/society as a whole.

Although the assumption of *opportunism* involves not knowing ex ante who can be trusted, Williamson acknowledges that *institutional* and *personal trust* may evolve in a close business relationship, typically when asset specificity is present to a non-trivial degree (Williamson 1985). Through personal interaction over time, for example as contracts are adapted and renewed in the ongoing relation, *institutional* and *personal trust* may evolve: "the individuals who are responsible for adapting the interfaces have a personal as well as an organizational stake in what transpires. Where personal integrity is believed to be operative, individuals located at the interfaces may refuse to be part of opportunistic efforts to take advantage of (rely on) the letter of the contract when the spirit of the exchange is emasculated […] Other things being equal, idiosyncratic exchange relations that feature personal trust will survive greater stress and will display greater adaptability" (Williamson 1985: 62). Although Williamson (1993) in his article on *calculative trust* sharply distinguishes between *calculative trust* and *personal trust*, my position is that the assumption of opportunism *is* retained, although *personal trust is* incorporated and plays an important role. Based on the argumentation above, *personal trust* is assumed to play a significant role in economic business activity and not only in relation to family, friends and lovers.

To sum up, we argue that human nature should be characterized as both *opportunistic* (Williamson 1985) and *social* (Macneil 1980). Hence, "human nature as we know it" is studied as recommended by Knight (1965: 270). Beyond doubt, economic actors are influenced by the society within which economic decisions are made. It is argued above that the social embeddedness of the exchange matters, and norms and values present in the contractual context heavily influence the behaviour thus curbing opportunistic *behaviour* (Macneil 1980; Granovetter 1985). The influence of the norms in society will curb opportunistic behaviour; however, the behavioural assumption that man has opportunistic *inclinations* is retained. In addition, potential opportunistic behaviour may be curbed by reputation effects and the interest of the actors in future cooperation, for example. Taken together, these effects increase or enlarge the effects of 'the shadow of the future' (Axelrod 1984); hence, opportunistic behaviour is likely to decrease. Based on the above argumentation, the integration between *transaction cost theory* and *relational exchange theory* may be defended.

2.3 Performance defined

This study tests the normative implications of transaction cost theory. Furthermore, a strong test of the theoretical predictions should include investment-governance alignment predictions, and the effect on performance (Cannon, Achrol et al. 2000). However, performance dimensions may be highly different in nature; some performance dimensions are easily handled by formal contracts, other performance dimensions like 'innovation' are less contractible[23]. Hence, we need to take into account the multidimensional nature of performance in our analyses (Noordewier, John et al. 1990; Holmstrom and Milgrom 1991). By including different relevant performance measures, we should be able to uncover the effects by a given investment-governance alignment. To be precise, it is necessary to identify dependent variables that are affected differently (Ghosh and John 2005).

Performance is defined and operationalized highly differently in the inter-organizational literature (Park and Ungson 2001; Olk 2002; Arino 2003). To our surprise, project performance is often measured very simplistically, for example by measuring achieved cost levels, time schedules, and measures of product performance such as quality failure or quality level (Cannon, Achrol et al. 2000). These measures of project performance do not fully encompass the success level of an innovation project as the following example suggests. For instance, a project may run smoothly achieving budget and time goals, and achieving an acceptable level of quality. However, what is also important in innovation projects is the innovative performance of the project, and the value creation potential for both the customer and the contractor. Therefore, the research literature was reviewed to achieve a better and more adequate measure of performance in innovation projects.

The research literature was reviewed with the intention of uncovering dimensions of project performance that are more relevant. Based on this literature review, four dimensions of project performance were identified as particularly relevant (Pinto and Slevin 1988; Pinto and Mantel 1990; Clark and Fujimoto 1991; Pinto, Pinto et al. 1993; Pinto 2002). First, the projects must meet requirements regarding design goals (i.e., specifications, design and schedules). Second, the project should be beneficial to the customer, that is, generate value for the customer beyond

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[23] For a similar approach see Lazzarini, S. G., G. J. Miller, et al. (2004). "Order with some law: Complementarity versus substitution of formal and informal arrangements." Journal of Law Economics & Organization **20**(2): 261-298.

meeting design goals. Third, the project should be beneficial to the contractor, that is, generate value for the contractor beyond positive margins. Finally, fourth, we claim that the level of innovative performance or just 'innovation' should be measured. We argue that these performance 'dimensions' or constructs are of special interest when innovation projects are studied and assume that high scores on all of these dimensions or constructs would indicate a more successful project for both parties.

Goal attainment measures deviation from goals that are more or less generic for all types of projects. By definition, all projects should be executed within a given resource frame (Kolltveit and Reve 2002), hence time schedules and cost levels are specified in the contract. Furthermore, a specification of quality levels is common (Cannon, Achrol et al. 2000). These project goals are relatively easy to specify *ex ante* in a written contract, and their realization can easily be measured ex post (Ghosh and John 2005). Finally, contracts commonly include a number of specifications and functions. These goals may be harder to specify *ex ante*. However, when specified, their realization can be measured quite easily *ex post*. We have grouped these goals together and labelled them 'goal attainment'. Furthermore, we note that other goals and results (i.e., other performance dimensions) in innovation projects are not that contractible in nature, value creation and innovative goals, for example. According to Sadeh, Dvir et al. (2000), performance evaluation should also include measures of value creation.

Customer value creation potential: Customer value creation potential is defined as future benefits to the customer as a result of the project (adapted from Sadeh, Dvir et al. (2000: 17)). The construct encompasses three dimensions as proxy for value creation potential: 1) cost reductions, 2) improvements, and 3) more efficient operations (in the customer's organization). Cost reductions are for example, net gains from lower production and administrative costs as a result of the output of the project. Cost reductions are attributed to transaction specific investments, for example in, "customized production techniques/processes, cheaper materials, simplified design and so forth" (Ghosh and John 2005: 349). Potential 'improvements' and more 'efficient operations' are for example, "net gains from increased customer utility delivered by the end product" (Ghosh and John 2005: 349). Hence, we measure the degree of 'improvements' in the customer's organization from the *present status.* Customer value is argued to be realized in the aftermath of the project, and is closely related to *goal attainment*. Hence, customer value creation, as well, is *relatively* easy to specify in a formal contract *ex ante*, and the results can

relatively easily be measured ex post (Ghosh and John 2005). Based on the above discussion, we argue that the performance dimension *customer value creation* is highly 'contractible' by nature.

Contractor value creation: We define this performance dimension as "benefit gained by the developing organization as a result of executing the project" (Sadeh, Dvir et al. 2000: 17). The construct encompasses three dimensions as proxies for the contractor value creation potential: 1) the project will open a new market, 2) the project will create a new product line, and 3) the project will develop new capabilities. Contractor value can be realized immediately in the aftermath of the project, far in the future, or never. Although goals can be specified in a formal contract document *ex ante* (but not easily), realization is very difficult to measure *ex post*. Hence, we argue that the performance dimension, *contractor value creation, is less contractible by nature.* However, we find it meaningful to measure the value creation potential since this performance dimension is of high relevance for the contractor. We thus implicitly assume that value creation results are *desired* by the contractor.

Innovative performance is defined as the degree of product newness to the customer, the contractor and the market (Cooper 1979; Atuahene-Gima 1995; Green, Gavin et al. 1995). The inclusion of an innovation variable is one of the main contributions of this research. Hence, the level of innovative performance or 'degree of innovation' in the project should be measured. This dimension is labelled 'innovative performance' or just 'innovation' in this dissertation. As for customer and contractor value creation, we assume that innovative results are desired.

Innovative goals and results are difficult to specify in a formal contract *ex ante*, and realization can not necessarily be measured *ex post.* However, note that several types of goals in innovation projects *can* be specified (see goal attainment). Due to high levels of ambiguity, innovative goals and results are particularly difficult to contract for, hence, innovative performance is argued to be less contractible. However, as stated earlier, we claim that governance (i.e., contracts) significantly influences these performances through influencing the level of transaction costs, and by providing incentives that increase investments in value creating assets.

Since innovative performance is central in this dissertation, the next section clarifies and elaborates different aspects of the concept 'innovation'. In the economic research field, innovation is frequently measured as numbers of innovations initiated and implemented in the organization; typically, numbers of patents are counted. In this dissertation we will not count

innovations, but measure the perceived "product newness" as a substitute. This choice allows us to use perceptual measures to measure the 'innovation' construct. The construct that is measured encompasses three dimensions: first, to what degree the developed product is new to the company (i.e., the contractor), second, to what degree the developed product is new to the customer (i.e., the oil company), and finally third, to what degree the developed product is new to the market (i.e., the international petroleum industry) (Cooper 1979; Atuahene-Gima 1995; Green, Gavin et al. 1995).

Regarding the level of "newness" in innovative performance, this dissertation looks at *incremental* as well as *radical innovations*. An innovation is defined according to the degree of change related to the innovation. Radical change could be competence-destroying innovations that fundamentally change the business. Incremental change is more marginal, that is, incremental innovations will typically improve products and processes over time, while radical innovations may change the market totally and undermine the competitors' existence (Damanpour 1991). Radical innovations are rare and to limit the study to radical innovations would reduce the number of relevant projects to nearly zero. More important, and more numerous, are all the incremental innovations that are more common and thereby more important to study.

Implicitly, the focus of this dissertation is set solely on technical innovations[24]. In the projects selected, the customers and contractors cooperate closely with the purpose of developing a new *technical* solution, for example a new technology, or a new solution to a *technical* problem, or a *technical concept*. Hence, the focus is placed on the technical *outcome* of innovation processes, and *not* on the process itself (Damanpour and Evan 1984).

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[24] For a thorough examination and review of the different types of innovations, for example technical versus administrative, see Gopalakrishnan, S. and F. Damanpour (1997). "A Review of Innovation Research in Economics, Sociology, and Technology Management." Omega-International Journal of Management Science **25**(1): 1528.

3 Literature review: governance, asset specificity, and performance

3.1 Introduction and empirical challenges

The purpose of this review is to account for empirical studies, which are relevant in relation to the positioning of the research, the research question, and the research model. The review provides a representative, although not exhaustive, selection of previous empirical work. Previous reviews have been heavily relied on, for example the reviews conducted by Barclay (1992), Shelanski and Klein (1995), Rindfleisch and Heide (1997), Gopalakrishnan and Damanpour (1997), and David and Han (2004). The empirical studies reviewed were conducted within the inter-organizational literature, that is, the business-to-business marketing literature, alliance literature, and the New Product Development literature.

David and Han (2004) conducted a systematic assessment of the empirical support for transaction cost analysis. They found only a few empirical studies that examined *performance* as a dependent variable. Twelve tests looked at the performance of marketing contracting (67% of the tests were supportive of the transaction cost theory), 10 examined the performance of hierarchies (only 10% were supportive), and 8 were of hybrids (63% were supportive). Overall, the authors found a 47% support of the transaction cost theory predictions (David and Han 2004: 46). The results contrast with the review conducted by Shelanski and Klein (1995). Shelanski and Klein (1995: 335), claimed that the empirical literature is "remarkably consistent" with the predictions of the transaction cost logic, which is a far more positive and supportive view than the results presented by David and Han (2004).

Noteworthy is the low support (10%) of the transaction cost theory when performance of hierarchies is examined (i.e., when asset specificity is high, transaction cost theory predicts that hierarchy is the preferred, efficient institutional form). More work on the efficiency of hierarchies and *hierarchical mechanisms* is obviously needed.

However, there could be several possible explanations for the mixed results. In this paragraph, some possible explanations are discussed. First, there is a considerable amount of disagreement, and thus different practices in the empirical literature, on how the core constructs (e.g., asset specificity and uncertainty) of transaction cost theory should be operationalized. This

discrepancy is grave and without doubt, will affect the level of support in the studies (i.e., the level of support in the empirical studies is highly related to how the construct is measured and operationalized). Second, studies of performance implications rarely include the contingent nature of the transaction cost theory. They are not explicit about the performance effect of aligning governance with the attributes of the transaction, although this is a central position within the transaction cost economic perspective (Williamson 1985). One notable exception is Cannon, Achrol et al. (2000). They examined performance consequences of governance mechanisms, independently and in combination, given certain level of transactional attributes (i.e., uncertainty and asset specificity). Third, the empirical results could suffer from methodological pitfalls. Research on the effects of governance mechanisms on performance is problematic. Unobserved factors may affect both the choice of governance mechanisms, and the performance effects in the sample. Further, the analytical models that are normally used ignore feedback loops, that is, structure influences performance, *but* performance could also influence structure and other important variables (Troye 1994). Another problem is that the data used in analysis "often rely on retrospective recall of informants, recall that is likely to reconstruct the past to make it consistent with subsequent performance results, conventional story lines, and current beliefs" (March and Sutton 1997: 699).

3.2 Alignment studies

Transaction cost theory argues that *aligning* the characteristics of the transaction with an appropriate governance form should result in processes and outcomes that are more efficient (i.e., increased performance due to cost minimization). For instance, for transactions involving both high levels of specific investments and high levels of uncertainty, hierarchy (i.e., vertical integration, internal organization etc.) are predicted to be a more efficient form of governance structure than the market, due to superior safeguarding, adaptive and monitoring properties (Williamson 1985). A brief review was conducted of empirical alignment studies, and important empirical findings in relation to this dissertation are presented below. The studies are presented in chronological order.

Noordewier, John et al. (1990) examined performance outcomes of purchasing arrangements in industrial buyer-vendor relationships. They found that if the relational content is increased, given low uncertainty, there is no increase in buyer performance. However, if uncertainty is high, increasing the relational content will increase buyer performance (Noordewier, John et al. 1990). The results are in accordance with transaction cost logic, due to reduced transaction costs, enhanced performance results.

Dahlstrom, Dwyer et al. (1995) used transaction cost and contingency theory to study governance, structure and performance in inter-firm exchange. They found that formalized procedures and vendor participation in decision making (decentralization) raised effectiveness when asset specificity was high and technological uncertainty was low (Dahlstrom, Dwyer et al. 1995). This result suggests that managers employ formalized arrangements to protect assets specific investments from opportunistic expropriation in stable technological environments.

Heide and Stump (1995) studied the performance implications in buyer-contractor relationships in industrial markets. They found that firms crafted stronger relationships in the presence of asset specificity and environmental uncertainty. Furthermore, they found that structuring the relationship in accordance with TCA prescriptions had positive performance implications (Heide and Stump 1995).

Dyer (1996) examined the relationship between governance (vertically integrated firms, hybrid, and market governance), asset specificity, and competitive advantage in U.S. and Japanese buyer-contractor alliances. The empirical findings support transaction cost theory, which suggests that aligning governance structures with transactions will result in efficiency advantages. The investment in transaction specific assets, especially "human asset co-specialisation" results in competitive advantage through better information sharing, coordination, and learning (Dyer 1996: 649). Hence, as the level of specific investments increased, the transaction was moved from the market into a hybrid organizational form.

Cannon, Achrol et al. (2000) studied the performance effects of legal[25] bonds, and social norms in buyer-seller relationships. When uncertainty and task ambiguity were high, legal bonds did not enhance performance. Furthermore, when uncertainty and task ambiguity were low, legal bonds enhanced performance (Cannon, Achrol et al. 2000). These results are not consistent with the transaction cost logic. According to transaction cost theory, legal bonds should be the efficient structure when the level of uncertainty and asset specificity are high. However, legal bonds were found to be positively related to performance when cooperative norms were strong.

Leiblein, Reuer et al. (2002) examined the influence of governance on technological performance. They found that the effects of firms' governance decisions are likely to be contingent upon several specific attributes underlying a given exchange. A firm's technological performance is contingent upon the alignment between the firm's governance mode and the degree of contractual hazards (Leiblein, Reuer et al. 2002).

Finally, Sampson (2004) examined the cost of misaligned governance in R&D alliances. Two costs of misalignment were evaluated: excessive contracting hazards (opportunistic behaviour such as leakage of knowledge and free riding) and excessive bureaucracy (formal mechanisms; joint venture versus pooling contract). She found that alliance governance selected according to transaction cost logic improves collaboration in comparison with governance not so selected. Surprisingly, misalignments imposing excessive bureaucracy reduced collaboration (and innovation) more than excessive contracting hazards did. Sampson concluded that there is a link between organizational form and innovation. Excessive bureaucracy reduces collaboration (and innovation) and reduces the creative process within and between organizations (Sampson 2004).

Several other alignment studies also show support for the main predictions of transaction cost theory c.f. Silverman, Nickerson et al. (1997), Mayer and Nickerson (2002), Achrol and Etzel (2003), and Nickerson and Silverman (2003).

Based on the literature reviewed above, we conclude that the governance alignment predictions of the transaction cost theory are more or less supported in the few studies conducted.

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[25] Legal bonds "refer to the extent to which detailed and binding contractual agreements are used to specify the roles and obligations of the parties" Cannon, Achrol et al. (2000: 182). In other words, legal bonds are much the same concept as the formal contract. Formalization is the degree of rules and procedures in the contract. The intension of both concepts is to control opportunistic behaviour, reduce conflict level, avoid misunderstandings etc.

Particularly, higher levels of asset specific investments are associated with more hierarchical structures (Dahlstrom, Dwyer et al. 1995; Heide and Stump 1995; Dyer 1996; Cannon, Achrol et al. 2000; Leiblein, Reuer et al. 2002; Sampson 2004)[26]. This conclusion is in line with the findings in the reviews conducted by Rindfleisch and Heide (1997) and David and Han (2004), although exceptions can be found (see for example: Anderson and Schmittlein 1984; Klein, Frazier et al. 1990).

Based on the support in the empirical literature, we conclude that the alignment logic of transaction cost theory can safely be relied upon as a basis for further theory building. In particular, enhanced performance through the use of hierarchical structures to safeguard transaction specific investments against opportunistic expropriation are heavily supported. Although important in the transaction cost literature, *few* alignment hypotheses/tests of transaction cost theory have been overall conducted. Hence, we conclude that more research is needed to study the alignment effects on performance.

3.3 Asset specificity and performance implications

In this section, we present empirical studies examining the relation between transaction specific investments and performance. The empirical studies are conducted within the inter-organizational literature. According to theory, investments in specific assets are presumed to be positively related to performance. These types of investments are commonly undertaken to enhance productivity like cost reductions and improvement of work processes in for example, fabrication (Williamson 1985). For example, investments in new machines and tools specially tailored to a customer may produce 'more' (i.e., quantity), 'better' (i.e., enhanced quality), or at a lower cost (Williamson 1985).

Parkhe (1993) examined, among other things, the effect of alliance structure (i.e., governance) on performance. He found a positive and significant relation between 'ex ante deterrents' or 'nonrecoverable investments' (i.e., transaction specific investments) and performance. Performance was operationalized as financial, operational, and effective performance.

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[26] See appendix E for a closer examination of these articles.

Furthermore, Heide and John (1988) studied the effect of relationship specific investments, dependence, and 'offsetting investments' on performance in agency-customer relationships. They found that the agent's financial performance was increased when dependence was reduced (due to offsetting investments), *given* high levels of specific investments. However, since this dissertation focuses on inter-firm innovation projects, we are mainly interested in identifying empirical studies that test the relation between transaction specific investments and performance, and, in particular, innovative performance.

In accordance with Williamson's predictions, Ghosh and John (2005) found that enhanced performance may be attributed to asset specific investments, for example customized production techniques/processes. Further, Dyer found that greater human asset specialization results in superior coordination, information sharing, learning, and innovation, which are critical in complex product industries (Dyer 1996).

Furthermore, investment in, for example, human asset specificity is posited to be related to increased customer and contractor *involvement* and *interaction* in the product development process. Limited attention has been given to the involvement of customers/contractors in product development processes. However, Gruner and Homburg (2000) found that the intensity of customer involvement enhances new product success. Furthermore, Von Hippel (1978), Leonard-Barton and Sinha (1993), and Leonard-Barton and Kraus (1985) reported similar results. Customer ideas and co-design prove successful in developing new industrial products.

To sum up, few empirical studies examine the relation between specific investments and performance. However, recent empirical work seems to indicate a positive relationship (i.e., high correlations) between physical investments and lower production costs, and furthermore, between human asset specialization and superior coordination, information sharing, learning, and innovation. To examine further the relationship between asset specialization and performance seems therefore appropriate.

3.4 Formal mechanisms and their performance implications

In the next paragraphs, we present and discuss empirical studies examining the effect of formal governance on different types of performance. Most of the empirical studies reviewed do not include the alignment logic of transaction cost theory. However, to some degree uncertainty and transaction specific investments are assumed to be present at an average or non-zero level. Hence, what appear in the extant studies as direct effects may actually be interactions. Below, we present the empirical studies reviewed, which are relevant to our study, and elaborate their effects on performance. The studies are presented in chronological order.

Dwyer and Oh (1987) were some of the first to examine how governance (bureaucratization) affected performance in a marketing channel. They found that bureaucratization (i.e., formalization, centralization, and participation) of the relationship had both negative and positive effects. A high degree of formalization and participation was positive for the channel relationship, and centralization had a negative effect. Performance was measured as satisfaction, opportunism, and trust (Dwyer and Oh 1987).

On the other hand, Barclay (1992) found in his review that formal aspects such as structure, control mechanisms, and formal decision making had little effect on success (Barclay 1992). Further, Deshpande, Farley et al. (1993) examined how corporate culture and customer orientation influenced innovativeness in Japanese firms. They found that a strong market culture was associated with best performance. Both clan (i.e., a form of relational governance) and hierarchical cultures (i.e., formal governance) were associated with poor performance (Deshpande, Farley et al. 1993). Liker, Collins et al. also studied factors related to development of new products (tolls). They found that formalization of work practices is negatively related to new product development (Liker, Collins et al. 1999). The same results are indicated by Pierce and Delbecq, they found that low formalization permits openness and facilitates the development of new ideas (Pierce and Delbecq 1977) .

The effect of contractual and procedural coordination (i.e., information exchange) on performance was studied by Sobrero and Schrader (1998). They examined 32 empirical studies in a quantitative meta-analysis. They found that the level of contractual coordination was positively related to relationship performance.

Tatikonda and Rosenthal (2000) studied governance of product development projects. Formality was positively associated with project execution success. When new products are developed, creativity is important for the outcome of the process. The findings in the study by Tatikonda and Rosenthal are interesting; *some* degree of formalization is obviously needed (Tatikonda and Rosenthal 2000). Much the same results were found by Sivadas and Dwyer (2000). They examined organizational factors influencing new product development. They found that administrative mechanisms such as formalism and clan were positively related to (competency and) NPD success (Sivadas and Dwyer 2000).

Luo (2002) studied how contract, cooperation, and performance are associated with one another within international joint ventures. He found that contract completeness and cooperation drive performance both independently and interactively, that is, the more formalization the better. Luo did not analyse the effect of alignment or misalignment on performance (Luo 2002).

Fryxell, Dooley et al. (2002) empirically examine the moderating effects of age and partner trust in international joint ventures. They found that reliance on formal control mechanisms and performance were positively related in younger alliances, and negatively related in older alliances. Hence, the importance of formalization decreases with the age of the relationship. As the age of the relationship or project increases, the importance of relational governance mechanisms also tends to increase. Nevertheless, in most cases it is important for the parties of a transaction to have some legal safeguards to fall back on if the transaction is terminated.

Finally, Vlaar (2006) studied, among other things, the effect of formalization on performance in inter-organizational relationships. His results indicated that performance in inter-organizational relationships is highly dependent upon the level of formalization and trust. Interestingly, he found that intermediary levels of both trust and formalization result in more positive effects than more extreme levels (i.e., low or high levels), indicating a curvilinear relationship. The same results were indicated by Tatikonda and Rosenthal (2000), that is, some formalization seems to be also appropriate in creative projects.

The level of *formalization* in contracts is an often-used variable in inter-organizational empirical research. We found that the effect of formalization on performance is ambiguous, and conclude that it is difficult to establish a clear relationship between the level of formalization and inter-

organizational performance (Vlaar 2006). To further complicate the picture, besides formalization, there are huge amounts of factors that interact with and influence the level of performance. More research is obviously needed in this respect. However, the literature reviewed indicates that there are different types of formalization measures, as well as different types of performance measures that might influence the relationship. Adler and Borys (1996) argued that formalization affects employees positively if the rules and procedures employed help them to master their tasks and functions. However, if formalization is used as a control measure, or in another coercive way, the effect would be negative on creativity for example, or other types of performance. Furthermore, the empirical review uncovers the importance of distinguishing different performance measures (Sobrero and Roberts 2001). Formalization should thus have different effects on, for example, efficiency measures, compared with learning and innovation.

Generally, we conclude that formalization of processes by employing rules and procedures is seen as positive regarding goal attainment and negative regarding innovation (Thompson 1965). Flexibility and low emphasis on work rules seem to facilitate innovation (Burns and Stalker 1961). However, note that the research literature that concludes that formalization is negative for creative processes has been mainly conducted in an intra-firm setting. In an inter-firm relationship, some formalization was found to be positive regarding performance, and in addition, is contingent on the attributes of the transaction (Dwyer, Schurr et al. 1987). This is consistent with the transaction cost logic; transactions in the market need to be safeguarded, and thus formalization needs to be higher than in intra-firm contexts.

To sum up: we conclude that the literature is divided on the effects of formalization, and that more research on these topics is needed. The effects of formalization on innovation in projects and other performance implications, both in inter-firm and intra-firm settings, need to be clarified through empirical research.

3.5 Relational mechanisms and their performance implications

In close co-operative arrangements, norms will develop over time and may contribute to what is termed relational governance (Macneil 1980). As argued in Section 2.2.2, the relational or cooperative norms of special interest in this study are flexibility, solidarity, mutuality, harmonization of conflict, restraint in the use of power, and information exchange (Cannon, Achrol et al. 2000). The intention of this section is to review the empirical literature, which has previously examined the relation between *norms* and *performance*. Several different types of performance have been included in this review; innovation, value creation, and goal attainment effects have been particularly focused upon. Below, the empirical studies reviewed and their effects on performance are presented in chronological order.

First, the relation between relational norms and innovation seems to have been neglected in the literature. However, some work has been executed on the role of *trust,* which is a central building block in relation to the development of norms. Zaheer and Venkatraman examined the role of trust in economic exchange. They found that trust positively influences joint action in economic exchange (Zaheer and Venkatraman 1995). Furthermore, Zaheer, McEvily et al. explored the effects of interorganizational and interpersonal trust on performance. They found that trust significantly improved performance in the exchange (Zaheer, McEvily et al. 1998). Fryxell, Dooley et al. (2002) empirically examined the moderating effects of age and partner trust in international joint ventures. Social control mechanisms and performance were positively related, but only in the presence of trust (Fryxell, Dooley et al. 2002). This is in line with Parkhe (1993) who studied the performance of strategic alliances. He found that performance was negatively related to perceived opportunistic behaviour. In the same line, Moorman, Zaltman et al. (1992) suggested that long-term cooperation may lead to poor performance due to opportunism, too high expectations (to the contractors), and finally, the loss of objectivity. That is, it was argued that the contractors lost their ability to be objective, and over time, became too similar to their clients, leading to losses of creativity and value creation. The work of Moorman, Zaltman et al. was replicated by Grayson and Ambler (1999) and Mooi (2005). Although the results were conflicting, there seems to be evidence that long-term cooperation may have "dark sides" that might influence innovation and performance negatively.

Artz and Brush (2000) studied how asset specificity, uncertainty, and relational norms affected coordination costs (i.e., negotiation costs in this study) in manufacturing alliances. They found that the development of relational norms lowered exchange costs in the alliance (Artz and Brush 2000).

Cannon, Achrol et al. (2000) and Poppo and Zenger (2002) found strong positive support for the importance of norms and their adaptive capability on performance (measured as efficiency and effectiveness).

And finally, Bello, Chelariu et al. (2003) examined the antecedents and performance consequences in export distribution channels. Support was found for the performance-enhancing qualities of relational governance in the export context (Bello, Chelariu et al. 2003).

To sum up so far: generally, high levels of trust and norms in a relationship seem to affect performance (e.g., satisfaction etc.) positively (i.e., through reduction of transaction costs). However, further examination of the relation between relational norms and performance seems important since relational norms contain many dimensions. Do all the dimensions of relational norms affect performance and innovation in the same way? In order to dig deeper into this question, we tried to identify empirical studies where the effects of each relational norm had been studied individually. We focused on flexibility, solidarity, harmonization of conflict, information exchange, mutuality, and restraint in the use of power (Cannon, Achrol et al. 2000).

Information exchange is argued to be an important factor that facilitates or enables innovation and value creation in addition to lowering transaction costs. Communication stands out as one of the most important factors in the NPD literature (Barclay 1992; Barclay 1992). The more communication between functional departments and between firms, the higher the performance, and the more innovation in projects (Barclay 1992; Barclay 1992).

Furthermore, Athaide, Meyers et al. examined the importance of buyer-seller interaction during the commercialization of technological process innovation. They found that communication between the engineering contractors and the customers was of utmost importance for success (Athaide, Meyers et al. 1996).

Brown and Eisenhardt reviewed the NPD literature in 1995 searching for factors affecting the success of product development. Recurring factors are the importance of internal and external communication (and the importance of gatekeepers), management support, involvement of contractors/customers, and the importance of team autonomy (Brown and Eisenhardt 1995). Similar supportive results were also found in Barclay 1992, Brockman and Morgan 2003, Blazevic and Lievens 2004, and Roy, Sivakumar et al. 2004. To sum up, information exchange seems to be an important element in relational governance that enables innovation and value creation through interaction and information sharing.

In their acknowledged book Burns and Stalker (1961) contend that *flexibility* and low emphasis on work rules facilitate innovation. Furthermore, a high level of flexibility between the parties during project execution is claimed to increase the ability to adapt to changing circumstances. Both the ability to change and the speed of change should be related to the level of flexibility between the cooperating parties in the project. A flexible behaviour and attitude will allow the parties to find better work methods, enhance the ability to implement new ideas and so forth. The opposite is also the case: rigid and non-flexible behaviour will destroy the climate and culture for creative behaviour (Burns and Stalker 1961). Flexibility should then be related to the level of innovative behaviour and increase the level of learning activities in the organization. Tatikonda and Rosenthal (2000) studied governance of product development projects. They found that resource flexibility is positively associated with project execution success (Tatikonda and Rosenthal 2000). To sum up, flexibility seems to enable better performance, innovation and learning. However, the empirical evidence is scant, thus more empirical studies are needed.

Solidarity in the relationship exists if the parties believe that success is possible if they work together to solve individual and joint problems (i.e., success comes from working together, not competing). How solidarity affects innovation and performance is not sufficiently studied in the research literature. Further, to my knowledge, no empirical studies have examined how solidarity affects innovation processes. Supportive and open-minded top management was found to positively impact the innovative processes of new product development (Barclay 1992). In summary, the empirical evidence is virtually non-existent; hence, studies that are more empirical are obviously needed on the role of solidarity.

How *harmonization of conflict* affects performance has not been previously studied in the inter-organizational research literature. Furthermore, to my knowledge, no empirical studies have examined if, and how, harmonization of conflict affects innovation and value creation. Empirical studies and evidence are scant on the relation between relational governance and the implications on performance. However, some work has been conducted on the effects of trust, and information exchange (or communication) on performance. Furthermore, the research literature does not say much about the effects of the different elements of relational governance. Do flexibility, solidarity, and harmonization of conflict affect the innovative processes in an inter-firm innovation project? On this subject the research literature is virtually silent.

3.6 Summary

Based on the studies reviewed above, we conclude that there are surprisingly few empirical studies exploring the performance effects of different governance mechanisms in inter-firm relationships. Even fewer empirical studies have focused on alignment between governance mechanisms, transaction attributes (i.e., their interaction) and the effects on performance. Further, when empirical studies have focused on performance, the focus has generally been on efficiency and effectiveness such as firm/alliance profits, sales level, market share, and on attitudinal measurements such as satisfaction. Performance implications such as value creation and innovative performance are surprisingly absent in the literature. Thus, to our knowledge, the effects of formal and relational governance mechanisms, assets specific investments, and their interactions on value creation and innovation have not previously been studied sufficiently. Hence, much more research is needed to close this gap, and in this respect, our study should have the potential to contribute significantly to the literature. The conclusion of this literature review is in line with the general understanding stated by Williamson: "Much more study of the relation between organisation and innovation is needed" (1985: 144).

4 Research model and hypotheses

4.1 Introduction

The theoretical framework of this dissertation was presented and elaborated in Chapter 2. As argued earlier, the framework is based on an integration of transaction cost theory, relational exchange theory, and elements from transactional value analysis. The contribution of this dissertation is: to study the performance effects of: 1) *formal* and *relational* governance mechanisms, 2) *project specific investments*, and 3) the *interaction* between governance and project specific investments. In this chapter, the full research model is presented and accounted for, and based on the theoretical framework, testable hypotheses are developed.

First, we present the research model, and then the direct effect hypotheses within the 'alignment' model are justified. Second, a total of 20 hypotheses are developed for the relations between the latent constructs within the research model. Finally, an overview of all latent variables and the hypothesized relationships between them is provided.

4.2 The research model

4.2.1 Introduction to the model

The full research model consists of seven latent constructs, of which three are independent variables, and four are dependent variables. The independent variables are all claimed to have a direct effect, in addition to an interaction effect, on performance. Hence, a total of 20 hypotheses are developed between the latent constructs in the model. The full research model is shown below.

Figure 4-1: The full research model

- Formal contract
- Relational contract

Project specific investments

Performance:

- Goal attainment
- Customer value creation potential
- Contractor value creation potential
- Innovative performance
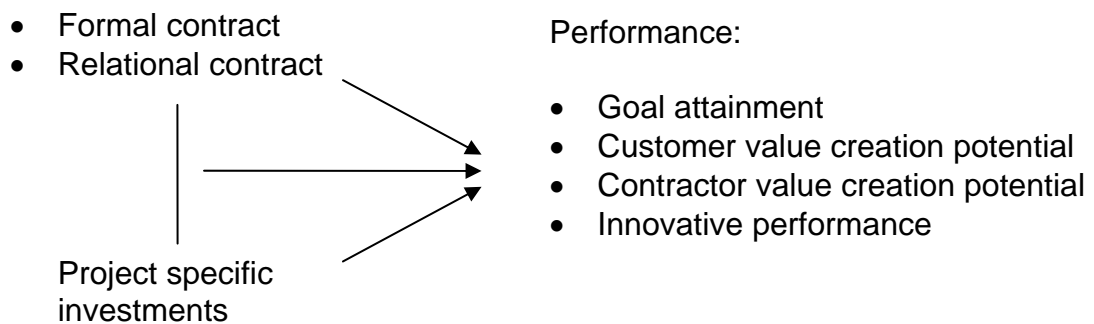
4.2.2 The interpretation of direct effects when interactions are present

The research model is an 'alignment' or 'interaction' model, where the structuring of the relationship in accordance with the normative prescriptions of transaction cost theory should lead to lower transaction costs and thus enhanced performance. However, hypotheses are also developed for the *direct effects* in the model, that is, without including the interaction effects. Below the choice of including direct effects is justified based mainly on argumentation found in Jaccard, Turrisi et al. (1990).

Whether to include direct effects or not in interaction models is highly controversial in the research community. There seem to be two 'camps' on the subject with opposite points of view (Jaccard, Turrisi et al. 1990). One camp defines a direct effect as "a constant effect of an

independent variable on a dependent variable that generalizes across all levels of the moderator variable" (Jaccard, Turrisi et al. 1990: 14). A statistically significant interaction effect indicates that a "constant" effect does not exist; hence, it would be meaningless to test and try to interpret a direct effect. The other camp argues the *opposite* view, that direct effects are meaningful in the presence of a significant interaction effect. The latter 'camp,' interprets direct effects "not in terms of constant effects, but rather in terms of the average effect of an independent variable on a dependent variable across values of the moderator variable" (Jaccard, Turrisi et al. 1990: 14). The latter interpretation is relied upon in this dissertation. The main argument is that the average effect of an independent variable on a dependent variable across values[27] of the 'moderator' variable provides *meaningful* information to the researcher. In summary, the interpretation of the direct effects as *average effects* is relied upon. Without doubt, this approach provides meaningful information about the relations in the research model; hence, direct effect hypotheses are developed (Jaccard, Turrisi et al. 1990).

4.3 Hypotheses

4.3.1 Introduction

First, direct effect hypotheses are developed between the independent variables (i.e., project specific investments, formal contract, and relational contract), and the dependent variables (i.e., the performance variables). Then, alignment/interaction hypotheses are developed, that is, the *interaction* between governance and project specific investments, on performance.

The effect of the two governance variables, and their interaction with project specific investments, on goal attainment and innovative performance, are claimed to be one of the main contributions of this research. Hence, when hypotheses are developed, emphasis is put on these latent constructs.

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[27] That is, values included in the sample.

4.3.2 The effect of project specific investments on performance[28]

The empirical studies identified in the literature review in Chapter 3 generally showed positive support in regard to the effect of specific investments on performance (von Hippel 1978; Leonard-Barton and Kraus 1985; Heide and John 1988; Clark and Fujimoto 1991; Leonard-Barton and Sinha 1993; Parkhe 1993; Dyer 1996). However, according to transaction cost theory, transaction costs are assumed to increase as the transacting parties make transaction specific investments. That is, the governance structures grow in complexity and volume due to the fear of opportunism. Then, if 'performance' is *only* related to transaction costs (which it is not), we should observe a decrease in performance due to the increasing transaction costs. However, transaction specific investments are mainly undertaken to enhance productivity (i.e., reduce *production costs*), and we claim, innovative performance and value creation in general. Hence, when hypotheses are developed below, we need to take into account *both* transaction and production cost considerations.

Furthermore, we argue that the *effect* of project specific investments on performance is also contingent upon the different performance dimensions; goal attainment, the customer and contractor value creation potential, and innovative performance. For instance, when the objective is value creation and innovative performance, 'productivity' gains are claimed to wipe out the effect of increased transaction costs. Consequently, we expect to see increased performance when the transacting parties invest in specific assets. Below in Figure 4-2, the hypotheses and their signs are indicated.

Figure 4-2: The effect of project specific investments on performance

- Formal contract
- Relational contract

Project specific investments

Performance:

- **(-) Goal attainment**
- **(+) Customer value creation potential**
- **(+) Contractor value creation potential**
- **(+) Innovative performance**

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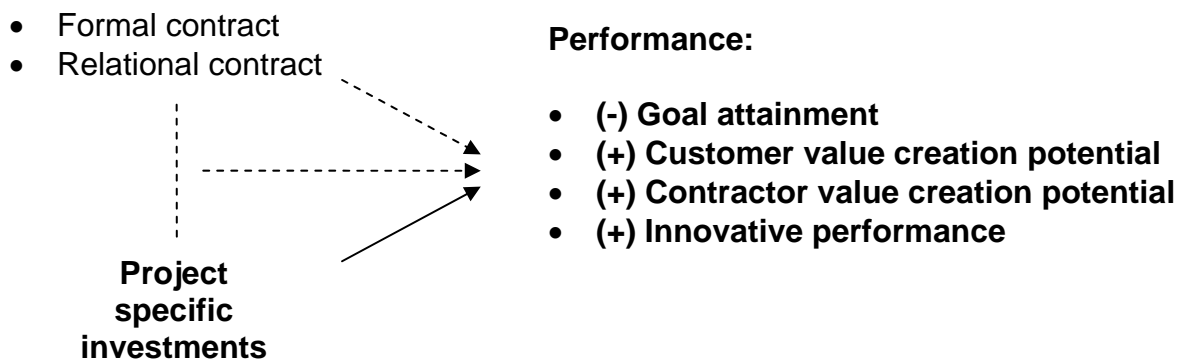
[28] All hypotheses that are developed in this section are direct effect hypotheses. An average level of governance is assumed to be present, hence no interactions are hypothesized. See Section 4.2.2 for further explanation.

First, it is practical to distinguish between *general purpose assets* and *specialized assets* although both can be a source of value creation and innovation. *General purpose assets* are investments in, for example, *standard* tools and machinery, which have limited potential '*value*' since these assets are readily available in the market (Williamson 1985; Barney 1991). Consequently, general purpose assets tend to be easier to imitate and substitute and thus possess limited value potential (Barney 1991). In order to create value and innovative solutions of a more *proprietary* kind, the parties are recommended to invest in more *specialized* assets to support the execution of the project. Below, we focus on *physical* and *human assets* as they are argued to be important sources of innovative performance and value creation[29].

