



# **Competence Relatedness, Asset Specificity and Vertical Integration**

**An integrating model of transaction cost economics  
and the competence perspective**

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Dissertation submitted to the Department of Strategy and Management at  
the Norwegian School of Economics and Business Administration in  
partial fulfilment of requirements for the degree of Dr. Oecon.

January 1998

98h001296

338.4.01

G95c

eks. 2

ISBN 82-994608-0-8  
Bergen, Norway 1998

## **Abstract**

This study develops a conceptual model that explains vertical integration as a synthesis of transaction costs economics and the competence perspective. It is proposed that variables derived from these two perspectives are complementary and interact in the vertical integration decision. The underlying behavioral assumptions in the two perspectives are examined and discussed. The assumptions of opportunism and bounded rationality as used in the TCE-framework are respecified and based on a synthesis of transaction cost economics, evolutionary economics and the resource-based perspective.

The model developed was empirically tested on a sample of Norwegian hydroelectric power stations industry. The results from the test show that the concepts derived from the two perspectives have substantial impact on the vertical integration decision. Consequently, the synthesis provides a much more powerful framework for explaining vertical integration, than the two perspectives may contribute in isolation. Accordingly, the two perspectives should be integrated into a unified framework sharing the same set of assumptions. Transaction cost economics and the competence perspective are not, as previously argued, in conflict, but are complementary. In the last part of the dissertation theoretical and managerial implications are presented and discussed, and suggestions for future research are provided.

## Acknowledgement

A number of people have supported and encouraged me in the process of working with this dissertation. First of all I would like to thank my dissertation committee members, Professors Sven A. Haugland (chair), Torger Reve and Lars-Gunnar Mattsson, for their contribution to the completion of this dissertation. I owe special thanks to Sven A. Haugland for his encouragement and support through the entire process. Especially, his advice to focus on core features of a problem, and his ideas of how to grasp and solve a problem has to a large extent stimulated my work. Moreover, Sven's positive mind and his patience when reading several drafts of the study made the collaboration very fruitful. Additionally, I wish to express my thanks to Professor Torger Reve, for having the time to discuss central problems with me, and for giving very useful comments on several drafts of the dissertation. I would also like to thank Professor Lars-Gunnar Mattsson for reading and giving comments on the final draft of the dissertation.

I also owe a special thank to Steinar Hovd and Jan Daleng. Steinar Hovd, Norsk Hydro, has through several meetings, discussed practical as well as theoretical questions with me. His long experience within the power station industry, as well as his curiosity about theoretical issues have inspired me and given important contributions to my work. Jan Daleng, "Energiforsyningens Felles Organisasjon" (EnFO), has given me valuable information and the possibility to get access to informants from the power station industry.

The comments and encouragement from my colleagues at Buskerud College, Kåre Sandvik and Øystein Sørebo have been most helpful to clarify many of the theoretical and empirical issues addressed in the dissertation. The stimulating and creative atmosphere developed through working together with Kåre and Øystein has to a great extent contributed to my work. Special thanks are given to Kåre Sandvik, who has been most helpful with respect to the data analysis of the empirical study. Also I owe thanks to Erik Døving, Arnt Buvik, and Aksel Rokkan, for reading and giving comment on earlier drafts of the study.

Completing this dissertation would have been very difficult without the financial support I received from Buskerud College. I wish to express my gratitude to Buskerud College for providing me with the opportunity to work with, and complete, this dissertation. This appreciation also includes the library of Buskerud College. The people working there have considerable effort to satisfy my requests of acquiring literature. Additionally, I owe special thanks to two of my colleagues at Buskerud College, Eva Tangen and Thor Iversen. Eva has, through several readings of earlier drafts, evaluated and improved the quality of my English writing. Thor has given me on-call assistance, when helping me out of several crises with word processing, and general layout problems. Thor has always been patient and supportive when I have approached him with all kinds of technical questions.

Last, but not least, I am profoundly grateful to my wife. Tove has not only supported me during this long period of time by giving encouragement and moral support, but she has also given me valuable input to my work. From the day we met, Tove has taught me that it is possible to get things done. I dedicate my dissertation to Tove.

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## **PART I: INTRODUCTION**

This part of the dissertation consists of the introduction chapter, which presents the background for the study, the specific research questions addressed, and the significance of the topic.

# 1. INTRODUCTION

## 1.1 Background

Vertical integration - internalization into the firm of tasks carried out by suppliers or customers - is a major strategic option. The literature on vertical integration is discussed in many contexts, and can roughly be divided into studies that are concerned about the effects of vertical integration, and the studies that focus on the determinants of vertical integration. The purpose of this dissertation is to focus on the latter aspect, and to examine factors expected to affect vertical integration. The objective is to synthesize two perspectives, the competence perspective (Wernerfelt, 1984; Conner, 1991; Kogut & Zander, 1992; 1993; Prahalad & Hamel, 1990; Nelson & Winter, 1982; Winter, 1988) and transaction cost economics (Williamson, 1975; 1979; 1981; 1985; 1991), seemingly viewed as contradictory perspectives, into a unified framework for analyzing the vertical integration decision.

The use of the two perspectives raises several important questions, which are not, yet, answered in the literature: Does a firm's existing competence matter in the choice of economic organization? If so, why is this aspect not included in the existing dominating framework explaining governance forms? Do all economic actors involved in exchange processes act opportunistically? Is there any kind of connection between opportunism, transaction costs and competence? Is the potential of opportunistic behavior only a problem in exchange processes involving autonomous parts? Does the firm in all circumstances have a superior ability to hamper opportunistic behavior, or are there some organizational mechanisms that may decrease or increase the degree of opportunistic behavior inside firm boundaries? Transaction cost economics and the recently developed perspective of what may be called the competence perspective have to date offered seemingly contradictory answers to these questions. While the former theory is well established as a part of the new institutional economics, the latter perspective is not yet fully developed as a theory. While both perspectives rest on efficiency considerations, the solutions they describe rest on different behavioral assumptions, as well as different interpretations of factors that determine the firm's efficient boundaries. This study will show that to date these two approaches have asked complementary questions and provide

complementary answers. Accordingly, we will in this study argue that in isolation, transaction cost economics and the competence perspective leave critical issues unaddressed.

Is it, however, possible to develop a consistent synthesis of these two perspectives by utilizing the same set of underlying assumptions? As Simon (1991) states, the choice of assumptions is the foundation of a theory, as it influences the selection of variables included in a model. Accordingly, there will be a trade-off between the clarity and precision in a theory's assumptions, and the realism in the predictions or explanations derived from the theory. Consequently, is it logically possible, realistic or even «right» to incorporate the same assumptions into both perspectives without losing the predictive power of one or both of the perspectives? We address this issue by developing a synthesis, and examine the paradigmatic choice of market versus hierarchical governance. Accordingly, utilizing the synthesis, attention is directed toward the determinants of vertical integration.

Theoretical and empirical work devoted to explaining vertical integration has taken a number of different approaches. The most applicable and dominating rationale to the neo-classical cost efficiency explanations, has so far been transaction costs economics (Perry, 1989). Transaction cost economics focuses on market failure and how to reduce opportunistic potential as explanations why firms integrate activities. However, in recent years the competence perspective (Conner, 1991; Kogut & Zander, 1992; 1993; 1996; Conner & Prahalad, 1996; Grant, 1996) has proposed competing theoretical explanations for the vertical integration decision. The competence perspective emphasizes that the performance gains from assessing internal capabilities and competence drive boundary decisions. The perspective focuses on the limits of internal organization, and views organizational failure as a condition when a new activity does not fit the firm's existing operations and competence.

Thus, while transaction cost economics mainly is concerned about transaction cost efficiency, the competence perspective more explicitly directs attention to production cost efficiency. The latter perspective argues that because firms have different resources, they often carry out the same activity with different production costs, and contrary to transaction cost economics, this perspective does not address performance losses from opportunism. However, very little attention has been given to explaining vertical integration within the latter framework (Poppo & Zenger, 1995; Argyres, 1996), compared with the extensive attention, empirically as well as

theoretically, the former has received (cf. Shelanski & Klein, 1995; Rindfleisch & Heide, 1997).

When studying vertical integration there is a need for theories that can explain limits to firm size, beyond the market failure argument (Wiggins, 1991). A competence perspective is argued to be well suited for this issue (Kogut & Zander, 1992; 1993). However, a theory of organizational failure must put the "study of internal organization more nearly on a parity with the theory of markets and market failure" (Williamson, 1994:19). Accordingly, the possibility of incorporating transaction cost economics and the competence framework into the same model should be examined (Conner, 1991; Mahoney & Pandian, 1992; Williamson, 1994). The competence perspective, however, is inadequate in that no consensus exists regarding definition and operationalization of core concepts. Consequently, clear criteria have not yet been developed for identifying, characterizing and isolating firm competencies (Williamson, 1994; Nordhaug, 1993; Bogaert, Martens & Van Cauwenbergh, 1994; Argyres, 1996; Teece, Pisano & Shuen, 1997). Because of this lack of core concepts to test the predictions from the competence perspective, there is a need to define and isolate different competence concepts grounded in the perspective. Accordingly, this study directs attention to developing and defining a concept that is qualified for testing the predictions from the competence perspective. This study directs attention to one, and probably the most focused issue addressed in the competence perspective. We focus on the issue in which familiarity or closeness in competence to an activity will be one important concept for testing predictions from this perspective.

Theoretical rationale for the need of such a concept is found in the closely associated approaches of evolutionary economics (Nelson & Winter, 1982), the resource-based theory (Penrose, 1959; Wernerfelt, 1984), and the core competence approach (Prahalad & Hamel, 1990). In this study these three approaches will together be labeled as the competence perspective. Evolutionary economics, the resource-based perspective and the core competence approach are closely related as they all focus on dynamic as well as evolutionary contexts (Mahoney & Pandian, 1992), share the same assumptions regarding human actors and focus on the limits of internal organization (Collis, 1991).

In sum, this study seeks to identify to what degree a synthesis of the two perspectives is possible. To offer an answer to this we follow a deductive theorizing approach (Lakatos,

1978; Camerer, 1985; Chiles & McMackin, 1996), and the behavioral assumptions that underlie the predictions in the perspectives will be examined and synthesized. Based on this, we argue that a theory of vertical integration can be developed as a synthesis of transaction cost economics and the competence perspective. We develop a conceptual model that incorporates main concepts and predictions from both perspectives. The study addresses this issue by examining buyers' incentives to integrate in industrial buyer-vendor dyads. Consequently, the main purpose of the present study is to extend the two addressed perspectives by developing a synthesis and to test that synthesis empirically.

## **1.2 Research questions**

The study seeks to build up arguments for an integration of two approaches that previously have been argued to be competing rather than complementary theories of vertical integration (Conner, 1991; Poppo & Zenger, 1995; Argyres, 1996). In order to achieve this objective, one has to identify and clarify the explanatory mechanisms as well as examine the underlying assumptions that drive the predictions in the theories (Lakatos, 1978). Empirical testing cannot solve this issue. It must rather be based on purely theoretical reasoning to decide if the two perspectives are rival or complementary explanations of vertical integration. Accordingly, the following research question has to be answered:

### **Research question 1:**

**To what degree are the competence perspective and transaction costs economics complementary theories of vertical integration, and to what degree is it possible to develop a consistent synthesis of these perspectives?**

If a synthesis can be logically outlined, the next issue is to decide how major concepts derived from the two perspectives will affect the vertical integration decision. To my knowledge, there exist no concepts, neither theoretically nor operationally defined in the literature, to test predictions from the competence perspective, that closeness in competence to activities will affect vertical integration. Implicit in the following research question is therefore an attention directed to defining a concept from the competence perspective, which can be empirically tested. Accordingly, the second research question is:

**Research question 2:**

**How do major concepts derived from the competence perspective and transaction cost economics affect vertical integration?**

**1.3 Significance of the topic**

There are several reasons for studying vertical integration by examining the complementarity between transaction cost theory and the competence perspective. First, such a study may provide a broader and more complete understanding of the phenomenon than each perspective may provide in isolation. Thus, the study seeks to explain vertical integration both from a market failure perspective as well as from an organizational failure perspective. In the literature, this problem has received limited theoretical and empirical attention. Secondly, the realism of the behavioral assumptions of transaction cost economics has been strongly attacked. Thus, the study seeks to give a theoretical rationale for a synthesis through relaxing the behavioral assumptions of transaction cost economics. Third, the competence perspective lacks rigorously developed concepts for testing its predictions. Development of concepts derived from the competence perspective is therefore both necessary and useful for further theoretical development. Thus, the study outlines, defines and operationalizes a concept for testing the prediction from the competence perspective, and also conceptually distinguishes this concept from previous "competence" concepts used in economics.

## **1.4 Organization of the dissertation**

The dissertation is divided into four main parts. In addition to the introduction part, Part II provides the foundation for the overall theoretical perspective of this study, and the discussion will be guided by research question 1. Part II closes by answering this research question. Part III consists of two chapters. First the conceptual model of the relationships to be studied empirically is presented. Next, the research hypotheses are outlined and formulated. The last Chapter in Part III presents the research design, and provides a description of the choices connected to an empirical test of the hypotheses. Part IV includes the last two chapters. First, the results of the empirical analysis are presented. The model is empirically tested on a sample of Norwegian hydroelectric power stations industry. The industry consists of 600 business units, in which 411 of these were identified and asked to respond to a questionnaire. The last chapter contains a discussion of the results of the study. The chapter includes suggestions for future research and implications for theory and practice.



## **PART II: LITERATURE REVIEW AND MAJOR CONCEPTS**

This part of the dissertation consists of 4 chapters. In Chapter 2 the theoretical position of this study is outlined and the two focused perspectives on vertical integration are reviewed. Moreover, major concepts derived from the two perspectives are outlined and defined. Chapter 3 discusses and defines the behavioral assumptions, which underlie the predictions in the dissertation. This is done by confronting the assumptions from transaction costs economics with the behavioral assumption that implicitly can be found in the competence perspective. Chapter 4 discusses and defines the concept of interfirm trust. In Chapter 5, we summarize the discussion. Chapter 5 concludes with the answering of research question 1.

## **2. THEORETICAL PERSPECTIVES ON VERTICAL INTEGRATION**

Section 2.1 argues for the relevance of using transaction cost economics and the competence perspective as the overall theoretical framework for explaining the phenomenon studied. In Section 2.2 the transaction cost framework is reviewed and analyzed. In section 2.3 evolutionary economics, the resource-based theory, and the core competence perspective are reviewed and analyzed. These latter perspectives are together argued to represent a competence perspective on vertical integration. Each perspective or theory is discussed according to its underlying assumptions, unit of analysis, strength and limitations. A definition and an outline of the concept of closeness to primary competence are the main objective of Section 2.4. The distinction between the concept of primary competence and earlier "competence" concepts used in economics, is the issue of Section 2.5. A summary and a discussion of implications are presented in Section 2.6. We argue that TCE and the competence perspective focus on different explanatory mechanisms when predicting vertical integration, and that an examination of the underlying assumptions in the two perspectives are necessary in order to analyze to which extent the competence perspective and TCE are complementary rather than competing theories of vertical integration.

### **2.1 Theoretical position**

Vertical integration has been studied in great depth in economics. The three broad determinants focused on have been market imperfections, technological economies, and contractual economies (Perry, 1989). The first two represent neo-classical rationale for vertical integration. The models have primarily used arguments due to increasing return to scale and attention has been directed to exploring the consequences of modifying the standard assumptions of competition, e.g. to restrain trade and create entry barriers. However, the fundamental paradox of orthodox theory is that the firm need not exist. Orthodox theory fails to provide an understanding of firm behavior, as it assumes away or does not regard phenomena such as transaction costs (Coase, 1937), limits on rationality (Simon, 1959; Nelson & Winter, 1982), opportunism (Williamson, 1975), learning processes (Rumelt, 1994) and

information asymmetry (Alchian & Demsetz, 1972). Accordingly, neoclassical economics has largely ignored the concept of the firm by viewing it strictly as a production function (Rindfleisch & Heide, 1997). Consequently, orthodox theory can neither answer why markets are not able to co-ordinate as firms do, nor why one big firm cannot work as well as markets (Winter, 1988).

When we build the conceptual model in this study, we follow the above critique and do not further address the neo-classical approach<sup>1</sup>. Accordingly, we are interested in going beyond the orthodoxy view of the firm as a "black box", and examine the efficient boundaries of firms in an organizational as well as in a market failure context. As the contractual approach is the candidate framework to evaluate the market failure argument, so far theories for explaining vertical integration from an organizational failure framework are nearly absent. Traditional scope considerations on firms are not sufficient in this respect. Chandler's treatment of economies of scope lacks systematic comparison of contractual considerations as well as how to grapple the concept of dynamic capabilities, and therefore offers no formal theory of the firm (Teece, 1993). According to Teece, further progress in the scope considerations of the firm should emphasize the firm as a unique bundle of resources. Further, he recognizes that bits and pieces of such a theory can be found in the contributions from e.g. Penrose (1959) and Nelson & Winter (1982).