Physical asset specificity occurs when one or both parties to a transaction invest in project specific *assets* that are *physical* in nature, that can only be used by one or both parties, and that have a significantly lower value in alternative uses (e.g., specialized equipment, tools etc.). These types of investments are commonly undertaken to enhance productivity like cost reductions and improvement of work processes (i.e., value creation) in for example, fabrication (Alchian and Demsetz 1972; Williamson 1985). Previous studies *have* found specialized physical assets to improve product quality (Clark and Fujimoto 1991). Since we study innovation projects, *all* investments in project specific *physical assets* are assumed to support the innovation process. Hence, we argue that investments in project specific *physical assets* are positively related to the customer and contractor value creation potential and innovative performance.

The effect of project specific *physical assets* on goal attainment is more ambiguous. A negative effect may even be hypothesized between *project specific physical assets* and goal attainment due to increase in *both* transaction and production costs. For example: since the tools and equipment are specialized or new, it takes *time* to fully master them (the first time). Furthermore, the same logic is applicable to achieving budget goals and maybe quality levels. Since the equipment is specialized or new, all associated costs are harder to identify *ex ante*. Thus, budgets may be exceeded due to the novelty of the physical assets. However, the effect on quality can be argued to be positive. Through the use of new and better physical equipment, we should (over time) expect increased quality levels (Williamson 1985). Based on the discussion above, we hypothesize a negative effect of project specific investments on goal attainment to be present. Furthermore, the importance of transaction costs related to 'goal attainment' must not be

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[29] Value creation is operationalized as: cost reductions, improvements, more efficient operations, the opening of new markets, and new production lines.

underestimated. According to transaction cost theory, transaction costs increase with increasing levels of project specific investments (i.e., governance structures increase due to fear of opportunism). Thus, as the level of project specific investments increase, transaction costs also increase correspondingly. To sum up, we hypothesize that project specific physical investments are negatively related to goal attainment due to increase in both transaction as well as production costs.

Human asset specificity refers to specific knowledge or know-how that is accumulated by the contracting parties throughout the business relationship (Dyer and Singh 1998). These human assets have significantly lower value in alternative uses. Since we study innovation projects, *all* investments in *project specific human assets* are assumed to support the innovation process. We assume further that the effects of increased transaction costs, due to investment in specialized assets, are more marginal compared to the 'productivity' gains and increased value creation. Two kinds of human asset specificity may be identified:

1) Investment in specific *customer* knowledge, such as specific knowledge of customer needs that has the potential to guide the innovation process, for example, dedicated engineers that learn about the customer's systems, procedures, and employees. The subsequent statement by Dyer and Singh is to the point, "Human cospecialization increases as alliance partners develop experience working together and accumulate special information, language, and know-how. This allows them to communicate efficiently and effectively, which reduces communication errors, thereby enhancing quality and increasing speed to market" (1998: 662). Furthermore, Dyer notes that: "Greater inter-firm human asset specificity gives Japanese firms the ability to rapidly disseminate knowledge throughout the value chain (particularly tacit knowledge) which speeds product development and innovation. Moreover, human co-specialization improves inter-firm communication and minimizes errors, thereby improving quality" (Dyer 1996: 657). Beyond doubt, investments in the specific assets described above should influence value creation and innovative performance.

2) Investments in specific *training* undertaken by the contractor. For instance, special training may be undertaken by the contractor to learn new technologies, new products and new equipment, in relation to the execution of the specific project. In innovation processes, new physical assets are often purchased (see previous paragraph), and these assets need to be mastered. Hence, special training is critical. As a consequence, the contractor's competencies and capabilities are leveraged due to specialized training in relation to the project. Furthermore,

the contractor may also make organizational arrangements, specific to the project, to support the execution of the project.

A positive externality of the investments undertaken by the parties is enhanced customer and contractor *involvement* and *interaction* in the innovation process. For instance, Gruner and Homburg (2000) find that the intensity of customer involvement enhances new product success. Von Hippel (1978) and Leonard-Barton et al. (1993), and Leonard-Barton (1985) reported similar results. Customer ideas and co-design prove successful in developing new industrial products.

In summary, although increased transaction costs are expected, we argue that the effect of project specific assets on value creation and innovative performance is highly positive due to 'productivity' gains. Furthermore, we argue that the effect of project specific assets on goal attainment is negative due to both increased transaction as well as production costs. Hence, the following four hypotheses are formulated.

Hypothesis 1: Project specific investments are negatively related to goal attainment

Hypothesis 2: Project specific investments are positively related to the customer value creation potential

Hypothesis 3: Project specific investments are positively related to the contractor value creation potential

Hypothesis 4: Project specific investments are positively related to innovative performance

4.3.3 The effect of formalization on performance[30]

In the review conducted in Chapter 3, it was indicated that the effect of formalization on performance is ambiguous, and contingent upon the level of specialized investments and uncertainty, for example. Furthermore, we claim that the multi-dimensional nature of performance also matters, goal attainment and innovative performance, for example (Sobrero and Roberts 2001). In the literature review, generally, formalization by employing rules and procedures was found to be positive when levels of uncertainty were low, and negative in relation to innovation and creativity. In other words, it was indicated in the literature review that there are limits on the adaptive properties of rules and procedures in formal contractual arrangements resulting in incomplete contracting (Rindfleisch and Heide 1997). All our projects are innovation project; hence, we assume a relatively high level of hazards associated with uncertainty and ambiguity to be present. Below, the theoretical rationale is discussed and hypotheses are developed, as indicated in Figure 4-3.

Figure 4-3: The effect of formalization on performance
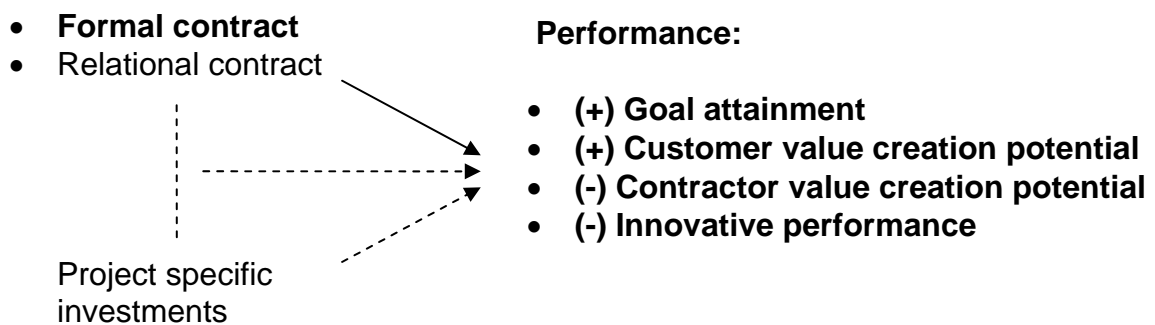
We have earlier defined transaction costs as (Williamson 1996: 379): "[…] the ex post costs of maladaptation and adjustment that arise when contract execution is misaligned as a result of gaps, errors, omissions, and unanticipated disturbances[…]". That is, if 'contract execution is misaligned' transaction costs increase, resulting in inferior project performance. Furthermore, we argue that the probability of misalignment of contract execution increases as the level of

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[30] All hypotheses that are developed in this section are direct effect hypotheses. The direct effect must be interpreted as an average effect across all levels of project specific investment; hence, no interactions are hypothesized. See

ambiguity increases. Although all innovation projects are more or less uncertain and ambiguous by definition, we claim that the different performance dimensions are highly different regarding the level of ambiguity. That is, how difficult it is to specify goals ex ante, and evaluate performance ex post.

Based on the literature review we claim that there are limits on the adaptive properties of rules and procedures in formal contractual arrangements (Rindfleisch and Heide 1997). Hence, we argue that formal contracts are particularly suitable as governance mechanism at medium and low levels of ambiguity. On the other hand, if the level of ambiguity is regarded to be high, highly formalized contracts and contract execution will soon be 'misaligned', leading to increased transaction costs and inferior performance.

Goal attainment is defined as achieving goals such as cost and time schedules, quality levels, specifications and functions. These project goals are relatively easily specified ex ante in a formal contract, and their realization can relatively easily be measured ex post; hence, compliance to the agreement can easily be established. In addition, misunderstandings etc. are more easily avoided (Hodgson 2004). Hence, the probability of misaligned contract execution is reduced. Increased formalization, that is, increased use of written rules and procedures in the contract document should enhance the probability that the project will be finished within budget, on time, and according to the specifications, and at the specified quality level. Based on the arguments presented above, we claim that formalization leads to reduced transaction costs and enhanced goal attainment. Hence, the following hypothesis is formulated.

Hypothesis 5: Formalization is positively related to goal attainment

The customer is presumably highly interested in realizing the value creation potentials related to the innovation project, for example cost reductions and improvements. These results are important 'end-results' in the aftermath of the innovation project respectively. That is, the outcome of the innovation project is assumed to contribute directly to the accomplishment of these 'end-results' in the customer's organization.

Section 4.2.2 for further explanation.

The aforementioned performance dimension, that is, cost reductions, improvements, and 'operations that are more efficient' are claimed to be relatively 'contractible.' Increased formalization, that is increased use of written rules and procedures in the contract document, will enhance the probability that the value creation potential is achieved. Hence, we use the same arguments as above; the probability of misaligned contract execution is *low* due to the low level of ambiguity related to the customer value creation potential. Consequently, formalization leads to reduced transaction costs and thus *facilitate*s enhanced customer value creation potential. Hence, the following hypothesis is formulated[31].

Hypothesis 6: Formalization is positively related to the customer value creation potential

Regarding the contractor value creation potential and innovative performance, we acknowledge that due to ambiguity, these types of performance dimensions are less 'contractible' by nature. However, even these performance dimensions will contain some elements that are contractible. Hence, we claim that governance significantly influences these performances through influencing the level of transaction costs (i.e., through effective alignment), and by providing incentives to invest in value creation assets.

Innovation projects typically involve complex technologies, sophisticated components etc. Hence, "…unanticipated changes in component design and specification are more likely. To identify all contingencies *ex ante* becomes costly if not impossible" (Ghosh and John 2005: 349). Therefore, due to the high level of ambiguity associated with innovative performance, the use of highly formalized contracts will be futile, and the probability of misaligned contract execution will increase, leading to increased transaction costs, and thus inferior performance. In the worst case, formalization might even destroy an innovative climate due to high levels of excessive 'bureaucratization costs' (Adler and Borys 1996; Ulset 1996). In short, we argue that there are *limits* to how much ambiguity rules and procedures can handle in a formal contract (Rindfleisch and Heide 1997; Poppo and Zenger 2002). Consequently, low level of formalization is recommended, resulting in comparatively lower transaction costs (i.e., misalignment is reduced), thus unnecessary bureaucratization costs are avoided. The same logic applies to the *contractor value creation potential* performance such as: the opening of new markets, new production lines,

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[31] Only the independent effect of the relevant governance mechanisms is tested, that is, the effect of the two governance mechanisms in combination is not tested.

and 'the development of new competencies', which are of great importance to the contractor. This performance dimension is less contractible, hence employment of formalized contracts is less appropriate. To sum up, use of highly formalized contracts will lead to unnecessary transaction costs, that is, contract execution will be misaligned. Hence, the following two hypotheses are formulated.

Hypothesis 7: Formalization is negatively related to the contractor value creation potential

Hypothesis 8: Formalization is negatively related to innovative performance

4.3.4 The effect of relational norms on performance

In the review conducted in Chapter 3, it was indicated that the literature is more or less concurrent on the positive effect of relational norms on performance. The theoretical rationale is briefly accounted for below and hypotheses are subsequently developed. Below in Figure 4-4, the hypotheses and their signs are indicated.

Figure 4-4: The effect of relational norms on performance
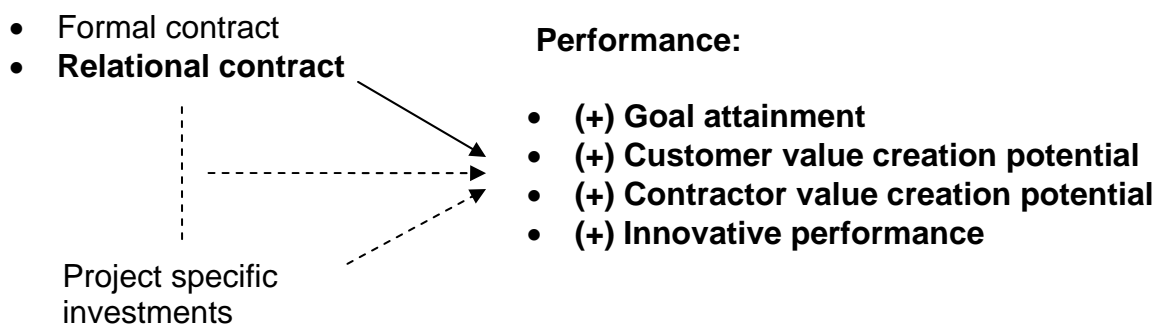
Innovation projects are generally characterized by a high level of ambiguity, for example. Hence, project goals may be ill-defined and involve open-ended performance (Cannon, Achrol et al. 2000), or, they may not be defined at all. Hierarchical governance through the use of rules and procedures may not be sufficient to protect against opportunistic expropriation (i.e., probability of misaligned contract execution increase due to ambiguity); hence, a formal contract may be characterized as 'incomplete' when ambiguity is high. However, relational norms may represent important *complementary* governance mechanisms in projects with high levels of ambiguity due to their safeguarding and superior adaptive capabilities. Norms "provide a general frame of reference, and standards against which to guide and assess appropriate behaviour in uncertain and ambiguous situations" (Cannon, Achrol et al. 2000: 184). However, are relational norms also important in more stable environments? The empirical literature shows ambiguous results; Noordewier (1990) found that relational norms are *only* important when uncertainty is present, while Cannon, Achrol et al. (2000) found that relational norms have a positive effect irrespective of the level of uncertainty.

Our position is in line with the findings in Cannon, Achrol et al. (2000); generally, strong relational norms should enhance all types of performances in an innovation project. The main reason is that *all* innovation projects are ambiguous and uncertain to some degree. However, the importance of relational norms is argued to increase as the level of ambiguity increases (Cannon, Achrol et al. 2000). Furthermore, it is argued that as ambiguity increases, the safeguarding and adaptive abilities of the formal contract decreases. Hence, relational norms are argued to provide important and possible complementary safeguarding mechanisms, which are additional to the formal contract. Namely, relational norms are said to fill the 'gaps' in the contract as the level of ambiguity increases.

As earlier maintained; relational norms are claimed to possess safeguarding and strong adaptive properties, which are of high importance particularly in innovation projects. Furthermore, we argue that a consequence of developing strong relational norms is more *interaction* between the parties, more sharing of relevant task-related information (e.g., often proprietary information). That is, the parties support each other with necessary information that might enable value creation and innovative performance. Furthermore, superior information sharing behaviour before and during project execution should result in more effective coordination of the innovation projects (lower transaction costs). Thus, we argue that the likelihood of misaligned contract execution is reduced, resulting in reduced transaction costs, and thus enhanced performance of all types. *More space will be devoted to relational norms and their safeguarding, adaptive and value creating properties when the interaction hypotheses are developed in Section 4.3.5.* The following four hypotheses are formulated based on the discussion above.

Hypothesis 9: Relational norms are positively related to goal attainment

Hypothesis 10: Relational norms are positively related to the customer value creation potential

Hypothesis 11: Relational norms are positively related to the contractor value creation potential

Hypothesis 12: Relational norms are positively related to innovative performance

4.3.5 Interaction hypotheses

As demonstrated in Chapter 3, findings in the empirical literature show support for the predictions of transaction cost theory. Hence, we presume that the *alignment logic* of the transaction cost theory can safely be relied upon as a basis for further theoretical development and hypothesis testing. According to this logic, high levels of project specific investments should particularly be associated with the use of more formalized contract structures. As earlier argued, in inter-organizational relationships, the formal contract has the ability to function as an efficient *safeguard* and instrument for *adaptation,* particularly when faced with high levels of hazards associated with (*project) specific investments.* An efficient alignment between governance mechanisms (including relational norms), and the level of project specific investments, should be associated with lower transaction cost and thus enhanced project performance (Williamson 1985)[32]. Furthermore, we claim that effective safeguarding positively influences the incentives for the parties to further invest in value creating investments (Dyer 1997).

The theoretical rationales are presented as the hypotheses are developed. Below in Figure 4-5 and Figure 4-6, the hypotheses and their signs are indicated.

Figure 4-5: Interaction hypotheses, formal contract

- **Formal contract**
- Relational contract

Performance:

- **(+) Goal attainment**
- **(+) Customer value creation potential**
- **(+) Contractor value creation potential**
- **(+) Innovative performance**

**Project
specific
investments**

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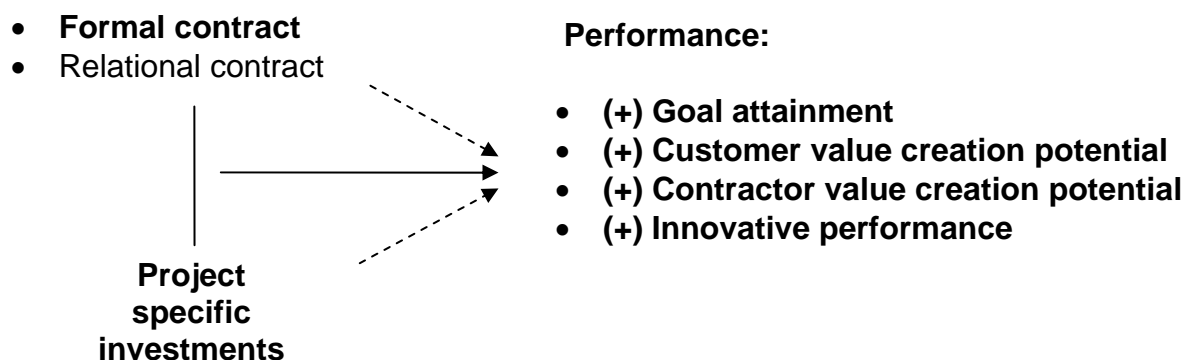
[32] For a similar approach see Ghosh, M. and G. John (2005). "Strategic fit in industrial alliances: An empirical test of governance value analysis." Journal of Marketing Research **August**: 346-357.

Figure 4-6: Interaction hypotheses, relational contract

- Formal contract
- **Relational contract**

Performance:

- **(+) Goal attainment**
- **(+) Customer value creation potential**
- **(+) Contractor value creation potential**
- **(+) Innovative performance**

Project specific investments
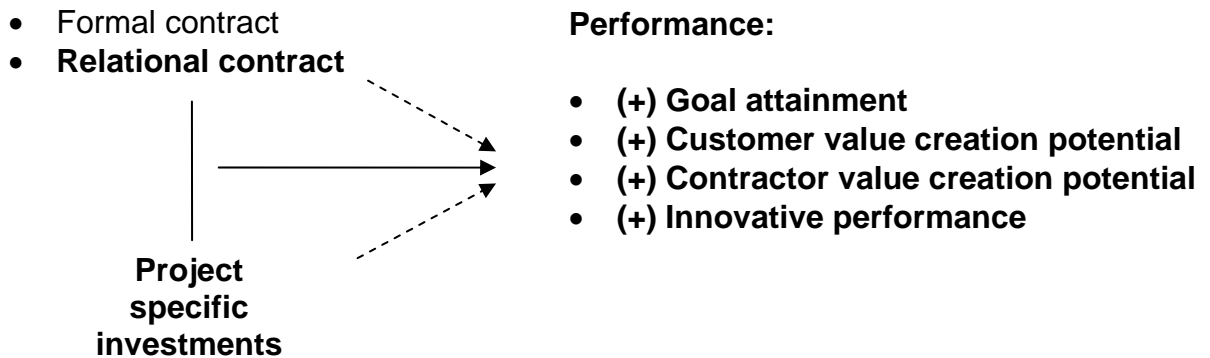
As argued earlier, the formal contract is an efficient governance structure to safeguard *project specific investments* from opportunistic appropriation in inter-organizational relationships. Furthermore, in order to achieve project goals like delivery time, budgets, and quality levels, project specific investments are argued to be of *minor* importance (see section 4.3.2). However, these specialized investments need to be safeguarded in any case. In addition, the rules and procedures in the formal contract are needed to safeguard against cost overruns, delays, inferior quality levels, for example. The probability of misaligned contract execution is low; hence, a preferred governance structure is a (formal) contract which is highly formalized. Contract execution is then 'aligned' resulting in reduced transaction costs, and enhanced goal attainment.

Furthermore, as the formal contract is assumed be an effective governance structure; the governance mechanisms afforded by relational norms are of less importance. However, since innovation projects are ambiguous by nature, relational norms and their safeguarding and adaptive properties may contribute significantly. Hence, the most appropriate solution would be to rely on both formal as well relational contracts. Hence, the following two hypotheses are formulated.

Hypothesis 13: The interaction of project specific investments and formalization will have a positive effect on goal attainment

Hypothesis 14: The interaction of project specific investments and relational norms will have a positive effect on goal attainment

Customer value creation potential is operationalized as cost reductions, improvements, and 'more efficient operations' in the customer's organization (improvements from current status). This performance dimension is claimed to be easily specified *ex ante* and easily measured *ex post*. Hence, formalization was hypothesized to be positively related to the customer value creation potential (direct effect). Furthermore, to enhance the customer's value creation potential, project specific investments (i.e., value creation initiatives) should be undertaken by the parties (Dyer 1997). Hence, project specific investments were hypothesized to be positively related to the customer value creation potential (direct effect). As earlier argued, formal contracts have the ability to function as an efficient safeguard, particularly related to hazards associated with project specific investments, for example. In other words, increased formalization is recommended to reduce the probability of being exposed to opportunistic behaviour; the result is reduced transaction costs (due to efficient alignment), and furthermore, incentives is provided to further invest in value creation investments. Hence, the following hypothesis is formulated.

Hypothesis 15: The interaction of project specific investments and formalization will have a positive effect on the customer value creation potential

As stated earlier, to enhance the customer's value creation potential, project specific investments should be undertaken by both the parties. Since *customer value creation* performance is claimed to be less ambiguous in nature (although more ambiguous than goal attainment)*,* we assume that a high level of formalization is preferred as a safeguarding mechanism based on our previous discussions (see Hypothesis 15). However, some ambiguity is obviously present; hence, the formal contract will not be 'complete', and thus less effective in curbing opportunistic behaviour. Hence, there is a real danger of misaligned contract execution and subsequently increased transaction costs. Since the adaptive properties of pre-specified rules and procedures are limited, governance mechanisms such as *relational norms* may contribute significantly to increase performance. As accounted earlier, relational norms possess safeguarding and superior adaptation properties. Hence, by relying on strong relational norms, the probability of contract execution misalignment is reduced, thus, resulting in reduced transaction costs, and additionally, increased incentives to further invest in value creating assets are introduced. Hence, the following hypothesis is formulated.

Hypothesis 16: The interaction of project specific investments and relational norms will have a positive effect on the customer value creation potential

Besides creating value for the customer, new products and technologies might have a huge commercial potential for the contractor - 'contractor value creation potential'. Contractor value creation potential is operationalized as new product lines, increased market share, and increased competencies due to the project. Much of the same logic as above is applied when hypotheses are developed (see Hypothesis 15 and 16). That is, project specific investments are considered of critical importance to enhance the contractor's value creation potential of the project. Hence, safeguarding these investments becomes imperative in order to reduce the risk of opportunism. Formalization is not anticipated to facilitate enhanced value creation directly (Adler and Borys 1996). However, we argue that the formal contract is a superior governance mechanism in safeguarding the project specific investments at stake. Thus, formalization may influence contractor value potential *negatively* by restricting creativity, and *positively* through reductions in opportunistic behaviour (Adler and Borys 1996). When the level of project specific investments increase, it becomes increasingly important to reduce or limit the level of opportunistic behaviour. We assume that the positive effects of formalization increase more than the negative effects, resulting in increased value creation and innovative performance. Furthermore, increased incentives to further invest in value creating assets are introduced. Hence, the following hypothesis is formulated.

Hypothesis 17: The interaction of project specific investments and formalization will have a positive effect on the contractor value creation potential

In general, we assume that strong relational norms influence the contractor value creation potential positively. Since this performance dimension is almost less contractible the importance of relational norms is argued to increase. As stated earlier, relational norm is claimed to provide safeguarding at low transaction costs, and furthermore, may facilitate value creation through increased interaction. Additionally, since formal contracts, to some extent, are 'incomplete', *relational norms* may contribute significantly to increase the level of value creation. Strong relational norms should result in reduced transaction costs, and subsequently, increased

incentives to further invest in value creating assets are introduced. Hence, the following hypothesis is formulated.

Hypothesis 18: The interaction of project specific investments and relational norms will have a positive effect on the contractor value creation potential

In order to enhance the level of *innovative performance* in the project, the contractor should invest in specialized tools, equipment, knowledge and know-how (i.e., project specific investments). As argued earlier, these investments may be an important and critical *source* of value creation and innovation. A high level formalization (i.e., rules and procedures) in formal contracts has the ability to safeguard project specific investments; hence, a high level of rules and procedures may be recommended in this respect. However, as argued earlier, the extensive use of rules and procedures in the formal contract may lead to 'bureaucratization' of the project. Thus, there is a danger that excessive control measures may lead to the destruction of an innovative climate in the project organization. That is, formalization might influence innovative performance *negatively* by restricting creativity or 'artistic freedom'. However, since formalization provides superior safeguarding properties, we argue that formalization *positively* influences all types of performance, innovative performance included, by mitigating or reducing opportunistic behaviour and transaction costs. As argued earlier, when the level of project specific investments increases, it becomes increasingly important to safeguard the investments and mitigate potential opportunistic behaviour. Hence, we argue that the positive effects of formalization increase more than the negative effects when the level of project specific investments increases, resulting in enhanced innovative performance.

Empirical evidence indicates that formal contracts have their 'limits' when uncertainty and ambiguity are high, which is the case in innovation projects (Rindfleisch and Heide 1997; Poppo and Zenger 2002). Although a formal contract is the safeguarding mechanism preferred, relational norms may provide additional, possibly complementary safeguarding, and 'adaptive' properties at low transaction cost, and thus enhance innovative performance.

As stated in previous sections, we argue that strong relational norms will affect innovative performance positively by mitigating or reducing opportunistic behaviour and transaction costs. When the level of project specific investments increases it becomes increasingly important to safeguard these investments and mitigate potential opportunistic behaviour. However, we

suspect relational norms to be a weaker safeguarding mechanism than formal contracts. On the other hand, relational norms do not lead to negative and unwanted 'bureaucratization' effects in the project.

For instance, it is costly (i.e., time and money) to spell out all the details in an agreement *ex ante*. Comparatively, relational norms are less costly to 'develop' and *do* encompass all future contingencies; the formal contract does not (Dyer and Singh 1998). Furthermore, monitoring costs are low due to the self-enforcing nature of cooperative norms. Hence, the parties do not necessarily need to invest in costly monitoring mechanisms. Self-enforcing mechanisms lower the cost of complex adaptations and allow the contracting parties to adjust the contract as the project evolves and to respond to changes in the market, technological challenges etc., (Dyer and Singh 1998). Consequently, we argue that both transaction costs as well as 'bureaucratization costs' are mitigated or reduced leading to enhanced performance. Since the safeguarding properties of relational norms are weak and may be questionable, we briefly present theoretical rationales and empirical findings to justify our reliance on these properties of strong relational norms.

A strong norm of *information exchange* will provide a *safeguard*, to both the contractor and the customer when, for example, decision control is transferred to the other party. A strong norm of information exchange will minimize the likelihood of conflicts, thus reducing transaction costs in the relationship. The project may be characterised by the following statements: "In this project, it is expected that any information that might help the other party will be provided to them" (adapted from Heide and John (1992: 37).

A strong *solidarity norm* represents a *safeguard*, to both the contractor and the customer, because it deters both the contracting parties from using decision control in an opportunistic way. The attitude may be characterized as: "Important problems that arise in the course of this project are treated by my firm and the customer as joint rather than individual responsibilities" (adapted from Heide and John (1992: 37). A strong norm of solidarity represents a *safeguard* and will curb opportunistic behaviour, thus reducing conflicts and transaction costs.

Furthermore, a strong *'harmonization of conflict'* norm will represent a *safeguard* to both of the contracting parties. For instance, although the project is highly uncertain and complex, both the contractor and the customers know that unforeseen contingencies in the project will be handled in good faith. The following statement characterizes projects with a highly developed norm of

conflict management: "When disagreements arise, we reassess all the facts and try to reach a mutually satisfactory compromise" (adapted from Lusch and Brown (1996: 35). Apparently, a highly developed norm of conflict management will reduce the conflict level and the associated transaction costs between the two cooperating parties.

To both the contractor and the customer, a norm of *flexibility* will represent a *safeguard* if the project is plagued with uncertainty and complex technical challenges with a high degree of future changes. That is, both the contractor and the customer know that the project will be subject to good faith modifications. The parties' attitude is that the agreement could and should be modified as the project evolves and develops. Flexible attitude and behaviour will increase the *adaptive* capabilities of the project, for example; "Both parties are flexible in their response to last minute requests made by the other party" (adapted from Heide and John (1992: 37).

The presence of strong relational norms usually involves enhanced *interaction* between the parties, such as close contact between the members of the organizations. Quality and quantity, as well as the mode of the interactions and contacts are important (Subroto, Sivakumar et al. 2004). Several authors have argued that "close and intense interaction between individual members of the organizations concerned acts as an effective mechanism to transfer and learn sticky and tacit know-how across the organizational interface" (Kale, Singh et al. 2000: 221). As Kale, Singh et al. (2000) suggest, interaction aids the learning process; we believe the same is true in relation to the innovation process. According to von Hippel (1978; 1987), more than two-thirds of innovations could be traced back to the customer's suggestions or ideas. Other empirical work concludes that major innovations could be traced back to the contractors. Further, von Hippel argues that networks with superior knowledge transfer capability out-innovate competing networks. Hence, the locus of innovation is not the firm, but the network (i.e., the dyad in this study). Furthermore, we conclude that firms in close cooperation, that exchange information (e.g., ideas, suggestions) and interact, *enable* innovative activity. These studies indicate that close relations between firms are the most important source for new ideas and information that result in performance enhancing technology and innovations.

Although the development of strong cooperative norms is regarded as highly positive regarding most types of performance aspects, negative effects of strong relational norms can also be imagined (Moorman, Zaltman et al. 1992). Moorman, Zaltman et al. suggested that long-term and close cooperation may lead to a decline in innovation due to opportunistic behaviour, loss of objectivity, and too high expectations from the customer's side. The work of Moorman, Zaltman

et al. was replicated by Grayson and Ambler (1999) and Mooi (2005). The empirical results are ambiguous; however, there seems to be some evidence that long-term cooperation may have "dark sides" that influence innovation and performance negatively if present.

Providing governance structures, for example, a formal contract that *safeguards* specific investments is of fundamental importance and often an absolute condition for a contractor to invest in project specific assets. Formalization, and even relational norms, may influence innovative performance *negatively* by restricting creativity, and *positively* through reductions in opportunistic behaviour, resulting in reduced transaction costs. As the level of project specific investments increases, it becomes increasingly important to safeguard these investments and reduce or limit the level of opportunistic behaviour. Thus, we assume that the positive effects of the applied governance mechanisms (i.e., formal and relational mechanisms) increase more than the potential negative effects when the level of project specific investments increases. As an important additional governance mechanism, in particular when the level of ambiguity and uncertainty is high, relational norms may provide safeguarding and adaptive properties, and thereby further *motivate* the parties to invest in project specific investments and the creation of value (Dyer 1997). Furthermore, strong relational norms enable innovation and value creation through more interaction, information exchange, solidarity, harmonization of conflict etc., keeping transaction cost low. Based on the above discussion the following two hypotheses are formulated.

Hypothesis 19: The interaction of project specific investments and formalization will have a positive effect on innovative performance

Hypothesis 20: The interaction of project specific investments and relational norms will have a positive effect on innovative performance

4.3.6 Summary of the hypotheses

A summary is provided below based on the previous discussion and hypotheses development.

Table 4-1: Summary of the hypotheses

	Structural linkages in the model	
H1	Project specific investments – Goal attainment	-
H2	Project specific investments – Customer value creation potential	+
H3	Project specific investments – Contractor value creation potential	+
H4	Project specific investments – Innovative performance	+
H5	Formal contract – Goal attainment	+
H6	Formal contract – Customer value creation potential	+
H7	Formal contract – Contractor value creation potential	-
H8	Formal contract – Innovative performance	-
H9	Relational contract – Goal attainment	+
H10	Relational contract – Customer value creation potential	+
H11	Relational contract – Contractor value creation potential	+
H12	Relational contract – Innovative performance	+
	Interaction effect hypotheses	
H13	FC * PSI – Goal attainment	+
H15	FC * PSI – Customer value creation potential	+
H17	FC * PSI – Contractor value creation potential	+
H19	FC * PSI – Innovative performance	+
H14	RC * PSI – Goal attainment	+
H16	RC * PSI – Customer value creation potential	+
H18	RC * PSI – Contractor value creation potential	+
H20	RC * PSI – Innovative performance	+

PART III

5 Research designs and methodological choices

5.1 Research design and validity concerns

In this chapter, we will briefly discuss different research designs and, based on this discussion, justify the design chosen in this study. The empirical study was designed to conduct theory testing of a casual model. The classical experiment, the quasi-experimental design, the cross-sectional design, and pre-experimental designs could all be used for conducting theory testing (Frankfort-Nachmias and Nachmias 1996). Each of these research designs has their limitations, which will be discussed below.

The classical experiment enables the researcher to fully control all variables in the research model. The result is strong internal validity and casual relationships can be established. One limitation is that external validity tends to be weak, and that the researcher is not able to replicate real-life situations in the laboratory. For our purpose, this research design was not an alternative. Treatment manipulation is difficult or even impossible when the unit of analysis is an organization, or more precisely, an inter-firm project executed by two independent organizations. When treatment design is not possible or practical, only two of the above mentioned designs are relevant: a cross-sectional design (i.e., a correlation design) and longitudinal designs. The pre-experimental designs were ruled out due to limitations regarding internal and external validity. Furthermore, due to practical limitations the longitudinal designs (e.g., panel and time series designs) were also ruled out. The main reason is that the resources available are limited; that is, the time and cost of conducting data collection in two (or more) separate periods were considered too consuming. The only practical option left is the cross sectional or correlation design.

Different forms of validity need to be considered when conducting research, whether a classic experiment, the longitudinal design, cross-sectional design, or a pre-experimental design is chosen. Cook and Campbell (1979) put forward four different forms of validity: internal, external, statistical, and construct validity. An optimal design should score a maximum on all these types of validity. Unfortunately, this is not possible due to some of the problems associated with empirical studies. If the study scores high on internal validity with the classical experiment as the research design, the consequence could be that the external validity of the study is low

(Cook and Campbell 1979; McGrath 1982). The main focus in a cross sectional design of theory testing (i.e., testing casual relations) should be on internal validity and construct validity (Cook and Campbell 1979). Statistical validity should be sufficiently high, and external validity, although important, should be relaxed. The "purpose" of this research is to test hypotheses. This can only be done if internal and construct validity are high (Mitchell 1985). It is necessary to use a research design without serious errors that cause low internal validity, and at the same time, develop constructs and measuring instruments which are well defined, thus securing high construct validity. If the research results suffer from low internal and construct validity, further statistical analyses are in vain.

A sufficiently high level of statistical conclusion validity is important. This type of validity is of particular importance in correlation research. If the results of the analyses show that there is not a sufficiently high level of statistical conclusion validity, then no valid statistical conclusions can be drawn from the study. In defining statistical conclusion validity we support Cook and Campbell (1979), who defined statistical conclusion validity as "inferences about whether it is reasonable to presume covariation given a specified alpha level and the obtained variances" (Cook and Campbell 1979: 41). Typical threats are: low reliability of the measures, low statistical power (e.g., small sample sizes combined with a low alpha level increases the likelihood of making a type II error), violated assumptions, random irrelevancies in the empirical setting, etc. (Cook and Campbell 1979).

Construct validity could be defined as "…the degree to which a measure assesses the construct it is purported to assess" (Peter 1981: 134), or the degree of correspondence between a theoretical construct and an operational measure (Mitchell 1985). A measure is valid if: 1) it assesses the magnitude and direction of the construct, and 2) it is not contaminated. Construct validity can be separated into trait validity and nomological validity. Efforts to examine a measure's reliability (i.e., consistency, absence of measurement errors), convergent validity (i.e., the measure must vary with the construct), and discriminant validity (i.e., the measure should not vary with other constructs) are primarily trait validity concerns (Campbell and Fiske 1959). Nomological validity encompasses examination of the relationship between theoretical constructs, and the empirical relationships between measures of those constructs (Peter 1981). Both of these validity concerns have to be addressed when conducting correlation research. All of the above issues represent a serious threat to the empirical study and need to be addressed.

The casual model, which will be tested, imposes several requirements regarding the research design. The conditions for demonstrating casualty are: isolation, association, and directionality (Bollen 1989). The cross sectional design has serious limitations regarding these fundamental conditions. It is simply not possible to study directionality when the study is conducted at *one* point in time. But the cross sectional design could be a starting point for later longitudinal studies, for example time series or panel studies. Regarding isolation, the challenge is to find any third variables that threaten valid inference making. The existence of third variables may seriously damage the internal validity of the study. According to Mitchell (1985), the focus should be directed on finding third variables through systematic thinking and literature reviews. In addition, the sample should be homogeneous and the model should include control variables (Mitchell 1985). We argue that the problem of isolation could be solved based on the arguments above. Regarding 'association', two important aspects need to be addressed: (1) variance in the independent constructs is necessary in order to obtain the desired co-variations between the constructs, and (2) the problem of stability. Furthermore, the time elapsed between cause and effect should be long enough to make sure that the effect has materialized. It is important that the level of both internal and construct validity is sufficiently high.

5.2 Sampling strategy

5.2.1 Choice of empirical setting

As argued in previous sections, this study is designed to conduct theory testing of a casual model. In theory testing of casual models, internal validity and statistical conclusive validity are ranked more important than external validity (Cook and Campbell 1979). Hence, the chosen empirical setting should provide sufficient variation in the main variables included in the theoretical model, and all other variables should ideally be constant, that is, no variation. However, this is hardly the case in any real life empirical setting, thus some "noise" must be expected. For instance, a highly heterogenic sample will provide the necessary variation in the variables in the model, but it will also induce noise into the results due to variation on variables outside the model. The researcher needs to balance this tradeoff, as accounted for in the subsequent paragraph. In order to secure a high level of internal and statistical conclusive validity, *one* industry, opposed to many industries, is particularly suitable. Selecting one industry will ensure that the projects are (more or less) homogeneous and thereby secure a higher level of internal validity (i.e., it should be possible to isolate third variables), and secure statistical conclusive validity (i.e., less random error variance), (Cook and Campbell 1979). In short, we presume that the choice of one industry, as in the empirical setting, will exclude or reduce confounding factors *associated with a specific industry*. In other words, external validity is sacrificed in order to achieve the highest possible level of internal validity, which is critical when conducting theory testing. If the theory holds in the sample (i.e., the theory is not falsified), further studies should test for external validity by performing additional studies in other contexts.

However, although only one industry has been chosen, there will be differences between the projects in the sample. The contractor industry is highly heterogenic and operates in all segments of the market, for example within design, fabrication and installation, research and development, engineering services/consulting, and software development etc. Although we have selected *one* industry as the empirical setting and thus reduced external validity, the study includes a broad selection of innovation projects, different contractors, and different oil companies. Altogether, 19 oil companies and 98 contractors are represented in the final sample of the study. Hence, due to the heterogeneous projects, contractors, and oil companies, we are confident that there will be sufficient variation in the main variables in the research model.

The theories applied in the study to analyze governance of innovation projects are generic. Hence, they should be valid for all the projects analyzed. However, since different segments of the industry are included in the study, for example, research and development, design and construction, and software development, the innovation projects are not homogeneous. Ideally, one segment or one project type should be analyzed to reduce noise. However, all segments were included in the study to secure an optimal sample size. Hence, the need for a homogeneous setting was sacrificed in order to increase the sample size and thus statistical power.