Leaving aside market imperfection and technological economics, the theoretical framework for this study is anchored in transaction cost economics (Williamson, 1975; 1979; 1981; 1985; 1991), the resource-based perspective (Penrose, 1959; Wernerfelt, 1984; Conner, 1991; Prahalad & Hamel, 1990) and evolutionary economics (Nelson & Winter, 1982; Winter, 1988; Kogut & Zander, 1992; 1993). In addition we use arguments from Arrow (1974) on information and search costs, and the knowledge transmission theory from Hennart (1982), when the behavioral assumptions of the study are outlined.

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<sup>1</sup>However, previous studies have established that various economic, strategic and power-dependency forces may influence vertical integration. We recognize the legitimacy of alternative perspectives and return to these motives when introducing control variables supplementing our conceptual model (Section 7.5).

## 2.2 Contractual Economies and Transaction Cost Economics

### The background

Coase (1937) was the first scholar to pose the question which activities are mediated through markets and which within formal organizations from a contractual point of view. Coase challenged the orthodox economic assumption that market transactions between economic actors could be handled without cost, and thereby added the concept of transaction cost to the price-theoretical apparatus. The main problem introduced was to economize on transaction cost, because the transaction costs differ according to the nature of the transaction and the way it is organized. According to Coase, under certain conditions the cost of conducting economic exchange in a market may exceed the cost of organizing the exchange within the firm. Accordingly, in order to address the question of a firm's efficient boundaries, the focus was directed to contractual constraints and the understanding of the exchange relation rather than production constraints.

The analysis by Coase was not given any further attention before the contributions by Alchian & Demsetz (1972) and Williamson (1975)<sup>2</sup>. According to Alchian & Demsetz, the existence of the firm was explainable in terms of the incentive problems that arise when team production is combined with asymmetrical information and shirking tendencies. Firms then arise because a manager can subjectively evaluate the performance of individual workers and discipline individual team workers. The theory then centers on the incentive problems of joint production. In such situations actors will not bear the full social cost of their action, and extensive shirking is the result. The problem is therefore to structure effective systems in a manner that minimizes their costs. In this perspective the firms are viewed as an entity of "nexus of contracts" (Jensen & Meckling, 1976; Fama, 1980).

While the "measuring" branch has mainly been centered on the cost of metering productivity and rewards, Williamson (1979; 1981; 1985) has focused on asset specificity as the main

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<sup>2</sup>TCE (Williamson, 1975; 1985) is often described as the asset specificity branch of the new institutional economics, as opposed to the work of Alchian and Demsetz, which is labeled the measurement or metering approach (Shelanski & Klein, 1995).

determinant regarding make/buy decisions. Such specific assets give rise to what Klein, Crawford and Alchian (1978) call "appropriable quasi-rents", which are the difference between the value of the asset in its best use and the value in its next best use. The tussle for rent in bilateral situations characterized by asset specificity is, given the assumptions of opportunism and bounded rationality, the driving forces behind firms' integration of activities. A fundamental assumption in transaction cost economics (TCE) is that the predicted governance forms serve efficiency purposes and economize on transaction costs (i.e. the costs of negotiating, writing, monitoring, and enforcing contracts between trading partners).

Although the two approaches surely have addressed the same questions from the Coasian analysis<sup>3</sup>, they have given rather different answers<sup>4</sup>. The metering branch views the firm as a complex set of market contracts. This makes it difficult to give the firm an analytical meaning. The main problem is that the manager (as well as the workers) can come from an employee of a separate firm with a contract that specifies his reward as the residual output, and thus offering no explanation of firms boundaries (Holmstrom & Tirole, 1989; Mahoney, 1992). The problem of organizational 'anonymity' is not shared by TCE, where organizational setting characteristics are important determinants for efficient governance structures. This difference might best be traced back to the behavioral assumptions of human actors in the two branches.

The metering approach has clearly a "stronger" rationality assumption than TCE, which in some respects is close to orthodox theory. The owner is fully aware of the hazard the agent poses, and, therefore, the problem is a matter of incorporating all relevant action into *ex ante* incentive alignments. The nexus of contracts approach therefore treats human actors as capable of processing all relevant information *ex ante*. The boundaries of the firm are therefore not an interesting issue, because the parties can agree today about a contract that needs no change in the future. The metering approach therefore theorizes about the contract between co-operating parties, regardless of boundaries (Eisenhardt, 1989). Hence, "it does not matter what affiliations the parties have and hence where the contract is embedded organizationally" (Holmstrom & Tirole, 1989:68). Therefore, TCE comes forth as the most suitable theory from

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<sup>3</sup>And what they share, of course, is the focus on exchange processes and its relevance in economic analysis.

<sup>4</sup>For a more detailed discussion of the difference between the approaches, see Williamson (1985, chapter 1 & 2).

the contractual perspective concerned about the issue of firm boundaries, and is further regarded below.

## **Transaction Cost Economics (TCE)**

After presenting an overview of the theory, the major empirical TCE-studies on vertical integration are summarized. A discussion of implications is then provided. Particularly, we discuss critical issues not addressed by the TCE-framework.

**The theory.** TCE identifies different modes of governance for transactions. The theory explicitly addresses firm versus market questions and gives an explanation why the firm exists and what determines its boundaries<sup>5</sup>. The ways of organizing transactions differ in costs depending on the characteristics of the transaction in question (Williamson, 1979). These characteristics or dimensions are uncertainty, the frequency of the particular transaction, and the degree to which durable, transaction specific investments are required to realize least cost supply (Williamson, 1985). Williamson proposes that where transactions have highly uncertain outcomes, recur frequently, and require transaction specific investments, they can be performed most efficiently within hierarchies.

According to Williamson, the governance choice is determined by firms' economizing on transaction costs. Williamson (1985) classifies transaction costs into three main groups; bargaining costs, control and monitoring costs and maladaptation costs. Bargaining costs refer to the costs induced through negotiations of ambiguous terms of trade. Control costs include time and resources spent on monitoring and evaluating various dimensions of the transactions taking place between transacting parties. Maladaptation costs occur when dependent parties are unable to respond quickly and easily to changing circumstances because of self-interest bargaining and disagreements. These transaction costs come into being because of actors' opportunistic potential and bounded rationality, combined with high asset specificity situations.

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<sup>5</sup>Moreover, TCE as a framework has been applied in studying a variety of economic relationships (e.g. long-term contracting, franchising, and the organization of work, joint venture and other contractual relationships). However, as Williamson (1985:13) states: "Vertical integration is not only an important condition in its own right but equally because the transaction cost treatment of the decision to integrate is paradigmatic".

As briefly mentioned, TCE operates with two behavioral assumptions. Williamson's concept of *bounded rationality* is derived from Simon and defined as: "... a condition in which human agents are intendedly rational, but limitedly so" (Williamson, 1985:45). The cognitive limitations of human actors are acknowledged, as they are not capable of writing comprehensive contracts accounting for all possible contingencies. However, Williamson uses only one strand of Simon's original concept, namely the cognitive limits to rationality leaving aside the 'satisficing' part of the concept (Martin, 1993). Therefore, actors are viewed as rational in their capacity to handle their own cognitive limitations as they are supposed to calculate the efficiency of different governance modes (Williamson, 1991). *Opportunism* is by Williamson (1985) defined as "self interest seeking with guile" (p. 47). It is a rather strong assumption of the selfish motives of actors resulting in shirking and dishonesty. The problem with opportunism in the TCE-framework is connected to the assumption of bounded rationality. Accordingly, both the assumptions of bounded rationality and opportunism have to be present in order to outline the transaction costs issues raised by Williamson. If either one of the behavioral assumptions should be absent, answering the question of efficient governance would be different: "... contracting would nevertheless be feasible if human agents were not given to opportunism. Thus, if agents, though boundedly rational, were fully trustworthy, comprehensive contracting would still be feasible" (Williamson, 1981:554). However, the fact that economic agents are "simultaneously subject to bounded rationality and .. are given to opportunism does not itself .. vitiate autonomous trading" (Williamson, 1981:554). It is the presence of a high degree of investments in asset specificity that creates the situation where the consequences of opportunistic behavior are critical. Asset specificity or transaction specific investments is by Williamson defined, as *investments required to realize least cost supply*. When asset specificity is high, hierarchical solutions are assumed more efficient than market solutions, since internal opportunism is, in this framework, easily handled by the organizational mechanism of fiat. When asset specificity is low, however, it would always, according to Williamson, be efficient to use market solutions due to the weaker incentives and the higher transaction costs, which exist internally.

**Empirical studies.** Even though all the three dimensions mentioned above are expected to affect the choice of governance form, asset specificity is the critical one: "Asset specificity is both the most important dimension for describing transactions and the most neglected attribute in prior studies of organization" (Williamson, 1981:555). Thus, asset specificity is the

dimension that is most utilized in empirical works. Regarding the to other two dimensions, very few empirical studies have examined transaction frequency (Mahoney, 1992; Shelanski & Klein, 1995; Rindfleisch & Heide, 1997). However, the few studies examining the hypothesized effect of frequency have been largely unsuccessful in that they "have failed to find any positive association between transaction frequency and hierarchical governance" (Rindfleisch & Heide, 1997:31). Uncertainty has been commonly employed in the empirical literature on vertical integration. However, the effect of uncertainty has showed mixed results. For example Harrigan (1986) finds that uncertainty reduces the probability of integration, while Walker & Weber (1987) find that uncertainty increases the probability of integration. Asset specificity has been extensively employed in empirical work on transaction costs explanations for vertical integration. Evidence in support of asset specificity's impact on vertical integration has been obtained in numerous studies. Reviews of TCE (cf. Joskow, 1988; Mahoney, 1992; Shelanski & Klein, 1995; Rindfleisch & Heide, 1997) show that asset specificity has significant effects on vertical integration. Thus, from TCE asset specificity is both theoretically and empirically the most important determinant of vertical integration.

According to TCE, the governance decision will involve a trade-off between transaction and production costs. Thus, some TCE-studies have given support to the argument that heterogeneous firm resources and production costs influence the make-buy decision. Monteverde & Teece (1982) find that the heterogeneous and unobserved firm effects had most significant influence on the make or buy decision. The study, however, also supported the transaction cost argument. Walker & Weber (1984; 1987) found production costs to be more statistically important predictors of the make or buy decision than were transaction costs. Even though the most important indicator of vertical integration was found to be differential firm capabilities, the Walker and Weber studies also, like the Monteverde & Teece study, find support for the transaction cost argument. According to Walker & Weber (1984): "... the effect of transaction costs on make-or-buy decisions was substantially overshadowed by comparative production costs" (p. 387). These three studies state that while boundaries of the firm indisputably are influenced by transactional dilemmas, they also propose the issue that firms' differential production costs matter. However, other studies (Anderson, 1985; John & Weitz, 1988) find the opposite. Because of the mixed findings and the fact that very few studies have examined the role of production costs, further research is needed to clarify the



role of production costs vs. transaction costs in determining appropriate governance structures (Rindfleisch & Heide, 1997).

To what degree can we question some of the empirical research done in the TCE-program? Shelanski & Klein (1995) give some guidelines to why the measuring of asset specificity in some cases can be questioned. They assert that asset specificity sometimes has been confused with other factors, and that imperfect measures on asset specificity in some empirical works are not able "to capture whether the investment has alternative value outside the transaction for which it was initially made" (p. 344). This leads us to questioning the construct validity. Additionally, the studies that measure vertical integration as a dichotomous variable (e.g. Monteverde & Teece, 1982; Masten, 1984; Walker & Weber, 1984: 1987) give no exact measure on the predictions from TCE and the focus on exchange relations. This means that it offers no exact attention to the standard TCE paradigm in which "partners are locked into a relationships *ex post* because of investments that have substantially higher value than outside it" (Holmstrom & Tirole, 1989:69). As Wiggins (1991) states, empirical studies in a TCE framework are subject to multiple interpretations. In fact, one could alternatively interpret some of the results in the way that firms continue to do things that are close to or identical to what they have done earlier, and not that it is the properties of the transaction per se that matter. However, relatedness in resources and competence has not been conceptualized as an alternative explanation in empirical work on TCE, which may be a matter of internal validity problems.

**Critical remarks.** Even though asset specificity has shown to be an important determinant of vertical integration, there is a need for other theories to be developed (Mahoney & Pandian, 1992; Minkler, 1993; Kogut, 1991; Whyte, 1994). TCE has little to offer in low asset specificity situations other than an exclusive advantage for market allocations (Wiggins, 1991). Following TCE, there are no limits of firm size, if and when the market fails. As Gibbons (96:4-5) states: "TCE has emphasized inefficiencies ... of the market in conducting certain transactions..., rather than the inefficiencies of the firm in its internal organization and operation". Hence, there is a need for a supplementary theory of organizational failure (Williamson, 1994).

TCE gives no attention to what extent the integration of an activity will fit a firm's existing competence or resource base, and, thus, no attention is directed to firms' uniqueness in resources or competence. TCE "assumes that the same productive activity can be carried out either within the firm or by a collection of autonomous contractors; that is except for the problem of opportunism, the same inputs can be used equally productively in a firm or in a market context" (Conner, 1991:142). Accordingly, there is no focus on firms' potential production constraints. Moreover, TCE assumes opportunistic actors, and is not able to "give refutable prediction about the implications of a deviance from opportunism" (Heide & John, 92:32). Accordingly, TCE does not specify the mechanisms through which opportunistic behavior is created or is reduced (Ghoshal & Moran, 1996). Although trust appears to be an essential element in efforts to explain the nature of economic organization (Ring, 1997), it is not incorporated into the mainstream model of TCE. Accordingly, trust as a governance mechanism (Bradach & Eccles, 1989) is generally ignored (Ring & Van de Ven, 92).

## **2.3 The competence approach**

Below, evolutionary economics (Nelson & Winter, 1982), the resource based perspective (Wernerfelt, 1984) and the core competence perspective (Prahalad & Hamel, 1990) are discussed and analyzed. These perspectives are argued to represent a unified competence perspective on firms. Moreover, we review the few theoretical and empirical studies that address how competence affects the choice of economic organization.

### **2.3.1 Evolutionary Economics (EE)**

Evolutionary economics (Nelson & Winter, 1982) focuses on firm dynamics. Nelson & Winter's contribution can be divided into a macro- and a micro part. In the macro part markets are viewed as dynamic and would never reach the equilibrium stadium as postulated by orthodox economic theory. Instead organizations will continually be confronted with ways of reproducing themselves. They do so by selecting successfully standard operating routines from the environment over time, and store those as a part of the organization's memory. The environment will select the firms that use relatively efficient routines. The micro part concentrates on how firms follow rules and routines, which give stability in operational activities. The primary concept to signify organizational functioning is routines. The organizational routines (using an analogy to biological genes) are the main reasons why organizations are resistant to change. The evolutionary dynamic explanation stresses that some antecedent conditions existed and "that the state of affairs now observed reflects the cumulative effect of the laws of change operating on that antecedent condition" (Winter, 1988:172). EE holds that actors have limited capacity to perform new tasks and regards actors' production constraints or what we refer to as bounded production rationality. The fundamental view in EE that organizations 'know how to do things', means that they know how to do things they are familiar with and not how to do things they are not familiar with. As Winter (1988:176) states; ".. when a firm grows by vertical integration, it is not just a question of 'more of the same'. But it is [also] more of something closely related, something about which the firm already has some degree of relevant knowledge. The evolutionary view suggests that this 'degree' is probably an important determinant of where integration takes place and where it does not." (p.176).

### **2.3.2 Resource-based theory and the core competence approach**

The resource-based view (Wernerfelt, 1984) emerged as a counterpoint to market structure analyses of competitive strategy, where competitive advantage is primarily seen as a function of inherent industry attractiveness and the market positioning of individual firms. As Teece, Pisano & Shuen (1997:513) state:

This approach [i.e., the resource-based perspective] focuses on the rents accruing to the owners of scarce firm-specific resources rather than the economic profits from product market positioning. Competitive advantage lies 'upstream' of product markets and rests on the firm's idiosyncratic and difficult-to-imitate resources.