The requirements of the empirical setting are fulfilled if the variables in the theoretical (or conceptual) model materialize in the empirical setting to varying degrees (Troye 1994). In short, the researcher must choose an empirical setting where the phenomenon of interest actually appears. In this paragraph, we argue that the main constructs in the theoretical model are present in the industry, and that they are present to varying degrees in the sample. Below we briefly account for the relevant variables.

Historically, the Norwegian petroleum industry has been heavily influenced by the American business culture. American companies were the first to operate on the NCS (e.g., Conoco Phillips, ExxonMobile), and they brought with them the rather tough and formal American contract style. Contracts were viewed as crucial, and considerable resources were spent in developing comprehensive and exhaustive contracts. Because of this foreign influence, the industry developed a more formalized culture than other Norwegian industry clusters. In short, extensive use of formal contracts should be expected.[33]

The extensive use of formal contracts in this industry might affect the level and presence of other more informal governance mechanisms; that is, a substitution effect might be present. Would the extensive use of formal contracts totally replace trust and cooperative norms for example? The NORSOK initiative had earlier indicated that these aspects were poorly developed between the parties in the industry (NORSOK 1995). Hence, we conducted in-depth interviews to make sure that these dimensions or constructs were present. Fortunately, the interviews revealed a strong presence of trust and relational norms in the industry, that is, the presence of 'relational

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[33] Compared to other industries a 'one' on the Likert-scale would indicate little formalization. The scale is relative, and a 'one' in the petroleum industry does not necessarily mean the same as a one in other industries. This is mainly due to the history of the industry. To avoid problems with the scale, the choice of one industry seems reasonable. Formalization is certainly different in construction and R&D projects, but we chose to include both project types. Both project types are important in this industry, and they are both relevant in the study of value creation and innovation.

contracts' between the parties. Furthermore, these attitudes and behaviours were regarded as fundamental in achieving superior project performance by the parties. Moreover, the length of the projects in the sample indicates that cooperative norms could be developed (project length; MEAN=2 years). To conclude, we presume that relational contracts are present to a varying degree in the projects of interest.

Project specific investment is a critical variable in the theoretical model. Investments in these assets are hypothesized to positively affect the relevant performance effects in the study. It is of critical importance that specific investments are likely to exist in the projects or dyads to a varying degree (Troye 1994). Below we argue the presence of these investments, first, on the customer side, and second, on the contractor side.

The oil companies on the NCS are generally reluctant to make specific investments in a relationship. They are anxious about being 'caught' in a situation where they are 'locked in' and dependent on just one contractor. This attitude was confirmed by the contractor companies in the interviews and in several interviews with informants in Hydro. The oil companies put a lot of effort into establishing and maintaining a well functioning market. Long-term relationships are 'broken' and new contractors are invited to compete on a regular basis. To sum up, transaction specific investments on the customer side are presumed to be present only to a marginal degree.

As argued in Chapter 1, it is reasonable to presume that the contractors invest in generic and specific assets related to the execution of an innovation project. The logic is straightforward. To create value, develop new technology, new solutions and so forth, investment is necessary in knowledge, training, new equipment etc. Some of these investments are likely to be project specific. During the preliminary interviews, we asked the informants if specific investments were present in the projects they had conducted. The response indicated that several contractors had made specific investments in for example: organization (e.g., adjusting the organization to the specific project), special training and education, specific equipment, and time (getting to know the customer organization and their problems etc). The interviews and the types of work performed in the sample project indicated that project specific investments are present to some degree – and that these investments are most likely to be found on the contractor side of the dyad.

In conclusion, we argue that the empirical setting chosen is likely to contain all of the relevant variables in the theoretical model. Further, the critical variables are likely to exist to a varying

degree in the sample. These conclusions were drawn on the basis of preliminary interviews and novel insight into the industry structure. Hence, we conclude that the empirical setting is relevant for the test of the theoretical model. The choice of one industry as the empirical setting will exclude or reduce confounding factors associated with a specific industry. External validity was sacrificed in order to achieve the highest possible level of internal validity, which is critical when conducting theory testing. The empirical setting is homogenous, although the contractor companies operated in different market segments. To sum up, we presume that the choice of empirical setting will secure enough variation in the independent constructs.

5.2.2 Empirical setting and sample size

The Norwegian petroleum industry consists of several hundred companies and several other actors[34]. Hence, an exact delimitation of the population of contractors or projects is difficult to accomplish - which companies should be included and which companies should not.

SNF[35] has been working on the delimitation issue for several years as part of conducting studies within this industry in 1997, 1999, 2001, 2003, and 2005. Fortunately, SNF gave us access to their files. The SNF files contained companies that were providing services and products within the petroleum sector. Only firms that sold a larger share of their products and services to another company within the industry were included in the population (i.e., petroleum related products and services). An initial requirement was an annual turnover above 25%[36], a total annual turnover above 10 million NOK, and more that 10 employees. The SNF files were recently updated in the spring of 2006.

Although my unit of analysis is inter-firm innovation projects executed between an oil company and a contractor, the SNF files provided a good start in the 'hunt' for projects and informants within the industry. In addition, we searched the Internet[37] to secure the quality of the SNF files and to add relevant companies to the list. For more information about the data collection process

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[34] By other actors we mean research foundations (e.g., SINTEF), the university sector (e.g., NTNU) etc.
[35] 'Institute for Research in Economics and Business Administration,' in Norwegian – SNF (Samfunns- og Næringlivsforskning AS). From now on, we will use the abbreviation SNF.
[36] For further inspection of the SNF –sample, consult for example: Heum, P., E. Vatne, et al. (2006). Petrorettet næringsliv i Norge: Tiltakende internasjonalisering og global tilstedeværelse. Bergen, Samfunns- og næringslivsforskning AS.

see Chapter 5.3. By June 2006, we had identified approximately 800 knowledgeable informants within the industry for our sampling body.

We consulted previous studies and expert knowledge about the petroleum industry, and estimated that a response rate of approximately 40% could be expected (Heum, Kristiansen et al. 2006). We then consulted the literature for further guidelines on the preferred sample size. However, the literature is not consistent on these matters, and there are several factors that influence the recommendations of an appropriate sample size. The number of independent variables to be estimated heavily affects the sample size, and if interaction effects are included, the required sample size will increase. In short, the more independent variables or free parameters to be estimated, the larger sample size is required (Bollen 1989; Hair, Anderson et al. 1998). According to Bollen (1989), there should be at least 100 informants/observations when conducting theory testing. Few informants (low n) and a low alpha level may increase the danger of making an incorrect no-difference conclusion (Type I-error), that is, reject a true model, see for example Cook and Campbell (1979).

In our case, the number of variables (i.e., items) to be estimated in the model is approximately 32^{38}. Since we apply structural equation modelling (SEM) and multiple regression (as control) these two methods are elaborated.

Multiple regression: Hair, Anderson et al. (1998) recommend a minimum of 1:5 and a more desired level of between 15-20 observations for each independent variable. If the ratio falls below 1:5, the researcher will have difficulties in detecting even strong relationships in the sample (i.e., a Type I failure), and further, the generalizability of the results would be problematic (Hair, Anderson et al. 1998). On the other hand, very large samples (above 1000) would make the statistical tests too sensitive (a Type II failure). Since no clear recommendations exist, we aimed at a sample size of approximately – (5-20) x 32 = 160-640 (MEAN: 400).

Structural equation modelling: As in all statistical techniques, the sample size is also of critical importance in SEM. There is no single criterion that determines the sample size, but there are four factors we need to take into account (Hair, Anderson et al. 1998): 1) model

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[37] Additional sources of information were: www.offshore.no, www.oilinfo.no, www.oilport.net, www.intsok.no, www.odin.dep.no, www.og21.no, www.nfp.no, www.olf.no, www.petromagasinet.no, www.petrad.no, www.nortrade.no, and www.norskindustri.no\olje_og_gass\

[38] This number was not fixed at the time of data collection. The final number of variables in the theoretical model was heavily dependent on the measurement model process. In the estimation of the measurement model, the

misspecification, 2) model size, 3) departure from normality, and 4) estimation procedure. Specification error is the omission of relevant variables in the specified model; if the researcher suspects specification errors then the sample size should be increased accordingly. The free parameters to be estimated heavily influence the recommended sample size, a ratio of at least 5:1 is recommended, and a ratio of 10:1 is considered most appropriate. Thus, a more complicated model with more variables requires a larger sample size, in our case: 10 x 32 = 320. If the researcher suspects that the data violate the assumptions of multivariate normality, an increased sample size is recommended (ratio 15:1) (Hair, Anderson et al. 1998).

The most widely used estimator is Maximum Likelihood Estimation (MLE). This estimator has provided valid results with sample sizes as small as 50, and the most appropriate and recommended sample size is between 100 and 150. As the sample size increases (400-500), the MLE seems to become too sensitive (Hair, Anderson et al. 1998).

If interaction effects are included in the study, the picture becomes even more ambiguous. The literature does not provide any specific recommendations, but intuitively the sample size should be larger when interaction effects are included. In this study, we use latent variable scores (LVS); fortunately, this method does not dictate a very large sample.

We conclude that the literature is highly divergent regarding the recommendations on sample size, and that the required sample size is dependent on several factors, for example the number of free parameters to be estimated. In this case, the estimated number of indicators (free variables to be estimated) was approximately 32. Since the literature does not provide any exact recommendations regarding sample size but only guidelines, we used our best judgement based on the argumentation above and settled for a ratio between (10-15):1. This ratio resulted in a sample size: 10-15 x 32 = 320-480 observations. With an estimated response rate of approximately 40%, this study required an initial sample frame of informants between 800 and 1000. We managed to identify approximately 800 knowledgeable informants reporting on unique projects, a result rather optimal according to the argumentation and literature above.

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variables that do not work will be excluded from the model. Thus the researcher cannot know in advance the exact number of variables in the final model.

5.3 Measurement

This section has two parts; in the first section, the different stages of the measurement process are presented. Then in the second section, we present all constructs included in the theoretical model, their dimensions and measures, that is, the operationalizations of the constructs. Further, validity and reliability issues will be dealt with in Chapter 6 along with the development and test of the measurement model.

5.3.1 The measurement process

As stated by Bollen, "The measurement process begins with the concept. A concept is an idea that unites phenomena [...] under a single term" (Bollen 1989: 180). When the researcher has come up with a concept to measure, four steps should be followed in the measurement process: 1) give the meaning of the concept, 2) identify the dimensions and latent variables to represent it, 3) form measures, and 4) specify the relation between the measures and the latent variables (Bollen 1989). The measurement process links the theoretically developed concepts to one or more latent variables[39], and these latent variables/dimensions are further linked to observable variables. Bollen's (1989) four-step measurement procedure is highly acknowledged and much cited, and will be used in this study although other comparable approaches exist (Churchill Jr. 1979).

The first two stages of the measurement procedure were achieved in Chapter 2. First, the relevant theoretical concepts were defined and explained on the basis of existing literature. "A theoretical definition explains in as simple and precise terms as possible the meaning of a concept" (Bollen 1989: 180). Second, the dimensions of the constructs were identified and explained. A theoretical construct may consist of one or many dimensions, thus the researcher may need one or more latent variables in the measurement model (i.e., one latent variable per dimension is needed). In this study, seven constructs (i.e., the independent and dependent variables) are included in the theoretical model. Except for relational contracts[40], all of the constructs consist of

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[39] Latent variables are the representation of concepts in the measurement model.

[40] The construct 'relational contract' consists of or is represented by three dimensions – information exchange, solidarity, and harmonization of conflict.

one dimension; the main model consists of seven constructs and ten dimensions or latent variables[41].

The third phase of Bollen's (1989) measurement process is to form measures to represent the latent variables in the theoretical model. As far as possible, this study applies established theoretical constructs and established measures that have been validated in previous studies. This is in line with the recommendations in Churchill's (1979) acknowledged article. Churchill (1979) states that it is difficult to accumulate knowledge if identical constructs are operationalized differently across empirical studies; thus, in order to "build" or accumulate knowledge, it is important that constructs and measures are cumulative (Churchill Jr. 1979; McGrath and Brimberg 1983).

An extensive review of the literature was conducted to identify potentially relevant empirical measures. This study applies multiple measures to ensure that the constructs are not underrepresented. However, single items are used in connection with the control variables. The use of multiple measures allows us to test the validity requirements. Regarding the theoretical point of departure, the inter-organizational literature suited my purpose well. This literature is well developed theoretically; furthermore, established and validated measures have been developed. A huge challenge was that these measures were mainly developed within the B2B marketing literature. The unit of analysis in the aforementioned literature is the 'relationship' between two parties, typically a buyer and a seller; whereas, in this study the transaction (i.e., the *inter-firm innovation project)* is the unit and object of analysis. This implied that the measures had to be rephrased to fit the unit of analysis and to fit within the empirical setting. Thus, the validity of the measurements could be threatened. Although the measures had been validated in the inter-organizational literature, extensive work was executed to establish face validity. Face validity is defined as the researcher's subjective evaluation of the validity of the measure (Frankfort-Nachmias and Nachmias 1996). Several experts should be consulted and if there is agreement among the experts, the researcher may state that the measures show face validity. In the measurement process, several experts were consulted. They were industry leaders and academic experts with in-depth knowledge of the industry. Some items were excluded in this process, several were rephrased, and some new items were included.

The independent constructs have been operationalized and measured a number of times in the interorganizational literature. This applies to *formal contracts, relational contracts, and*

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[41] In addition, several control variables and rival predictors are included in the measurement model.

transaction specific investments. However, the unit of analysis and empirical setting is different here; therefore, a considerable amount of time and energy was used to identify appropriate measures and conduct the necessary modifications of these constructs. The items chosen were consequently rephrased to fit the empirical setting and unit of analysis.

The <u>dependent construct</u> of goal attainment (i.e., *specification, function, quality, cost and time)* has been operationalized several times in relevant empirical studies; hence, it was straightforward to use these measures in the study. The *value creation* measures were considerably more challenging; these measures were especially tailored for the B2B marketing setting and were useless for the purpose of this study. A considerable amount of time was used to search for suitable measures, but in the end, we had to rely on global measures on this construct; that is, the measures are not specific (for example cost reductions, improvements etc. were used as measures of value creation). Furthermore, the *contractor value creation potential* and *innovative performance* measures were adapted from the new product development literature and fitted to our empirical setting.

The fourth phase of Bollen's (1989) measurement process is to specify the relations between the measures and the latent variables. This is achieved in Chapter 6 where a measurement model is constructed to show the relation between the measures and the latent variables. Reflective scales are used instead of formative scales, since the items are assumed to share a common factor. When the constructs increase in value, this should be reflected in the value of the items, which should also increase in value. Finally, all constructs are measured by use of perceptual data. In the next section, the measures representing the constructs in the theoretical model are presented.

5.3.2 Independent variables

5.3.2.1 Hierarchical governance represented by the formal contract

In this research, we have defined "hierarchical governance" to consist of two dimensions: formalization and centralization. Centralization is included as a control variable.

Formalization

Project formalization is defined as the degree to which the project is regulated by rules and procedures, fixed policies (e.g., dispute resolution mechanisms), and to what degree the project team members follow the agreed upon rules and procedures during the execution of the project, for example in decision making (Moenaert, Souder et al. 1994; Lusch and Brown 1996; Cannon, Achrol et al. 2000; Haugland and Reve 2004). A scale was developed based on the inter-organizational literature, and adjusted to the appropriate object of analysis (the project) and context. There seemed to be an agreement in the literature about the operationalization of the construct, and the items used in Haugland and Reve (2004) were chosen. The items are listed below (5 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The customer and we have developed rules and procedures for most issues in this project.

2. How to handle the day-to-day management of the project is written in a formal contract document.

3. Both parties intend to follow jointly agreed upon rules and procedures in the daily management of the project.

4. It is important to us to behave correctly according to (the letters of) the contract.

5. In dealing with the customer, our contract precisely states how disagreements should be solved.

5.3.2.2 Relational governance represented by the relational contract

"Relational governance refers to norms of obligation and cooperation for coordinating exchange processes" (Haugland and Reve 2004: 7). Relational norms are expectations about attitudes and behaviour that are at least partially shared by a group of decision makers (Gibbs 1981).

According to Cannon (2000) and Heide (1992), the norms below are of particular importance in cooperative relationships. Relational governance implies a certain amount of solidarity, mutuality, restraint in the use of power, and harmonization of conflict and interests. Furthermore, inter-firm innovation projects are generally exposed to uncertainty, making flexibility and information exchange critical success factors.

Information exchange

The norm of information exchange "defines a bilateral expectation that the parties will proactively provide information useful to the partner" (Heide and John 1992: 35). A strong norm of information exchange will provide a safeguard, to both the contractor and the customer, when for example, decision control is transferred in the project. There seemed to be an agreement in the literature about the operationalization of the construct. The scale was developed based on the inter-organizational literature, and was adjusted to the appropriate object of analysis (the project) and context (Dwyer and Oh 1988; Heide and John 1992; Lusch and Brown 1996; Jap and Ganesan 2000). The items are listed below (5 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. In this project, it is expected that any information that might help the other party will be provided to them.

2. Information is informally exchanged in this project.

3. It is expected that we keep each other informed about events or changes that may affect the project.

4. Exchange of information in this project takes place frequently.

5. It is expected that the parties will provide proprietary information if it can help the other party or the project.

Solidarity "defines a bilateral expectation that a high value is placed on the relationship" or project (Heide and John 1992). The attitude is that success comes from cooperating, not competing, and that the parties stand by each other in the volatile marketplace (Cannon, Achrol et al. 2000). A strong norm of solidarity represents a safeguard, to both the contractor and the customer, because it deters both the contractor and the customer from using decision control in an opportunistic way. A measure was developed based on the following empirical studies (Dwyer and Oh 1988; Heide and John 1992; Lusch and Brown 1996; Jap and Ganesan 2000; Antia and Frazier 2001; Bello, Chelariu et al. 2003; Rokkan, Heide et al. 2003). The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. Important problems that arise in the course of this project are treated by my firm and the customer as joint rather than individual responsibilities.

2. Both firms are committed to improvements that may benefit the project as a whole and not only the individual parties.

3. The firms do not mind owing each other favours.

Flexibility

Flexibility "defines a bilateral expectation of willingness to make adaptation as circumstances change" (Heide and John 1992: 35). A norm of flexibility represents a safeguard to both the contractor and the customer if the project is plagued with uncertainty, complex technical challenges, and a high degree of future changes. That is, both the contractor and the customer know that the project will be subject to good-faith modifications. The parties' attitude is that the agreement could, and should be modified as the relationship evolves and develops.

The literature is consistent in the operationalization of the construct. A measure was developed based on the following empirical studies (Dwyer and Oh 1988; Heide and John 1992; Lusch and Brown 1996; Jap and Ganesan 2000; Antia and Frazier 2001; Rokkan, Heide et al. 2003). The items were adjusted to fit the context and the object of analysis. The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. Both parties are flexible in their response to last-minute requests made by the other party.

2. Both parties are open to each other's request to modify a prior agreement.

3. When some unexpected situation arises, both parties would rather work out a new deal than hold each other to the original terms.

Harmonization of conflict

Harmonization of conflict defines a bilateral expectation of willingness to solve conflicts in the project in the spirit of future cooperative ends (Cannon, Achrol et al. 2000). A "harmonization of conflict" norm will represent a safeguard to both the contractor and the customer if the project is uncertain and complex. That is, both the contractor and the customers know that conflicts in the project will be handled in good-faith. Few empirical studies have operationalized the construct, but the scale developed by for example Lusch and Brown covers the dimension we want to measure (Lusch and Brown 1996; Bello, Chelariu et al. 2003). The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. No matter who is at fault, problems are joint responsibilities.

2. When disagreements arise, we reassess all the facts and try to reach a mutually satisfactory compromise.

3. In dealing with our customer, we have a mutual understanding of how disagreements will be handled or resolved.

Mutuality

Mutuality defines a bilateral expectation, and attitude that one cannot succeed at the expense of the partner; that is, success is a function of your partner's success and visa versa. Success is dependent on joint responsibility (Gundlach, Achrol et al. 1995; Lusch and Brown 1996; Achrol and Gundlach 1999; Cannon, Achrol et al. 2000). Based on this literature a scale was developed. The items are listed below (2 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. Both sides are concerned about the other's profitability.

2. The project is grounded on mutual benefit and trust.

Restraint in the use of power

Restraint in the use of power defines a bilateral expectation and attitude that power asymmetry and dependency in the relationship should not be opportunistically exploited. Use of power may trigger conflict situations, undermine solidarity and mutuality, and even lead to opportunistic behaviour (Cannon, Achrol et al. 2000).

A measure from Cannon, Achrol et al. (2000) was used. This item is presented below (1 item, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. One party will not take advantage of a stronger bargaining position.

5.3.2.3 Asset specificity/transaction specific investments

According to Cannon et al. (2000: 181) relation specific adaptations or asset specificity is defined as "investments made to modify processes, product technologies, or procedures to the specific needs and/or capabilities of an exchange partner". The investments represent "sunk costs" outside the relationship if asset specificity is high. Examples of these investments are: 1) site specificity, 2) physical asset specificity, 3) human asset specificity, 4) brand name capital, 5) dedicated assets, and 6) temporal specificity (Reve and Lewitt 1984; Williamson 1985; Williamson 1991). These kinds of adaptations create a dependency relationship to a specific

partner. The dependency is created because specific investments (or idiosyncratic investments) have less value outside the relationship; that is, switching costs arise in the relationships.

The asset specificity scale was developed by examining an array of empirical studies (Heide 1987; Heide and John 1990; Haugland and Reve 1994; Heide and Stump 1995; Gulbrandsen 1998; Buvik and John 2000; Cannon, Achrol et al. 2000; Joshi and Campbell 2003; Rokkan, Heide et al. 2003). There seems to be an agreement in the literature regarding the definition and the operationalization of the construct. A scale was developed on the basis of the literature above. The items are listed below (8 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. We spent significant resources in reorganizing/adjusting our own organization in connection with this particular project.

2. We spent resources on training and development of our employees during this particular project.

3. We have made significant investments in tools and equipment dedicated to the project.

4. We have carried out considerable product adjustments in order to meet the requirements from the customer.

5. We have made several adjustments to adapt to the other party's technological norms and standards.

6. In order to deliver to this customer we have acquired competence, which has a limited value if the project is terminated/the customer stops buying from us.

7. We have used considerable time and resources in order to build the relationship with this specific customer.

8. Project termination will be a great loss to our company.

5.3.3 Dependent variables

Based on the literature review, four dimensions or constructs of project performance were identified as particularly relevant (Pinto and Slevin 1988; Pinto and Mantel 1990; Pinto, Pinto et al. 1993; Olk 2002; Pinto 2002). First, the projects must meet requirements regarding design goals (i.e., design and schedules). Second, the project should be beneficial to the customer, that

is, generate value for the customer beyond meeting design goals (Ghosh and John 2005). Third, the project should be beneficial to the contractor, that is, generate value for the contractor beyond positive margins. The fourth goal is innovative performance or just 'innovation'.

Goal attainment

These goals are more or less generic for all types of projects, hence the title "goal attainment." Typical goals are requirements regarding product specifications and functions. Time schedules and cost levels are specified, and quality level requirements are common (Cannon, Achrol et al. 2000). The items are listed below (5 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The customers technical specifications were met.
2. The customers functional specifications were met.
3. The customers objectives in terms of quality were met.
4. The customers objectives in terms of time schedules were met.
5. The customers objectives in terms of budget goals were met.

Customer value creation potential

Customer value creation potential is defined as "future benefits to the customers from the projects end products" (Sadeh, Dvir et al. 2000: 17; Ghosh and John 2005). The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The project will contribute to more efficient operations (in the customer organization).
2. The project will contribute to improvements (in the customer organization).
3. The project will contribute to cost reductions (in the customer organization).

Contractor value creation potential

Contractor value creation potential is defined as "benefit gained by the developing organisation as a result of executing the project" (Sadeh, Dvir et al. 2000: 17). The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The project will open up a new market.

2. The project will create a new product line.

3. The project will develop/developed new technological competence.

Innovative performance

Innovative performance is defined as the degree of product newness to the customer, the firm and the market (Cooper 1979; Atuahene-Gima 1995; Green, Gavin et al. 1995). The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The product/solution developed in the project is/was technologically new to our firm (Green, Gavin et al. 1995).

2. The product/solution developed in the project is new to the customer (Cooper 1979; Atuahene-Gima 1995).

3. The product/solution developed in the project is new to the market (petroleum industry) (Cooper 1979; Atuahene-Gima 1995).

5.4 Control variables and rival predictors

Control variables and rival predictors are included in the test of the theoretical model to strengthen the study by accounting for spurious associations and other competing explanations.

First, relevant control variables are included to meet the requirement of isolation (i.e., identify potential causes of spurious effects) and association (i.e., reduce the error terms) in the model. The chosen control variables are suspected to correlate with *both* the independent *and* the dependent variables.

Second, rival predictors are included to account for alternative explanations of project performance. Hence, the chosen rival predictors are suspected to correlate with the dependent variables.

5.4.1 Control variables

Importance

The "size" or "importance" of a project is presumed to influence the governance structures and possibly also project performance (Williamson 1979; Cannon, Achrol et al. 2000). Hence, the variable is included as a control variable. In particular, the economic scope of a project is presumed to influence how contracts are formulated, that is, the level of complexity, number of rules and procedures, and generally the level of the mechanisms incorporated in the contract. The more important the financial aspects of a project are, the more carefully the contract should be developed or prepared. Hence, size may be a source of spurious effects between the independent and the dependent variables.

The "size" or "importance" of the project is captured by measuring size of the project, that is: 1) number of people involved in the project, and 2) contract value/internal budget.

1. How large was the project? Approx. number of people.

2. How large was the project? Total budget/contract value.

Project length

It is necessary to account for the potentially spurious effects of project length on governance structures and project performance. Hence, the variable is included as a control variable. Project length is presumed to influence the governance structures and performance. As time goes by, the contracting parties will develop mutual knowledge and experience about each other. Increased knowledge will presumably influence the level of formal contracts and the development of stronger relational contracts. High level of "project length" should reflect higher performance and satisfaction in the project, more customized contracts, and stronger relational contracts. Hence, project length may be a source of spurious effects between the independent and the dependent variables.

1. From month/year (mm.yyyy) to month/year (mm.yyyy)

Past experience

Past experience between the contracting parties is presumed to influence the governance structures and possibly also influence project performance. Hence, the variable is included as a control variable. Past experience should influence the development speed of relational contracts, that is, the development of cooperative norms in the project (Lambe, Spekman et al. 2000). Hence, past experience may be a source of spurious effects between the independent and the dependent variables. The items are listed below (2 items, 8-point scale, 0=no previous experience, then anchored by "to a very low degree" and "to a very high degree").

1. We have many years of experience with this customer prior to this project.

2. We have had a very good relationship with this customer prior to this project.

Future expectations

High expectations of future sales are presumed to influence the governance structures and possibly also influence project performance. Hence, the variable is included as a control variable. The logic is based on the "shadow of the future" effect. According to this logic, a firm should perform better if the result of the work executed in the project will affect future decisions and future sales to the customer. A high expectation of future sales will affect the level cooperative norms (i.e., both attitude and behaviour) and performance in the project. Hence, high expectation of future sales may be a source of spurious effects between the independent and the dependent variables.

The items are listed below (2 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. We expect future deliveries to this customer.
2. We have a binding agreement to deliver to this customer in the future.

5.4.2 Rival predictors

Contract type (compensation format)

Contract type, or compensation format, is presumed to influence project performance (Ghosh and John 2005). Hence, the variable is included as a rival predictor. A taxonomy was developed based on the literature within project management and B2B marketing, see for example Sadeh, Dvir et al. (2000). There seems to be no agreement in the literature on the taxonomy of compensation formats other than the two main categories the *fixed price contract* and the *reimbursable contract*. Hence, the two anchors are "fixed price contract" and "reimbursable contract," and in between there is a wide array of definitions. This study follows Sadeh, Dvir et al. (2000); four categories were identified:

1. Fixed price contract.
2. Fixed price contract, includes incentive mechanisms tied to performance (cost, time etc.).
3. Reimbursable contract includes incentive mechanisms tied to performance (cost, time etc.).

4. Reimbursable contract, fixed margins.

Centralization

The hierarchical dimension "centralization" is defined as locus of authority or locus of decision making, that is, the degree of buyer control in the project (Klein 1989; Heide and John 1992). This variable describes the actual control the buyer posses regarding decisions most often made by the contractor. In a typical market transaction, these decisions would be in the domain of the contractor. The literature is not entirely consistent regarding the measurement of the construct; the items vary according to the context and focus. A scale was developed based on the inter-organizational literature, and adjusted to the appropriate object of analysis (the project) and context. The items listed below are developed based on Heide and John (1992), (4 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The production processes and manufacturing technology used in the project are entirely decided by the customer.

2. Ongoing design and engineering changes in the project are entirely decided by the customer.

3. The customer decides entirely who our subcontractors/contractors should be.

4. The quality control procedures in the project are entirely decided by the customer.

Market governance

Market governance is presumed to influence project performance (Haugland and Reve 2004). Hence, the variable is included as a rival predictor. Market governance in its pure form is governance based only on price (i.e., arm's length market exchange). In its pure form, the price system contains all relevant information needed, that is, in those (very few) transactions the price is 'sufficient statistics' (Hayek 1945). We may say that the price system is the coordinating device that takes care of *all* the coordination between the parties. Market governance is primarily associated with autonomous actors, but it can also be applied in long-term relationships, and projects of some duration. "The core of market governance is the reliance on market incentives

as means of coordination" (Haugland and Reve 2004: 7). Incentives may be used to direct the contractor's behaviour, and market surveillance may be used to secure the competitiveness of a chosen contractor (Haugland and Reve 2004). A scale developed by Haugland and Reve (2004) was used to measure two dimensions of the latent construct: price and market surveillance. The scale was adjusted to the appropriate object of analysis (the project) and context. The items are listed below (3 items, 7-point scale, anchored by "to a very low degree" and "to a very high degree").

1. The customer draws our attention to competing offerings in order to have us work more effectively.

2. The customer monitors the market to be assured that we do not offer prices that are substantially higher than other contractors have.

3. The customer will change to another contractor if another contractor can deliver the product/project cheaper than we can.

5.5 Data collection

The collection of primary data on a large scale (i.e., in many units at the project level) is a huge challenge[42]. In addition, the nature of the critical variables in our theoretical model pointed towards using (key) informants and a structured questionnaire as the best solution. In the next sections, we will take a close look at the advantages and disadvantages of the 'key informant' technique, and the use of only one informant. Furthermore, we will outline the sampling procedures used in detail, and present the results of the data collection process.

5.5.1 The key informant technique and the number of informants

The 'key informant technique' is the most used technique to collected data in inter-organizational research. The technique implies that just one or a few informants are relied upon to describe critical factors of the unit of analysis (Phillips 1981). These informants are specially identified and have specific knowledge regarding the unit of analysis; in addition, the informants should have the capabilities to describe and communicate the phenomenon of interest (Campbell 1955).

An additional requirement is that the phenomenon of interest exists independently of the informant (Heide and John 1995; Wathne 2001; Svendsen 2005). If the phenomenon of interest (i.e., the information you seek) is tied directly to the informant, that is, if the informant is reporting on himself, then you need not one, but a representative sample of informants to report on the phenomenon of interest. In this study, the critical constructs are related to: 1) governance (e.g., level of formalization), 2) hazards (e.g., the level of project specific investments), and 3) the performance effects (e.g., if an innovation has occurred). All of these 'phenomena' are assumed to be independent of the informant, and we conclude that the "researcher can select informants on the basis of their alleged knowledge instead of their representativeness in a statistical sense" (Svendsen 2005: 87). In this study, we contacted general managers in the relevant companies, and we asked them to pick project managers who were knowledgeable and motivated (i.e., we assumed that the quality of the data would be highly dependent on the motivation of the informant). Since the unit of analysis is the project, a natural choice of

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[42] Measures of TCE's central constructs are often not accessible from archival data Williamson, O. E. (1985). The Economic Institutions of Capitalism. New York, Free Press, Rindfleisch, A. and J. B. Heide (1997). "Transaction cost analysis: Past, present, and future applications." Journal of Marketing **61**(4): 30-54. Hence, in this study data on the project level or "micro level" is needed to conduct valid empirical tests of the hypotheses.

informant is the project manager, or next best, a dedicated project member with in-depth knowledge of the project. We concluded that the requirements put forward by Campbell (1955), Phillips (1981), and John (1984) are satisfied; project managers do have deep insight into the project processes, project managers are knowledgeable about the customer and their organization, and finally, project managers should also be knowledgeable about the actual performance in their own project.

However, data collection from just one informant has both advantages and disadvantages. It is, of course, highly problematic to collect data on complicated, abstract, and maybe ambiguous phenomena, and then only rely on a single informant. The researcher does not know who the informant is, in most cases. Is the informant motivated, really knowledgeable, and to be trusted? The researcher does not have any tool to establish the accuracy of the data without multiple informants; for instance, Phillips (1981) concluded that informants belonging to the same unit/organization had divergent views on the same phenomenon. Let me put forward an example that illustrates this point. Imagine that technical and commercial informants report on the same unit of analysis: the relation with a long-term contractor. The technical people have worked side-by-side with the contractor over many years and are really satisfied with the relationship; they may have developed strong interpersonal (i.e., social) ties with the people employed by the contractor. Consequently, their perception of the contractor's performance is very positive. The commercial purchaser, on the other side, might have another view. The purchaser has conducted a market survey and he is not satisfied with the contractor's price levels, the quality delivered etc. A multiple informant approach in this case would have revealed the highly divergent views of how the contractor is evaluated; the engineers and the purchasers have different information regarding the relative performance of the contractor.

On the other hand, the collection of data from just one informant has several advantages. We presume this is the reason why researchers, almost without exception, collect data from just one informant, on one side of the dyad. First, the collection of data from several informants is time consuming (and time is money!) and requires a lot more resources (Kumar, Stern et al. 1993). In this case, time was limited and the resources scare. This is a cynical argument, but unfortunately the reality. Second, when the data is gathered, it must be analyzed. This is a much more time consuming exercise when the researcher has many observations for the same phenomenon (Kumar, Stern et al. 1993). Then the data must be analysed for convergence and a joint understanding should be reported. The interpretation of these results is ambiguous and not

straightforward. When a single informant is used, the results are reported directly, thus saving both time and money. No further analysis of possible divergent data is necessary.

Third, informants are a scarce resource! Although multiple informants are preferred to avoid or reduce the risk of biased information (Phillips 1981), the focus was placed entirely on the identification of as many project managers as possible. To gather multiple informants for each project would just be too difficult (or even impossible) and time consuming. Multiple informants for each project would certainly reduce the number of observations considerably; furthermore, on many projects the contractor company only had one informant available. The managers were generally very positive and wanted to contribute to the study, but due to a (extremely) high activity level in the industry, multiple informants on each project were not considered a relevant option.

Another related and recurrent discussion in the interorganizational literature is the problem of data collection on one or both sides of the dyad (Phillips 1981; Heide and John 1995). This problem is strongly related to the problem of one or multiple informants from the same organization reporting on the same phenomenon. In short, it is highly problematic to collect data on complicated phenomena and just rely on one single informant from one organization/one side of the dyad (i.e., either the customer or the contractor). As argued above, Phillips (1981) concluded that informants that belonged to the same organization had highly divergent views on the same phenomenon; what about informants belonging to different organizations? In the following, we will provide arguments that support data collection on only one side of the dyad, although this is *not* an optimal solution. Following Svendsen (2005), we will use the empirical literature and theoretical reasoning to justify our choices. However first, many of the same practical arguments can be used as above (i.e., the arguments behind the choice of one informant compared to multiple informants from the same organization). There are time and resource constraints, and data collection will be more straightforward compared to sampling on both sides. Furthermore, the analysis of the collected data is simpler with just one informant on *one* side of the dyad. Furthermore, the interpretation of the data is much simpler when data is collected on one side of the dyad (Kumar, Stern et al. 1993). An argument not previously mentioned, is that to collect data on both sides of the dyad, one has to identify the informants on both sides of the dyad. Without doubt, this would lead to a significant reduction in the number of observations or projects. Furthermore, there could be confidentiality issues related to the dyad,

which in the worst case, could lead to refusal to participate in the study, and in the end lead to an even smaller number of observations.

Therefore, we now consult the empirical studies within the interorganizational literature. First and most important, is the fact that the literature within the field concludes that it *is* justifiable to collect data on only *one* side of the dyad (Heide and John 1994). Several studies have conducted data collection on both sides of the dyad (e.g. Heide and John 1990; Anderson and Weitz 1992). This approach is highly relevant if the unit of analysis is affected by both parties, and the parties (for whatever different reasons) are assumed to have potentially divergent views on critical issues, for example, how well the contractor organization has performed their tasks. The multiple informant approach will give the researcher a more objective value of the construct in question. In this study, critical constructs are, for example, 'formalization,' 'relational contracts,' 'project specific investments,' and several constructs that measure 'project performance.' Regarding 'formalization' and 'relational contracts,' we find support in the empirical literature that both of the reporting organizations have the same convergent views on the structural elements of the dyad (Reve 1980; John and Reve 1982; Svendsen 2005). The same results are confirmed for 'specific investments,' according to Anderson and Weitz (1992). This empirical support is found in the distribution channel literature, where the parties typically have worked together for an extensive period of time. Projects are significantly shorter in length (i.e., time that the parties actually work together). On the other hand, projects are intense and the project managers involved (i.e., the informants) are assumed to be knowledgeable on all aspects of the project, including the structural parts.

To sum up, some empirical support for the critical variables in this study is found in the empirical literature. There seems to be convergence in the buyer and seller perception of the elements of the dyad. For a more thorough investigation of these arguments consult Svendsen (2005). One critical construct is project performance; to assume that both the oil companies and the contractors have the same perceptions on this construct is perhaps dangerous. It is, of course, especially problematic for the contractor to objectively evaluate his/her own performance.

The key informants that participated in the study, that is, the informants who returned acceptable questionnaires, displayed the following characteristics. In all, 361 questionnaires were returned, and 320 were accepted. That is, 320 unique informants employed within the contractor industry contributed to the study. These 320 informants were employed in 98 contractor companies. Of

the 320 informants, 201 were project managers (63%), 37 were project members (11%), and 82 informants had some other role in the project, for example general manager (26%).

We conclude that the collection of data from multiple informants, that is, multiple informants on both the contractor side and on the customer side, is highly problematic. In this research, it would not be a practical and realistic approach due to the limitations in time and resources. We also find empirical evidence that gives support to data collection on one side of the dyad only (Heide and John 1994). It is practical and efficient to collect on one side only and with just one informant on each project. However, validation of the results is problematic and interpretation of the data and results must be treated with caution.

5.5.2 Sampling procedures

Information from the industry was gathered in three phases: first, qualitative data was gathered from specially selected contractors in the industry, second, informants in the relevant companies were identified, and third, a structured questionnaire was prepared and sent out by e-mail.

Phase one – interviews. Qualitative data was gathered through interviews with carefully selected project managers in the contractor companies. In this phase we had several objectives: 1) the main objective was to become familiar with the empirical setting and make contact with the relevant companies and project managers (i.e., future informants), thus creating a network for future use, 2) become familiar with the practical use and practical understanding of critical constructs, thus better understand if and how the phenomena of interest were present in the industry, and finally 3) acquire a deeper practical understanding of the hypothesized relations between the critical constructs in the theoretical model.

Phase two – identification of informants in the contractor companies. The Institute for Research in Economics and Administration (SNF AS) provided us with a list of approx. 400 relevant contractor companies operating in the industry. These companies develop and produce all sorts of products related to the activities on the NCS, from small standard products to large-scale design and construction projects worth billions of NOK (e.g., EPCI-projects - Engineering, Procurement, Construction, and Installation).

The next step was to identify companies that had conducted "innovation projects" for an oil company operating on the NCS. Thus, many companies were excluded from the list due to limitations regarding the unit of analysis. All companies were contacted by phone and the general manager was introduced to the research topics and asked to participate. The response was generally very positive, although the industry was experiencing an extremely busy period with a high activity level (due to the high prices for petroleum). The general manager identified the persons most appropriate to answer the questionnaire on behalf of the company. Typically they were project managers or project members with in-depth knowledge on the relevant topics, in addition, some were chosen because of their competence and position within the company (Phillips 1981; John 1984). Approximately 800 informants were identified in this process (all informants were not contacted in advance).

Phase three: An e-mail was sent directly to the informants who were identified in Phase two. In the text of the e-mail, the informants were directed to a web server and the questionnaire.

The informants were given instructions in the questionnaire to secure the best possible quality of the answers. To avoid sample bias effects they were instructed to report on: 1) the latest finished project and 2) the customer of the project (should be an oil company).

The first part of the questionnaire identified the project, name, length, type, financial information, and the characteristics of the project. The second part of the questionnaire focused on investments in the project, dependency etc. The third part focused on governance aspects and the forth and last part focused on performance aspects, see Appendix B to see the full questionnaire.

After the first distribution of e-mails, we waited two weeks before we sent the first reminder. In all, four reminders were sent during June, July and August 2006. After the second reminder, we started to call the informants one-by-one by phone. Almost all informants were reached in this period. Unfortunately, the time when the questionnaires were returned was not registered in the software/web server. The web application did not provide this option. A direct consequence is that it was impossible to control for late response bias in the sample.

By the end of September 2006, we closed down the web server and ended the survey. All told, 361 questionnaires were returned, giving a response rate of 45%. The response rate could have been higher and we will briefly point out some arguments:

- The general managers picked informants in their own organizations. After calling the informants directly, some of them did not have the competence, or had not been involved in relevant projects (they discovered this fact after they had started to answer the questionnaire). Furthermore, some general managers picked people and used the wrong criteria – the most obvious reason that came to mind is that the general manager did not understand the purpose of the study initially.

- The response rate was particularly low in the academic sector. Earlier, we had contacted the institutes and departments and asked for informants. We conclude that the informants did not feel obliged to participate.

Of the 361 questionnaires, 41 were deleted due to 1) missing values, or 2) wrong unit of analysis. 1) 19 questionnaires were deleted due to missing values on critical constructs. Typically, there were missing values on 'project performance,' and the rather obvious reason was that these projects were not finished at the time of data collection. All of these projects were deleted. Some projects were soon to be finished and in these cases, the observations were included in the sample. We are confident that the informants were capable of providing valid information even though the projects were not completely finished. 2) 22 questionnaires were deleted due to 'wrong unit of analysis.' In these cases, the customers were typically large sub-contractors (e.g., Aker Kværner ASA), and had to be deleted as this study focuses on the vertical dyad: oil company – contractor. Altogether, 320 questionnaires were retained and used in the analysis.

A response rate of approximately 45% of the 'total' population of project managers is rather high compared with other surveys in the industry. After 41 questionnaires were deleted, the final response rate was approximately 40%.

Are the 320 projects representative of the total population of projects executed in the industry during the last few years? The total of executed projects on the NCS is not known, as no statistics within this area exist. We will argue that the sample of 320 projects is representative based on the procedure used to identify the contractor companies. All registered companies that operate within the industry were contacted and the list of companies has been through a strict inspection and was up-to-date. Hence, the 320 projects should be representative of the total population of projects conducted between the oil companies and contractors on the NCS during the last few years.

PART IV

6 Analysis

This chapter contains all the analyses conducted in this study. In Section 6.1, the descriptive statistics of the variables in the study are evaluated. Then, the analysis follows the acknowledged two-step approach recommended by Anderson and Gerbing (1988), that is, it should be established that the measurement model is supported in the sample before proceeding to analysis of the structural model.

First, confirmatory factor analysis using LISREL 8.71 is conducted. Next, the structural relationships among the latent variables are examined, and the research hypotheses outlined in Chapter 4 are tested. Finally, a summary of the analysis is provided.

6.1 Descriptive statistics – examination of the data

The first step in multivariate data analysis is to examine the data. The use of multivariate techniques places an increased burden on the researcher to understand, evaluate, and interpret the more complex results (Hair, Anderson et al. 1998). The analytical sophistication of multivariate data analysis has forced the researcher to use a series of data examination techniques to ensure that the statistical requirements and assumptions are met. Breach of the underlying assumptions may seriously compromise the results, hence the following measures were undertaken based on Hair, Anderson et al. (1998). First, a graphical examination of the data was executed to achieve a better understanding of the data. Second, missing value analysis was conducted and some cases were deleted. Finally, the statistical assumptions of multivariate data analysis were inspected.

Graphical examination of the data

Using SPSS, histograms and frequency tables were used to achieve a better understanding of the data and their interrelationships. Attention was immediately drawn to the performance variables – they seemed to be rather skewed towards high values on the Likert scale. Possible violations to the statistical assumptions of multi normality are analysed below.

Missing values analysis

It is important to conduct a missing values analysis because missing values have the potential to bias the results (Hair, Anderson et al. 1998). Missing data was a problem in the sample and appropriate measures were implemented. Typically, these informants had ended the survey before all questions had been answered. Nine cases were deleted because almost all values were missing. Ten cases were deleted because values were missing on the critical constructs in the research model. Furthermore, the data was evaluated to be randomly missing, that is, no pattern in the missing values could be detected. Hence, mean substitution was used for the rest of the missing values in the sample.

Statistical tests to assess normality

In addition to the graphical examination of the data, statistical tests are necessary to assess normality. To check for violations of the normality assumptions, a simple test is a rule of thumb based on the skewness and kurtosis values (provided by LISREL). If the values for skewness and kurtosis exceed a critical value or limit (i.e., are non-normal) – the data may cause biased estimates, unreliable standard errors, and influence model fit (Bagozzi and Yi 1988; Hair, Anderson et al. 1998). Hence, non-normal variables should preferably be deleted before further analysis is conducted. The literature is not concurrent regarding the cut-off values. However, Hair, Anderson et al. (1998: 73) provide some guidance – a calculated value exceeding +/- 2.58 indicates that the assumption of normality can be rejected at the 0.01 probability level. Other literature suggests that values exceeding 1 should be treated with caution, especially when the sample size is small (Kaplan 1990). Hence, a sample size of 320 should indicate cut-off values well above one. In this study, the formulas and guidance provided by Hair, Anderson et al. (1998) are followed.

A summary of the descriptive statistics provided by LISREL 8.71 is shown in Table 6-1. Overall, the values of skewness and kurtosis do not seem to be especially problematic in the sample. Hence, it is safe to conclude that the data do not suffer from non-normality though some exceptions must be made. The value of items number 8 and 33 exceeds the critical value, but not to a dramatic degree. In addition, the items are theoretically important. Hence, items number 8 and 33 are retained in the analysis, but the results of the analysis will be treated with caution.

Item number 53 clearly exceeds the critical value and will be excluded in the measurement model developed in the next section.

Table 6-1: Descriptive statistics of the sample, N=320

Item nr		MEAN	STD.DEV.	SKEWNESS	KURTOSIS
	Formal contract				
1	FC1	4.359	1.5991	-0.328	-0.846
2	FC2	4.389	1.7418	-0.414	-0.930
3	FC3	5.069	1.3947	-0.828	0.312
4	FC4	5.060	1.4339	-0.766	0.026
5	FC5	4.878	1.8093	-0.679	-0.676
	Relational contract				
6	INFOEX1	5.706	1.1776	-1.128	1.729
7	INFOEX2	5.684	1.1892	-1.148	1.709
8	INFOEX3	5.816	1.0625	-1.299	**2.759**
9	INFOEX4	5.447	1.2204	-0.834	0.721
10	SOL1	5.663	1.2337	-1.109	1.195
11	SOL2	5.482	1.2459	-0.860	0.713
12	SOL3	4.342	1.6160	-0.276	-0.699
13	FLEX1	4.968	1.4293	-0.670	-0.094
14	FLEX2	3.971	1.5463	-0.090	-0.070
15	FLEX3	4.498	1.5202	-0.365	-0.614
16	HARM1	4.952	1.4880	-0.642	-0.249
17	HARM2	5.262	1.2634	-0.731	0.243
18	HARM3	4.860	1.3153	-0.387	-0.261
19	MUT1	4.353	1.5774	-0.322	-0.640
20	MUT2	5.522	1.3099	-1.008	0.802
21	POW	4.143	1.6481	-0.151	-0.778
	Project specific investments				
22	PSI1	3.144	1.6791	0.399	-0.933
23	PSI2	2.297	1.5423	1.289	0.763
24	PSI3	2.200	1.3451	1.466	1.727
25	PSI4	3.872	1.6869	-0.046	-0.952
26	PSI5	3.428	1.9203	0.457	-1.039

	Goal attainment				
27	PERF-specifications	6.019	0.8780	-1.127	1.937
28	PERF-functions	6.066	0.8986	-1.122	1.715
29	PERF-quality	5.963	0.8950	-0.877	1.192
30	PERF-time	5.641	1.2806	-1.070	0.844
31	PERF-cost	5.565	1.3384	-1.106	0.884
	Customer Value Creation Potential				
32	PVC1-Customer	5.566	1.3719	-1.253	1.625
33	PVC2-Customer	5.620	1.2076	-1.435	**3.028**
34	PVC3-Customer	4.881	1.5643	-0.660	-0.186
	Contractor Value Creation Potential				
35	PVC1-Contractor	4.200	1.9096	-0.245	-1.187
36	PVC2-Contractor	3.343	2.0184	0.380	-1.205
37	PVC3-Contractor	4.582	1.7593	-0.559	-0.787
	Innovative performance				
38	INNO1	4.334	2.3130	-0.081	-1.339
39	INNO2	4.941	2.4379	-0.458	-1.224
40	INNO3	4.534	2.5306	-0.125	-1.508
	Control variables and rival predictors				
	Project importance				
41	IMP1	2.97	2.632	0.844	-1.212
42	IMP2	4.19	2.686	-0.011	-1.865
	Contract type				
43	CONTYPE	1.86	1.170	0.890	-0.824
	Centralization				
44	CEN1	2.943	1.7536	0.723	-0.521
45	CEN2	3.950	1.7395	-0.009	-0.964
46	CEN3	2.578	1.6642	1.055	0.312
47	CEN4	3.000	1.668	0.705	-0.481

	Market governance				
48	MG1	2.972	1.6465	0.541	-0.702
49	MG2	3.338	1.9690	0.482	-1.046
50	MG3	3.042	2.0392	0.597	-1.033
	Past experience				
51	EXP1	6.331	2.0533	-1.273	0.624
52	EXP2	6.425	1.8856	-1.574	1.741
	Future expectations				
53	FUT1	7.147	1.1825	-2.027	**4.987**
54	FUT2	5.878	2.2800	-0.799	-0.751

6.2 Measurement models

This study applies the two-step approach to model building recommended by Anderson and Gerbing (1988). The two-step model building approach can be thought of as analysis of two conceptually distinct models – a measurement and a structural model (Anderson and Gerbing 1988). The test of the structural model may be meaningless, unless it is first established that the measurement model holds in the sample (Jöreskog and Sörbom 1995). Hence, the fit of models should be addressed independently in two sequential steps (Anderson and Gerbing 1988). The two-step approach has a number of comparative strengths, for example the approach "allows an assessment of whether any structural model would give acceptable fit" (Anderson and Gerbing 1988: 422). The latent constructs were allowed to freely correlate with each other. The absence of structural constraints enables the test of the measurement model; hence, lack of fit can only come from the indicators and their error terms (Anderson and Gerbing 1988; Jöreskog and Sörbom 1995).

In this study, LISREL 8.71 is used to perform confirmatory factor analysis. The objective is to test the hypothesized theoretical measurement model, that is, the *a priori* set of indicators defines the underlying theoretical constructs. This will test unidimensionality of the scales, that is, a test of the indicators' internal and external consistency. If the pre-specified indicators do not measure the construct they are meant to measure, the measurement model needs to be modified through specification and re-specification until the model demonstrates an acceptable overall fit.

In addition, the measurement model provides a confirmatory assessment of convergent and discriminant validity (Campbell and Fiske 1959; Anderson and Gerbing 1988). Furthermore, if the measurement model through specification and re-specification provides acceptable convergent and discriminant validity, then the structural model provides or constitutes a confirmatory assessment of nomological validity (Anderson and Gerbing 1988).

The next section provides several tests of the full measurement model, but first the dimensions of relational contract scale need to be analyzed. Then, the full measurement is assessed; that is, the indicators of the measurement model are subject to several "fit"-tests.

6.2.1 The dimensionality of the relation contracts scale

The measures employed in this study are claimed to be reflective, that is, the items are supposed to reflect the constructs or latent variables they intend to measure. One exception is the 'relational contract' concept. How to handle the 'relational contract' concept in the measurement model is not straightforward, and the research literature is not concurrent – some treat the concept as a unidimensional construct and others treat it as a multidimensional construct. First, theoretical arguments are presented and preliminary conclusions are drawn on theoretical grounds. Second, statistical analyses are conducted to provide additional evidence.

MacNeil identifies and discusses a total of 28(!) norms or dimensions of the 'relational contract' concept. These partially overlap and have been reduced by academic scholars to between three and seven contractual norms (Kaufmann and Stern 1988; Noordewier, John et al. 1990; Gundlach, Achrol et al. 1995; Cannon, Achrol et al. 2000). "Five norms are especially important social complements to contracts" (Cannon, Achrol et al. 2000: 193). These are: *information exchange, solidarity, flexibility, harmonization of conflict, mutuality*, and *restraint in the use of power*. Theoretically, these arguments indicate that the 'relational contract' concept should be treated as a multidimensional construct, and be reflected in the norms or dimensions listed above. Accordingly, the most appropriate approach should be to treat the concept as a second-order construct with the six cooperative norms as first order constructs. Bollen and Lennox (1991) concur, they state, "Our point of view is that, for all practical purposes, equally reliable effect indicators of a *unidimensional* concept are interchangeable. However, heterogeneous facets preclude unidimensionality. If [...] are talking about multidimensional constructs, then each dimension should be measured with several indicators. Forcing effect indicators of distinct dimensions into a unidimensional model [...] is not an adequate solution" (1991: 308). Hence, there are strong theoretical arguments that support the view that relational contracts are multidimensional constructs, and thus should be measured as a second-order construct. Relevant examples of empirical studies that measure relational contracts as a second order construct are Heide and John (1992) and Noordewier, John et al. (1990).

However, as stated above, the research literature is not concurrent. Another literature stream treats the 'relational contract' concept as a unidimensional construct. The basic argumentation is as follows - since the norms partially overlap, they can not be treated as (empirically) *independent* dimensions (Cannon, Achrol et al. 2000). Using a unidimensional global measure, Kumar, Stern et al. (1992) demonstrated that complex constructs can be measured satisfactorily.

Hence, several empirical studies employ a 'global measure' for the relational contract concept. Relevant empirical studies are for example, Cannon, Achrol et al. (2000), and Poppo and Zenger (2002).

To sum up, arguments supporting both views can be found in the literature. Based on the arguments presented and an evaluation of their inherent logic – this study gives support to the theoretical view that the relational contract concept should be treated as a multidimensional construct. In the next section, statistical analysis is conducted to further examine the dimensionality of the concept.

Following Churchill (1979), explorative factor analysis is used in the early stage of analysis to examine the 'dimensionality' of a concept. The factor analysis of the relational contracts construct revealed not one, but several dimensions or factors underlying the concept. Factor 1 accounted for 48.3% of the total variance, factor 2 accounted for 11.3% and factors 3 and 4 accounted for approximately 5-6% of the total variance. Accordingly, the most appropriate approach should be to treat the concept as a second-order construct with *information exchange, solidarity, flexibility, harmonization of conflict, mutuality*, and *restraint in the use of power* as first order constructs. Second, the exploratory factor analysis was used to reduce the number of relevant norms. The exploratory factor analysis revealed that the norm *mutuality* loaded on several of the underlying factors; hence, the mutuality norm was removed. The norm *restraint in the use of power* was measured with only one item; thus it was deleted. Although three items were deleted, the meaning of the theoretical concept was retained due to the overlapping character of the norms, hence interpretability and meaning has not been lost (Anderson and Gerbing 1988). Accordingly, the *a priori* measurement model, which was tested, is a four-dimensional relational contracts scale with a total of 13 indicators.

Before starting the LISREL analysis of the measurement model, some comments about the process have to be made. Anderson and Gerbing (1988: 417) state that "Given a converged and proper solution but unacceptable overall fit, there are four basic ways to re-specify indicators that have not "worked out as planned": Relate the indicator to a different factor, delete the indicator from the model, relate the indicator to multiple factors, or use correlated measurement errors. The first two ways preserve the potential to have unidimensional measurement and are preferred because of this, whereas the last two ways do not, thereby obfuscating the meaning of the underlying constructs. The use of correlated error terms may be justified only when they are specified *a priori*." As the *a priori* relational contract scale contains several indicators - deletion

of troublesome indicators seems to be the most appropriate solution. In the process of achieving a good model fit, the modification indices in LISREL's output file were inspected. Indicators that share high cross-loadings or high error terms with other indicators should be related to other factors, or as chosen in this study - deleted. The deletion of indicators based on the inspection of modification indices is purely statistical. Before deletion of indicators, theoretical considerations must also be taken into account.

The next step is to evaluate the two alternatives: 1) the relational contract as a multidimensional second-order construct, or 2) the relational contract as a unidimensional global measure. LISREL 8.71 and the confirmatory factor analysis application were used in this process. In the end, what approach and alternative to follow is an empirical matter. If the second order construct does not perform satisfactorily in the tests conducted below, then the next step will be to test the relational contract concept as a global measure.

The relational contract as a second-order construct

Model 1: The *a priori* measurement model did not perform well, see Table 6-2 below. The RMSEA value and other fit indexes were not satisfactory. After inspecting the modification indices of the measurement model, high cross-loadings were observed between *flexibility* and both the *solidarity* and the *information exchange* dimensions. Deletion of the three flexibility items was executed. The deletion of these items is problematic, but as the theoretical meaning of the variable is more or less retained, the approach may be defended (the *harmonization of conflict* norm accounts for much of the same underlying dimension).

Model 2: Rerunning the measurement model without the flexibility dimension gave an improved model fit. The RMSEA value was still not satisfactory, but came close to acceptance. The other indices showed good model fit, see Table 6-2. Accordingly, the modification indices were studied once again to search for troublesome items that could, if theoretically justified, be deleted to improve fit. Items 7 (INFOEX2) and 12 (SOL3) had correlated error terms with a number of other variables and are obvious candidates for deletion. The theoretical meanings of the two constructs are retained without these items; hence, deletion of the items can be justified on theoretical grounds. The solidarity dimension is represented by only two items, although this is not desirable, it can be defended.

Model 3: Rerunning the measurement model without Item 7 (INFOEX2) and Item 12 (SOL3) gave an additional improvement in model fit (see Table 6-2 below). As the measurement model indicates acceptable fit on all indexes – no more re-specifications were conducted. Hence, the modelling process was stopped and Model 3 was retained. Although a satisfactory measurement model was accomplished, further measures could be taken to improve the fit of the measurement model, for example allow the measurement errors to correlate. However, this is not a recommended approach as the meaning of the estimated underlying construct would be obfuscated (Anderson and Gerbing 1988) – measurement Model 3 was retained and will be used in the full measurement model.

Table 6-2: The four-dimensional relational contract measurement model

	Fit index[43]	Evaluation	Specification
Model 1	$\chi^2 = 246.44$	Not accepted	*A priori* measurement model
	df = 61		
	RMSEA = 0.098	Not accepted	
	NNFI = 0.96	Good fit	
	CFI = 0.97	Good fit	
	IFI = 0.97	Good fit	
	AGFI = 0.84	Not accepted	
	RMR = 0.18	Not accepted	
	CN = 121.28	Not accepted	
Model 2	$\chi^2 = 89.26$	Good fit	The *flexibility* dimension was excluded, that is, Items 13 (flex1), 14 (flex2), and 15 (flex3).
	df = 32		
	RMSEA = 0.075	Good fit	
	NNFI = 0.98	Good fit	
	CFI = 0.99	Good fit	
	IFI = 0.99	Good fit	
	AGFI = 0.91	Good fit	
	RMR = 0.042	Good fit	

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[43] See Appendix D for a discussion of the fit indices. An overview and a justification of the chosen fit indices are provided.

	CN = 196.04	Not accepted	
Model 3	$\chi^2 = 26.45$	Good fit	Item 7 (infoex2) and Item 12 (sol3) were excluded.
	df = 17		
	RMSEA = 0.042	Good fit	
	NNFI = 0.99	Good fit	
	CFI = 1.00	Good fit	
	IFI = 1.00	Good fit	
	AGFI = 0.96	Good fit	
	RMR = 0.02	Good fit	
	CN = 393.65	Good fit	

One-dimensional relational contract measurement model

Although a satisfactory second-order measurement model has been proven, the competing one-dimensional relational contract measurement model should be tested. All 16 items from the relational contract dimensions, that is, *information exchange, solidarity, flexibility, harmonization of conflict, mutuality*, and *restraint in the use of power* were used in the *a priori* measurement model. The process followed the same criteria as above. After several runs and reruns, the final model achieved a RMSEA value of 0.072, which indicates just barely a good model fit to the data. Although the model achieved acceptable fit, these measures were all statistical in nature. Theoretical considerations must also be taken into account in the modelling process. The information exchange norm, which is considered especially important in the study, is no longer present in the measurement model. To sum up, the one-dimensional relational contract scale was judged as violating the theoretical meaning of the concept. The final one-dimensional relational contract scale did not reflect the meaning of the concept to a sufficient degree and was therefore rejected.

Table 6-3: The one-dimensional relational contract measurement model

|	Fit index	Evaluation	Specification
Model 1	$\chi^2 = 1115.96$	Not accepted	*A priori* measurement model
	df = 104	Not accepted	
	RMSEA = 0.175	Not accepted	
	NNFI = 0.90	Not accepted	
	CFI = 0.92	Not accepted	
	IFI = 0.92	Not accepted	
	AGFI = 0.60	Not accepted	
	RMR = 0.18	Not accepted	
	CN = 59	Not accepted	
Model 2	$\chi^2 = 23.73$	Good fit	Items 11, 13, 17, 18, 19, and 21 are retained in the model.
	df = 9		
	RMSEA = 0.072	Good fit	
	NNFI = 0.98	Good fit	
	CFI = 0.99	Good fit	
	IFI = 0.99	Good fit	
	AGFI = 0.94	Good fit	
	RMR = 0.070	Good fit	
	CN = 305	Good fit	

One final test of the second-order construct remains: do the first-order dimensions reflect the second-order construct (i.e., the relational contract as a reflective measure) or do the first-order dimensions cause the construct (i.e., the relational contract as a formative construct)? To test the second-order construct, the procedures presented by Bollen and Lennox (1991) were followed. Basically, if indicators or dimensions reflect a construct, the indicators should be positively and highly inter-correlated (Bollen and Lennox 1991). As shown in Table 6-4 below, the dimensions of the relational contract scale exhibit a high level of inter-correlation. Hence, according to Bollen and Lennox (1991), it may be concluded that the second-order construct up for evaluation is a reflective measure. If the relational contract scale had been caused by the dimensions (i.e., a

formative measure), the dimension would be highly correlated only by chance (Bollen and Lennox 1991).

Table 6-4: Inter-correlation between the three dimensions of the relational contract scale

	Info. exchange	Solidarity	Harm of conflict
Information exchange	1.0		
Solidarity	0.86	1.0	
Harm of conflict	0.65	0.77	1.0

Figure 6-1: The final measurement model – 'relational contract'
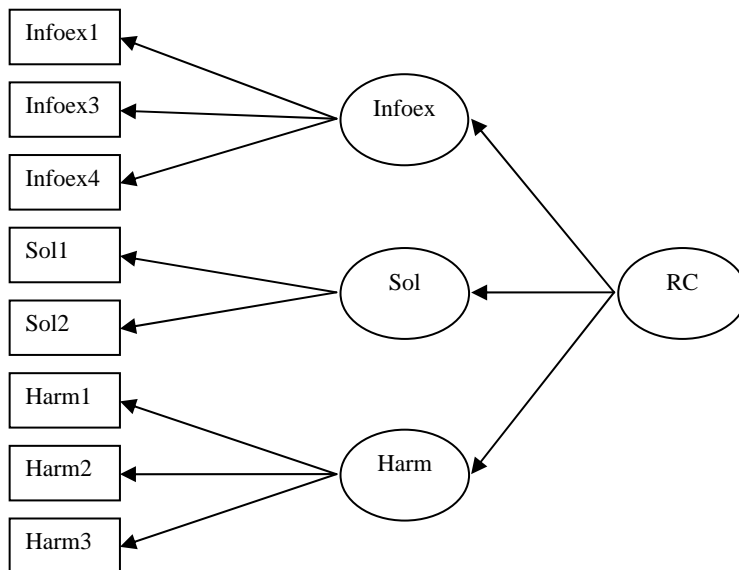
6.2.2 The full measurement model

The further analysis in this chapter, that is, evaluation of the constructs in the measurement model, will follow the same approach as the modelling process in the previous section - the recommended two-step approach will be employed (Anderson and Gerbing 1988). First, all relevant constructs in the measurement model are used in the analysis – then the unidimensionality of the measures are assessed by assessing the various fit indices. Second, the reliability of the constructs is assessed.

6.2.2.1 The full measurement model – assessment of fit

The full measurement model consists of the following (latent) constructs: formal contract (ξ_1 = FC), relational contract (ξ_2 = RC) with first order dimensions: information exchange (η_1 = INFOEX), solidarity (η_2 = SOL), harmonization of conflict (η_3 = HARM), project specific investment (ξ_3 = PSI), goal attainment (ξ_4 = GOAL), customer value creation potential (ξ_5 = CVCP1), contractor value creation potential (ξ_6 = CVCP2), and innovative performance (ξ_7 = INNO). The above constructs and their observed indicators form the *a priori* measurement model, which was tested using confirmatory factor analysis with LISREL 8.71.

However, all control variables and rival predictors should also be included in the measurement model. The relevant variables are: *project importance* (ξ_8 = IMP), *contract type* (ξ_9 = CONTYPE), *centralization* (ξ_{10} = CEN), *market governance* (ξ_{11} = MG), *past experience* (ξ_{12} = EXP), and *future expectations* (ξ_{13} = FUT). Due to the large number of variables in the study, and parsimony considerations, not all constructs are shown in the illustration in Figure 6-2. Hence, only the constructs of the research model are presented below – a figure of the *a priori* measurement model is shown (Figure 6-2).

As with the relational contract measurement model, the constructs were allowed to freely correlate to provide the strongest test of the measurement model (Jöreskog 1993: 297), that is, the covariance matrix of the constructs was unconstrained. Hence, a lack of fit can only be attributed to the relations among the measures and their error terms.

First, before the measurement model is subject to the various testing, the normality of the indicators should be remembered. A summary of the descriptive statistics provided by LISREL

8.71 was shown in Table 6-1. Recall that the value of Items 8 and 33 exceeded the critical value for kurtosis, but not to a dramatic degree - nevertheless, interpretation of these constructs should take into account that these measures may violate the assumptions of multivariate data analysis. Item 53 clearly exceeded the critical value (for kurtosis) and was excluded from the measurement model.

Figure 6-2: The full a priori measurement model
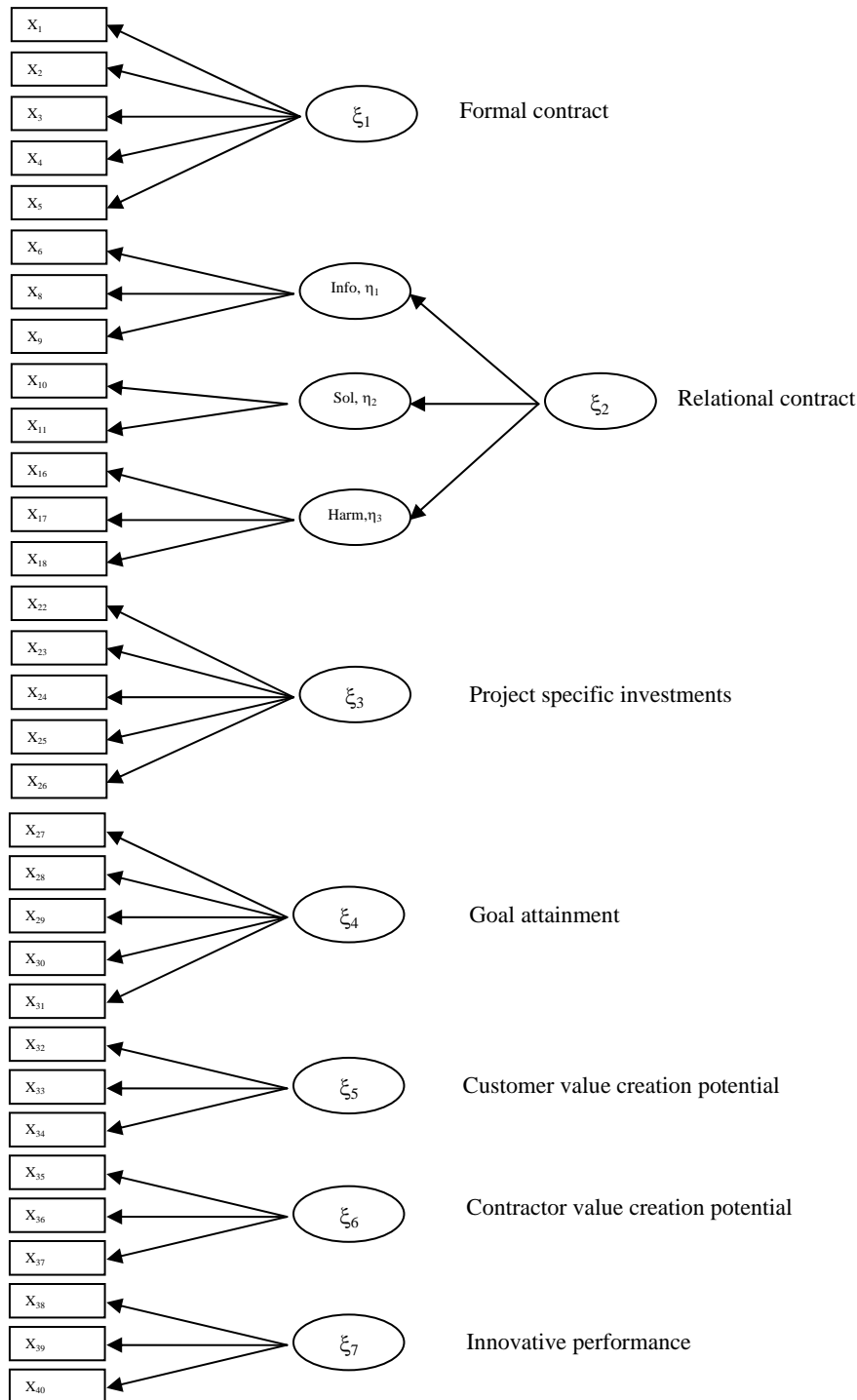
Several measurement models were tested. The first measurement model to be tested was the *a priori* measurement model. The modelling process is outlined below.

Model 1: Running the *a priori* measurement model showed pleasantly surprising and positive results. The fit indices showed good fit, and the modelling process could be stopped at this point. Nevertheless, further inspection of the measurement model was conducted with the intention to further improve the fit of the model.

The inspection revealed that four items had extremely high error terms and low factor loadings – the troublesome items were: PSI5 (Item 26; error term 0.81), PERF-cost (Item 31; error term 0.92), and CEN4 (Item 47; error term 0.79). Overall, their error terms were very high and their 'contributions' to the scales were minimal (i.e., low factor loading). As all constructs consisted of multiple indicators, deletion could theoretically and empirically be defended.

Model 2: Rerunning the measurement model showed further improvement in the fit indices. Again, as the fit indices showed good fit, the modelling process could be stopped at this point. Nevertheless, further inspection of the measurement model was conducted with the intention to further improve the fit of the model. This time, the focus was particularly set on the constructs of the main research model, see Figure 6-2. Accordingly, the modification indices were studied to search for troublesome items that could be deleted to improve fit if theoretically justified. Item 2 (FC2) was deleted in this process.

Model 3: Rerunning the measurement model without Item 2 (FC2) gave an additional, but only marginal improvement of model fit (see Table 6-5 below). As the measurement model indicates acceptable fit on all indexes – no more re-specifications were conducted. Hence, the modelling process was stopped and Model 3 was retained. Although a satisfactorily measurement model was accomplished, further measures could be taken to improve the fit of the measurement model, for example, allowing the measurement errors to correlate. However, this is not a recommended approach as the meaning of the estimated underlying construct would be obfuscated (Anderson and Gerbing 1988) – measurement Model 3 was retained and will be used in the full measurement model.

Table 6-5: The a priori full measurement model

	Fit index	Evaluation	Specification
Model 1	$\chi^2 = 1414.00$		*A priori* measurement model
	df = 842		
	RMSEA = 0.46	Good fit	
	NNFI = 0.95	Good fit	
	CFI = 0.96	Good fit	
	IFI = 0.96	Good fit	
	AGFI = 0.80	Not accepted	
	St. RMR = 0.058	Good fit	
	CN = 211.25	Good fit	
Model 2	$\chi^2 = 1148.12$		Four items were deleted:
	df = 716		
	RMSEA = 0.043	Good fit	Items 26 (PSI5), and 31 (PERF-cost).
	NNFI = 0.96	Accepted	
	CFI = 0.96	Accepted	Control item:
	IFI = 0.96	Accepted	Item 47 (CEN4).
	AGFI = 0.82	Accepted	
	St. RMR = 0.054	Accepted	
	CN = 220.31	Not accepted	
Model 3	$\chi^2 = 1069.83$		One item was deleted:
	df = 676		
	RMSEA = 0.043	Good fit	Item 2 (FC2).
	NNFI = 0.96	Good fit	
	CFI = 0.97	Good fit	
	IFI = 0.97	Good fit	
	AGFI = 0.82	Not accepted	
	St. RMR = 0.053	Good fit	
	CN = 224.64	Accepted	

6.2.2.2 Reliability

In the previous sections, a measurement model was developed that exhibited reasonably good fit measures. Nevertheless, it is quite possible that the measurement model is not acceptable, although the global fit indices indicate an acceptable model! This internal fit of the model needs to be justified (Bagozzi and Yi 1988) . Below, the reliability measures recommended by Bagozzi and Yi (1988) are evaluated.

Evaluation criteria:

1. The parameter estimates and their significance should be evaluated. Cut-off criteria: λ should preferably be larger than 0.6, and a significant t-test (Bagozzi and Yi 1988: 80).

2. The individual item reliabilities should be evaluated although this is not straightforward. A cut-off criteria is not established, "it is not possible to suggest even loose rules-of-thumb as to adequate sizes" (Bagozzi and Yi 1988: 80). Nevertheless, the research literature usually operates with values between approx. 0.6-0.9.

3. Scale reliabilities of the constructs should be above 0.6 (Bagozzi and Yi 1988: 80).

4. The average variance should be above 0.50 (Bagozzi and Yi 1988: 80).

Table 6-6 summarizes the reliabilities of the measures in the measurement model. The reliability measures all show satisfactory levels, except $\lambda_{1,5,}$ which has a scale reliability of only 0.42. Deleting one or two of the most troublesome indicators may be defended in this situation to try to increase the level of scale reliability. However, this procedure failed – it was not possible to achieve a higher scale reliability level. Hence, the results of the analysis should be interpreted with caution.

Table 6-6: The full measurement model - reliability measures and factor loadings

Factor loadings		t-values	Error terms		t-values	Item reliability	Average variance extracted	Composite Scale reliability	Highest shared variance
Formal contract, ξ_1									
$\lambda_{1,1}$	0.61	11.14	$\theta_{1,1}$	0.63	11.29	0.37	0.53	0.82	0.17
$\lambda_{2,1}$	0.82	16.29	$\theta_{2,1}$	0.34	7.92	0.67			
$\lambda_{3,1}$	0.80	15.79	$\theta_{3,1}$	0.37	8.47	0.64			
$\lambda_{4,1}$	0.67	12.61	$\theta_{4,1}$	0.55	10.73	0.45			
Relational contract, ξ_2:									
Information exchange, η_1									
$\lambda_{1,2}$	0.80	16.78	$\theta_{1,2}$	0.35	9.99	0.64	0.69	0.87	0.72
$\lambda_{2,2}$	0.87	18.78	$\theta_{2,2}$	0.25	8.25	0.76			
$\lambda_{3,2}$	0.82	17.18	$\theta_{3,2}$	0.33	9.73	0.67			
Solidarity, $\eta_{2:}$									
$\lambda_{4,2}$	0.84	17.88	$\theta_{4,2}$	0.29	8.89	0.71	0.74	0.85	0.72
$\lambda_{5,2}$	0.88	19.22	$\theta_{5,2}$	0.22	7.00	0.77			
Harmonization of conflict, η_3									
$\lambda_{6,2}$	0.76	15.13	$\theta_{6,2}$	0.42	9.90	0.58	0.63	0.83	0.59
$\lambda_{7,2}$	0.86	17.82	$\theta_{7,2}$	0.27	7.26	0.74			
$\lambda_{8,2}$	0.76	15.04	$\theta_{8,2}$	0.43	9.96	0.58			
Project specific investments, ξ_3									
$\lambda_{1,3}$	0.58	10.00	$\theta_{1,3}$	0.66	10.84	0.34	0.42	0.73	0.13
$\lambda_{2,3}$	0.73	13.17	$\theta_{2,3}$	0.46	8.38	0.53			
$\lambda_{3,3}$	0.74	13.41	$\theta_{3,3}$	0.45	8.08	0.55			
$\lambda_{4,3}$	0.49	8.23	$\theta_{4,3}$	0.76	11.53	0.24			
Goal attainment, ξ_4									
$\lambda_{1,4}$	0.87	18.81	$\theta_{1,4}$	0.25	8.44	0.76	0.63	0.87	0.14
$\lambda_{2,4}$	0.90	20.01	$\theta_{2,4}$	0.19	6.81	0.81			

$\lambda_{3,4}$	0.81	17.07	$\theta_{3,4}$	0.34	10.06	0.66			
$\lambda_{4,4}$	0.56	10.47	$\theta_{4,4}$	0.69	12.05	0.31			
Customer value creation potential, ξ_5									
$\lambda_{1,5}$	0.85	16.85	$\theta_{1,5}$	0.28	6.06	0.72	0.60	0.82	0.14
$\lambda_{2,5}$	0.83	16.22	$\theta_{2,5}$	0.31	7.01	0.69			
$\lambda_{3,5}$	0.63	11.78	$\theta_{3,5}$	0.60	11.09	0.40			
Contractor value creation potential, ξ_6									
$\lambda_{1,6}$	0.83	17.41	$\theta_{1,6}$	0.32	9.33	0.69	0.69	0.87	0.62
$\lambda_{2,6}$	0.87	18.84	$\theta_{2,6}$	0.24	7.85	0.76			
$\lambda_{3,6}$	0.79	16.35	$\theta_{3,6}$	0.37	10.08	0.62			
Innovative performance, ξ_7									
$\lambda_{1,7}$	0.88	19.80	$\theta_{1,7}$	0.22	9.70	0.77	0.83	0.93	0.62
$\lambda_{2,7}$	0.92	21.23	$\theta_{2,7}$	0.15	7.93	0.85			
$\lambda_{3,7}$	0.92	21.28	$\theta_{3,7}$	0.15	7.86	0.85			

CONTROL VARIABLES:

Importance, ξ_8									
$\lambda_{1,8}$	0.82	15.54	$\theta_{1,8}$	0.33	6.40	0.67	0.68	0.81	0.35
$\lambda_{2,8}$	0.83	15.70	$\theta_{2,8}$	0.31	6.14	0.69			
Centralization, ξ_{10}									
$\lambda_{1,10}$	0.62	10.29	$\theta_{1,10}$	0.62	9.70	0.38	0.42	0.68	0.17
$\lambda_{2,10}$	0.77	12.81	$\theta_{2,10}$	0.40	6.02	0.61			
$\lambda_{3,10}$	0.54	8.94	$\theta_{3,10}$	0.71	10.74	0.29			
Market governance, ξ_{11}									
$\lambda_{1,11}$	0.69	13.18	$\theta_{1,11}$	0.52	10.52	0.48	0.59	0.81	0.35
$\lambda_{2,11}$	0.73	13.96	$\theta_{2,11}$	0.47	10.01	0.53			
$\lambda_{3,11}$	0.88	17.94	$\theta_{3,11}$	0.23	5.34	0.77			
Past experience, ξ_{12}									
$\lambda_{1,12}$	0.89	16.88	$\theta_{1,11}$	0.21	3.85	0.79	0.78	0.88	0.24
$\lambda_{2,12}$	0.88	16.72	$\theta_{2,11}$	0.22	4.11	0.77			

6.2.2.3 Validity

Next, different forms of validity need to be considered. The main focus in a cross sectional design of theory testing (i.e., testing casual relations) should be on internal validity and construct validity (Cook and Campbell 1979). Construct validity can be defined as, "the degree to which a measure assesses the construct it is purported to assess," (Peter 1981: 134) and includes face, construct, discriminant, and nomological validity[44]. *Convergent* validity (i.e., the measure must vary with the construct), and *discriminant* validity (i.e., the measure should not vary with other constructs) are assessed below.