Even though the 1984-article by Wernerfelt gave the start of a new renaissance in strategy, the basic ideas from the resource-based perspective (that connects performance to a firm's unique competencies and resources) has for a long time been of concern. Drawing on insight from economics (Penrose, 1959; Schumpeter; 1934; Nelson & Winter, 1982), administrative science (Selznik, 1957) and strategy (Andrews, 1971) scholars identified a view of corporate strategy that placed unique difficult-to-imitate skills, knowledge and other resources (tangible as well intangible) ahead of focusing exclusively on the competitive environment. The underlying theoretical approach is to see the firm as a unique bundle of intangible and tangible resources, and not through its activities in the product market (Wernerfelt, 1984). The emerging central theme addressed seems to be that privately held knowledge or competence is the basic source of advantage in competition (Conner & Prahalad, 1996). Conner & Prahalad (1996:477) state:

As the literature makes increasingly clear, a knowledge-based view is the essence of the resource-based perspective... The resource-based view generally addresses performance differences between firms using asymmetries in knowledge (and in associated competencies or capabilities...). A resource-based theory of the firm thus entails a knowledge-based perspective.

So far, however, little attention has been given to explaining economic organization and vertical integration in the resource-based literature (Poppo & Zenger, 1995). However, resource-based theory (RBT) generally points out that limits of integration can come from a lack of relatedness, not only from the opportunism problem (Conner, 1991; Conner &

Prahalad, 1996; Kogut & Zander, 1992; Kogut & Zander, 1996). RBT emphasizes that firms lack the capability to develop new competencies quickly (Dierickx & Cool, 1989), which implies that the choices of domains of competence are influenced by past choices (Teece, Pisano & Shuen, 1997). Teece, Pisano and Shuen (1997:515) further state:

At any given point in time, firms must follow a certain trajectory or path of competence development. This path not only defines what choices are open to the firm today, but it also puts bounds around what its internal repertoire is likely to be in the future.

Thus, according to RBT (and in accordance with EE), a firm will fail on vertical integration if a new activity does not fit the firm's existing competence base. Therefore, RBT represents, according to Conner (1991:143), an "alternative rationale for existence of the firm and its scope".

The roots of the core competence approach (Prahalad & Hamel, 1990) can be traced back to the resource-based view of the firm, and is based on the same assumption that the uniqueness of firms is the foundations for competitive advantages (Rumelt, 1994). However, in contrast to the resource-based approach, where rent-earning factors were identified as the whole 'bundle of resources', the core competence approach almost exclusively focuses on competence as the most important factor, considering other resources as less important. In a way the approach is not unlike an activity chain, because a core competence is tied to competitive advantage through core products, which again is the basis for the final products. This implies that competence is viewed as the foundation of the value-creating process (De Leo, 1994; Bogner & Thomas, 1994), and that the unit of analysis is the underlying competence, and not a particular product or service (Hamel, 1994). Therefore, focusing on core competence means that some kind of competencies underlie the activities or transactions in question, which comes earlier in the causal chain, and that some competencies must be reflected in the performance of the activity. In this study the core competence approach is viewed as a category classified under the RBT-framework<sup>6</sup>.

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<sup>6</sup> Moreover, since this study brings attention to competence issues, the concept of core competence is used as a theoretical departure when defining the concept of closeness to primary competence (cf. section 2.4).

### 2.3.3 A unified approach

EE is closely aligned with the resource-based perspective. EE and RBT share with orthodox theory the ignorance of exchange processes in their analysis. Firms are further viewed as repositories of productive knowledge, making no difference between production and transaction costs, and is embedded in the same knowledge or competence class (Blackler, 1995). Both perspectives focus on dynamic as well as evolutionary contexts (Mahoney & Pandian, 1992). EE follows the Schumpeterian dynamic competition model, which involves carrying out "new combinations» including new methods of production. This model may be translated into the RBT framework (Mahoney & Pandian, 1992) by considering the firm's "new combinations of resources" (Penrose, 1959:85), as means of deploying existing resources into new business activities. In an evolutionary context, both approaches emphasize that firms' past decisions and decision rules are the basic genetics that firms possess (Mahoney & Pandian, 1992). Accordingly, firms are viewed as repositories of competence, and it is emphasized that this competence base involves idiosyncratic features that distinguish them from other firms in the same business. Both pay attention to the internal resources of the firm, and how these are acquired and developed (Collis, 1991). Moreover, neither of the perspectives consider transaction costs (Winter, 1988; Collis, 1991), and ignores the issue that some human agents are given to opportunism (Foss, 1996a; 1996b).

Even though RBT and EE are closely aligned, EE is better suited to understand the kind of bounded rationality found in the competence perspective, while RBT (together with the core competence perspective) provides a better understanding of the importance of a firm's unique resources and competencies. EE is mostly concerned about explaining firms' routine behavior in a descriptive way, while RBT and the core competence perspective are concerned with the more normative strategic aspect of identifying inputs likely to generate rents. EE, in contrast to TCE, relies more on the "behavioralist" position (Cyert & March, 1963) when arguing that organizations will resist change, because they will follow procedures that have given earlier success. EE focuses explicitly on the limitations firms' routines, as firms are supposed to reproduce themselves instead of adapting to perfectly competitive environment. According to Nelson & Winter (1982), firms are "much better changing in direction of 'more of the same', than they are at any other kind of change" (pp. 9-10). Accordingly, EE moves attention to

firms' limited capability to perform new and different tasks (Winter, 1988). The latter view on rationality is by Williamson (1985) classified as organic rationality, and is, even though different from the 'semistrong rationality' assumption of TCE, "nevertheless complementary; each can expect to benefit from the insights of the other" (p. 47).

Implicit in RBT is the same view of actors' 'bounded production rationality' as developed in EE (Barney, 1991). It is stressed that firms would have performance advantages for related diversification over unrelated diversification (Mahoney & Pandian, 1992). Additionally, RBT stresses that firms should select product markets where existing resources can be deployed even though other markets objectively may give better performance (Penrose, 1959; Wernerfelt, 1984). Finally, firms grow in the direction set by their capabilities and these capabilities will slowly expand and change (Penrose, 1959).

### **2.3.3 Review of competence-based perspectives on economic organization**

Recently, a number of contributions within the framework of evolutionary economics and the resource-based perspective have tried to theorize on the economic organization of the firm. What these theories have in common is that they all try to rationalize the existence or the growth of the firm based on a competence perspective on firms, and that this issue may be solved without regarding or by rejecting the new institutional economics assumption of opportunism (Foss, 1996b). Accordingly, the studies view firms as heterogeneous, knowledge bearing entities, and agree that the assumption of opportunism is an unnecessary premise for explaining economic organization. After reviewing the theoretical studies, we consider the few studies that explicitly address how competence or knowledge affects the transfer of goods across technological interfaces. A discussion of implications is then provided.

#### **The studies**

According to Conner (1991), firms exist because some co-specialized assets make 'a better fit' with some firms than with other firms. According to Conner, firms have different organizational routines and cultures and are heterogeneous entities, which makes the information transmission between firms costly and time consuming. She further posits that the

degree to which new undertakings are successful depend on the degree to which they are related to the firm's existing asset base. Such relatedness provides an opportunity for gains to generate new redeployable resources as well as to economize on intra-knowledge and intra-information transmission. Thus, firms economize if internalizing when this fit is present because the firm's sharing of some kind of codes, languages etc. implies that co-operation in only one direction is needed. In contrast, under market exchange two autonomous parties "must try to orient in two different directions" (p. 142).

Kogut & Zander (1992) argue that firms exist because they have some higher-order organizing principles that markets cannot supply. It is not clear what these higher-order organizing principles are (Foss, 1996b), but according to Kogut & Zander (1992:474) they include "shared coding schemes", "values", "a shared language", and "mechanisms by which to codify technologies into a language accessible to a wider circle of individuals". Thus, by utilizing these higher-order organizing principles what firms "do better than markets is the sharing of and transfer of the knowledge of individuals and groups within an organization" (p. 383). According to the authors, the decision to make or buy is dependent upon three elements: "how good a firm is currently at doing something, how good it is at learning specific capabilities, and the value of these capabilities as platforms into new markets" (p. 395). The only reason why firms purchase goods from suppliers is because suppliers in some situations may have superior knowledge. Otherwise firm organization or some kind of complex contracting will be preferred. Thus, the vertical integration decision is independent of potential opportunism problems: "In contrast to the contract approach to understanding organizations, the assumptions of the selfish motives of individuals resulting in shirking and dishonesty is not a necessary premise of our argument" (p. 384).

Conner & Prahalad (1996) extend the arguments from Conner (1991) and are mainly concerned about knowledge-based transaction costs that are independent of opportunistic considerations. Conner & Prahalad assume, as Williamson, bounded rationality, and argue that "cognitive limitations prohibit individuals from possessing identical stock of knowledge" (p. 478). They assume away opportunism, and assume instead that individuals are taken to behave truthfully: "We disagree with the proposition that honest behavior necessarily results in market contracting" (p. 483). However, a very important argument of their study is that honesty "does



not rule out intense disagreements or haggling”, because, “truthful individuals honestly may disagree about the best present and future action for their business activities” (p. 483).