The examination of convergent and discriminant validity follows the recommendations laid out by Anderson and Gerbing (1988). Hence, convergent validity was assessed by an examination of the statistical significance of each item's estimator pattern coefficient (i.e., the λ's) on the underlying construct hypothesized. All the λ– and τ-values are presented in Table 6-6. All λ–values were significant, that is, t-values above 2.33 (p<0.01), hence it is concluded that convergent validity can be claimed.

Discriminant validity can be examined according to the following procedure (Anderson and Gerbing 1988): use a 95% confidence interval around the correlation estimates for each of the latent constructs in the measurement model; that is, use the correlation estimates +/- two standard errors. The resulting 95% confidence intervals should not include 1 (absolute value). The necessary information is provided by LISREL, that is, the correlation estimates and the standard error terms, in the Φ-matrix (i.e., PHI-matrix). No structural paths constrain the model, since all the latent variables are considered to be ξ variables in the measurement model.

The Φ matrix is shown below (Table 6-7). In Table 6-7, the estimated correlation matrix between the latent constructs, including the standard error terms, is reported. To sum up, none of the 95% confidence intervals (i.e., correlation estimates +/- two standard errors) includes 1 (absolute value); hence, discriminant validity can be claimed for all latent constructs examined. The highest correlations are estimated between INFOEX (η_1) and SOL (η_2) 0.85, between SOL (η_2) and HARM (η_3) 0.77, and between CVCP2 (ξ_6) and INNO (ξ_7) 0.79. The high correlations between INFOEX (η_1), HARM (η_3) and SOL (η_2) were high as expected – all three latent constructs are first-order dimensions of the second-order relational contract scale. The

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[44] See Chapter 4 for an in-depth discussion of validity concerns.

estimated correlations between CVCP2 (ξ_6) and INNO (ξ_7) were also rather high (i.e., close to 1) – the correlations were estimated to be 0.79 with the corresponding confidence intervals between 0.73 and 0.85. Hence, discriminant validity can be claimed for all latent constructs in the measurement model[45].

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[45] Additionally, a Fornell and Larcker (1981) test was conducted since the estimated correlations between CVCP2 (ξ_8) and INNO (ξ_9) came close to 1 (the cut off criteria). Shared variance between all pairs of latent constructs were calculated and compared with the values for average variance (AVE) extracted in Table 6-6. The calculated variances should be lower than AVE. Discriminant validity was established – all latent constructs, except those between INFOEX (η_1) and SOL (η_2) passed the test. The two latent variables are dimensions of the relational contract scale. See Fornell, C. and D. F. Larcker (1981). "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error." Journal of Marketing Research **XVIII**(February): 39-50.

Table 6-7: Estimated correlation matrix between latent constructs

	IMP	CONTYPE	PSI	FC	CEN	MG	INFOEX	SOL	HARM	EXP	FUT	PERF-ORD	PERF-PVCcus	PERF-PVCcon	PERF-INNO
IMP	1														
CONTYPE (Standard error)	0,23 -0,06	1													
PSI (Standard error)	0,26 -0,07	-0,12 -0,06	1												
FC (Standard error)	0,29 -0,06	0,2 -0,06	-0,04 -0,07	1											
CEN (Standard error)	0,39 -0,07	0,35 -0,06	0,03 -0,08	0,35 -0,07	1										
MG (Standard error)	0,59 -0,05	0,06 -0,06	0,29 -0,07	0,26 -0,06	0,41 -0,06	1									
INFOEX (Standard error)	-0,05 -0,07	0,07 -0,06	-0,12 -0,07	0,41 -0,06	0,05 -0,07	-0,14 -0,06	1								
SOL (Standard error)	-0,15 -0,07	0,06 -0,06	-0,18 -0,07	0,34 -0,06	0,06 -0,07	-0,16 -0,06	0,85 -0,03	1							
HARM (Standard error)	-0,19 -0,07	0,03 -0,06	-0,12 -0,07	0,26 -0,06	-0,03 -0,07	-0,31 -0,06	0,65 -0,04	0,77 -0,03	1						
EXP (Standard error)	0,05 -0,07	0,18 -0,06	-0,13 -0,07	0,18 -0,06	0,05 -0,07	-0,06 -0,06	0,3 -0,06	0,2 -0,06	0,13 -0,06	1					
FUT (Standard error)	0,1 -0,06	0,17 -0,05	-0,11 -0,06	0,19 -0,06	0,09 -0,07	0 -0,06	0,2 -0,06	0,12 -0,06	0,11 -0,06	0,49 -0,05	1				
PERF-ORD (Standard error)	0,23 -0,06	0,11 -0,06	-0,09 -0,07	0,35 -0,06	0,23 -0,07	0,24 -0,06	0,27 -0,06	0,19 -0,06	0,16 -0,06	0,09 -0,06	0,02 -0,06	1			
PERF-PVCcus (Standard error)	0,17 -0,07	0,01 -0,06	0,2 -0,07	0,13 -0,07	0,08 -0,07	0,07 -0,07	0,22 -0,06	0,18 -0,06	0,17 -0,06	0,07 -0,06	0,11 -0,06	0,37 -0,06	1		
PERF-PVCcon (Standard error)	-0,22 -0,06	-0,09 -0,06	0,36 -0,06	-0,16 -0,06	-0,23 -0,07	-0,16 -0,06	0,11 -0,06	0,11 -0,06	0,17 -0,06	-0,08 -0,06	-0,06 -0,06	-0,15 -0,06	0,28 -0,06	1	
PERF-INNO (Standard error)	-0,3 -0,06	-0,18 -0,06	0,27 -0,06	-0,23 -0,06	-0,31 -0,06	-0,17 -0,06	0,08 -0,06	0,06 -0,06	0,1 -0,06	-0,09 -0,06	-0,09 -0,06	-0,23 -0,06	0,15 -0,06	0,79 -0,03	1

6.3 Structural analysis

In this section, the hypotheses developed in Chapter 4 as well as the significance of the structural model are tested. The hypotheses and the structural model are tested with the use of structural equation modelling (SEM). The choice of SEM over multiple regression analysis needs to be accounted for; it was an easy choice when all the pros and cons of different methods were evaluated.

Choice of statistical tool – structural equation modelling

The rather complex research model calls for powerful statistical tools to examine the hypotheses. Multiple regression, factor analysis, multivariate analysis of variance, etc. are all powerful statistical tools, but they all share one common limitation – each of the techniques can examine only one relationship at a time (Hair, Anderson et al. 1998). As the research model in this study includes four dependent variables, the choice of SEM seems appropriate - SEM examines a series of dependence relationships simultaneously. In addition to the test of the predictive relationships in the research model, SEM also provides an examination of the degree of measurement error, thus improving statistical estimation. In all methods except SEM, it is assumed that the measures are error free. As SEM (e.g., LISREL) provides tools to handle and reduce these errors in the measurement model, the choice of SEM seems even more appropriate. Hence, measurement error and the unavoidable contamination of the variables are reduced when SEM is used as method. The ability to test the measurement model in advance to secure that the model holds in the sample is a great advantage, that is, conducting structural tests without an approved measurement model may even be meaningless.

Another advantage when SEM is used is the ability to incorporate variables that we do not measure directly – that is latent variables (Hair, Anderson et al. 1998). An example is the ability to develop second-order constructs with first order dimension to better represent theoretical constructs, as is the case in this study.

'Moderator' considerations in the interaction model

Since the main focus of this study is to examine the alignment between governance and the characteristics of the transaction (i.e., project attributes), and the implications for performance, the interaction effects are central in the study. Before conducting the statistical analysis of the structural model, it is necessary to classify the type of variables. Classification is necessary because the 'nature' of the variables influences the choice of statistical methods and tests. In order to classify the variables, we rely upon the work by Sharma, Durand et al. (1981), who classified specification variables in a validation model as an antecedent, a homologizer, a quasi-moderator, or a pure moderator. "A specification variable is one which specifies the form and/or magnitude of the relationship between a predictor and a criterion variable" (Sharma, Durand et al. 1981: 292). Hence, there are basically two forms of moderators: 1) moderators that only influence the strength between the predictor(s) and the criterion variable(s), and 2) moderators that modify *and* influence the strength between the predictor(s) and the criterion variable(s).

The classification below is based on the relationship between the specification variable, the criterion, and the predictor variable(s). If the specification variable is related to the criterion and/or the predictor variable(s), but does not interact with the predictor, then the variable is referred to as an *antecedent* variable (i.e., not a moderator variable).

If the specification variable only influences the strength of the relationship, and "does not interact with the predictor variable, and is not significantly related to either the predictor or the criterion variable" (Sharma, Durand et al. 1981: 292) it is termed a *homologizer* variable. The two latter specification variables influence the strength and modify the form of the relationship between the predictor and the criterion; that is, the specification variable interacts significantly with the predictor variable. In order to be considered a *pure* moderator, the specification variable cannot be related to the predictor and/or the criterion variable. In other words, the specification variable cannot itself be a predictor variable. Furthermore, if the specification variable, in addition to interacting significantly with the predictor variable, is also related to the criterion – the term "quasi"-moderator is commonly used (Sharma, Durand et al. 1981).

The argumentation provided in the theory chapter indicates that 'project specific investments' should interact with the governance variables (i.e., the predictor variables), and be significantly related to the dependent variables (i.e., the criterion variables). Hence, although not "quasi"-

moderators, our independent variables are argued as fitting nicely into the framework developed by Sharma, Durand et al.

Choice of statistical method for the analysis of interaction effects

Three commonly used statistical methods for analysis of interaction effects are described in the literature, see for example Jaccard, Turrisi et al. (1990): the *2 x 2 median split analysis*, the *moderator median split analysis*, and the *traditional product term analysis,* respectively. These three methods are briefly presented below, and subsequently the choice of statistical method is made.

The *2 x 2 median split analysis* dichotomizes both the variables, that is, the independent and the moderator variable is divided using for example median split or some other criteria. Then, a 2 x 2 analysis of variance is conducted. There are two disadvantages with this approach (Cohen and Cohen 1983). First, the independent and the moderator variable are de-scaled from a multipoint scale (this study employs a 7-point Likert scale) to a 2-point scale (e.g., a high/low condition). Hence, valuable information is lost. Second, the statistical analysis loses power and the variance accounted for by the variables may decrease.

The *moderator median split analysis* dichotomizes *the sample* on the moderator variable (or even trichotomizes the variable, that is, a three point index). Then the slopes for the dependent variable(s), on the independent variable(s), are computed for both of the two (or three) groups. The difference between the two groups is then subjected to statistical tests of significance using a t-test. Unfortunately, the *moderator median split analysis* approach is plagued with many of the same disadvantages as the *2 x 2 median split analysis*. First, the de-scaling of the moderator variable leads to lost precision, second, due to the smaller sample size, the statistical tests become less powerful (i.e., more likely to make a type-II error), and third, there is the absence of an index that accounts for the strength of the interaction effect (i.e., the t-value only indicates significance, and does not account for percent of variance).

The most commonly used statistical method for analysis of interaction effects is the *traditional product term analysis* recommended by Cohen and Cohen (1983). In short, multiple regressions are used and the interaction effects are accounted for by a multiplicative term in the equations. First, the un-moderated equation (without the multiplicative term) is estimated producing an un-

moderated R^2 value, then a multiplicative term is included in the equation, and the equation is estimated, producing a moderated R^2 value. An interaction effect is present if the difference between the two estimated R^2 values (ΔR^2) is statistically significant. The *traditional product term analysis* is not plagued with the disadvantages of the other two methods; that is, the variables are not de-scaled. Therefore, precision is retained, and the sample is not split, thus retaining the statistical power. However, *product term analysis* poses other challenges for the applied researcher, for example the case of multicollinearity (Jaccard and Turrisi 2003). Multicollinearity arises due to the high correlation between the multiplicative term in the equation and the component parts used to define the multiplicative term. However, the fear of multicollinearity is exaggerated – multicollinearity may be avoided if the components included in the multiplicative term are centered[46] (Jaccard, Turrisi et al. 1990).

In the *product term analysis* a prerequisite is that the variables fit into the framework of a quasi-moderator (and not a pure moderator), (Jaccard, Turrisi et al. 1990). In *product term analysis* the direct effect of all the independent(s) variables (e.g., X and Z) is tested – that is, the two variables (X and Z) are included in both the 'moderated' and 'un-moderated' equations.

To sum up, there seem to be more arguments overall favouring the *traditional product term analysis* than the other two available methods. Hence, this study will employ the *traditional product term analysis* when *interaction effects* are analyzed as recommended by Cohen and Cohen (1983) and Jaccard, Turrisi et al. (1990). The traditional product term analysis will be used when both latent variables scores (LVS) are calculated, and when multiple regression analyses are performed (multiple regression analyses are performed as an additional check since the latent variables scores method is relatively new (Jöreskog 2000). Although the use of latent variable scores are rare, the method has performed satisfactorily in preliminary tests (Schumacher 2002; Bansal, Taylor et al. 2005).

In the next sections, the hypotheses developed in Chapter 4 as well as the significance of the structural model will be tested. First, the direct effects of project specific investments, formal contracts, and relational contracts on all four performance dimensions are tested. Second, the interaction between project specific investments and the two governance mechanisms is tested. Finally, control variables are included to test for spurious effects; that is, the robustness of the

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[46] Formation of the "centered" multiplicative term: The centered multiplicative term ("M(c)") is composed of an independent variable (X) and a moderator variable (Z). Formula: M(c) = (X-mean value of X) * (Y-mean value of Y).

findings is subject to testing. In addition, rival predictors are introduced to account for other possible rival explanations for performance.

6.4 Test of hypotheses – direct and interaction effects (Model 1)

The base model and the hypotheses up for testing are presented below. The results of the analyses are reported in Table 6-8.
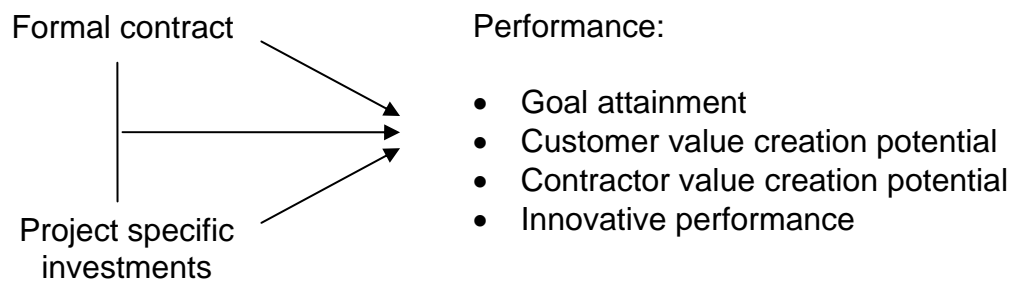
The effect of project specific investments on performance.

H1:   Project specific investments are negatively related to goal attainment

H2:   Project specific investments are positively related to the customer value creation potential

H3:   Project specific investments are positively related to the contractor value creation potential

H4:   Project specific investments are positively related to innovative performance

The effect of formal contracts on performance

H5:   Formalization is positively related to goal attainment

H6:   Formalization is positively related to the customer value creation potential

H7:   Formalization is negatively related to the contractor value creation potential

H8:   Formalization is negatively related to innovative performance

Interactions

H13: The interaction of project specific investments and formalization will have a positive effect on goal attainment

H15: The interaction of project specific investments and formalization will have a positive effect on the customer value creation potential

H17: The interaction of project specific investments and formalization will have a positive effect on the contractor value creation potential

H19: The interaction of project specific investments and formalization will have a positive effect on innovative performance

Table 6-8: Test of hypotheses – direct and interaction effects in the base model

		Method: Standard SEM			Method: Latent Variables Scores		
Structural linkages in the model		Estimates[47]	SE[48]	t-values	Estimates	SE	t-values
Project specific investments – Goal attainment	H1	-0.06	0.05	-1.19	-0.06	0.04	-1.43
Project specific investments – Customer value creation potential	H2	0.24	0.08	3.02***	0.24	0.06	3.84****
Project specific investments – Contractor value creation potential	H3	0.56	0.11	5.30****	0.56	0.08	6.90****
Project specific investments – Innovative performance	H4	0.53	0.13	4.10****	0.54	0.11	5.00****
Formal contract – Goal attainment	H5	0.26	0.05	5.45****	0.26	0.04	6.52****
Formal contract – Customer value creation potential	H6	0.16	0.08	2.15**	0.16	0.06	2.59***
Formal contract – Contractor	H7	-0.22	0.10	-2.23**	-0.22	0.08	-2.74***

[47] Standardized estimates
[48] Standard error

		Method: Multiple Regression			Method: Latent Variables Scores		
value creation potential							
Formal contract – Innovative performance	H8	-0.44	0.13	-3.51****	-0.44	0.10	-4.10****
Alignment hypotheses		Method: Multiple Regression			Method: Latent Variables Scores		
FC * PSI - Goal attainment	H13	0.77	0.03	1.438	0.05	0.04	1.31
FC * PSI - Customer value creation potential	H15	0.146	0.04	2.67***	0.11	0.06	1.95*
FC * PSI - Contractor value creation potential	H17	0.142	0.06	2.68***	0.19	0.08	2.57**
FC * PSI - Innovative performance	H19	0.10	0.08	1.80*	0.20	0.10	1.98**

Significance levels: $t > 1.645$: $p < 0.10$*; $t > 1.96$: $p < 0.05$**; $t > 2.58$: $p < 0.01$***; $t > 3.29$: $p < 0.001$****

	Squared multiple correlations for reduced form[49]	Additional variance explained by including the interaction effect[50], R^2
Goal attainment	0.13	6.8% (from 0.088 to 0.094)
Customer value creation potential	0.06	60.0% (from 0.035 to 0.056)
Contractor value creation potential	0.15	20.4 % (from 0.098 to 0.118)
Innovative performance	0.12	11,2% (from 0.089 to 0.099)
Overall Goodness-of-fit indices	$\chi^2 = 259.66$ df = 174 RMSEA = 0.039 NNFI = 0.98 CFI = 0.98 IFI = 0.98 AGFI = 0.90 St. RMR = 0.047 CN = 267.97	

All goodness of fit indices for the base model indicate very good fit (e.g., RMSEA=0.039). Since the model indicates good fit to the data, our confidence in the results of the analysis increases.

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[49] Calculated by LISREL 8.71
[50] Calculated by SPSS 14.0.

Furthermore, the independent variables in the model explain from 6 to 15% of the variance in the endogenous variables (i.e., the performance variables), see Table 6-8. As expected, the explained variance is low, but compared with other studies these results are on the average (see for example: Noordewier, John et al. 1990; Cannon, Achrol et al. 2000; Poppo and Zenger 2002). All direct effects are generated using both structural equation modelling (LISREL 8.71) and latent variables scores (as an additional check). The results reported in Table 6-8 above demonstrate highly concurrent results between the two methods. Furthermore, the interaction hypotheses are estimated using latent variables scores and controlled by applying multiple regressions. In addition, these two estimation methods produce concurrent results, hence our confidence in the results are strengthened. Below the results from the hypotheses testing are briefly presented. The results will be discussed and implications will be drawn in chapter 7.

Direct effects

Hypotheses 1, 2, 3, and 4: The effect of project specific investments on performance was hypothesized to be positive, except for the relation between project specific investments and goal attainment where a negative relation was hypothesized. The table reports that most hypotheses were supported (H2 was supported on the $p<0.01$ level, and H3 and H4 were supported on the $p<0.001$ level). Although a negative relation was indicated, no significant relation was found between project specific investments and goal attainment, consequently H1 was not supported.

Hypotheses 5, 6, 7, and 8: The effect of formalization on goal attainment and the customer value creation potential, that is, performance types with low level of ambiguity was hypothesized to be positive. The results reported in Table 6-8 show that both hypotheses were supported (H5 were supported on the $p<0.001$ level, and H6 on the $p<0.05$ level). The effect of formalization on the contractor value creation potential, and innovative performance, that is, performance types with a high degree of ambiguity, were hypothesized to be negative, and the results show support for both hypotheses (H7 were supported on the $p<0.05$ level, and H8 on the $p<0.001$ level).

Interaction effects

Hypotheses 13, 15, 17, and 19 hypothesized that when high levels of project specific investments are present, high levels of formalization should enhance project performance of all types. The table reports that hypotheses 15, 17, and 19 were supported (H15 and H17 were supported on the $p<0.01$ level, and H19 on the $p<0.1$ level). Although a positive relation was indicated, hypothesis 13 was not supported.

6.5 Test of hypotheses – direct and interaction effects (Model 2)

The model and the hypotheses up for testing are presented below. The results of the analyzes are reported in Table 6-9.

Relational contract

Performance:

- Goal attainment
- Customer value creation potential
- Contractor value creation potential
- Innovative performance

Project specific
investments
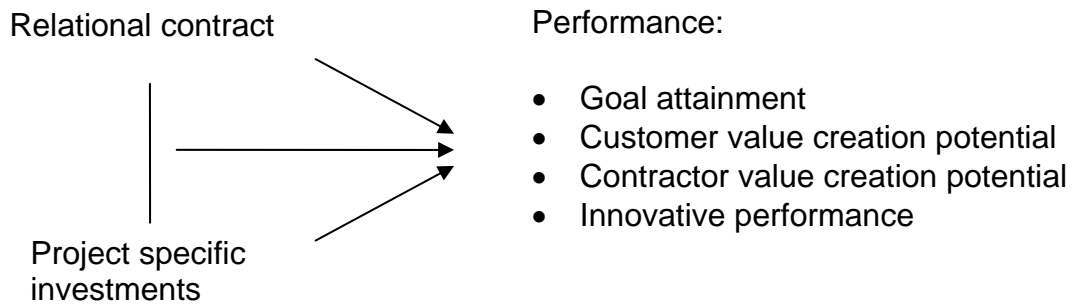
The effect of relational norms on performance

H9:	Relational norms are positively related to goal attainment
H10:	Relational norms are positively related to the customer value creation potential
H11:	Relational norms are positively related to the contractor value creation potential
H12:	Relational norms are positively related to innovative performance

Interactions

H14:	The interaction of project specific investments and relational norms will have a positive effect on goal attainment
H16:	The interaction of project specific investments and relational norms will have a positive effect on the customer value creation potential
H18:	The interaction of project specific investments and relational norms will have a positive effect on the contractor value creation potential
H20:	The interaction of project specific investments and relational norms will have a positive effect on innovative performance

Table 6-9: Test of hypotheses – the independent effect of relational contracts

Structural linkages in the model		Method: Standard SEM			Method: Latent Variables Scores		
		Estimates[51]	SE[52]	t-values	Estimates	SE	t-values
Project specific investments – Goal attainment	H1	-0.11	0.05	-1.65	-0.11	0.04	-1.94*
Project specific investments – Customer value creation potential	H2	0.26	0.05	3.91****	0.26	0.04	4.90****
Project specific investments – Contractor value creation potential	H3	0.52	0.11	7.74****	0.52	0.08	10.82****
Project specific investments – innovative performance	H4	0.44	0.13	6.77****	0.44	0.10	8.59****
Relational contract – Goal attainment	H9	0.20	0.05	3.24***	0.18	0.04	3.09***
Relational contract – Customer value creation potential	H10	0.28	0.05	4.50****	0.26	0.04	4.74****
Relational contract – Contractor value creation potential	H11	0.23	0.10	3.88****	0.22	0.08	4.43****
Relational contract – Innovative performance	H12	0.17	0.12	2.83***	0.16	0.11	3.07***
Alignment hypotheses		Method: Multiple Regression			Method: Latent Variables Scores		
Relational * PSI - Goal attainment	H14	0.12	0.04	2.14**	0.10	0.04	1.79*
Relational * PSI - Customer value creation potential	H16	0.16	0.05	3.02***	0.09	0.03	1.70*
Relational * PSI - Contractor value creation potential	H18	0.02	0.07	0.342	0.05	0.07	0.95
Relational * PSI - Innovative performance	H20	-0.03	0.10	-0.50	0.02	0.09	0.43

Significance levels: t>1.645: p<0.10*; t>1.96: p<0.05**; t>2.58: p<0.01***; t>3.29: p<0.001****

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[51] Standardized estimates
[52] Standard error

	Squared multiple correlations for reduced form	Additional variance explained by including the interaction effect, R^2
Goal attainment	0.06	28.3% (from 0.046 to 0.059)
Customer value creation potential	0.12	30.1% (from 0.083 to 0.108)
Contractor value creation potential	0.28	1.0% (from 0.104 to 0.105)
Innovative performance	0.19	1.9% (from 0.054 to 0.055)
Overall Goodness of fit indices	$\chi^2 =$ 729.40 df = 267 RMSEA = 0.074 NNFI = 0.93 CFI = 0.94 IFI = 0.94 AGFI = 0.81 St. RMR = 0.10 CN = 138.83	

The goodness of fit indices for the 'relational norm'-model indicate acceptable to poor fit to the data (in particular, critical N is low). The independent and moderator variables in the model explain from 6 to 28% of the variance in the endogenous variables (i.e., the performance variables); see Table 6-9. Compared with other studies, these results rank favourably. All direct effects are generated using both structural equation modelling and latent variables scores. As in the base model, the results are highly concurrent between the two estimating methods. As stated earlier, the interaction hypotheses were estimated using latent variables scores and controlled by applying multiple regressions. In addition, these two estimation methods produce concurrent results, hence our confidence in the results is strengthened.

Direct effects

Generally, it was hypothesized that relational norms influence all types of performances positively. Furthermore, as the level of ambiguity increases, then the importance of relational norms should also increase as well (Noordewier, John et al. 1990; Cannon, Achrol et al. 2000; Poppo and Zenger 2002). Hence, it was hypothesized that relational norms would be positively

related to all types of performances (H9, H10, H11, and H12). The results show strong support for all hypotheses; H9 ($p<0.01$), H10 ($p<0.001$), H11 ($p<0.001$), and H12 ($p<0.01$).

Interaction effects

Hypotheses 14, 16, 18, and 20 theorized that when high levels of project specific investments are present, high levels of relational norms would enhance project performance. The table reports that Hypotheses 14 and 16 was supported (H14 and H16 was supported at the $p<0.1$ level). However, the result from the multiple regression analyses indicates stronger support, see Table 6-9. Relational norms seem to be positively related to performance dimensions with low to medium levels of ambiguity. Hypotheses 18 and 20 were not supported, thus indicating that the safeguarding properties of relational norms are marginal when the level of project specific investments increases. That is, there seem to be 'limits' to the safeguarding and adaptive properties of relational norms.

6.6 Test of hypotheses – direct and interaction effects, full model (Model 3)

The full research model and all hypotheses in the full research model are presented below. The results of the analyses are reported in Table 6-10.

- Formal contract
- Relational contract

Performance:

- Goal attainment
- Customer value creation potential
- Contractor value creation potential
- Innovative performance

Project specific investments
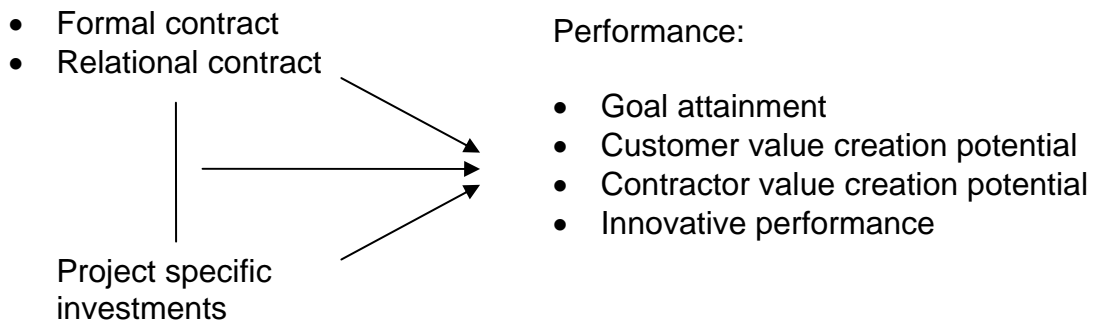
Table 6-10: Test of hypotheses – the full model

Structural linkages in the model		Method: Standard SEM			Method: Latent Variables Scores		
		Estimates[53]	SE[54]	t-values	Estimates	SE	t-values
Project specific investments – Goal attainment	H1	-0.06	0.05	-0.95	-0.06	0.04	-1.11
Project specific investments – Customer value creation potential	H2	0.24	0.08	3.48****	0.24	0.06	4.56****
Project specific investments – Contractor value creation potential	H3	0.40	0.11	5.91****	0.40	0.08	7.91****
Project specific investments – Innovative performance	H4	0.30	0.13	4.61****	0.30	0.11	5.72****
Formal contract – Goal attainment	H5	0.31	0.05	4.48****	0.30	0.04	5.24****
Formal contract – Customer value creation potential	H6	0.06	0.08	-0.80	0.05	0.07	0.79
Formal contract – Contractor value creation potential	H7	-0.25	0.11	-3.60****	-0.25	0.09	-4.57****

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[53] Standardized estimates
[54] Standard error

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Formal contract – Innovative performance	H8	-0.30	0.14	-4.50****	-0.30	0.11	-5.38****
Relational contract – Goal attainment	H9	0.10	0.05	1.52	0.08	0.05	1.37
Relational contract – Customer value creation potential	H10	0.23	0.08	3.22***	0.20	0.07	3.37****
Relational contract – Contractor value creation potential	H11	0.29	0.11	4.22****	0.27	0.09	4.77****
Relational contract – Innovative performance	H12	0.24	0.13	3.61****	0.23	0.12	3.90****
Alignment hypotheses		Method: Multiple Regression			Method: Latent Variables Scores		
FC * PSI – Goal attainment	H13	0.03	0.03	0.447	0.01	0.04	0.16
FC * PSI – Customer value creation potential	H15	0.06	0.04	0.970	0.02	0.06	0.30
FC * PSI – Contractor value creation potential	H17	0.10	0.06	1.763*	0.08	0.08	1.35
FC * PSI – Innovative performance	H19	0.07	0.08	1.253	0.06	0.11	1.06
RC * PSI – Goal attainment	H14	0.09	0.04	1.497	0.10	0.04	1.61
RC * PSI – Customer value creation potential	H16	0.05	0.15	2.518**	0.14	0.06	2.26**
RC * PSI – Contractor value creation potential	H18	0.07	0.01	0.085	0.05	0.08	0.82
RC * PSI – Innovative performance	H20	0.10	-0.03	-0.475	0.02	0.10	0.35

Significance levels: t>1.645: p<0.10*; t>1.96: p<0.05**; t>2.58: p<0.01***; t>3.29: p<0.001****

	Squared multiple correlations for reduced form	Additional variance explained by including the interaction effects, R^2
Goal attainment	0.14	8.8% (from 0.102 to 0.111)
Customer value creation potential	0.10	33.9% (from 0.083 to 0.112)
Contractor value creation potential	0.22	6.6% (from 0.151 to 0.161)
Innovative performance	0.17	3.2% (from 0.125 to 0.129)
Overall Goodness of fit indices	χ^2 = 536.46 df = 356	

	RMSEA = 0.040 NNFI = 0.98 CFI = 0.98 IFI = 0.98 AGFI = 0.87 St. RMR = 0.050 CN = 247.42	

All goodness of fit indices in *the full research model* indicates good fit to the data (e.g., RMSEA=0.040). Since the model indicates good fit to the data, our confidence in the results of the analysis increases. The independent variables in the model explain from 10 to 22% of the variance in the endogenous variables, see Table 6-10. As in the previous models, the results are highly concurrent between the estimation methods (see Table 6-10); hence, our confidence in the results is strengthened.

Direct effects

Hypotheses 1, 2, 3, and 4: The effect of project specific investments on performance was hypothesized to be positive, except for the relation between project specific investments and goal attainment, where a negative relation was hypothesized. The results reported in the table above show that *most* hypotheses were supported (H2, H3 and H4 were supported on the $p<0.001$ level). Although a negative relation was indicated, *no* significant relation was found between project specific investments and goal attainment, thus H1 was not supported.

Hypotheses 5, 6, 7, and 8: The effect of formalization on goal attainment and the customer value creation potential was hypothesized to be positive (H5 and H6), and the effect of formalization on the contractor value creation potential and innovative performance was hypothesized to be negative (H7 and H8). The results reported in the Table 6-10 show that Hypotheses H5, H7, and H8 were supported ($p<0.001$), and that Hypothesis 6 was not supported. Except for the results of H6, these results were supported in the base model, thus the results are strengthened.

Hypotheses 9, 10, 11, and 12: It was hypothesized that relational norms were positively related to all types of performance. The results show support for all hypotheses (H10, H11, and H12 at the p<0.001 level). Although a positive effect is indicated, Hypothesis 9 was not supported[55].

Interaction effects

Hypotheses 13, 15, 17, and 19 theorized that when high levels of project specific investments are present, high levels of formalization should enhance all types of project performance. None of these hypotheses was supported. Although none of the hypothesized effects is significant, a positive effect is indicated. Although not significant, note that the results are stronger when multiple regressions are utilized. The significant results from the base model reported in Table 6-8 seem to be weakened by the inclusion of relational norms.

Hypotheses 14, 16, 18, and 20 hypothesized that when high levels of project specific investments are present, high levels of relational norms would enhance all types of project performance. The table reports that Hypothesis 16 was supported (H16 was supported on the p<0.05 level). However, the results in Table 6-10 indicate that the presence of strong relational norms seem to be positively related to goal attainment. Hypotheses 18 and 20 were not supported, thus indicating that the safeguarding properties of relational norms are marginal when the level of project specific investments increases. These results are supported in the previous model, see Table 6-9[56].

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[55] Although beyond the scope of this dissertation, we also tested the interaction effects between formal and relational contracts on all four dimensions of performance (*given an average level of project specific investments*). Our results showed that none of the interaction effects was significant, although weak negative effects were indicated. Estimation method: Multiple regression (SPSS).

[56] We also tested the interaction effects between formal and relational contracts on all four types of performance *given a high level of project specific investments* (median split of the sample). Our results showed that the interaction effects between formal and relational contracts on customer and contractor value creation potential were partially significant (at the t>1.645: p<0.10 level). However, the interaction effects were *not* positive, but negative, thus a substitution effect is indicated to be present. Furthermore, our results showed that none of the interaction effects was significant on goal attainment and innovative performance. Although interesting, these issues are beyond the scope of this dissertation and further analyses will not be undertaken. Estimation method: Multiple regression (SPSS).

6.7 Including control variables and rival predictors (Model 4)

The control variables and rival predictors are included to increase the confidence in the theoretical research model. The following variables were included as control variables: the importance of the project, past experience, and future expectation respectively. Furthermore, contract type, centralization, and market governance were included as rival predictors. Below, the hypotheses are indicated below. The results of the analyzes are reported in Table 6-11.

Table 6-11: Test of hypotheses – control variables and rival predictors included

Structural linkages in the model		Method: Standard SEM			Method: Latent Variables Scores		
		Estimates[57]	SE[58]	t-values	Estimates	SE	t-values
Project specific investments – Goal attainment	H1	-013	0.05	-2.07**	-0.10	0.06	-1.42
Project specific investments – Customer value creation potential	H2	0.21	0.08	3.18***	0.32	0.09	4.38****
Project specific investments – Contractor value creation potential	H3	0.44	0.10	6.86****	0.70	0.10	11.95****
Project specific investments – innovative performance	H4	0.34	0.12	5.56****	0.66	0.12	11.36****
Formal contract – Goal attainment	H5	0.21	0.05	3.52****	0.13	0.08	1.27
Formal contract – Customer value creation potential	H6	0.02	0.07	0.28	-0.08	0.12	-0.78
Formal contract – Contractor value creation potential	H7	-0.12	0.09	-2.03**	-0.45	0.13	-5.33****
Formal contract – Innovative performance	H8	-0.16	0.12	-2.75***	-0.48	0.16	-5.78****
Relational contract – Goal attainment	H9	0.19	0.04	3.22***	0.16	0.04	3.13***
Relational contract – Customer value creation potential	H10	0.23	0.07	3.76****	0.18	0.06	3.44****
Relational contract – Contractor value creation potential	H11	0.20	0.09	3.52****	0.09	0.06	2.03**

[57] Standardized estimates
[58] Standard error

		Multiple regression			Latent Variables Scores		
Relational contract – Innovative performance	H12	0.15	0.11	2.76***	0.04	0.08	1.03
Significant effects of control variables							
Project importance – Performance (P1-P4)[59]		0.14	0.05	2.35	0.29	0.06	3.95****
		0.16	0.08	2.46	-0.59	0.09	-9.77****
		-0.19	0.10	-3.15	-0.72	0.10	-11.96****
		0.25	0.12	4.29	0.17	0.12	2.22**
Past experience – Performance (P1-P4)		0.05	0.04	0.90	0.01/	0.06	0.08
		0.00	0.07	0.06	0.0/	0.09	0.04
		-0.07	0.08	-1.16	0.11/	0.09	2.19**
		-0.04	0.11	-0.71	0.16	0.12	3.12***
Future expectations – Performance (P1-P4)		-0.09	0.04	-1.56	-0.22/	0.04	-3.43****
		0.08	0.07	1.43	-0.03/	0.07	-0.46
		0.01	0.08	0.17	0.09/	0.07	1.75
		-0.01	0.11	-0.10	-0.04	0.09	-0.68
Significant effects of rival predictors							
Contract type - (P1-P4)		0.01	0.04	0.23	-0.03/	0.10	-0.35
		-0.04	0.07	-0.61	0.06/	0.16	0.91
		0.04	0.08	0.70	-0.06/	0.16	-0.82
		-0.04	0.11	-0.73	-0.11	0.21	-1.36
Centralization - (P1-P4)		0.03	0.05	0.043	0.28/	0.06	2.27**
		0.01	0.08	0.08	0.44/	0.10	3.32****
		-0.13	0.10	-2.09	0.53/	0.10	4.94****
		-0.16	0.13	-2.63***	0.63	0.13	5.97****
Market governance - (P1-P4)		0.18	0.04	2.98***	0.21/	0.09	1.83
		-0.01	0.07	-0.12	0.27/	0.14	2.35***
		-0.07	0.09	-1.24	0.81/	0.14	8.75****
		-0.02	0.12	-0.36	1.0	0.18	10.84****
Alignment hypotheses		Method: Multiple regression			Method: Latent Variables Scores		
FC * PSI – Goal attainment	H13	0.03	0.03	0.59	-0.04	0.05	-0.71
FC * PSI – Customer value creation potential	H15	0.06	0.04	0.97	0.06	0.07	1.09
FC * PSI – Contractor value creation potential	H17	0.10	0.06	1.78*	0.11	0.08	2.47**
FC * PSI – Innovative performance	H19	0.08	0.08	1.47	0.10	0.10	2.44***
RC * PSI – Goal attainment	H14	0.10	0.10	1.66	0.15	0.04	2.85***
RC * PSI – Customer value creation potential	H16	0.15	0.05	2.53**	0.15	0.06	2.74***
RC * PSI – Contractor value creation potential	H18	0.00	0.07	-0.49	0.13	0.06	2.93***

---

[59] P1 = Goal attainment, P2 = Customer value creation potential, P3 = Contractor value creation potential, and P4 = Innovative performance.