Their main arguments are connected to what they call the knowledge-substitution and flexibility effects on organizational mode. The knowledge-substitution effect implies that within the firm the manager’s wisdom may replace the employees’. Thus, it is not necessary that the employee may absorb the manager’s wisdom before he can apply it. Under market contracting, however, each autonomous party in an exchange uses his own judgment, and, “retains the right or power of self-government” (p. 478). According to the authors, bounded rationality implies that the knowledge-based transaction costs will increase as the differences in the stock of knowledge between parties increase. Thus, by having the ‘power to give direction’ a firm will economize on knowledge transaction costs, and hence economize on knowledge substitution grounds if the degree of perspectives or knowledge between exchange partners is high. Thus, they propose that firm organization is more likely to be preferred, the greater is the initial differences in knowledge between two parties. The flexibility effect concerns the relative cost under the two organizational modes, of altering the parties’ duties and responsibilities on an ongoing basis, in order to respond to new learning or other developments arising during the course of work. In uncertain situations, they argue, market contracting requires costly contract renegotiations in order to implement flexibility, while firm organization does not. Thus, they propose that firm organization is more likely to be preferred on knowledge flexibility grounds, the more dynamic and uncertain is the competitive environment, and that this proposition is independent of opportunistic potential.

Kogut & Zander (1996) argue that firms exist because coordination, communication, and learning “are situated not only physically in locality, but also mentally in an identity” (p. 502). Their discussion implies that the existence of the firm may be explained in terms of some deep preferences for firm organization and that people wish to belong to a community. Thus, the development of shared identities may lower the costs of communication, coordination, and learning.

Kogut & Zander (1993) study the decision to transfer technology within the firm or in the market with focus on the attributes of knowledge. They propose that the more tacit the knowledge that underlies the technology, the more likely the technology will be transferred

within the firm. This hypothesis was found to be statistically significant. Drawing on Winter's (1987) work, they develop scales to measure the latent construct of tacit knowledge (Polanyi, 1966). Kogut & Zander's work shows that the characteristics of the knowledge involved in transactions seems to matter in the make/buy decision: "Our findings suggesting that firms specialize in the transfer of relatively tacit and idiosyncratic knowledge are consistent with the broader evolutionary perspective" (Kogut & Zander, 1993:640). Moreover, their results indicate that: "... as the knowledge becomes more codified and more easily taught [low degree of tacitness], the more likely it will be transferred to a third party." (Kogut & Zander, 1993:635).

Borman (1994) examines common knowledge between companies and argues that the presence of common knowledge reduces co-ordination costs and thereby facilitates market exchange. This is due to common knowledge between the parties that reduces the degree of uncertainty. However, the empirical results of the study are very difficult to interpret. The overall problem is the descriptive approach. Besides, the operationalization of the construct seems to be questionable. It seems to be impossible to assess to what degree it really represents the theoretical constructs. However, the theoretical implications outlined are interesting, but the empirical results cannot be seen as an overall support of the theory developed.

## Comments

Important critics and shortcomings of the theoretical studies are excellently discussed in Foss (1996a) and Foss (1996b). Regarding Conner (1991) and Kogut & Zander's (1992; 1996) studies, Foss states that in absence of opportunism why could not co-specialization or higher order organizing principles develop in markets as well as in firms. None of the studies are able to explain why there should be more organizing principles, co-specialization or common codes in the firm than in the market. Accordingly, what the studies do not address is that without opportunism why should there be more co-operation in firms than in markets. From a contractual point of view, however, firms are constructed to hamper opportunism. The TCE explanation is simply that the reason why there is more of co-specialization (Conner, 1991) or higher order organizing principles (Kogut & Zander, 1992) in the firm than in the market is because "firm-organization is the transaction cost-minimizing mode of organizing for this type of asset" (Foss, 1996a:474).

Moreover, the Conner & Prahalad (1996) study addresses the issue that transaction costs may arise even from truthfully behavior. Clearly, disagreements on future actions may depend on different initial knowledge structures and perspectives, as well as on opportunistic behavior. If opportunism is absent, however, why could not two autonomous parties ex-ante simply agree that e.g. the buyer's perception of the unforeseen situations should be followed. However, a long-lasting relationship may imply that the parties develop high levels of relational norms (Macneil, 1980). Opportunism absent, these norms may secure that exchange partners develop common expectations about how to behave when responding to 'dynamic and uncertain competitive environments'. Accordingly, what the no opportunism-based transaction costs Conner & Prahalad (1996) are concerned about, is more a complementary than competing perspective to TCE.

As Foss (1996a:747) states, and strongly emphasized in this study, a competence perspective may complement transaction cost economics in the analysis of various agency-problems in internal organization: "... so that - for example - the organizational knowledge residing in business culture is also seen as influencing the organization's agency cost", and "... as the ... firm moves increasingly away from its core competencies ..., it may confront increasing agency

costs, as increasingly unfamiliar activities produce more severe moral hazard and adverse selection problems.” Thus, one should try to incorporate “... some of the insights from knowledge-perspectives in the contractual approach” but “we cannot do without concepts such as opportunism if we wish to explain the existence of the firm” (Foss, 1996a:747). None of the issues Foss addresses are, however, theorized in the studies above reviewed. However, these issues are the ones we try to solve in the analyses provided in the forthcoming chapters.

While there has been done extensive empirical works on vertical integration within the TCE-framework, very limited effort has been made within a competence framework. Consequently, empirical studies focusing on closeness to existing competence as a determinant for vertical integration have not been found in the literature. However, the studies by Kogut & Zander (1993) and Zander & Kogut (1995), have given important insight in pointing out that the degree of tacit knowledge involved in the transferring of goods between interfaces seems to affect the governance of transactions. Accordingly, the concept is outlined and defined below.

### **2.3.4 The concept of tacit knowledge**

The concept of tacit knowledge was introduced by Polanyi, who started out with the fact that individuals “... can know more than we can tell” (Polanyi, 1966:4). Polanyi emphasized individual problems and low ability to give useful explanations of (or articulate) the rules involved in a skilful performance. Nelson & Winter (1982) further explored the significance of the concept in organizational analysis, when emphasizing the tacit dimension involved in firms’ routine activities. Winter (1987) elaborated this issue by introducing five dimensions meant to represent the degree of tacit knowledge<sup>7</sup>. According to Winter (1987) the dimensions of codifiability and teachability are the dimensions that best represent tacitness. This proposition is supported by the empirical study of Zander & Kogut (1995): “These two [dimensions] provides the most direct insights to the degree to which capabilities are tacit and difficult to communicate” (p. 85). Thus, the dimensions of codifiability and teachability are selected to

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<sup>7</sup>These five dimensions are viewed as continua representing degrees of tacitness, and are: not teachable - teachable; not articulated - articulated; Not observable in use - observable in use; Complex - Simple, An element of a system - Independent. The left-hand ends of the continua are expected to represent high degrees of tacitness. Moreover, Kogut & Zander (1993) and Zander & Kogut (1995) developed continuous scales of these dimensions.

represent the construct of tacitness. Additionally, system dependence is included as a dimension representing tacitness (Winter, 1987)<sup>8</sup>.

In this study, the tacit knowledge involved in the transaction is built on research by Winter (1987) and Zander & Kogut (1992). However, we limit the focus to the buyer's perception about the vendor's tacit knowledge<sup>9</sup>. Accordingly, the concept of *tacitness is defined as the buyer's perceived degree of the tacit knowledge underlying the vendor's performance of the activity purchased*. A high degree of tacit knowledge will imply that the group is to a limited degree able to explain, articulate, write down, teach and so on the knowledge or the 'theory' which lies behind the performance of the activity. Thus, system dependency, lack of teachability and lack of codifiability represent high degrees of tacitness.