RC * PSI – Innovative performance	H20	-0.04	0.10	-0.72	0.04	0.08	0.82

Significance levels: t>1.645: p<0.10*; t>1.96: p<0.05**; t>2.58: p<0.01***; t>3.29: p<0.001****

	Squared multiple correlations for reduced form	Additional variance explained by including the interaction effects, R^2
Goal attainment	0.16	7.5% (from 0.146 to 0.157)
Customer value creation potential	0.13	29.0% (from 0.100 to 0.129)
Contractor value creation potential	0.31	4.6% (from 0.197 to 0.206)
Innovative performance	0.26	3.0% (from 0.199 to 0.205)
Overall Goodness of fit indices	χ^2 = 1703.38 df = 743 RMSEA = 0.064 NNFI = 0.93 CFI = 0.93 IFI = 0.93 AGFI = 0.76 St. RMR = 0.11 CN = 173.72	

All goodness of fit indices in the research model indicate acceptable fit to the data (e.g., RMSEA=0.064). As the model indicates only 'acceptable' or poor fit to the data, our confidence in the results of the analyses decreases. The independent variables in the model explain from 13 to 26% of the variance in the endogenous variables, see Table 6-11. Contrary to the previous models, the results are not concurrent between the estimation methods (see Table 6-11). The deviance in results applies only to the latent variable score estimates, particularly, some of the direct effects of the control variables and rival predictors. Hence, these results (latent variable scores) must be interpreted with great caution. One possible explanation is that there are too many variables in the model; that is, the complexity of the model might be too high for the estimation method to handle. To our knowledge, this phenomenon has not been recognized and treated earlier in the research literature. However, in previous empirical studies it has been found that the latent variable scores estimation method produced 'stronger' results than other methods,

see for example Svendsen (2005). The model was re-specified and several reruns were undertaken to produce results that were more 'meaningful', however these measures were not successful. As a result, we relied on multiple regressions when interpreting interaction effects, and standard structural equation modelling when interpreting direct effects in the model (Table 6-11).

The results reported in Table 6-11 show that: *project importance* is positively and significantly related to performance (although not the contractor value creation potential), *past experience* is *not* related to performance (!), *future expectations* are *not* related to performance, *contract type* is *not* related to performance, *centralization* is *not* related goal attainment, and *negative and significantly* related to innovative performance (and the contractor value creation potential), and finally, *market governance* is positively and significantly related to goal attainment, but has no effect on customer and the contractor value creation potential and innovative performance.

When we compare the sizes and significance levels of the hypotheses in the full model (Table 6-10) with the result in the table above (Table 6-11), we see only small changes. Hence, our confidence in the (full) research model and the related results are further strengthened. However, with regard to the *interaction effects*, although the changes are small, they dramatically influenced the results. Hence, as a consequence of including control variables and rival predictors, several of the interaction effects now drop below the cut off levels as seen in Table 6-11 (i.e., they are no longer significant). As discussed earlier, the complexity of the model may mask the effects of the interactions, and the problem of multicollinearity has been raised as another potential explanation. However, we acknowledge that the interaction effects are weak (t-values) and that the additional variances achieved by including the interaction effects are small. Nevertheless, the results are as expected. Compared to other empirical studies our results rank equally, see for example Noordewier, John et al. (1990), Cannon, Achrol et al. (2000), Poppo and Zenger (2002).

6.8 Summary of the findings

In the table below (Table 6-12), a summary of findings is presented. For a detailed presentation of the results, please see the previous sections in this chapter.

Table 6-12: Summary of the findings

Structural linkages in the model						
	Hypothesized. relationship	Hyp. effect	Found	Sig. level	Conclusion	t-value
The full research model (Model 3):						
H1	Project specific investments – Goal attainment	-	-0.06	Not supported	Not supported	-0.95
H2	Project specific investments – Customer value creation potential	+	0.24	p<0.001	Supported	3.48****
H3	Project specific investments – Contractor value creation potential	+	0.40	p<0.001	Supported	5.91****
H4	Project specific investments – Innovative performance	+	0.30	p<0.001	Supported	4.61****
H5	Formal contract – Goal attainment	+	0.31	p<0.001	Supported	4.48****
H6	Formal contract – Customer value creation potential	+	0.06	Not Supported	Not Supported	-0.80
H7	Formal contract – Contractor value creation potential	-	-0.25	p<0.001	Supported	-3.60****
H8	Formal contract – Innovative performance	-	-0.30	p<0.001	Supported	-4.50****
H9	Relational contract – Goal attainment	+	0.10	Not supported	Not supported	1.52
H10	Relational contract – Customer value creation potential	+	0.23	p<0.01	Supported	3.22***
H11	Relational contract – Contractor value creation potential	+	0.29	p<0.001	Supported	4.22****
H12	Relational contract – Innovative performance	+	0.24	p<0.001	Supported	3.61****

Alignment hypotheses – formal contract model (Model 1):						
H13	FC * PSI – Goal attainment	+	0.05	Not supported	Not supported	1.31
H15	FC * PSI – Customer value creation potential	+	0.11	p<0.10	Supported	1.95*
H17	FC * PSI – Contractor value creation potential	+	0.19	p<0.05	Supported	2.57**
H19	FC * PSI – Innovative performance	+	0.20	p<0.05	Supported	1.98**
Alignment hypotheses – relational contract model (Model 2):						
H14	RC * PSI – Goal attainment	+	0.10	p<0.1	Partial support	1.79*
H16	RC * PSI – Customer value creation potential	+	0.09	p<0.1	Partial support	1.70*
H18	RC * PSI – Contractor value creation potential	+	0.05	Not supported	Not supported	0.95
H20	RC * PSI – Innovative performance	+	0.02	Not supported	Not supported	0.43
Alignment hypotheses – the full research model (Model 3)						
H13	FC * PSI – Goal attainment	+	0.01	Not supported	Not supported	0.16
H15	FC * PSI – Customer value creation potential	+	0.02	Not supported	Not supported	0.30
H17	FC * PSI – Contractor value creation potential	+	0.08	Not supported	Not supported	1.35
H19	FC * PSI – Innovative performance	+	0.06	Not Supported	Not Supported	1.06
H14	RC * PSI – Goal attainment	+	0.10	Partial support	Partial support	1.61
H16	RC * PSI – Customer value creation potential	+	0.14	p<0.05	Supported	2.26**
H18	RC * PSI – Contractor value creation potential	+	0.05	Not supported	Not supported	0.82
H20	RC * PSI – Innovative performance	+	0.02	Not supported	Not supported	0.35
Significance levels: t>1.645: p<0.10*; t>1.96: p<0.05**; t>2.58: p<0.01***; t>3.29: p<0.001****						

7 Discussion and implications

7.1 Discussion of the results

The goal of this dissertation has been to study the performance implications of: 1) *formal* and *relational* governance mechanisms, 2) *project specific investments*, and 3) their *interactions* (1 x 2) in inter-firm *innovation* projects. In the following sections, we present and discuss the results of the analyses performed in Chapter 6. First, we present and discuss the direct effects of *project specific investments* on performance. Second, we present and discuss the direct and interaction effects of formalization and relational norms on performance. We will discuss them all one-by-one, starting with the effect of *project specific investments*.

7.1.1 Main result I - The effect of project specific investments

The direct effect of project specific investments

The direct effects hypothesized of project specific investments on project performance are illustrated below. We use *one* figure to demonstrate both the hypothesized direction and the results of the hypotheses testing, and for that reason we have included text in the figure below to explain our use of signs. In the corresponding figures throughout this chapter, further explanations are excluded.

Figure 7-1: The direct effects of project specific investments on performance

- Formal contract
- Relational contract

Performance:

- **(-) [ ] Goal attainment**
- **(+) [+**] Customer value creation potential**
- **(+) [+**] Contractor value creation potential**
- **(+) [+**] Innovative performance**

Project specific investments
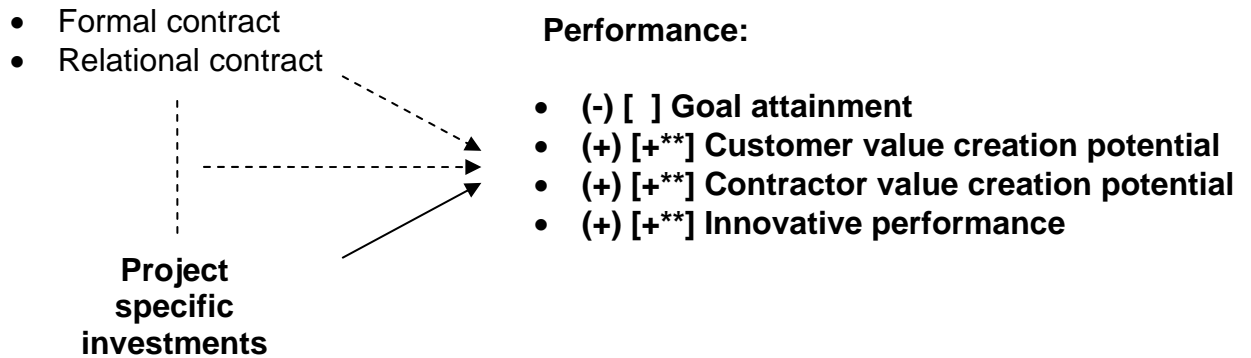
( ) = No hypothesized relation
(+) = Positive hypothesized relation
(-) = Negative hypothesized relation

[   ] = Not supported
[-/+] = Negative/positive support in Model 1 or 2
[-/+*] = Negative/positive support in the full model (Model 3)
[-/+**] = Negative/positive support in both models

One example: (+) = positive hypothesized relation, and [+**] = positive relation was found as predicted, and ** means that the result was found in both models.

The reported result shows that a *negative* effect of project specific investments on *goal attainment* is indicated (although not significant). This result is in accordance with our arguments that project specific investments are mainly undertaken to create value, and *not* with the intention to achieve project goals such as time and cost schedules, and pre-specified quality levels. However, *if* project specific investments are undertaken by the parties, our results show that they should also take into consideration the potential downsides of these investments (e.g., increased transaction costs). That is, project specific investments *may* lead to delays, cost overruns, and possibly quality failures due to the *uniqueness* of these investments. One more comment must be added to the discussion: we argued that the *partial* effect of project specific investments on quality levels might be positive. Unfortunately, our test does not reveal this potentially important partial effect on quality. Hence, if the effect on quality had been left out, project specific investments *might* have had an even stronger negative effect on cost overruns and delivery time.

Further, the reported results indicate a strong positive and significant effect of project specific investments on *customer and the contractor value creation potential and innovative performance*. These results are in accordance with our arguments that greater project specific investments (i.e., human and physical asset specificity) lead to the development of superior competencies, that is, knowledge, know-how, and training. Furthermore, the resulting specialized or specific knowledge and know-how enhances the probability of value creation and innovative performance. Hence, based on our results, we conclude that project specific investments are a *source* of value creation and innovative performance. Our results support previous conceptual work by for example, Williamson (1985) and Clark and Fujimoto (1991); both argue that specific investments are undertaken to facilitate cost reductions and product development. Furthermore, our results corroborate the empirical findings in Dyer (1996) that greater human asset specialization results in superior coordination, information sharing, and innovation.

To sum up, our study provides evidence that supports the value creating properties of specific assets. In our study, we have included multidimensional performance measures and thus explicitly demonstrated the distinct and different effects of project specific investments on performance. The empirical research is scarce on these subjects, thus we claim that our results contribute significantly to the literature. The reported results were supported in all models (Models 1-4).

7.1.2 Main result II - The effect of formalization

The direct effect of formalization on performance

The hypothesized effects of formalization and the results of the hypotheses testing are illustrated in the figure below (see Figure 7-1 above for an explanation of the signs and text used in the figure).

Figure 7-2: The direct effects of formalization on performance

- **Formal contract**
- Relational contract

Performance:

- **(+) [+**] Goal attainment**
- **(+) [+] Customer value creation potential**
- **(-) [-**] Contractor value creation potential**
- **(-) [-**] Innovative performance**

Project specific investments
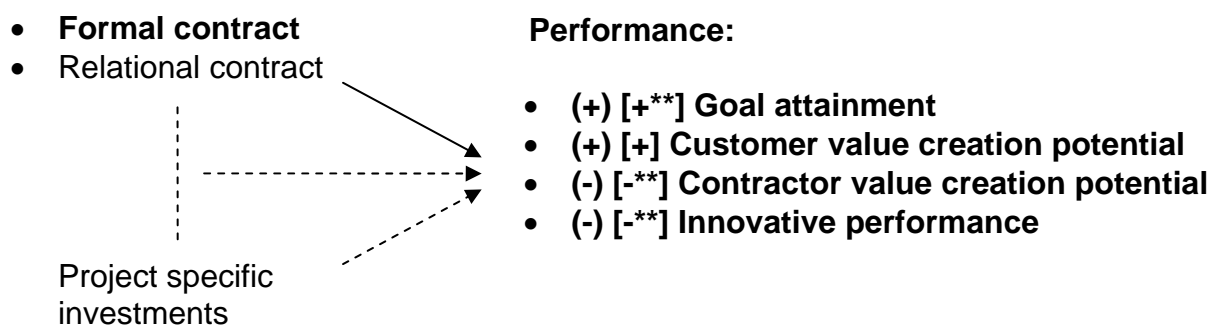
The results reported indicate a positive and significant effect of *formalization* on *goal attainment,* as well as on the *customer value creation potential*. These results are in accordance with our arguments that rules and procedures in a formal contract are particularly suitable as governance mechanisms when ambiguity is low. Hence, formal contracts may be used effectively to both achieve project goals such as cost and time schedules, quality levels, as well as to enhance value creation potentials such as cost reductions and improvements.

Furthermore, our results indicate a negative and significant effect of *formalization* on *the contractor value creation potential* and *innovative performance*. These results provide support to our arguments that innovation is less contractible, that is, increasing the level of formalization will be futile resulting in misaligned contract execution and increased transaction costs. Due to increase of 'bureaucratization' costs, innovative activities are disabled, leading to reduced innovative performance. These results are in compliance with the new product development literature.

Our results supports the findings in Poppo and Zenger (2002) that there are 'limits' to the adaptive properties of formal contracts, particularly when the level of ambiguity is high. Furthermore, our results indicate that high levels of formalization reduce innovative performance in projects. Hence, our results have the potential to answer the speculations in Sampson (2004) that excessive rules and procedures might reduce innovative performance. Furthermore, the same results are indicated in relation to the contractor value creation potential. Hence, these results provide additional support to our arguments that an increase of formalization is futile when the level of ambiguity is high.

The results presented support previous conceptual work within for example, the innovation literature, which claims that a high level of formalization might destroy an innovative culture or climate (Burns and Stalker 1961). However, most of this work has been conducted in an intra-organizational context (i.e., low level of hazards). In the inter-organizational literature, the effect of formalization is not concurrent as demonstrated in Chapter 3 (literature review). By demonstrating that the effect of formalization is significantly different for each performance dimension, we are able to clarify the effects of formalization on performance. Hence, by including the multidimensional nature of performance, our results have the potential to contribute significantly to the literature.

The interaction effects of formalization and project specific investments

The hypothesized interaction effects between formalization and project specific investments, and the results of the hypotheses testing are illustrated in Figure 7-3 below.

Figure 7-3: The interaction effects of formalization and project specific investments

- **Formal contract**
- Relational contract

Performance:

- **(+) [ ] Goal attainment**
- **(+) [+] Customer value creation potential**
- **(+) [+**] Contractor value creation potential**
- **(+) [+] Innovative performance**

Project specific investments
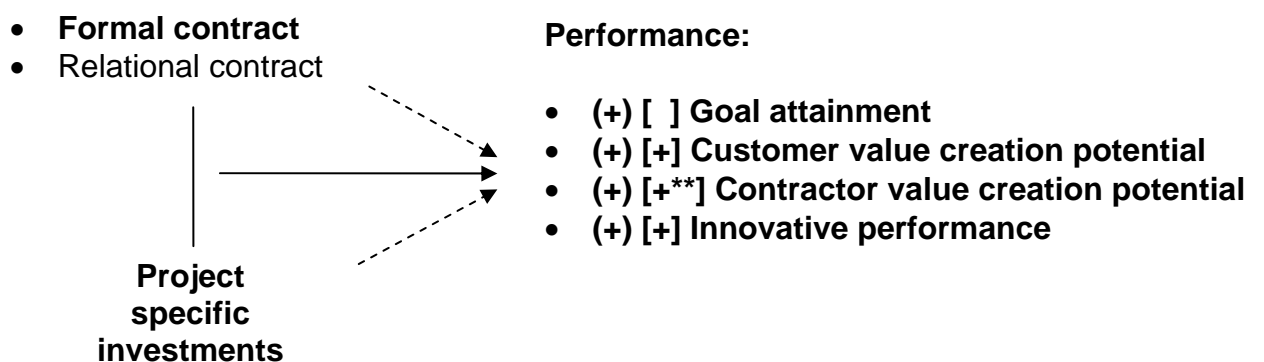
The results reported above show that the effects of formalization, aligned with the level of project specific investments, are positive and significant on performance. One exception is the contingent effect of formalization on goal attainment; the effect was positive but not significant.

First and foremost, these results strongly support the normative predictions of transaction cost theory. The results are in accordance with transaction cost theory *and* our argumentation that hierarchical mechanisms (represented by rules and procedures in a formal contract) are effective mechanisms to safeguard the transaction against hazards associated with project specific investments and ambiguity. That is, efficient alignment results in reduced transaction costs and enhanced performance. A more in-depth interpretation of the results follows below.

Our results from the previous section indicated that the *direct* effect of employing rules and procedures on innovative performance was negative. The negative effect on innovative performance was attributed to the negative effects of rules and procedures when goals are less contractible. Furthermore, bureaucratization effects may result due to the excessive use of rules and procedures, reducing the innovative activity in the project. That is, formalization seems to negatively influence creativity and innovative performance (i.e., transaction costs increase when contract execution is misaligned). However, when high levels of project specific investments are introduced, our results indicate that *formalization* functions as an *effective safeguard* to mitigate the hazards associated with such investments. This affects innovative performance more than goal attainment. The results are comparatively lower transaction costs, increased incentives to undertake project specific investments, and therefore increased innovative performance. That is, *our results indicate that as the level of project specific investments increases, the positive safeguarding effects of formalization increase more than the negative bureaucratization effects, leading to increased value creation potential and innovative performance.* These effects are illustrated in Figure 7-3 and 7-4.

As argued above, although the formal contract may be limited in its adaptive properties, our results indicate that the safeguarding properties of rules and procedures more or less *override* the partial effect of its limited adaptive properties. Hence, our results strongly contradict the findings in Poppo and Zenger (2002), and Dyer (1996) that "managers may lose confidence in contracts as hazards becomes particularly severe" (Poppo and Zenger 2002: 719). On the contrary, even in innovation projects, our results indicate that managers should put considerable effort into crafting customized contracts to safeguard their investments.

Below in Figure 7-4, we have illustrated the results of the interaction hypotheses in three dimensions. That is, the interaction effect of the formal contract and project specific investments on all four performance dimensions.

Figure 7-4: 3D illustration of the interaction hypotheses (formal contract x project specific investments)

Customer value creation potential

Project specific investments

Formal contract

Contractor value creation potential

Project specific investments

Formal contract
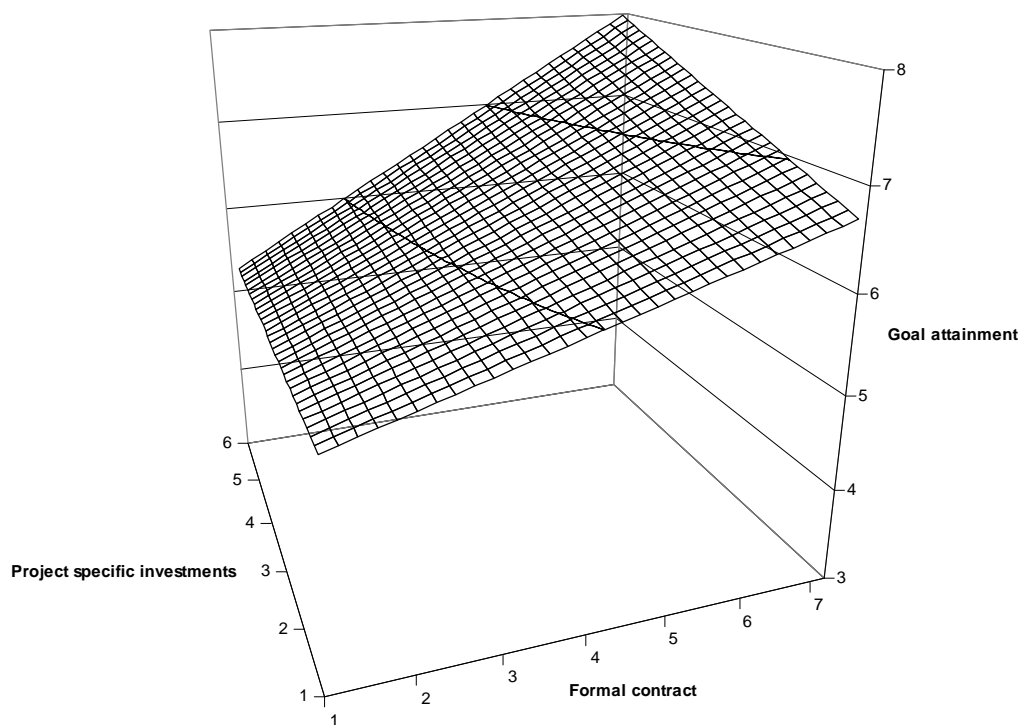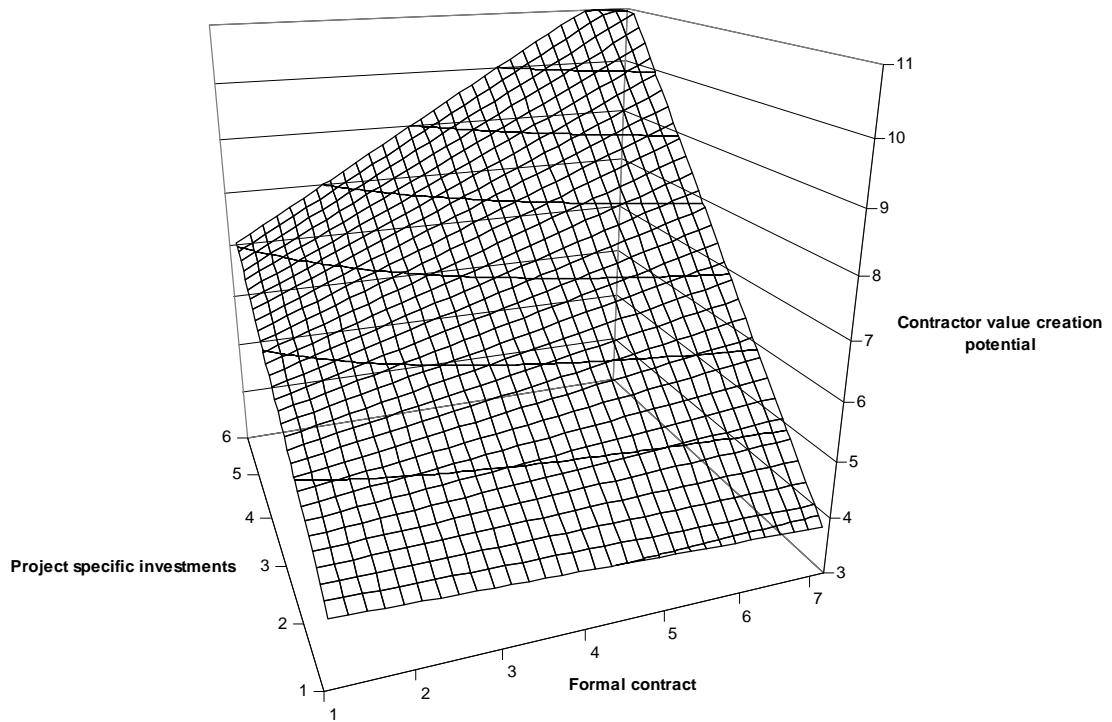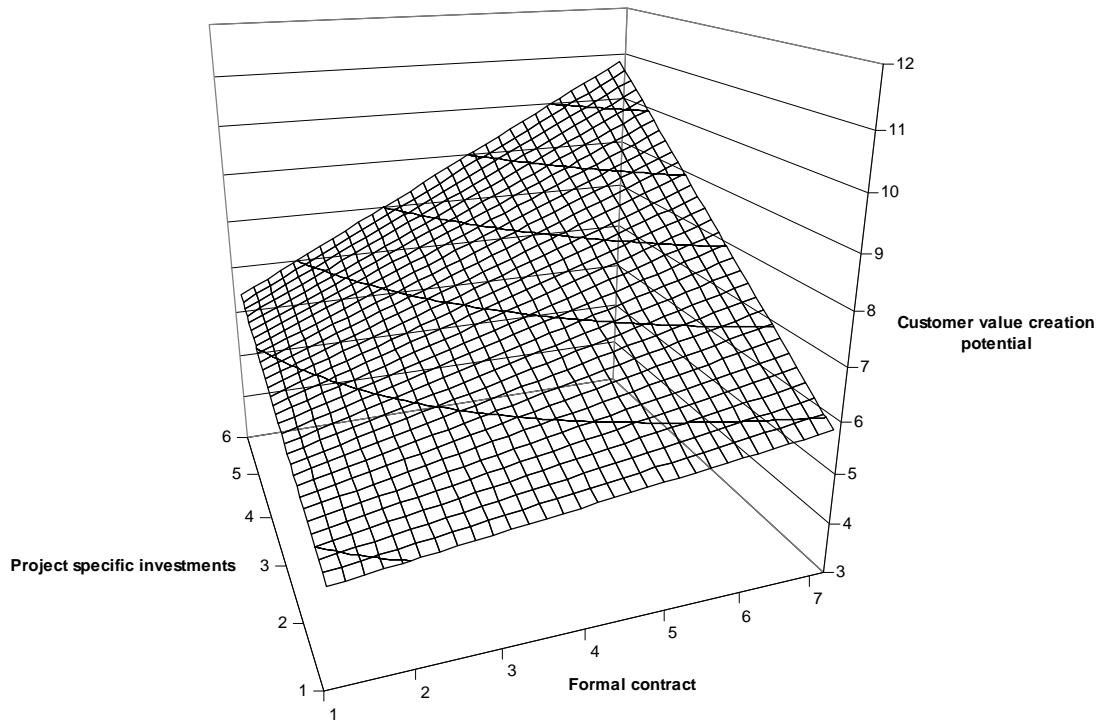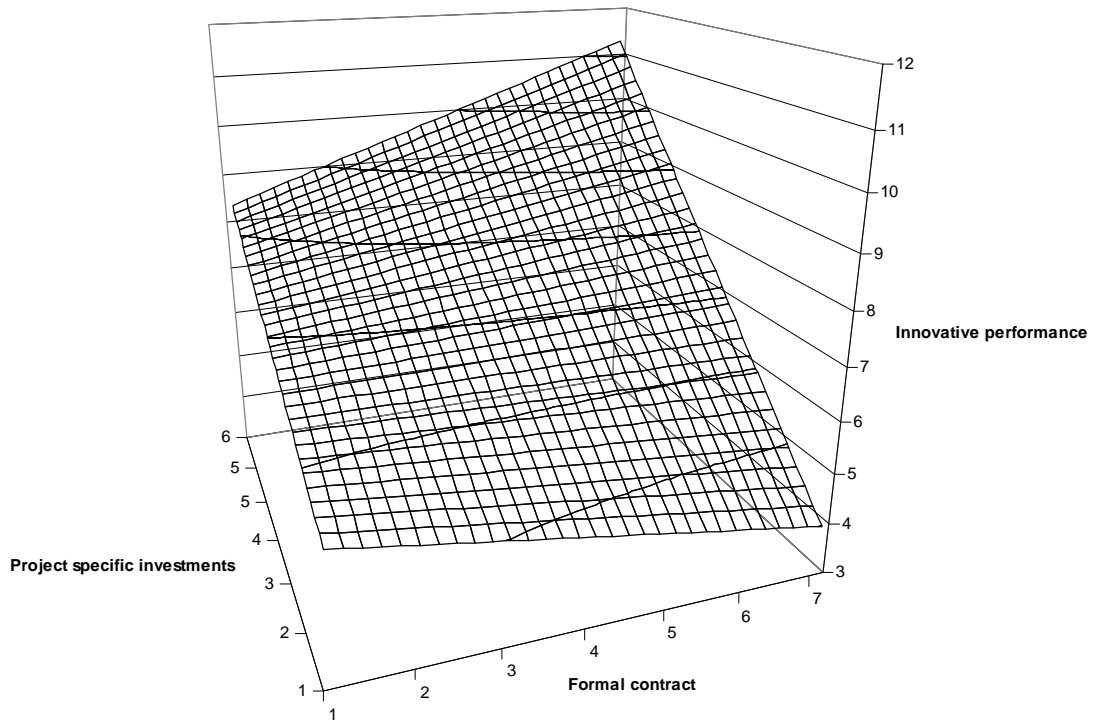
7.1.3 Main result III - The effect of relational norms

The direct effects of relational norms on performance

The direct effects hypothesized of relational norms and the results of the hypotheses testing are illustrated in Figure 7-5 below.

Figure 7-5: The direct effects of relational norms on performance

- Formal contract
- **Relational contract**

Project specific
investments

Performance:

- **(+) [ ] Goal attainment**
- **(+) [+**] Customer value creation potential**
- **(+) [+**] Contractor value creation potential**
- **(+) [+**] Innovative performance**
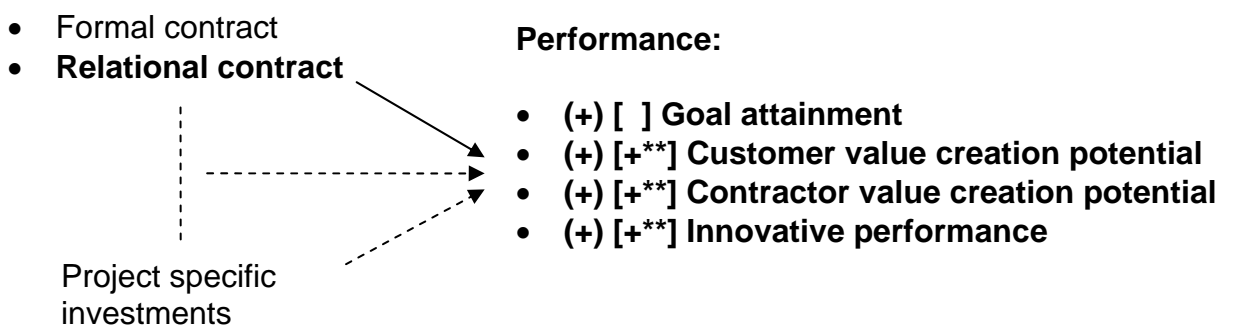
The results show that the overall effects of relational norms on performance are positive, *and* that the positive effect of relational norms becomes *stronger* as the level of ambiguity increases from goal attainment (positive but not significant) to innovative performance (positive and significant). These results provide support to our argumentation that relational norms are important for all types of performance. However, relational norms are indicated to be of less importance when ambiguity is low; therefore formal governance is indicated to be *sufficient* to govern the project in this respect.

Further, our results show that relational norms are positively related to value creation and innovative performance. These results are in accordance with our argumentation that relational norms provide superior adaptive properties when exposed to high levels of ambiguity like in innovation projects. That is, relational norms are indicated to 'fill' the gaps in the contract, and provide *additional* adaptive properties to the contracting parties. Due to the limited ability of formal contracts to enable innovative performance (see previous section), we emphasize the importance of relational norms when ambiguity is high.

The literature is not concurrent on the effect of relational norms in the face of uncertainty (see literature review in Chapter 3). For instance, Williamson (1975) argues that a 'favourable trading atmosphere' will have a positive effect in general on a business relationship. However, other researchers argue that relational norms are effective only in the presence of uncertainty (Noordewier, John et al. 1990; Cannon, Achrol et al. 2000). For example, both Noordewier, John et al. and Cannon, Achrol et al. argued that relational norms are redundant when ambiguity is low. As stated above, our results provide support to both sides; relational norms are positively related to performance, and the positive effect of relational norms becomes *stronger* when ambiguity increases, like for value creation and innovative performance. By including the multidimensional nature of performance, our results contribute to the extant literature by *better* demonstrating the complex effect of relational norms on performance.

Finally, our results *may* indicate that the *nature* of the relational norms matters, that is, relational norms *might* be an additional '*source*' of value creation and innovation. Strong relational norms implicitly assume enhanced *interaction* (both in quality and quantity) between the contracting parties. Thus, increased value creation and innovative performance might be attributed to the quality and quantity of for example, the information exchanged in the relationship. To sum up, increased value creation and innovative performance might be attributed to the partial effects of increased *adaptation*, or increased *interaction,* or both. Unfortunately, we have not been able to test these *partial* effects on value creation and innovative performance.

The interaction effects hypothesized between relational norms and project specific investments and the results of the hypotheses testing are illustrated in Figure 7-6 below.

Figure 7-6: The interaction effects of relational norms and project specific investments

- Formal contract
- **Relational contract**

Performance:

- **(+) [+**] Goal attainment**
- **(+) [+**] Customer value creation potential**
- **(+) [ ] Contractor value creation potential**
- **(+) [ ] Innovative performance**

Project specific investments
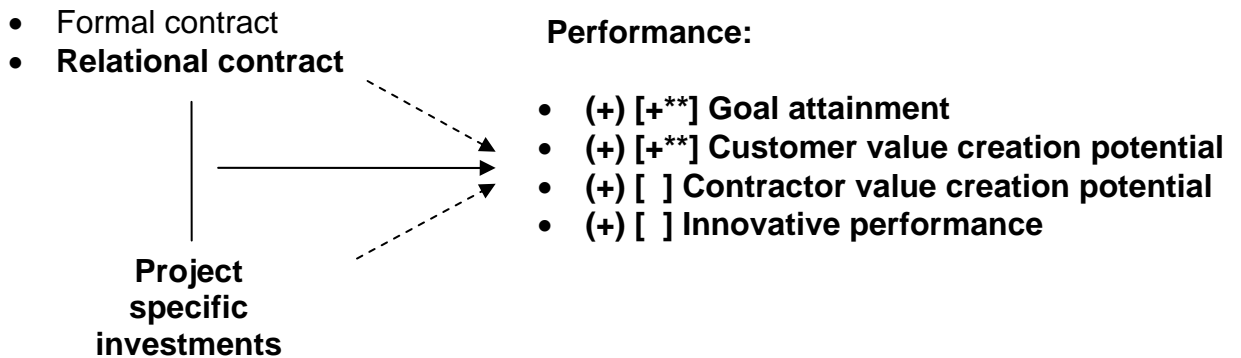
Although not significant, our results confirm that stronger relational norms are positively related to enhanced goal attainment. Further, our results indicate a positive effect of relational norms on cost reductions and improvements (i.e., the customer value creation potential). The level of ambiguity increase, and thus, the importance of norms as gap-fillers increase accordingly (see previous section). Hence, these results indicate that relational norms provide the necessary safeguarding and adaptive capabilities to protect against opportunistic behaviour. The result reported supports the presented arguments.

In the previous section (i.e., direct effects of relational norms), the overall effects of relational norms on *all* kinds of performance were indicated to be positive. However, when the level of project specific investments increased, the positive effects of relational norm were, to our surprise, no longer indicated on the *contractor value creation potenti*al and *innovative performance* (see Figure 7-6). These results do *not* support our argumentation that relational norms and values guide behaviour *ex ante* and control behaviour *ex post*. Furthermore, our results demonstrate that relational norms are *not* an effective mechanism to safeguard *project specific investments* from opportunistic appropriation. Finally, the results indicate that relational norms do *not* provide incentives and motivation that are strong enough for the parties to undertake further value creating initiatives.

Based on the results of our analyses, we conclude that the safeguarding properties of relational norms are *marginal* when both the level of ambiguity *and* the level of project specific investments are high (in combination). Furthermore, these results indicate the presence of a substitution effect, and *not* a complementary effect, between the two governance mechanisms. Hence, our argumentation that formal and relational mechanisms support each other when hazards are severe must be questioned. All models (Models 2, 3 and 4) demonstrated concurrent results, hence our confidence in the results are strong.

In our study, the results indicated a *limited* ability of relational norms to safeguard project specific investments. These results are surprising, and are contrary to our hypotheses, as well as the extant literature, see for example Heide and John (1992), and Cannon, Achrol et al. (2000). However, our results are supported by similar findings in Poppo and Zenger (2002). Due to the rather surprising results, we discuss some possible explanations. In other contexts such as B2B – marketing, where relationships typically endure for several years, stronger support *might* be found for the relational norms hypotheses. Hence, one possible explanation is that the relational norms have not yet been sufficiently developed due to the low average project length (MEAN=2 years). However, this explanation was ruled out due to the high scores on the relational contract scale (Mean=5.4, Std.dev. 1.0). That is, the relational norms seem to be strong and fully developed! These results are consistent with the conceptual work presented in Lambe, Spekman et al. (2000) that relational norms may be fully developed although the exchange is of a interimistic[60] character. Lambe, Spekman et al. argued that a high level of intensity and interaction during project execution would boost the development of relational norms. Our results support these arguments; that is, strong relational norms can be developed within a relatively short period of time.

Below in Figure 7-7, we have illustrated the results of the interaction hypotheses in three dimensions. That is, the interaction effect of the relational contract and project specific investments on all four performance dimensions.

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[60] Interimistic relational exchange is defined as a close, collaborative, fast-developing, short-lived exchange relationship in which companies pool their skills and/or resources to address a transient, albeit important, business opportunity and/or threat." Lambe, C. J., R. E. Spekman, et al. (2000). "Interimistic relational exchange: Conceptualization and propositional development." Journal of the Academy of Marketing Science **28**(2): 212-225.

Figure 7-7: 3D illustration of the interaction hypotheses (relational contract x project specific investments)

Contractor value creation potential

Project specific investments

Relational contract

Innovative performance

Project specific investments

Relational contract
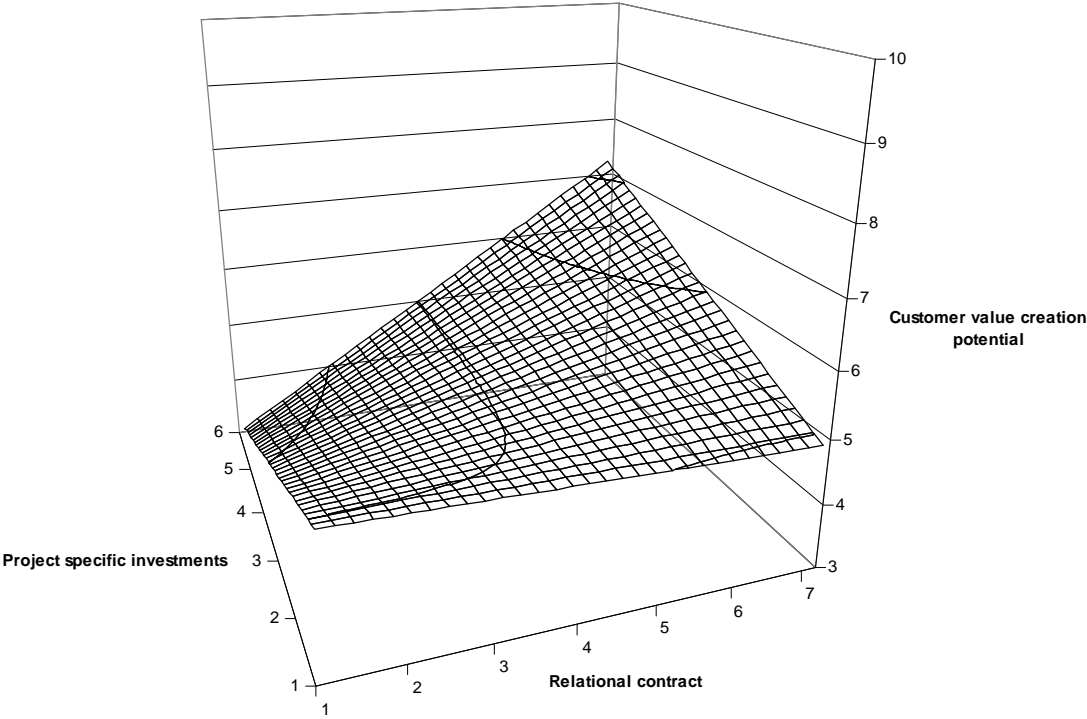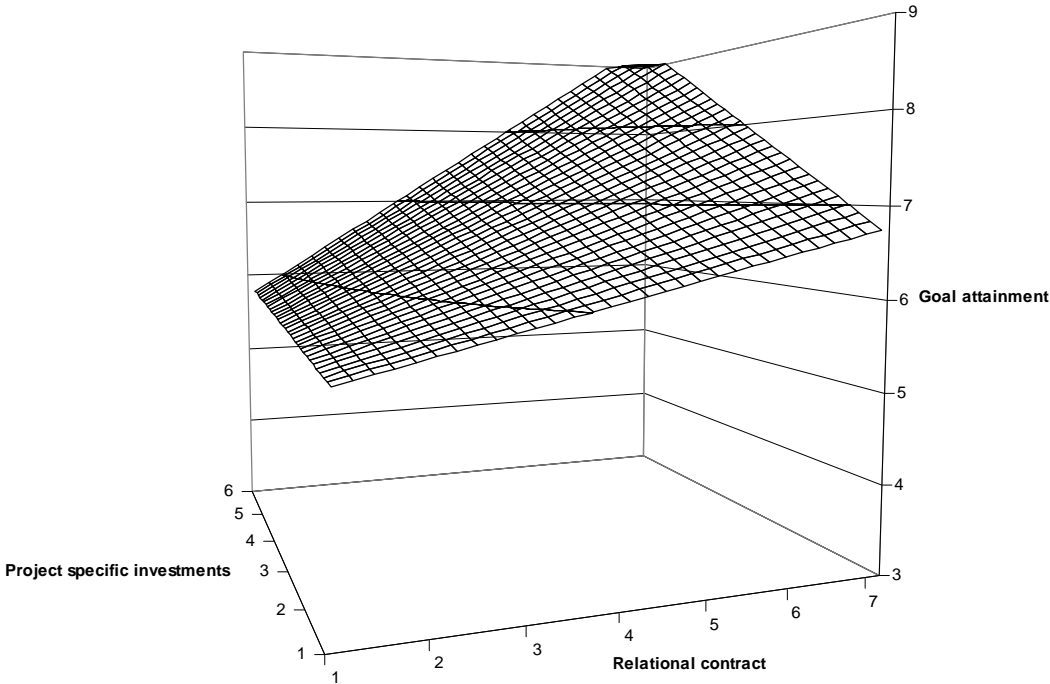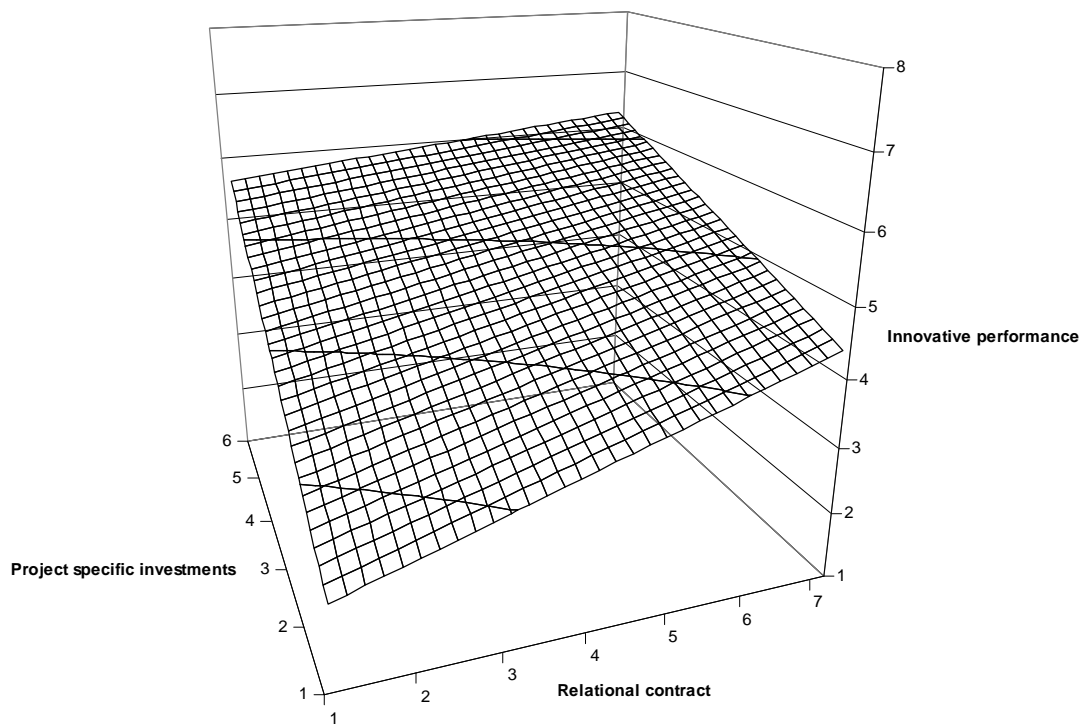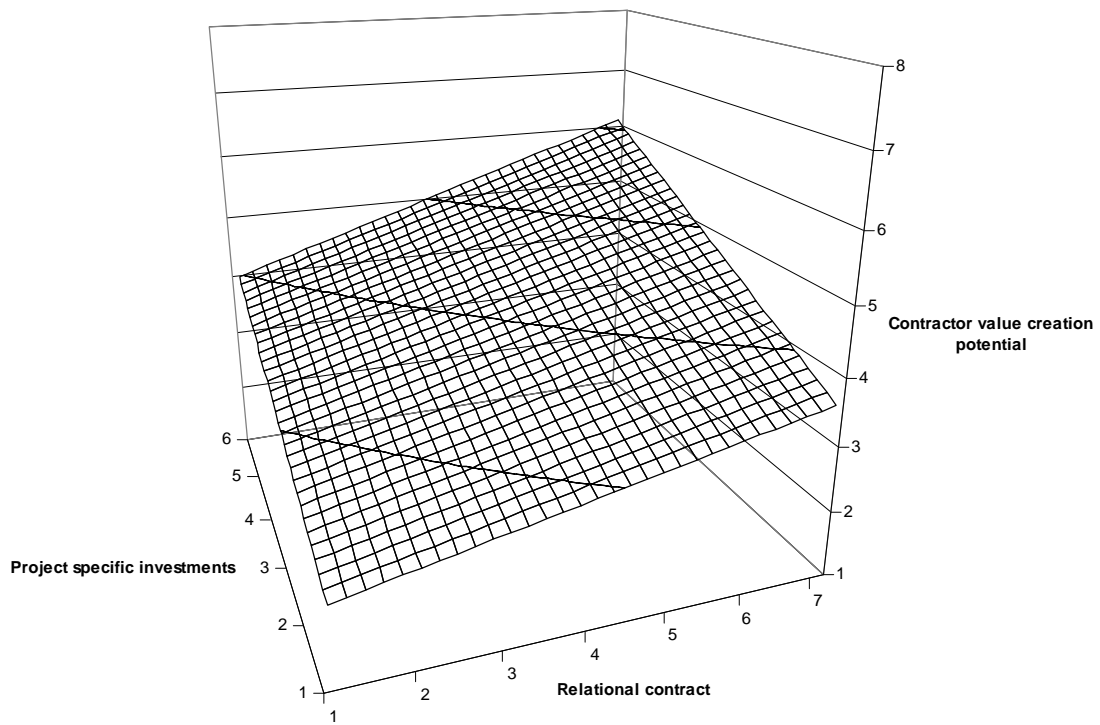
7.2 Theoretical and managerial implications

In this section, theoretical and managerial implications are presented and briefly discussed. The empirical contributions of our study were partly presented in the previous section when the results were discussed (see Section 7.1).

7.2.1 Theoretical implications

In this chapter, the theoretical implications are presented in the same order as they were discussed in the previous section. That is, the contributions are not ordered according to their theoretical importance.

Theoretical contribution I – extending transaction cost theory

First and foremost, our results provide support to the normative predictions of standard transaction cost theory: that hazards associated with specific investments, and to some degree uncertainty, can be mitigated by employing more *hierarchical* mechanisms. The results support our argumentation that high levels of formalization effectively mitigate the hazards associated with 1) project specific investments combined with the assumption of opportunism, *and to some degree* 2) incompleteness combined with the assumption of bounded rationality. The use of hierarchical mechanisms is indicated to reduce transaction costs, and subsequently an increase of *all* types of performance.

As we know, transaction cost logic is based on cost minimization. Thus, enhanced 'goal attainment' may perfectly well be attributed to a reduction in transaction costs. However, how likely is it that cost minimization will lead to enhanced innovative performance? Although some part of enhanced innovative performance and value creation potential can be attributed to a reduction in transaction costs (and in particular "bureaucratization" costs), this study has included elements from *transaction value analyses* to be able to more fully explain the cause of enhanced value creation and innovative performance. Hence, we do not only focus on cost minimization alone, but on value maximization as well. That is, in this dissertation we have argued that increased value and innovative performance can be attributed to both 1) a reduction in transaction costs by safeguarding project specific investments, and 2) governance mechanisms that provide incentives for value creating initiatives; value creating initiatives that may create

values beyond our expectations (i.e., value creation beyond what was contracted for). Although the focus is changed slightly from cost minimization to value maximization, we claim that the logic is basically the same as in standard transaction cost theory.

Hierarchical mechanisms are indicated to provide sufficient safeguarding, and thus incentives to undertake value creating investments. The results indicate support to our argumentation that value creation is not only a result of reduction in transaction costs, but is also due to *increased* levels of project specific investments. Furthermore, based on our results, we claim that enhanced value creation and innovative performance are observed mainly due to increased levels of project specific investments. These specialized investments are of significant importance when value maximization is desired. That is, additional value or value creation *may* be generated that is beyond our expectations. In short, *our results indicate that as the level of project specific investments increases, the positive safeguarding effects of formalization increase more than the potential negative effects related to 'bureaucratization' costs, leading to enhanced value creation potential and innovative performance.*

Unfortunately, due to the limitations in our study, we are not able to identify the partial effects of reduced transaction costs. In this respect, more research is needed. However, the results give us some indication of the *partial* effect of project specific investments. From our previous analyses, we established that project specific investments were *not* related to goal attainment, *and* were positively and significantly related to value creation potential and innovative performance. That is, project specific investments are indicated to be of utmost importance regarding value creation and innovative performance. What we do *not* know is the *partial* effect of transaction costs on all types of performance. However, our results indicate that 'goal attainment' and perhaps 'customer value creation' are related more to reduced transaction costs, and that 'contractor value creation' and 'innovative performance' are only marginally related to lower transaction costs. Since project specific investments are indicated to be of utmost importance regarding value creation and innovative performance contracting parties should be more concerned with maximizing transactional value through value creation initiatives. We conclude that formal contracts may provide the necessary incentives and thus motivate the parties to further invest in project specific investments that may create value beyond our expectations.

Further, we see more clearly the importance of hierarchical governance mechanisms when we compare the effect of formalization with the effect of relational norms on innovative performance. Our results show that relational norms do *not* seem to provide the parties with

sufficient safeguards, increased transaction costs, and thus inferior performance results. Increased formalization, on the other hand, does provide sufficient safeguards, resulting in lower transaction costs and enhanced innovative performance. For instance, our results show that formalization is *negatively* related to innovative performance when the hazards associated with specific investments are average. However, *when the level of hazards increases, our results indicate that use of hierarchical mechanisms leads to, or facilitates, enhanced innovative performance.* These results are *new* and in accordance with the predictions of transaction cost theory; thus, they provide additional support to this highly acknowledged and often mistakenly criticized theory within the field of new institutional economics.

In addition to measuring transaction cost, more research should be undertaken to explore the effect of project specific investments on all kinds of performance. In particular, we suggest that transaction cost theory and elements from the resource-based view should be integrated more closely (Gulbrandsen and Haugland 2000; Makadok 2003). First, we briefly present the resource-based view.

In Chapter 4, it was argued that investments had to be 'valuable', difficult for a competitor to imitate and substitute, to be a source of competitive advantage (Williamson 1985; Barney 1991). Hence, in order to create value and innovative solutions of a more *proprietary* kind, it was recommended that the parties invest in more *specialized* assets to support the execution of the project. The roots of Barney's work lie within *the resource-based view*. The core of the resource-based view is the assumption that industries are heterogeneous and that resources are immobile. Penrose (1959) argued that firms consist of heterogenic resources, which give firms a unique character, and this unique character was argued to be the basis of 'sustainable, competitive advantage.' Furthermore, the resource-based view focuses on 'value added' or 'value maximization' of the 'bundle of resources' of which a firm consists (Wernerfelt 1984).

Our results seem to provide support for the 'predictions' of the resource-based view that *unique resources* are a source of value. The equivalent within transaction cost theory is that *specific assets* might be a source of value if governed according to prescriptions of transaction cost logic. However, the resource-based view focuses on 'value maximization' of the 'bundle of resources' of which a firm consists. Hence, in order to integrate elements from the resource-based view into transaction cost theory, we need to expand the cost minimization logic of transaction cost theory into *transaction value analysis*, and thus incorporate a *value maximizing* logic (Zajack and Olsen 1993). That is, a too narrow focus on the minimization of transaction costs would not be

sufficient to explain all effects in our analyses. That is, higher transaction costs and less efficient governance *might* provide opportunities for innovation and learning (Sobrero and Roberts 2001). Thus, appropriate governance mechanisms should be put into place that enable such investments in the project (Zajac and Olsen 1993; Dyer 1996). However, we argue that the alignment logic of standard transaction cost theory should be followed. That is, by safeguarding the transaction and thus provide incentives for value creating investments, we may create value beyond our expectations (e.g., radical innovations).

More research should examine the importance of transaction cost economics in relation to innovation and value creation. Cost minimization logic seems too narrow when performance in innovation projects is studied; further work should be undertaken to extend transaction cost theory with the value maximization logic of transactional value analysis. Furthermore, future research should try to separate the increase of value due to the reduction of transaction costs, *and* the increase of value due to the applied governance mechanism's ability to provide incentives and motivation for the contracting parties to further invest in value creating initiatives such as project specific investments. To achieve this, the micro-foundations of transaction cost theory should be studied more closely by *directly measuring* the level of transaction costs.

Finally, the interaction effects illustrate another theoretically important subject. The results from the interaction analyses indicate that formal contracts can be 'fine-tuned' by the contracting parties to mitigate relevant hazards. Reduction of transaction cost results, and enhanced performance is observed. By contrast, relational norms do not seem to provide managers with the same properties (capabilities).

Theoretical contribution II – extending relational exchange theory

Relational norms are treated as 'governance' mechanisms in this dissertation. However, how easy is it to govern a project through these mechanisms? In Chapter 2, we argued that it is difficult to imagine that implicit governance modes, such as relational contracting, can be consciously designed. Below, we present evidence that indicates support to such an assumption.

Our results demonstrate that strong relational norms positively influence the level of value creation and innovative performance (direct effects). However, our results suggest that the effects of relational norms are *marginal* when the level of uncertainty and project specific investments increase. That is, the safeguarding properties of relational norms are weak and marginal. These results provide us with interesting and important theoretical implications. The results indicate that it is difficult, or even impossible, to 'fine-tune' these types of governance mechanisms in the project to achieve specific goals. The norms are either present or not, and the opportunity to manipulate them during project execution is regarded as minimal. However, managers who are aware of the importance of relational norms may take precautions (see managerial implications). Due to the importance of this subject, more research should be undertaken to uncover and clarify if, and to what degree, relational norms can be 'governed'.

As demonstrated above, our results show that the effects of relational norms are *marginal* when the level of ambiguity and project specific investments increase. Although the adaptive properties of relational norms perform satisfactorily, our results indicate that *relational norms may have 'limits' to their safeguarding properties when exposed to high levels of hazards associated with project specific investments.* These findings are analogous to the 'limits' of formal contracts when exposed to high levels of ambiguity, resulting in incomplete contracts. We conclude that the safeguarding properties of relational norms seem to be highly questionable. Although contrary to the extant theory, our results are consistent throughout all models; thus, our confidence in the results is strong.

Strong relational norms may not only provide safeguarding and adaptive properties. In addition, and as an extension of the theory, we have argued that the *nature* of relational norms possesses value creating properties ideal for innovative performance. The presence of strong relational norms involves enhanced *interaction* between the parties, that is, *closer* contact between the members of the two cooperating organizations. Firms and individuals, which are involved in close cooperation will most likely increase the amount and quality of interaction and exchanged

information (e.g. ideas, suggestions). Furthermore, interaction of this kind will most likely *enable* an innovative climate, thus the probability of enhanced value creation and innovative performance increases. These results indicate that close relations between firms are an important *source* of new ideas and information that result in enhanced value creation and innovative performance. However, our study does not separate the partial effects of adaptation, safeguarding and interaction, thus future research should further explore these partial effects.

Theoretical contribution III – the unit of analysis

Previous empirical works, which have examined the effects of formal and relational governance mechanisms and their performance implications, have mainly been conducted within the B2B marketing literature. Within these empirical contexts (e.g., distribution), long-term business relations are common and the unit of analysis is typically 'the relation' or 'the relationship'. The unit of analysis in this dissertation is the *transaction*, or inter-firm *project* (i.e., object of analysis); that is, the application of relational exchange theory is extended into what Lambe, Spekman et al. (2000) call *interimistic* relational exchange. "Interimistic relational exchange is defined as a close, collaborative, fast-developing, short-lived exchange relationship in which companies pool their skills, and/or resources to address as transient, albeit important, business opportunity or treat" (Lambe, Spekman et al. 2000: 212). Although not fully recognized in the literature, our results have demonstrated that strong relational norms can be also developed in projects of a more interimistic character. The main argumentation is that the intensity and high level of interaction during project execution would help boost the development of relational norms and values. Our results corroborate the conceptual work by Lambe, Spekman et al. (2000). It is possible to apply relational exchange theory successfully on inter-firm innovation projects, thus, the pre-existence of a long-term relationship in not an absolute demand. These findings should have important implications for managers. Our results indicate that strong relational norms can be developed in a relatively short period of time, and that these norms have the ability to contribute significantly to enhanced project performance.

7.2.2 Managerial implications

Today it is common to involve partners or contractors in innovation projects, or even leave *all* the development work to an external contractor. One reason behind this trend is that the actors in the industry acknowledge the great potential for technological innovations when cooperating more closely with key partners. However, close co-operation with only *one* key partner involves risks for both the oil company and the contractor. In this dissertation, we focus on the mitigation of hazards associated with investments in project specific assets, in combination with contract incompleteness due to ambiguity. Thus, *governance* of inter-firm innovation projects is needed to secure that value is created in the project, and that the value that is created is fairly *distributed* or *claimed* by the parties involved in the project (Ghosh and John 2005).

Formal contracts are the most used 'tool' to achieve these goals, a formal contract effectively safeguards the transaction against potentially opportunistic behaviour, provides excellent adaptation properties, as well as sanctions supported by litigation as the last resort. Relational (or informal) contracts, based on socially developed norms and values, were included in the study as an independent, governance mechanism. The literature indicates that these norms may provide *additional* safeguarding and superior adaptation properties, hence mitigating the hazards associated with project specific investment and ambiguity. In that case, how do the effect of formal and relational contracts, the effect of project specific investments, and their interaction, influence goal attainment, the customer and contractor value creation potential, and innovative performance? By providing answers to these questions, this study provides useful knowledge for managers in this respect.

First, we have previously discussed that the effect of formalization, that is, rules and procedures, is contingent upon the multidimensional nature of performance. Mangers should apply highly formalized contracts *only* when ambiguity is low. For example, a high level of formalization is particularly suitable to achieve time schedules, cost and quality levels. However, when the level of ambiguity increases, it becomes increasingly difficult to write exhaustive contracts *ex ante*. Regarding innovative performance, contracting becomes particularly challenging due to ambiguity. Hence in this case, we recommend a minimum level of rules and procedures in the contract: firstly, because our results indicate that more formalization does not increase innovative performance, and secondly, because excessive use of rules and procedures may lead to unwanted bureaucratization costs, and even destroy an innovative climate.

Second, *relational or cooperative norms* are found to be positively related to all types of performance. Thus, our results are more or less consistent with the extant literature. Managers on both sides of the relation should thus acknowledge the importance of more informal cooperation. In particular, strong norms of information exchange, flexibility, solidarity, and conflict resolution are identified as important relational norms leading to trust, mutuality, and finally, enhancement of all types of project performance. In particular, the first phase of a project is considered the most important. We advise mangers to put extra energy into the first phase, that is, invest in personal relations, for example, spend sufficient time, money, and personal energy into getting to know the other party, their goals, technology, and capabilities etc. Through the socialization process, managers might be able to develop strong common norms and values in relation to the specific project. An effective measure might be 'team building' activities and more informal meetings upfront or during the first phase of the project. In these informal meetings, the parties should sort out "how things should be done" in the project, try to communicate their unique organization culture etc. In other words, more effort should be directed into the first phase to enhance the probability of developing strong relational norms and values in the project. However, since relational norms are difficult or even impossible to manipulate during project execution, the selection of the right partner upfront is of critical importance. We assume that the choice of a well suited partner may positively influence the speed and quality of the relational norms and values, which will be developed in the project, thus leading to enhanced performance.

Third, we have demonstrated that formal and relational contracts need to take into account the level of project specific investments, as well as the multidimensional nature of performance. That is, hazards associated with specific investments and uncertainty can be mitigated by employing more hierarchical mechanisms such as rules and procedures in a formal contract. Our results demonstrated that high levels of formalization and safeguards would *not* destroy the innovative climate and innovative performance, but actually secure and motivate further investments in specific assets. Regarding the effects of relational norms, the results are more ambiguous. That is, there seems to be 'limits' to the safeguarding properties of relational norms. These results have direct impact on managers and their contracting dispositions. We caution managers to trust socially developed norms as safeguarding mechanisms when the level of hazards are high, for example associated with project specific investments in combination with high uncertainty as in innovation projects.

Finally, we have demonstrated the importance of project specific investments and their effect on the value creation potential and enhanced innovative performance. These results are consistent

with the extant literature within the field. In other words, the oil companies should motivate the contractors to undertake specific investments, before and during the execution of the innovation project. That is, for example, investments in specialized tools and equipment, relational investments in the other parties' representatives, technology, and organization etc. However, the contracting parties should also be aware of the downsides of undertaking such investments. Our results indicate an increased probability of cost overruns, delays, and *possibly* quality failures if project specific investments are undertaken. Nevertheless, these factors may be subordinate to, for example, achieving innovative performance. That is, in innovation projects the development of new technology might be more important than keeping tight time schedules!

7.3 Limitations and future research

This study has several limitations, which are presented and accounted for below. Hence, the findings in the study must be interpreted carefully and in relation to the limitations.

Theoretical issues

We have studied the effect of both formal and relational mechanisms and their performance implications. In order to do so, we tried to integrate transaction cost theory with relational exchange theory into one theoretical framework. Although there were some conflicting assumptions, more conceptual work should be done to further integrate these theoretical streams. Even Williamson has acknowledged the importance social norms and values have to control human behaviour; see for example his (1999) article on public and private bureaucracies. Furthermore, Ouchi identified clans as an impotent institutional 'form'- governing human behaviour as early as 1980.

Second, we see formal and relational contracts as mainly independent. However, we acknowledge the 'dynamic' nature of these mechanisms, thus conceding that "contracts may perform a critical role in the earlier stages of an exchange, but thereafter decrease in significance as patterns of cooperative behaviour and reputation emerge," (Poppo and Zenger 2002: 722). Hence, a substitution effect between formal and relational contracts may be present and significant in projects of 'extensive' project length. Thus, future research should examine these relations more closely than our preliminary analyses in Chapter 6.

Third, the study only applies two out of many 'governance mechanisms.' For example, one additional hierarchical mechanism, which could be integrated into the framework, is centralization. Furthermore, not all relational mechanisms were included; for example, we did not measure 'trust' directly in the study. All these (and more) mechanisms should be tested individually and in combination. We chose not to further expand our research model due to the *already* high complexity of the model.

Fourth, in Chapter 1, we defined the institutional form of the unit of analysis to be a hybrid (i.e., the inter-firm innovation project). According to Williamson (1991), each institutional form is a syndrome of attributes. Unfortunately, we have only been able to include one out of several hierarchical *attributes* in our research model. We chose to focus on the level *formalization*, that is, the level of rules and procedures in the contract, because this attribute broadly encompasses the hierarchical nature of organizations. Another reason was that *formalization* had performed satisfactorily in several previous interorganizational studies, for example within the B2B marketing literature. Another interesting hierarchical mechanism is, for example, *authority* (i.e., '*centralization*'). Consequently, in this study we have only tested the *partial* effect of formalization, and *not* all the possible hierarchical mechanisms that may be present in the project. For instance, in our study *centralization* was included only as a control variable. Future research should try to encompass the whole picture of hierarchical mechanisms and examine their partial effects thoroughly.

Methodological issues

First, the study applies a cross-sectional design, thus bringing validity issues forward: the limited ability to infer casual relations. For example, we hypothesized in Chapter 4 that strong relational norms generally affect performance positively. However, the opposite effect is also likely, that is, superior performance may have a positive and direct effect on the development of relational norms (Troye 1994). Hence, longitudinal data are necessary to establish statistically valid effects of this kind. Future research should reveal these effects, thus providing additional support or rejecting our hypotheses and findings.

Second, the external validity of the study may be questioned. We have collected data from *one* industry in *one* country only. Hence, generalizing the results to other settings should be done

with caution. Furthermore, future research should test our model in other empirical settings, thus enhancing the external validity of the results.

Third, the data was only collected on the contractor's side of the dyad. Hence, a bias was introduced in the sample. To control and hopefully eliminate this threat, data should ideally be collected on both sides of the dyad. Due to limited time and resources, this was not done; however, one could have collected data on *some* dyads to control for bias. To sum up, we recommend that future researchers collect data on both sides of a limited amount of dyads as an additional check to reduce the threat from biased data.

Institutional factors

Formal contract traditions, and the legal system in our empirical setting (that is, the nation of Norway) are highly developed, thus the contracting parties safely rely on the safeguarding properties and enforcement of formal contracts. In other industries and countries with other legal systems, which are perhaps not that well developed and well functioning, formal contracts might not be that effective in enhancing performance. The same is the case with the presence and relevance of relational contracts. The international oil industry, including the Norwegian Petroleum industry, is highly influenced by American contracting traditions due to the dominant positions of the major American oil companies (history dependence). Although relational norms were identified as present and of relevance in the Norwegian petroleum industry, our impression is that formal contracting dominates, and that reliance on norms is of less importance. Our results indicate and corroborate such an impression, that is, relational contracts and norms might get stronger support in other empirical contexts.

7.4 Conclusion

To our knowledge, the performance effects of *formal and relational governance mechanisms*, *project specific investments*, and the *interaction* between governance and project specific investments have not been previously studied. This applies to business relationships and projects in general, and to innovation projects in particular. Here, such performances include: *goal attainment, value creation potential for the customer and the contractor*, and *innovative performance*. Repeatedly, scholars have called for more work on the effect of governance on performance, and recent research clearly indicates the potential importance of such effects. Industry and government bodies have also repeatedly asked for more and better empirical studies that could help clarify the importance of project governance, particularly in the petroleum industry. To address this research gap, we developed a theoretical framework and hypotheses drawing on transaction cost theory and relational exchange theory. In the subsequent section, our main results and implications are summed up.

First, the interaction effects of formalization and project specific investments on all types of performance were positive and thus highly supportive of the normative predictions of transaction cost theory. O*ur results indicate that as the level of project specific investments increased, the positive safeguarding effects of formalization increased more than the potential negative effects related to 'bureaucratization' costs, leading to enhanced value creation potential and innovative performance.* These results are *new* and in accordance with the predictions of transaction cost theory as well as transaction value analysis.

Second, the interaction effects of relational norms and project specific investments on performance were more ambiguous; some hypotheses were *not* supported, and others were only partially supported. That is, the safeguarding properties of relational norms seem to be rather weak, resulting in inferior performance. Hence, we caution managers to rely on personal relationships to safeguard their investments. These surprising results may be due to the specific context of this study – the petroleum industry. This industry relies heavily on more formalized contracting traditions, thus the reliance on relational norms is assumed to be less important.

Third, the direct effects of project specific investments on all types of performance were generally positive. Hence, our results demonstrate that there were strong effects of project specific investments on the customer and contractor value creation potential and innovative performance. Based on our results, we recommend that the oil companies motivate the

contractors to undertake specific investments before and during the execution of an innovation project. However, both contracting parties should be aware of the potential downsides of undertaking such investments. For instance, if a single contractor becomes the single source of a specific technology or product, a lock-in situation is created with the potential of high switching and transaction costs.

Fourth, the direct effects of relational norms on all types of performance were generally positive. Strong relational norms may not only provide safeguarding and adaptive properties. In addition, we have argued as an extension of the theory that the nature of relational norms possesses value creating properties ideal for innovative performance. Our results indicate that close relations and strong relational norms are important in facilitating new ideas and information exchange, which could result in enhanced value creation and innovative performance.

Fifth, the direct effects of formalization were more complex and contingent on each performance dimension. Formalization seems to be effective in relation to goal attainment, and correspondingly less effective in relation to innovative performance. In particular, the direct effects of formalization on the contractor's value creation potential and on innovative performance were significantly negative, in compliance with the innovation literature.

Sixth, this study clarifies the importance of project governance on performances particularly relevant for the actors within the Norwegian petroleum industry. Hence, in addition to important theoretical issues, our study also contributes more insight into relevant practical challenges, as well as providing managerial implications. In this respect, we have also responded to the requests from both industry and government bodies for more and better empirical studies.

We conclude that formalized contracts and relational norms *have strong and significant effects on performance in inter-firm innovation projects*. However, some important questions remain unanswered. More research should examine the importance of transaction cost economics in relation to innovation and value creation. We claim that the cost minimization logic is too narrow when performances in innovation projects are studied. Hence, the micro-foundations of transaction cost theory should be studied more closely by *directly measuring* the level of transaction costs, and thus, their importance might be uncovered. Finally, in addition to measuring transaction costs, more research should be undertaken to explore the effect of project specific investments on all types of performance. In particular, we suggest that transaction cost

theory and the resource-based view should be integrated more closely in future conceptual and empirical work.

PART V

8 References

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9 Appendices

9.1 Appendix A: Profile of the sample

9.1.1 The oil companies

Table 9-1: The oil companies present on the Norwegian Continental Shelf

No	Oil companies	Number of projects
1	AGIP	1
2	BP	16
3	ChevronTexaco	4
4	ConocoPhillips	17
5	DNO	2
6	DONG	1
7	ENI	1
8	Exxon	9
9	Gaz De France*	2
10	Hydro	76
11	Lundin	1
12	Marathon	3
13	Melrose resources**	2
14	Mærsk Oil & Gas *	2
15	Petoro *	2
16	Pertra/Talisman	5
17	Shell	10
18	Statoil	135
19	Total	7
20	Many (e.g. Joint Industry Project)	13
21	Others (anonymous)	11
	Number of oil companies included in the sample***:	**19**
	Total number of projects analyzed	320

	* not operator
	** not operator and no licence on NCS
	*** 34 oil companies are operators, and 5 oil companies have licenses. A total of 39 oil companies are operating or have interests on the NCS.

9.1.2 The contractors

The contractors: Main contractors, system integrators, product suppliers, service companies, research and development, consulting, and finance.

Table 9-2: The contractors participating in the study

No	Contractors/partners*	Number of projects
1	ABB AS	7
2	Abyssus Marine Services AS	1
3	Aceca Norge AS	1
4	Acergy AS	4
5	Ability Group AS	6
6	Aker Kværner (group)	79
7	Aquateam	1
8	Autronica Fire and Security	1
9	Badger Explorer ASA	1
10	Baker Oil Tools AS	2
11	Baker, Inteq AS	1
12	BJ Services AS	1
13	Blom Maritime AS	1

14	Blue Water Energy Service AS	1
15	Cabot AS	1
16	CGG AS	1
17	Christian Michelsen Research AS (CMR)	1
18	ClampOn AS	2
19	Computas AS	1
20	Cybernetica AS	1
21	D&F Group AS	1
22	DeepOcean AS	1
23	Det Norske Veritas (DNV) AS	9
24	EMGS AS	1
25	Endeavour AS	1
26	Epsis AS	2
27	Flow Design Bureau AS	1
28	FMC Kongsberg Subsea Systems AS	23
29	Force Technology Norway AS	1
30	Framo Engineering AS	2
31	Frank Mohn Flatøy AS	2
32	Geoconsult AS	1
33	Grenland Minox AS	1
34	Halliburton Norge AS	7
35	Heerema Tønsberg AS	2
36	Hitec Products Drilling AS	1
37	IBM Norge AS	1
38	Institutt for energiteknikk (IFE)	4

39	IMC Diving AS	1
40	Inocean AS	1
41	IOR Chemco AS	1
42	IRIS	5
43	KCA Deutag Drilling Norge AS	3
44	Kongsberg Maritime AS	9
45	Leirvik Module Technology AS	2
46	Linjebygg Offshore AS	2
47	LMG Marin AS	2
48	Luster Mekaniske Industri AS	1
49	MARINTEK	5
50	Maritime Hydraulics AS	2
51	Mator AS	1
52	Mjørud AS	1
53	National Oilwell Varco AS	3
54	Naxys AS	2
55	Nera ASA	3
56	Nexans Norway AS	4
57	Norges Geologiske Institutt (NGI)	2
58	Norsar	3
59	Norsk regnesentral AS	1
60	Novatech AS	1
61	NTNU	2
62	Numerical Rocks AS	1
63	Odfjell Well Services AS	2

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64	ODIM AS	2
65	OLF	1
66	Petec Software & Services AS	1
67	Petrell AS	1
68	Petrotech AS	1
69	PGS Production AS	1
70	Poseidon AS	1
71	Read ASA	1
72	Reinertsen AS	1
73	Reslink AS	1
74	Roxar AS	5
75	Scandpower Petroleum Technology AS	1
76	Schlumberger	1
77	Seadrill Engineering AS	1
78	SEAF AS	1
79	Sense Intellifield	1
80	Servi Motion Control AS	1
81	Siemens AS	6
82	Simula Research Laboratory	1
83	SINTEF Energi-/Petroleumsforsk. AS	13
84	Technip Offshore Norge AS	7
85	Tektonisk AS	1
86	Tel-Tek AS	1
87	Teredo AS	1
88	TGS-Nopec Geophysical Company ASA	2

89	Typhonix AS	1
90	Unifob AS	2
91	University of Bergen	3
92	University of Oslo	1
93	Vetco Gray/Aibel AS	14
94	Weatherford AS	3
95	Well Technology AS	1
96	Well Dynamics Norge AS	1
97	Wärtsilä Automation Norway AS	2
98	Unknown (anonymous)	3
	Total number of contractor companies included in the sample:	**98**
	Total number of projects analyzed:	320
	*The companies are grouped as Ltd.	

9.1.3 Types of organizations participating in the study

Table 9-3: Types of organizations, private vs. public

Type of institution	Number of companies	Number of projects	Comments
Private corporations	89	282	Ltd.
"Public"	9	38	Examples: universities, research institutes, research foundations, etc.
Total number of contractor companies in the sample:	**98**		
Total number of projects analyzed:		320	

9.1.4 Project category by industry segments

Table 9-4: Project category by industry segments

No	Category/segments	Number of projects
1	Drilling and well service	8
2	Design, fabrication and installation	103
3	Research /development	159
4	Supply	0
5	Industry products	7
6 and 7	Engineering services and Consulting	35
8	Exploration (oil and gas companies)	0

9	HSE	0
10	Personnel/recruiting	0
11	Pipes	2
12	Software	5
13	Transport	5
14	Equipment for rent	0
15	Equipment repair	0
16	Other	1
	Total number of projects analyzed	**320**

9.1.5 Contractor key informant job title

Table 9-5: Contractor key informant job title

No	**Contractor Key Informant Job Title**	**Number of projects**
1	Project manager	201
2	Project co-worker	37
3	Other role (e.g., general manager)	82
	Total number of projects analyzed	**320**

9.1.6 Norwegian Research Council (NFR) programs

Table 9-6: Norwegian Research Council (NFR) programs

No	Norwegian Research Council (NFR) programs	Number of projects
1	DEMO2000	23
2	PETROMAKS	35
3	Other NRC programs	8
4	Other public support	11
5	**Projects with some sort of public support (sum of 1-4)**	**77**
	Total number of projects analyzed	320