*Codifiability* is defined as the extent to which the vendor's knowledge is articulated in documents available for the buyer. *Teachability* refers to the ease by which the vendor's skills can be learned by the buyer. *System dependency* is the extent to which the transfer of knowledge from the vendor to the buyer is impaired due to dependence of many different (groups of) experienced people for its production. The above definitions are somewhat different from Winter's and Kogut & Zander's. Our definitions imply that the vendor's knowledge actually may be e.g. codified, but that this codified knowledge (e.g. the recipes, formal record and documents) is not available for the buyer. Hence, it is possible that the buyer can perceive the knowledge as tacit, even though the vendor will not. Accordingly, we are not able distinguish between knowledge which is in fact tacit, and knowledge that is not tacit for the vendor but perceived as tacit for the buyer. However, this will not cause any problems with regard to the explanatory logic underlying the predictions involving this construct. If the buyer perceives the knowledge as tacit, this knowledge will, regardless be unfavorable to knowledge transfer.

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<sup>8</sup> This implies that the dimensions of complexity and product observability is excluded from Winter's (1987) originally taxonomy. This choice is based on Kogut & Zander's (1995) empirical study, which concludes that these dimensions to a lesser degree represent tacit knowledge, which also is consistent with Winter (1987). According to Winter, observability in use is more related to the costs of observation, while complexity is related to "the amount of information required to characterize the item of knowledge in question" (p. 172).

<sup>9</sup> Kogut & Zander, however, are concerned about the efficiency for a firm to establish a wholly owned subsidiary compared with the efficiency of using an agent. They do not address the issue that the competence base of the other side of a dyad matters.

Following Winter (1987), the concept of tacitness is proposed to be caused by the three dimensions of codifiability, teachability and system dependency. As outlined by Bollen & Lennox (1991), with cause dimensions one cannot expect that an increase in value of one dimension simultaneously requires an increase or decrease in the other dimensions that cause the concept. For example, if codifiability increases then it is not expected that system dependency and teachability necessarily will decrease and increase simultaneously. If knowledge is not codified this does not imply that one automatically will expect that system dependency is absent and that the activity is easy to teach. Teaching a task may often involve learning-by-doing, without manuals or records to guide the learning process (Nelson & Winter, 1982). Likewise, even though knowledge is not codified this does not imply that performing the activity is less dependent on other parts of a system. Thus, tacitness is proposed to be formative concept.

### **2.3.5 Summary**

Within the TCE-framework, without positive transaction costs there will be no incentives for hierarchical governance. Within the competence framework, however, the reviewed studies argue that hierarchical governance may be efficient even if transaction costs is absent. In a TCE-framework hierarchical governance will always contribute to higher production costs, and the potential savings are in transaction costs. By contrast, in a competence perspective, lower production costs may exist because of economies of relatedness and avoidance of good intention transaction costs. However, the competence approach neither evaluates or rules out integration decisions based on reducing opportunistic potential. Accordingly, there is no focus on exchange costs, and therefore no theorizing about how to avoid opportunistic potential. Even though some kind of closeness in competence to an activity will reduce the production costs internally, *ceteris paribus*, the high power incentives of the markets (Williamson, 1985) may further reduce the production costs. Besides, the cost of exchange has to be regarded when deciding either to make or buy. For example, if the cost of running the exchange relation is at a minimum (near perfect market conditions), some governance costs, in contrast, will always be present in the hierarchy (Williamson, 1975; 1985). Accordingly, while the perspective gives plausible explanations of when a firm will fail in integrating an activity, it is;

however, not able to analyze when favorable internal conditions will outperform market exchange.

Furthermore, the literature lacks rigorously conceptualized concepts (Williamson, 1994; Nordhaug, 1993; Bogaert, Martens & Van Cauwenbergh, 1994; Argyres, 1996; Teece, Pisano & Shuen, 1997), and a competence framework applied in empirical works on the make or buy decision, is, except for the work of Kogut & Zander (1993)<sup>10</sup>, to my knowledge, absent. There exists in the literature no concepts, neither theoretically nor operationally defined, to test the loosely formulated prediction from the competence perspective that closeness in competence to activities will affect vertical integration. Accordingly, in the next section, such a concept is developed and discussed in the context of buyer-vendor relationships, and regards the buyers competencies.

## **2.4 The concept of closeness to primary competence**

When firms grow by vertical integration, they will most likely grow in the direction of something closely related to current competencies. This premise, adopted from the competence perspective (evolutionary economics as well as from resource-based perspective), is the foundation for the development of the competence construct of the study.

A firm surely possesses many different kinds of competencies (Nordhaug, 1993). Some competencies, however, are likely to be more important than other competencies. The other major departure when developing the competence construct of the study is grounded in the resource-based perspective and the core competence approach. As discussed in Section 2.3, according to resource-based theory the competencies that contribute best to the success and survival for a firm will be the foundation behind a firm's integration activities. The most manifest perspective emphasizing such issues in the literature is the core competence approach. Accordingly, we start the discussion of the competence concept used in this study, by drawing on the guidelines identified in this approach.

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<sup>10</sup>Kogut & Zander, however, are concerned about the efficiency for a firm to establish a wholly owned subsidiary compared with the efficiency of using an agent. They do not address the issue that the competence base of the other side of a dyad matters.

In Paragraph 2.4.1, organizational competence is outlined and defined. In Paragraph 2.4.2 the concept of primary competence is defined. Finally, the concept of buyer's closeness to primary competence (CPC) is defined in paragraph 2.4.3.

### **2.4.1 Defining organizational competence**

The term competence has been used in psychology (White, 1959), in strategy (Andrews, 1971), in economics (Penrose, 1959) and in administrative sciences (Selznik, 1957). Due to the fact that the concept has been used in many different disciplines and because the treatment of the concept has neither been analytically well treated nor empirically measured and validated, there exists great terminological confusion. Consequently, in economic approaches to competence there is a lack of basic concepts that theory development can be built on (Nordhaug, 1993; Bogaert, Martens & Van Cauwenbergh, 1994). Concepts such as competencies, core competence, capabilities, invisible and visible assets, strategic assets, resources and skills partly overlap and partly represent different concepts in the literature. In short, the different definitions are fragmentary and no conceptual agreement is identifiable. Taking all of these concepts together, almost everything in the firm becomes competencies. An avoidance of this is important to prevent the competence and resource-based perspectives from becoming tautological (Conner, 1991).

The often used dimensions of organizational genetics (Nordhaug, 1993), collective attitudes (Hall, 92), organizational culture (Defillippi & Arthur, 1994), shared value systems (Bognar & Thomas, 1994) as parts of the competence concept are good examples of how competence seems to cover almost everything of a firm's internal and external resources. As shown by population ecologists (cf. Hannan & Freeman, 1977) and scholars in organizational culture (cf. Schein, 1985), it seems like cultural factors affect the organization's ability to survive. Culture may, in a sense, have effects on organization's survival and income, but incorporate culture, as a dimension of the competence concept will make the competence concept tautological. We are following Nordhaug (1993) in that an economic view on competence should exclude psychological variables like motivation and attitudes. In addition we will also exclude the cultural aspect. We view the cognitive aspects of competence as the most important in



economic analyses, and exclude the value-oriented perspective as emphasized for example by scholars in the old institutionalism in sociology (e.g. Selznik, 1957).

The distinctions between assets and resources have been discussed in the competence literature and some scholars regard assets as the overall concept (e.g. Teece, Pisano & Shuen, 1990) and some see resources as the general concept (e.g. Wernerfelt, 1984; Barney, 1991). However, the most frequent distinction is the one between "having" and "doing" (Bogaert, Martens & van Cauwenbergh, 94), where having is related to tangible assets and competence to doing, and where both assets and competencies are regarded as resources (Hall, 1992; Bogaert et al., 1994; Nordhaug, 1995). Another argument for this distinction is that firms do not have property right over competence in the same manner as other resources<sup>11</sup>, and that competence to a great degree represents intangible resources for the firm. Beside, a competence is not an inanimate thing, it is reflected in an activity (Hamel, 1994). So competence is seen as underlying both the exploitation of assets and the performance of activities.

Drawing on the insight that competence is not an asset, in the accounting sense of the word, leaves out many of the dimensions used earlier. Tangible resources will be regarded as assets, and are the "sort of thing ... reflected on the asset side of a balance sheet" (Winter, 1987:163), and should be distinguished from competencies (Hall, 1992). Organizational competencies are those information-based resources<sup>12</sup> that are mainly invisible, and will consist of both organizational knowledge and organizational skills. Organizational knowledge is defined as specific information about a subject or a field, and organizational skills as a special ability to perform work-related tasks (Nordhaug, 1993). Our definition of competence is closely aligned with organizational competence categorized as information and know-how (Kogut & Zander, 1992). A central premise in both definitions is that some organizational competencies is held by individuals, but that it is also "expressed in regularities by which members co-operate in the firm" (Kogut & Zander, 1992:383). As Kogut & Zander (1992) emphasize, if competencies

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<sup>11</sup>The distinction can, however, be more problematic than this. Firms may have ownership of the competence that is embedded in the standard procedures and routines. The distinction between Polanyi's (1966) tacit and explicit knowledge (cf. Paragraph 2.3.4) seems to be important in this respect. The knowledge that is explicit and embedded in the firm routines and SOP is to a larger degree owned by the firm than tacit knowledge, which largely is owned by the employees that possess it.