9.2 Appendix B: Questionnaire (in Norwegian)

The text in the e-mail and the questionnaire is displayed as viewed by the informant on his computer screen, that is, a direct print of the screen.

```
''Verdiskapende samspill i petroleumsnæringen''

Invitasjon til deltakelse i undersøkelse av samarbeidsrelasjoner mellom leverandører
og oljeselskap på norsk sokkel

Formålet med spørreundersøkelsen er å studere hvordan samarbeidsrelasjoner mellom
leverandører og oljeselskap kan styrkes til fordel for begge parter. Undersøkelsen er
del av et doktorgradsarbeid ved Norges Handelshøyskole (NHH).

Du er utpekt av din leder/arbeidsgiver til å delta i denne undersøkelsen på grunnlag
av din spesielle erfaring med petroleumsrelaterte prosjekt, eller du har tidligere
sagt deg villig til å delta. Vi håper du kan ta deg tid til å svare på noen spørsmål
om et prosjekt som din bedrift har utført på oppdrag for et bestemt oljeselskap eller
som del av en samarbeidsavtale med dette oljeselskapet. Velg det sist avsluttede
prosjekt, eller eventuelt et pågående prosjekt.

Utvikling av mer verdiskapende samarbeid på norsk sokkel har vært etterlyst i en
årrekke (f.eks. NORSOK-prosessen og Kon-Kraft studiene). Gjennom denne studien ønsker
vi å bidra aktivt til en slik utvikling. Resultatene fra undersøkelsen vil således bli
brukt til
-       doktoravhandling ved NHH
-       utvikling av nye undervisningstilbud innen prosjektledelse
-       spesialkurs for petroleumsnæringens prosjektledere
-       konsulentbistand for deltakende bedrifter og institusjoner
-       innspill i det videre arbeidet med utforming av nye kontraktstyper og
samarbeidsformer i petroleumsindustrien

Studien er uavhengig og finansieres av Norges Handelshøyskole. Studien støttes av
Norsk industri (Olje og gass), Oljeindustriens landsforening (OLF), og Norges
forskningsråd (NFR). De oppfordrer sine medlemmer og samarbeidspartnere til å delta i
studien. Deltagerne i studien består således av et bredt utvalg respondenter fra
leverandørindustrien og forskningssektoren.

For å realisere studien er vi imidlertid helt avhengig av Deres velvilje til å delta.
Spørreskjemaet består av 114 korte spørsmål og vil ta ca. 25-30 minutter å besvare.

Alle opplysninger som blir gitt i dette skjemaet vil bli behandlet strengt
konfidensielt. I rapporter og andre publikasjoner som utgis i forbindelse med
prosjektet, vil de innsamlede data kun bli benyttet i anonymisert form slik at det
ikke vil bli mulig å tilbakeføre opplysninger til den enkelte bedrift. De som deltar
vil få tilsendt en rapport i etterkant av undersøkelsen.

Dersom du har spørsmål vedrørende undersøkelsen, vær vennlig å ta kontakt med
undertegnede.

Følg linken for å delta i studien:
http://oilsurvey.jobi.no/skjema.aspx?code=3149&pass=1065253212

Med vennlig hilsen
Per Anders Sunde
Doktorgradsstipendiat
Tlf 470 57 197 / 55 95 99 21

per.anders.sunde@nhh.no

Norges Handelshøyskole
Institutt for strategi og ledelse
5045 Bergen
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Velg et nærmere angitt prosjekt som din bedrift har utført på oppdrag for et bestemt oljeselskap eller som del av en samarbeidsavtale med dette oljeselskapet (kunden). Velg det sist avsluttede prosjekt, eller eventuelt et pågående prosjekt. I de tilfeller hvor det er flere kunder i prosjektet, vil vi at dere tar utgangspunkt i den kunden som dere samarbeidet mest med. "Produktet" som blir levert eller utviklet i prosjektet kan være et fysisk produkt eller tjeneste (eksempel: komponent, konstruksjon, konsept, kompetanse).

1a. Navn på prosjektet (sist avsluttet eller pågående):

1b. Navn på oljeselskapet (dersom flere velg viktigste, heretter kalt **kunden**):

1c. Navn på din bedrift (heretter kalt **bedriften**):

2. Når startet prosjektet (mm.åååå):　　　(mm)　(åååå)

3. Når ble/blir prosjektet avsluttet (mm.åååå)　　　(mm)　(åååå)

4. Hvem var prosjektleder for prosjektet
- ○ Bedriften
- ○ Kunden
- ○ Begge (delt prosjektledelse)

5. Hva er din rolle i dette prosjektet?
- ○ Prosjektleder
- ○ Prosjektmedarbeider
- ○ Annen rolle, angi:

6. Hvem hos kunden rapporterte du til (prosjektansvarlig)?
- ○ FoU-senter
- ○ Utforskning
- ○ Utbygging
- ○ Drift (Operativ feltenhet)
- ○ Annet selskap tilhørende kunden
- ○ Felles samarbeidsselskap

7. Hvilke aktiviteter besto prosjektet av?

a. Forskning (ny kunnskap)　　○ Ingen ○ Noe ○ Mye

b. Produkt- og teknologiutvikling　　○ Ingen ○ Noe ○ Mye

c. Designstudie, system- og konseptutvikling　　○ Ingen ○ Noe ○ Mye

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d. Organisasjonsutvikling	◯ Ingen ◯ Noe ◯ Mye
e. Fabrikasjon og/eller bygging	◯ Ingen ◯ Noe ◯ Mye
f. Produksjon og leveranse av ferdigprodukter	◯ Ingen ◯ Noe ◯ Mye

8. Hvor stort var prosjektet?

a. Antall personer på det meste (ca.):	
b. Samlet budsjett/kontraktspris i mill NOK (ca.):	

9. Hvem betalte for prosjektet og med hvor mye?

a. Kunden		%
b. Bedriften		%
c. Offentlig støtte		%
d. Andre bidrag		%
	SUM = 100 %	

10. Hvilke offentlige programmer har støttet prosjektet?

a. DEMO2000	◯ Nei ◯ Ja
b. Petromaks	◯ Nei ◯ Ja
c. Andre NFR programmer	◯ Nei ◯ Ja
d. Annen offentlig støtte	◯ Nei ◯ Ja

11. Hvilken betalingsform ble avtalt med kunden?	◯ a. Fastpriskontrakt ◯ b. Fastpriskontrakt med incentivbestemmelser (dere fikk bonus i forhold til målsatte krav vedrørende kostnader, tid og/eller ytelser) ◯ c. Kostnadskontrakt med incentivbestemmelser (fortjenesten var variabel ut fra om de realiserte kostnadene var lavere eller høyere enn forventet) ◯ d. Kostnadskontrakt med fast fortjeneste/margin
12. Hvilken betaling av royalty ble avtalt med kunden	◯ a. Ingen avtale om royalty ◯ b. Vi må betale royalty til kunden ved framtidig bruk eller salg ◯ c. Kunden må betale royalty til oss ved fremtidig bruk eller salg

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Følgende påstander gjelder ulike sider ved prosjektet:

	I svært liten grad						I svært stor grad
13. Kontraktsgrunnlaget var konkret og spesifikt	○1	○2	○3	○4	○5	○6	○7
14. Kontraktsgrunnlaget var tilstrekkelig for vårt behov	○1	○2	○3	○4	○5	○6	○7
15. Det ble stilt krav til utvikling av nye løsninger i prosjektet	○1	○2	○3	○4	○5	○6	○7
16. Teknologien i prosjektet kan karakteriseres som usikker	○1	○2	○3	○4	○5	○6	○7
17. Teknologien i prosjektet kan karakteriseres som kompleks	○1	○2	○3	○4	○5	○6	○7
18. Teknologien i prosjektet kan karakteriseres som ny og ukjent	○1	○2	○3	○4	○5	○6	○7
19. Kunden har vanskelig for å vurdere kvaliteten på arbeidet i prosjektet	○1	○2	○3	○4	○5	○6	○7
20. Kunden har vanskelig for å vurdere framdrift i prosjektet	○1	○2	○3	○4	○5	○6	○7
21. Kunden har vanskelig for å vurdere grunnlaget for fakturering i prosjektet	○1	○2	○3	○4	○5	○6	○7

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Følgende påstander angår forholdet mellom partene i prosjektet

	I svært liten grad						I svært stor grad
22. Vi brukte betydelige ressurser på å tilpasse egen organisasjon i forbindelse med dette prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
23. Vi måtte investere betydelige beløp i materiell som har begrenset verdi for oss dersom kunden avslutter prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
24. Vi måtte investere betydelig i kompetanseutvikling som har begrenset verdi dersom kunden avslutter prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
25. Vi brukte mye tid og ressurser på å bygge opp dette spesifikke kundeforholdet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
26. Dersom prosjektet måtte avsluttes før det var ferdig, ville det medført et stort tap for oss	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
27. Kunden brukte mye tid og ressurser på å utvikle et produktivt forhold til vår bedrift	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
28. Dersom prosjektet måtte avsluttes før det var ferdig, ville det medført et stort tap for kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
29. Det var få alternative kunder for denne leveransen i markedet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
30. Det ville ta oss mye tid og krefter å finne en erstatning for denne kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
31. Kunden har unik teknologi/kompetanse som vi hadde nytte av i prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
32. Det var få alternative leverandører for denne leveransen i markedet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
33. Det ville tatt kunden mye tid og krefter å finne en erstatning for oss	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
34. Vi har unik teknologi/kompetanse som kunden hadde nytte av	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

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Følgende påstander gjelder kundens styring og deltakelse i prosjektet

	I svært liten grad						I svært stor grad
35. Kunden bestemte fullt ut valg av produksjonsprosesser og produksjonsteknologi	○1	○2	○3	○4	○5	○6	○7
36. Kunden bestemte fullt ut løpende endringer	○1	○2	○3	○4	○5	○6	○7
37. Kunden bestemte fullt ut hvem som skulle være våre underleverandører i prosjektet	○1	○2	○3	○4	○5	○6	○7
38. Kunden bestemte fullt ut prosedyrer for kvalitetskontroll	○1	○2	○3	○4	○5	○6	○7
39. Kunden tok viktige beslutninger i prosjektet på høyere nivå	○1	○2	○3	○4	○5	○6	○7
40. Kunden tok ofte små beslutninger i prosjektet på høyere nivå	○1	○2	○3	○4	○5	○6	○7
41. Kunden brukte ofte lang tid på å ta beslutninger på høyere nivå	○1	○2	○3	○4	○5	○6	○7
42. Regler og retningslinjer var utviklet for de fleste forhold i dette prosjektet	○1	○2	○3	○4	○5	○6	○7
43. Skriftlige avtaler regulerte for en stor del den daglige prosjekthåndteringen	○1	○2	○3	○4	○5	○6	○7
44. Begge parter la vekt på å følge de gjeldende regler og retningslinjer for den daglige prosjektstyringen	○1	○2	○3	○4	○5	○6	○7
45. Begge parter anså det for viktig å opptre nøyaktig i tråd med kontraktens bestemmelser	○1	○2	○3	○4	○5	○6	○7
46. Kontrakten beskrev nøyaktig hvordan uenigheter og klager skulle løses	○1	○2	○3	○4	○5	○6	○7
47. Kunden betalte i henhold til betalingsplanen uten forsinkelser	○1	○2	○3	○4	○5	○6	○7
48. Vi spilte en aktiv rolle i beslutningstakingen i prosjektet	○1	○2	○3	○4	○5	○6	○7
49. Vi ble aktivt oppfordret av kunden til å komme med forslag til løsninger i prosjektet	○1	○2	○3	○4	○5	○6	○7
50. Vi ble ofte konsultert når kunden skulle ta viktige	○1	○2	○3	○4	○5	○6	○7

beslutninger i prosjektet

51. Kunden deltok konstruktivt i den tekniske gjennomføring av prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
52. Kunden deltok kontinuerlig i den tekniske gjennomføring av prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
53. Kunden lot oss gjennomføre prosjektet uten unødvendig innblanding	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
54. Kunden overvåket markedet kontinuerlig for å sikre seg at vi hadde lave nok priser	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
55. Kunden ville valgt en konkurrerende leverandør dersom denne kunne tilby lavere pris	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
56. Kunden brukte konkurrerende priser i markedet for oppnå lavere pris av oss	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

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Følgende påstander gjelder partenes holdning til samarbeid

	I svært liten grad						I svært stor grad
57. Begge parter var innstilt på å utveksle informasjon som kunne være til hjelp for den annen part	○1	○2	○3	○4	○5	○6	○7
58. Begge parter var innstilt på å utveksle informasjon uformelt når det måtte passe seg	○1	○2	○3	○4	○5	○6	○7
59. Begge parter var innstilt på å informere hverandre om hendelser eller endringer av betydning	○1	○2	○3	○4	○5	○6	○7
60. Begge parter var innstilt på å utveksle informasjon ofte	○1	○2	○3	○4	○5	○6	○7
61. Begge parter anså løsing på viktige problem for å være et felles anliggende	○1	○2	○3	○4	○5	○6	○7
62. Begge parter var innstilt på å gjøre forbedringer til beste for hverandre	○1	○2	○3	○4	○5	○6	○7
63. Begge parter så det som naturlig å hjelpe hverandre uten å ta seg betalt for det	○1	○2	○3	○4	○5	○6	○7
64. Begge parter var innstilt på å være fleksible når det gjaldt endringer sent i prosjektet	○1	○2	○3	○4	○5	○6	○7
65. Begge parter var innstilt på å endre tidligere avtaler dersom den ene part ba om det	○1	○2	○3	○4	○5	○6	○7
66. Begge parter var innstilt på å justere avtalen dersom noe uventet skulle skje	○1	○2	○3	○4	○5	○6	○7
67. Begge parter anså løsning av viktige problemer for å være et felles ansvar uansett skyld	○1	○2	○3	○4	○5	○6	○7
68. Begge parter var innstilt på å finne gjensidig tilfredsstillende løsninger på uenigheter	○1	○2	○3	○4	○5	○6	○7
69. Begge parter hadde felles oppfatning av hvordan uenigheter skulle håndteres eller løses	○1	○2	○3	○4	○5	○6	○7
70. Begge parter var opptatt av å sikre hverandre	○1	○2	○3	○4	○5	○6	○7

tilfredsstillende lønnsomhet

71. Begge parters holdning til hverandre var preget av gjensidig nytte og tillit	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
72. Kunden hadde som prinsipp at han ikke skulle utnytte sin sterke forhandlingsposisjon	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

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Følgende påstander gjelder tidligere erfaring og framtidig leveranser

	Ingen tidligere erfaring	I svært liten grad						I svært stor grad
73. Vi har mange års erfaring med denne kunden forut for prosjektet	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
74. Vi har fra tidligere et meget godt forhold til denne kunden	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
75. Vi forventer framtidige leveranser til denne kunden	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
76. Vi har avtaler om framtidige leveranser til denne kunden	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

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Følgende påstander gjelder oppnådde og forventede resultater av prosjektet

	I svært liten grad						I svært stor grad
77. Kundens kravspesifikasjoner ble oppnådd	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
78. Kundens krav til funksjon ble oppnådd	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
79. Kundens krav til kvalitet ble oppnådd	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
80. Kundens krav til leveringstid ble oppnådd	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
81. Kundens kostnadskrav ble oppnådd	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
82. Kundens målsetning med prosjektet ble oppnådd	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
83. Prosjektet vil bidra til mer effektiv drift hos kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
84. Prosjektet vil bidra til forbedringer hos kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
85. Prosjektet vil bidra til kostnadsreduksjoner hos kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
86. Prosjektet vil bidra til verdiskapning hos kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
87. Prosjektet har lært oss å samarbeide bedre med kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
88. Prosjektet var preget av konflikter med kunden	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
89. Kunden er alt i alt fornøyd med prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
90. Prosjektet vil bli svært lønnsomt for vår bedrift	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
91. Prosjektet vil åpne opp et nytt marked for vår bedrift	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
92. Prosjektet vil skape en ny produktlinje i vår bedrift	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
93. Prosjektet vil skape ny teknisk kompetanse i vår bedrift	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
94. Prosjektet vil skape positivt omdømme for vår bedrift	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
95. Alt i alt er vår bedrift fornøyd med prosjektet	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
96. Prosjektet vil bidra positivt til verdiskapning i industrien (drift, utbygging med mer)	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

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97. Prosjektet vil bidra positivt
til kostnadsreduksjoner i
industrien (drift, utbygging
med mer)   ○ 1   ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7

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Følgene påstander gjelder patenter, eiendomsrett og bruksrett til nye løsninger som eventuelt ble utviklet i prosjektet

	Intet nytt	I svært liten grad						I svært stor grad
98. Produktet som ble utviklet i prosjektet er nytt for oss	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
99. Produktet som ble utviklet i prosjektet er nytt for kunden	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
100. Produktet som ble utviklet i prosjektet er nytt for petroleumsindustrien internasjonalt	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
101. Nye løsninger er allerede patentert	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
102. Nye løsninger vil bli patentert senere	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
103. Nye løsninger vil gi oss store royaltyinntekter fra kunden	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
104. Nye løsninger vil gi oss store royaltyinntekter fra andre enn kunden	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
105. Bedriften har eiendomsrett til nye løsninger utviklet i prosjektet	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
106. Kunden har eiendomsrett til nye løsninger utviklet i prosjektet	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
107. Andre prosjektdeltagere har eiendomsrett til nye løsninger utviklet i prosjektet	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
108. Andre rettighetshavere har eiendomsrett til nye løsninger utviklet i prosjektet	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
109. Bedriften har eksklusiv bruksrett til nye løsninger utviklet i prosjektet	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7
110. Kunden har eksklusiv bruksrett til nye løsninger utviklet i	○ 0	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6	○ 7

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prosjektet

| 111. Andre prosjektdeltagere har eksklusiv bruksrett til nye løsninger utviklet i prosjektet | ○ 0 | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ 6 | ○ 7 |

| 112. Andre rettighetshavere har eksklusiv bruksrett til nye løsninger utviklet i prosjektet | ○ 0 | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ 6 | ○ 7 |

| 113. Hvor stort salg hadde Deres bedrift til kunden i 2005 (eks mva)? | Omtrent _____ Millioner NOK |

| 114. Bedriftens totale omsetning i 2005 (eks mva) | Omtrent _____ Millioner NOK |

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9.3 Appendix C: Measures

An overview of all variables used in the structural analyses is presented below. Variables that were deleted in the measurement model specification and re-specification process are not included.

9.3.1 Measures of the variables in the theoretical model

Formal contract (Scale reliability = 0.82)

1. We and the customer have developed rules and procedures for most issues in this project
2. Both parties intend to follow jointly agreed upon rules and procedures in the daily management of the project
3. It is important to us to behave accurately - according to (the letter of) the contract
4. In dealing with the customer, our contract precisely states how disagreements should be solved

Relational contract

Information exchange: (Scale reliability = 0.87)

1. In this project, it is expected that any information that might help the other party will be provided to them
2. It is expected that we keep each other informed about events or changes that may affect the project
3. Exchange of information in this project takes place frequently
4. It is expected that the parties will provide proprietary information if it can help the other party or the project

Solidarity: (Scale reliability = 0.85)

1. Important problems that arise in the course of this project are treated by my firm and the customer as joint rather than individual responsibilities
2. Both firms are committed to improvements that may benefit the project as a whole and not only the individual parties

Harmonization of conflict: (Scale reliability = 0.83)

1. No matter who is at fault, problems are joint responsibilities
2. When disagreements arise, we reassess all the facts and try to reach a mutually satisfactory compromise
3. In dealing with our customer, we have a mutual understanding of how disagreements will be handled or resolved

Asset specificity/transaction specific investments (Scale reliability = 0.73)

1. We spent significant resources in reorganizing/adjusting our own organization in connection with this particular project
2. We spent resources on training and development of our employees during this particular project
3. We have made significant investments in tools and equipment dedicated to the project
4. We have carried out considerable product adjustments in order to meet the requirements from the customer

Performance

Meeting design goals or 'goal attainment': (Scale reliability = 0.87)

1. The objectives in terms of functional specifications were met
2. The objectives in terms of technical specifications were met
3. The objectives in terms of time schedule were met
4. The objectives in terms of quality were met

Customer value creation potential: (Scale reliability = 0.82)

1. The product led to more efficient operations
2. The product delivered an improvement
3. The product led to cost reductions

Contractor value creation potential: (Scale reliability = 0.87)

1. The project opened a new market
2. The project created a new product line
3. The project developed a new technological capability

Innovative performance: (Scale reliability = 0.93)

1. The product/solution developed in the project is/was technologically new to our firm
2. The product/solution developed in the project is new to the customer
3. The product/solution developed in the project is new to the market (petroleum industry)

9.3.2 Measures of control and rival predictors

Importance (Scale reliability = 0.81)

1. How large was the project? Approx. number of people
2. How large was the project? Total budget/contract value

Past experience (Scale reliability = 0.88)

1. We have many years of experience with this customer prior to this project
2. We have had a very good relationship to this customer prior to this project

Future expectations

1. We have a binding agreement to deliver to this customer in the future

Contract type (compensation format)

1. Fixed price contract
2. Fixed price contract, includes incentive mechanisms tied to performance (cost, time etc.)
3. Reimbursable contract includes incentive mechanisms tied to performance (cost, time etc.)
4. Reimbursable contract, fixed margins

Centralization (Scale reliability = 0.68)

1. The production processes and manufacturing technology used in the project are entirely decided by the customer
2. The ongoing design and engineering changes in the project are entirely decided by the customer
3. The customer entirely decides who our sub contractors/contractors should be
4. The quality control procedures in the project are entirely decided by the customer

Market governance (Scale reliability = 0.81)

1. The customer draws our attention to competing offerings in order to have us work more effectively
2. The customer monitors the market to be assured that we do not offer prices that are substantially higher than other contractors
3. The customer will change to another contractor if another firm can deliver the product/project cheaper than us

9.4 Appendix D: Choice of estimation method and fit indices

9.4.1 Introduction

Given the high number of different indices for assessing the goodness of a model, the researcher might have trouble deciding which index to include in the report. Although many indices exist, the researcher should not list them all without evaluating the appropriateness of each index up front; that is, the chosen indices must be suitable for the attributes of the study (e.g., the sample size is particularly critical). Hence, it is recommended that the researcher provides an overview of the chosen indices, their definitions, and the cut off value for each index that indicates good fit. Before elaborating on the choice of appropriate indices, a brief account of the choice of estimation method is provided.

9.4.2 Choice of estimation method

The maximum likelihood estimation (MLE) has become the most common estimation procedure in structural equation modelling (Hair, Anderson et al. 1998). The main reason is that the ML estimator generally performs better than most other estimators, for example, the generalized least square (GLS), and the asymptotic distribution-free estimator (ADF) (Hu and Bentler 1995; Olsson, Troye et al. 2000). The MLE produces valid results with sample sizes as small as 50, but the recommended minimum is between 100 and 150. If the sample size exceeds 400 to 500, the MLE procedure becomes too sensitive, that is, all goodness-of-fit indices will indicate poor fit (Hair, Anderson et al. 1998). The sample size in this study is 320, hence the choice of the ML-estimator seems reasonable.

A "problem" with the MLE procedure is that the ML-estimator is sensitive to violations of the assumption of multi-normality. Hence, several other estimators have been developed to circumvent the problem, for example, weighted least squares (WLS), generalized least square (GLS), and the asymptotic distribution-free (ADF) estimator. Nevertheless, the MLE seems to perform better than the other estimators even when the assumptions are stretched (Olsson, Troye et al. 2000). However, since multi-normality and sample size assumptions are not violated in this study, the MLE procedure is retained and will be used as the estimation method.

9.4.3 Choice of fit indices: Overview and justification

In structural equation modelling, there is no single test that best describes the "goodness" of the model, that is, how well the theoretical model fits the data in the sample. Although no "perfect" test has yet been developed, varieties of tests have been developed in the last few years. Thus, the researcher has numerous different tests (i.e., goodness-of-fit indices) available to examine the goodness of a theoretical model. Used in combination, the researcher should employ indices that emphasize the different aspects of model fit, that is, all of these indices will provide an indication of how well the model fits the data (Hair, Anderson et al. 1998; Kelloway 1998). An overview of the most popular and acknowledged tests are given below and choices are made as to which tests to include in the assessment of the models in the study.

The fit indices are of two main categories: overall fit or *absolute* fit of the model, and *comparative* fit to a base model (null model). Comparative tests may also be divided further into comparative fit and *parsimonious* fit (Hair, Anderson et al. 1998; Kelloway 1998).

Overall or absolute fit indices

"Absolute fit measures determine the degree to which the overall model (structural or measurement models) predicts the observed covariance or correlation matrix" (Hair, Anderson et al. 1998: 654), that is, the model's ability to reproduce the correlation/covariance matrix. Hence, a saturated model will exactly reproduce the observed covariance matrix. Common indices to assess absolute fit of the model are the *Chi-Square Statistic*, the *Root Mean Square Residual*, the *Root Mean Square Error of Approximation*, the *Goodness of Fit Index*, the *Non-centrality* parameter, the *Expected Cross-Validation Index*, and the *Cross-Validation Index* (Hair, Anderson et al. 1998). Of these tests, the *last* three are used when the researcher wants to compare alternative models. Furthermore, these tests have no specified range of acceptable values. The last three tests are therefore not suitable for the study and are thus not reported. Below, the tests that are reported in the study are presented: first, each of the tests is defined, second, justification for the choice of the specific test provided, and third, cut off values for the different tests are presented.

The *Chi-Square Statistic (χ^2)* is the most fundamental measure of overall fit (Jöreskog and Sörbom 1995), and the only index that is statistically based. The Chi-Square measures the degree to which the a priori model accounts for observed correlations. Although commonly reported and

highly acknowledged, there are some serious problems with the Chi-Square measure. The test is too sensitive to sample size differences, particularly when the sample size exceeds 200. A large sample size will indicate significant differences for almost any model (i.e., a too strict test), that is, as the sample size increases, the possibility of rejection of the model also increases. In this study, the sample size is 320; hence, the Chi-Square index must be interpreted with caution. Although problematic, the Chi-Square statistics are reported in this study. The main reason is that the Chi-Square is a highly acknowledged test statistic, and therefore is commonly reported in almost all SEM studies.

As the Chi-Square test is sensitive to large sample sizes, the researcher should use other tests available as complements. Hence, numerous other tests and fit indices have been developed for this purpose in the recent years. Below some of the most acknowledged tests are justified.

The *Root Mean Square Residual (RMR)* is "the squared root of the mean of the squared discrepancies between the implied and observed covariance matrices" (Kelloway 1998: 27). A problem with the RMR test is that it is difficult to determine the cut off value due to difficulties with the scale of measurement of the model's variables. A standardized RMR is therefore also provided by LISREL in addition to the original RMR-index. The standardized RMR index has a lower boundary of 0 and a higher boundary of 1; values below 0.05 indicate a good fit to the data (Hu and Bentler 1999). The *standard Root Mean Square Residual* (st. RMR) is reported in the study.

The *Root Mean Square Error of Approximation* (RMSEA) developed by Steiger (1990), is the discrepancy per degree of freedom. The RMSEA index has a lower boundary of 0 and a higher boundary of 1; values between 0.08 and 0.05 indicate acceptable (but not good) fit to the data, and values below 0.05-0.06 indicate a "close fit" to the data (Browne and Cudeck 1993; Hu and Bentler 1999). The *Root Mean Square Error of Approximation* (RMSEA) is reported in the study. In addition, we report the statistically based Critical N (Hoelter 1983).

Many other indices have been developed in the research literature and among the more promising are the *Goodness-of-Fit Index* (GFI) and the *Adjusted Goodness-of-Fit Index* (AGFI). GFI is defined as "the ratio of the sum of the squared discrepancies to the observed variances" (Kelloway 1998: 27). Further, the AGFI is the same index as the GFI index, adjusted for degrees of freedom in the model. Both tests range from 0 (no fit) to 1 (perfect fit), with values above 0.95 indicating good fit (Hu and Bentler 1999). As none of these indices is statistically based (i.e., the

distribution is not known), the results should be interpreted with caution. The *Adjusted Goodness-of-Fit Index* (AGFI) is reported in this study.

Comparative fit

Due to problems with the absolute fit indices, the researchers developed another category of fit index, which is called the comparative or incremental fit indices. These indices compare the proposed theoretical research model with a pre-specified baseline model (also called "null"-model or independence model). Thus, the comparative fit test examines whether the model, which is examined, is better (i.e., achieves better fit) than a competing baseline model. The competing baseline model is often the "null" or "independence" model. A "null"model specifies null relations between the variables in the model; hence, the result is (and should be) a very poor fit to the data. Then, the theoretical model is compared to the baseline model achieving X% better fit; a 95% better fit is often judged as the cut off value (Hu and Bentler 1999). Below, some popular and acknowledged comparative fit indices suitable for this study are identified and the cut off values are presented.

Commonly used indices to assess the comparative fit of the model are: the *normed fit index* (NFI), the *non-normed fit index* (NNFI), the *incremental fit index* (IFI), *comparative fit index* (CFI), and the *relative fit index* (RFI).

The normed fit index (NFI) proposed by Bentler and Bonett (1980) is a widely used comparative fit index in SEM (Hair, Anderson et al. 1998). The range of NFI goes from 0 (no fit) to 1 (perfect fit), with values above 0.9 indicating good fit. The *non-normed fit index* (NNFI) combines a measure of parsimony (i.e., including the degrees of freedom) into the NFI comparative fit index. The range of NNFI goes from 0 (no fit) to 1 (perfect fit), with values above 0.95 indicating good fit (Hu and Bentler 1999).

A number of other comparative fit measures have been proposed: the *incremental fit index* (IFI), proposed by Bollen (1989), which introduces a scaling factor on the Chi-Square statistic (i.e., includes the degrees of freedom), the *comparative fit index* (CFI), introduced by Bentler (1990), which is based on the non-central Chi-Square distribution, and the *relative fit index* (RFI) introduced by Marsh, Balla et al. (1988), which includes degrees of freedom and sample size into the index. All of the above comparative tests range from 0 (no fit) to 1 (perfect fit), with values above 0.95 indicating good fit (Hu and Bentler 1999).

As the theoretical model is complex, it will be advantageous to report indices that include the degrees of freedom; nevertheless, the popular NFI index is reported. The other comparative fit indices are reported: the *non-normed fit index* (NNFI), the *incremental fit index* (IFI), and the *comparative fit index* (CFI).

Parsimonious fit indices

The objective of the parsimonious fit indices is to examine whether or not model fit has been achieved by overfitting the data with too many coefficients (Hair, Anderson et al. 1998). Parsimonious fit is defined as "achieving higher degrees of fit per degree of freedom used" (Hair, Anderson et al. 1998: 658). Hence, the parsimonious fit indices are concerned with the trade off between model fit and loss in degrees of freedom. Commonly used indices to assess parsimonious fit of a theoretical model are the *parsimonious normed fit index* (NFI), the *parsimonious goodness-of-fit index* (PGFI), the *normed Chi-Squa*re statistic, and the Aikaike Information Criterion (AIC).The *parsimonious normed fit index* (NFI) and the *parsimonious goodness-of-fit index* (PGFI) range from 0 ("no" parsimony) to 1 (more parsimonious fit) with values between 0.6-0.9 indicating substantial model differences, that is, more parsimonious fit.

The *normed* Chi-Square is the ratio of the Chi-Square divided by the degrees of freedom. As the Chi-Square is highly problematic, especially when the sample size is large, this test statistic is not reported. In addition, the normed Chi-Square has been shown to be unreliable (Hair, Anderson et al. 1998). The Aikaike Information Criterion (AIC) considers both the fit of the model and the number of estimated parameters. Smaller AIC-values indicate better fit, unfortunately there is no consensus about the level of "small" values. Hence, AIC values are not reported in the study.

To sum up, the parsimonious fit indices are not reported in this study. These indices are mostly used when competing models are compared, thus they are of less relevance.

Summary of the chosen "Overall Goodness-of-Fit Measures" (fit-indices)

The table below provides a summary of the chosen goodness-of-fit measures – name, definition, and cut off values.

Table 9-7: Reported goodness-of-fit indices

Overall or absolute fit indices		
Name	Definition	Critical value
Chi-Square statistic, χ^2	The Chi-Square Statistic (χ^2) measures the degree to which the a priori model accounts for observed correlations.	
St. RMR	The Standard *Root Mean Square Residual* (RMR) is the squared root of the mean of the squared discrepancies between the implied and observed covariance matrices.	Good fit: St. RMR<0.05
RMSEA	The *Root Mean Square Error of Approximation* (RMSEA) measures the degree of close fit (i.e., the discrepancy) per degree of freedom.	Acceptable fit: RMSEA<0.08 Good fit: RMSEA<0.05
AGFI	The AGFI corresponds to the GFI in replacing the total sum of squares by the mean sum of squares. The AGFI-index, compared to GFI, adjusts for the degrees of freedom in the model.	Good fit: AGFI>0.95
Critical N	Critical N is based on the Chi-Square statistic, χ^2	CN > 200
Comparative or incremental fit indices		
NNFI	NNFI is the *Non-Normed Fit Index*. It combines a measure of parsimony (i.e., including the degrees of freedom) into the NFI or TLI (Tucker-Lewis Index) comparative fit index. NNFI compares the lack of fit of the model with a baseline model.	Good fit: NNFI>0.95
IFI	IFI is the *Incremental Fit Index*. It introduces a scaling factor on the Chi-Square Statistic (i.e.,	Good fit: IFI>0.95

	include the degrees of freedom). IFI compares the lack of fit of the model with a baseline model.	
CFI	CFI is the *Comparative Fit Index* (also called the *Relative Non-centrality Index,* RNI). CFI is based on the non-central Chi-Square distribution and compares the lack of fit of the model with a baseline model.	Good fit: CFI>0.95

9.5 Appendix E: Literature review

Table 9-8: Governance alignment and performance

Author (s)	Sample	Independent variable(s)	Dependent variable(s)	Key findings
Achrol and Etzel (2003)	375 owners or managers of reseller firms	Reseller goal priority, characteristics of the task environment	Reseller performance	They found that goal priorities emerge in relation to the environmental imperatives, in accordance to transaction cost theory. Productivity goals are associated with a stable environment, and adaptation goals are associated with dynamic environment – as predicted by transaction cost theory.
Cannon, Achrol et al. (2000)	424 purchasing professionals	Legal bonds, cooperative norms. Moderators: transactional uncertainty, market dynamism, relation specific adaptation	Performance (price or value received, delivery performance, product quality, after sale service and technical support)	They found that legal bonds decreased performance, when social norms where low, and increased performance when social norms where high. When uncertainty and task ambiguity where high, legal bonds did not enhance performance. And further, when uncertainty and task ambiguity where low, legal bonds enhanced performance, and further, social control still played an important role
Dahlstrom, Dwyer et al. (1995)	94 mainframe computer user group members	Formalisation, participation	Opportunism, effectiveness	They found that formalized procedures and vendor participation in decision making (decentralisation) raised effectiveness when asset specificity where high/technological uncertainty where low.
Heide and Stump (1995)	60 purchasing agents/directors representing manufacturing firms	Buyer specific assets, volume unpredictability, continuity expectations.	Performance evaluations	They found that firms crafted stronger relationships in the presence of asset specificity and uncertainty. Further, they found that structuring the relationship in accordance with TCA prescriptions had positive performance implications (Heide and Stump 1995).
Dyer (1996)	50 Japanese and 50 US suppliers	Asset specificity Hierarchical-, hybrid, and market governance.	Quality, New model cycle time, efficiency/cost, profitability	Asset specific investments positively related to competitive advantage Hybrid governance positively related to competitive advantage
Leiblein, Reuer et al. (2002)	176 alliances in the semi conductor industry, database ICE.	Intercept, firm tenure, firm size, ex ante numbers of suppliers, demand uncertainty, asset specificity.	Technological performance	They found that the effects of firms' governance decisions are likely to be contingent upon several specific attributes underlying a given exchange. A firm's technological performance is contingent upon the alignment between the firm's governance mode and the degree of contractual hazards.

Author (s)	Sample	Independent variable(s)	Dependent variable(s)	Key findings
Mayer and Nickerson (2002)	190 information technology projects	Expropriation, measurement cost, interdependency,	Mode and profit margin	They found that projects aligned according to transaction cost theory and agency theories, on the average, are more profitable than misaligned projects.
Nickerson and Silverman (2003)	ICC database, U.S. trucking industry	Driver misalignment, LTL Share, union, integration, environmental characteristics, organisational characteristics.	Driver misalignment, profitability.	They find that firms whose governance is poor according to transaction cost reasoning realize lower profits than their better aligned counterparts. They also find evidence that firms that are poorly aligned will try to adapt and change towards a better alignment.
Noordewier, John et al. (1990)	140 purchasing personnel, ball and roller bearings	Uncertainty, buyer transaction performance, amount, dependence, price, distance, frequency	Performance (turnover, on-time, acceptable)	They found that if the relational content is increased, given low uncertainty, there is no increase in buyer performance. If uncertainty is high, increasing the relational content will increase buyer performance. The results are in accordance with the TCA logic – the buyer will perform better from lower transaction costs.
Sampson (2004)	464 R&D alliances in the telecom equipment industry	Multilateral, R&D Plus, Narrow scope, broad scope, tech diversity, prior links, alliance experience, intellectual property regime, judicial efficacy, rule of law, political risk	Firm innovative performance.	She found that alliance governance selected according to transaction cost logic improves collaboration over governance not so selected. Surprisingly, misalignments imposing excessive bureaucracy reduced collaboration (and innovation) more than excessive contracting hazards did.

Table 9-9: Formal governance and performance

Author (s)	Sample	Independent variable(s)	Dependent variable(s)	Key findings
Barclay (1992)	Review	Formality (structure, control mechanisms, and formal decision making)	New product success	Barclay found that formal aspects such as structure, control mechanisms, and formal decision making had little effect on success.
Boyle and Dwyer (1995)		Bureaucracy (formalisation and centralisation)	Performance (effectiveness and efficiency)	Boyle and Dwyer (1995) found that bureaucracy had no effect on performance in the relationship(Boyle and Dwyer 1995).
Deshpande, Farley et al. (1993)	50 firms, interviews/survey	Culture (market, adhocracy, clan, hierarchy), Customer orientation, Innovativeness	Performance (profit, size, market share)	Deshpande, Farley et al. (1993) found that a market cultures was associated with best performance. Both clan (relational governance) and hierarchical cultures (formal governance) was associated with poor performance.
Dwyer and Oh (1987)		Bureaucratization (formalisation, centralisation, and participation)	Performance was measured as satisfaction, opportunism, and trust.	Dwyer and Oh (1987) found that bureaucratization of the relationship had both negative and positive effects. High degree of formalisation and participation was positive for the channel relationship, and centralisation had a negative effect.
Fryxell, Dooley et al. (2002)	129 US based international joint ventures	Formal and social control mechanisms. Inter-partner trust, age, and cultural distance.	INJ Performance (ROE, operating costs, production processes, marketing and sales)	They find that reliance on formal control mechanisms and performance were positively related in younger alliances, and negatively related in older alliances. As the age of the relationship or project increase, the importance of relational governance mechanisms increases. But, in most cases it is important for the parties of a transaction to have some legal safeguards to fall back on if the transaction is terminated.

Source	Sample	Variables	Dependent Variable	Findings
Liker, Collins et al. (1999)	74 heads of manufacturing	Job specialisation, formalisation, tall hierarchy, etc.	Manufacturing tooling, time compression, cost reduction	Liker, Collins et al. (1999) found that formalisation of work practices is negatively related to new product development.
Luo (2002)	293 IJV. List of foreign-invested enterprises in China	Contract (term specificity, contingency adaptability), cooperation.	Performance (ROI, Sales)	Luo find the contract completeness and cooperation drive performance both independently and interactively, i.e. the more formalisation the better. Luo did not analyse the effect of alignment or misalignment on the performance effects.
Moenaert, Souder et al. (1994)	147 respondents in the Belgium electronics, industrial machinery, chemicals)	Project centralisation, project formalisation, inter-functional climate, R&D role flexibility, Marketing role flexibility, information exchange	Commercial success of innovation project	Moenaert, Souder et al. found that communication flows between market and R&D are increased under conditions involving e.g. formalisation and decentralisation in projects. Formalisation is positively related to innovation.
Poppo and Zenger (2002)	285 top executives in the information services industry	Formal contract (contractual complexity), relational governance, asset specificity, measurement difficulty, technological change, longevity of the relationship, and budget.	Performance (satisfaction with the exchange)	Poppo and Zenger (2002) found support for their hypothesis that formal and relational governance functioned as complements and affected performance positively
Sivadas and Dwyer (2000).	130 alliance partnerships, semiconductor industry	Administrative mechanisms, partner type, governance structure, mutual dependence, innovation type, institutional support, complementarity, cooperative competency.	New Product Success	Sivadas and Dwyer found that administrative mechanisms (decentralized, formalism, or clan) is positively (!) related to competency and NPD success. Sivadas and Dwyer found that administrative mechanisms like decentralisation were positively related to NPD success.
Tatikonda and Rosenthal (2000)	120 new product development projects	Formality, Project management autonomy, Resource flexibility	Project execution success (technical performance, unit cost, time to market)	Formality was positively associated with project execution success. When new products are developed creativity is important for the outcome of the process. Project management autonomy (decentralized governance) found to be positively associated with project execution success.

Table 9-10: Relational governance and performance

Author (s)	Sample	Independent variable(s)	Dependent variable(s)	Key findings
Artz and Brush (2000)	393 original equipment manufacturers, alliance	Relational norms, ORM Specific assets, collaboration, communication strategies, environmental uncertainty.	Negotiation costs	Artz and Brush (2000) found that the development of relational norms lowered exchange costs in the alliance
Athaide, Meyers et al. (Athaide, Meyers et al. 1996).	334 middle level marketing managers	Product customisation, information generation on product performance, product education/training, ongoing product support, proactive political involvement, product demonstration, and clarification of the products relative advantage.	High tech process innovations (success full commercialisation)	Athaide, Meyers et al. found that communication between the engineering and the customers were of utmost importance.
Bello, Chelariu et al. (2003)	290 manufactures/exporters	Relationalism (solidarity, information exchange, flexibility).	Distributors performance	Bello, Chelariu et al. (2003) found for the performance-enhancing qualities of relational governance and the impact of the export context on the development of relational exchange in exporting.
Blazevic and Lievens (2004)	124 Belgian banks	Innovative communication, coordinative communication, management support, cross-functional interface, organisational diversity, participative decision making. Project learning.	Performance (corporate reputation, competitive position, cost position, cross selling, service delivery)	Blazevic and Lievens (2004) found that the following factors were positively related to project learning and performance: innovative and coordinative communication, management support, cross-functional interface, organisational diversity, participative decision making.
Brockman and Morgan (2003)	323 firms, sample from a multiple industry database	Organisation structure, innovative information, etc.	New Product Innovativeness, New Product Performance.	Brockman and Morgan (2003) found that innovative information influenced NPD performance positively.

Author (s)	Sample	Independent variable(s)	Dependent variable(s)	Key findings
Fryxell, Dooley et al. (2002)	129 US based international joint ventures	Formal and social control mechanisms. Inter-partner trust, age, and cultural distance.	IJV Performance (ROE, operating costs, production processes, marketing and sales)	Fryxell, Dooley et al. (2002) empirical examines the moderating effects of age and partner trust in international joint ventures. Social control mechanisms and performance where positively related, but only in the presence of trust.
Parkhe (1993)	111 inter-firm alliances across many industries	Opportunistic behaviour, (+structure, history of cooperation, length of time horizon, etc.)	Performance of strategic alliance (fulfilment of major strategic needs) +	Parkhe (1993) found that performance was negatively related to perceived opportunistic behaviour.
Poppo and Zenger (2002)	285 top executives in the information services industry	Formal contract (contractual complexity), relational governance, asset specificity, measurement difficulty, technological change, longevity of the relationship, and budget.	Performance (satisfaction with the exchange)	Poppo and Zenger (2002) found support for their hypothesis that formal and relational governance functioned as complements and affected performance positively
Tatikonda and Rosenthal (2000)	120 new product development projects	Formality, Project management autonomy, Resource flexibility	Project execution success (technical performance, unit cost, time to market)	Tatikonda and Rosenthal (2000) found that resource flexibility are positively associated with project execution success(Tatikonda and Rosenthal 2000).
Zaheer, McEvily et al. (1998)	153 purchasing managers	Inter-organisational trust, interpersonal trust, negotiation, conflict, asset specificity.	Supplier performance,	Zaheer, McEvily et al. (1998) explored the effects of interorganizational and interpersonal trust on performance. They found that trust significantly improved performance in the exchange.
Zaheer and Venkatraman (1995)	329 independent insurance agencies	Trust, asset specificity, uncertainty, reciprocal investments.	Joint action, quasi integration.	Zaheer and Venkatraman (1995) examine the role of trust in economic exchange. They found that trust positively affects joint action in economic exchange.