<sup>12</sup>Leaving aside intangible resources as a firm's loyalty and reputation, which is not information based (Løwendahl, 1993).

only were represented by individuals, "then firms could change simply by employee turnover" (p. 383).

## 2.4.2 The concept of primary competence

The discussion in this paragraph will be related to the difference between primary and core competence (Prahalad & Hamel, 1990), analyzed in accordance with Rumelt's (1994) components presented below.

### Core competence versus primary competence

The concept of core competence has four key components (Rumelt, 1994):

1. Corporate span (the core competence supports several products)
2. Temporal dominance (products are the momentary expression of a firm's underlying core competencies)
3. Learning-by-doing (competencies are gained and enhanced by work.)
4. Competitive locus (product-market competition is merely the superficial expression of a deeper competition over competencies)

**Corporate span.** The requirement of being unique, as emphasized in the core competence perspective is often related to being one of the world leaders in the field<sup>13</sup>. Accordingly, if the underlying competence gives rise to several, unrelated product markets, it will be easy to give up one segment and concentrate on others. However, that kind of ongoing learning processes has its costs, and for most firms there is no need to be the world's best, or even specially to let the business go around. In situations when there is no need or even any possibility of having a broad competence base, the basic need is to sustain and gradually develop the firm's primary competence. However, a firm will evaluate the trade-off between investments in the development of new competence and the replications of current competence (March, 1991;

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<sup>13</sup>As shown by several scholars in the approach when world leading corporations are referred to, as for example Sharps core competence in flat-screen displays that gives access to diverse product markets such as computers, video projection screens, pocket television etc. (Hamel, 1994); or Honda's engine competencies that allow them to compete in distinctive markets such as automobiles, motorcycles, lawnmowers and electric generators (Prahalad & Hamel, 1990). Other frequently used examples include Sony's miniaturization competence, Apples user-friendly interface, and Canons competence in laser printers.

Cohen & Levinthal, 1990). Accordingly, we expect that a further development of the competence resources of the firm is based on efficiency considerations. That is, we expect a firm to identify competence inputs likely to generate rents (Conner, 1991), and that the primary competence of the firm is the most likely candidate to generate such rents.

**Temporal dominance.** The argument that products are but the momentary expression of a firm's underlying core competencies, is as important here as in the original approach. The focus that what is expressed in the product is a result of the underlying competence, is a central argument when defining and analyzing primary competence.

**Learning-by-doing.** The earlier contributions from Selznik and Andrews, on distinctive competence, were both essentially static (Rumelt, 1994). However, the experience curve brought some dynamics into thinking, and experience has so far empirically proved to have a better effect on a firm's performance, than other focused parts in the organizational learning literature (Huber, 1991). Accordingly, the contributions from Dierickx & Cool (1989) and Teece, Pisano & Shuen (1990) have both united the classic distinctive competence view with the learning-by-doing dynamism of the experience curve. This approach has been further developed by Prahalad & Hamel (1990) and recently by Teece, Pisano & Shuen (1997). Prahalad & Hamel (1990) argue that organizations should collectively learn, especially about co-ordination of production skills and integration of technologies.

Most of the scholars in the competence approach have therefore recently recognized learning processes as fundamental in the process of building core or new competence, but they are inadequate in giving a more comprehensive view of the problem (Bognar & Thomas, 1994). While learning is still in an analytical vacuum (as well as empirical) in the competence perspective, a few theoretical studies have been concerned with combining a static competence approach with the more dynamic theories on organizational learning (e.g. Nordhaug, 1993; Kogut & Zander, 1992; Helloid & Simonin, 1994). A theory of organizational learning must include a static component (Nordhaug, 1993; Kogut & Zander, 1992), that is a present analysis of the skills (Nelson & Winter, 1982), knowledge (Kogut & Zander, 1992) or competence (Nordhaug, 1993) that will influence the question how and what kind of learning processes can be implemented. In the same way, a competence perspective must include a dynamic component (Nordhaug, 1993).

In order to analyze the dynamic argument embedded in the core competence perspective, it is important to note that firms do best in tasks closely related to present activities (Cyert & March, 1963; Nelson & Winter, 1982). In fact the approach is based on the assumption that "the core competencies which will retain competitive advantage in the future are built on the core competencies of today" (Bogner & Thomas, 1994). Therefore a firm must carefully consider the balance between exploitation of existing competencies and the development of new ones (Wernerfelt, 1984; Cohen & Levinthal, 1990). The efficiency of performing new activities in terms of both costs and time will therefore be dependent on to what degree the competencies necessary to perform the new activities are close to the existing ones. This is maybe the most important issue when focusing on primary competence.

**Competitive locus.** Hamel (1994) distinguishes among three broad types of core competencies; market-access competencies, integrity-related competencies and functionality-related competencies. The latter focuses on the kind of competence of concern in this study, that is, competencies which contribute to better performance and more effective, cost-reducing activities in the operational day-to-day work<sup>14</sup>. It is the kind of competencies that are necessary to perform the activities directly related to the core products of the firm.

## **Describing and defining primary competence**

In regard to the four components above, the component of corporate span is of lesser importance when focusing on primary instead of core competence. This component is linked to the uniqueness that is embedded in the argument offered by Prahalad & Hamel<sup>15</sup>, and may be seen as the component that distinguishes primary competence from core competence. This conceptualization is very similar to the way Teece, Pisano & Shuen (1997) recently distinguished between core and distinctive competencies. According to Teece, et al. (1997), core competencies "are those competencies that define a firm's fundamental business as core" (p. 516). Additionally, they state that "the degree to which a core competence is distinctive

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<sup>14</sup>This, however, does not imply that a firm's primary competence could not be one of the other two competencies.

<sup>15</sup>The uniqueness can be traced to Prahalad & Hamel's arguments that a core competence must be competitively unique and be a gateway to new markets. Or as Hamel (1994:14) put it: A competence should not be considered core unless "the company's level of competence is substantially superior to all others".

depends on how well endowed the firm is relative to its competitors, and on how difficult it is for competitors to replicate its competencies" (p. 516). Thus, compared with Teece, Pisano & Shuen, a primary competence approximates a core competence, while unique competence approximates distinctive competence. Consistent with Teece, Pisano & Shuen (1997)<sup>16</sup>, a primary competence is defined, as *one of those competencies that define a firm's fundamental business as core*.

Moreover, it is important to note that primary competence is but one category of the competencies a firm possesses. A firm will surely possess other competencies that must be present in order to perform well (see e.g. Nordhaug, 1993: Chapters 3 & 4, for an overview of different competencies a firm possesses). However, the primary competence would be what further competence development must be based on. Without primary competence, the firm would not have any basis for staying in business.

### **2.4.3 Defining and outlining closeness to primary competence (CPC)**

#### **A definition**

For a buyer, the competence that is close to the present competence base would be the target for "borrowing" from the vendor. A buyer may find out that he actually has many of the necessary competence elements himself, and thereby try to imitate the remaining parts in order to perform the transaction "in-house". Or he may, because of a relatively long lasting relationship, have incorporated many parts of the elements in his own routines or competence base through internal learning processes. However, it is the closeness in competence that is the main argument for the buyer to incorporate the knowledge in the routine "pool". Thus, the existing underlying competence is used as a catalyst (Verdin & Williamson, 1994) in the further process of accumulating those competencies that without the existing competence base would be much slower and costly to build and incorporate in the routine pool.

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<sup>16</sup> We prefer the distinction between primary and core competence because this seems more consistent with the core competence literature in general. As discussed above, in the literature core competence is often viewed as a competence that contributes to be one of the world leaders in a field.

Following the discussion in this section, the definition of closeness to primary competence is *the degree to which the firm's existing primary competencies can be used as a catalyst in the internal learning processes and in the process of imitating environment-specific competencies.*

This concept can be used when analyzing expansion of firms' competence bases in general. The phenomenon examined in this dissertation, however, is restricted to buyer-vendor dyads, and transactions as the basic unit of analysis. The operationalization of environment-specific competence is therefore restricted to *the competencies represented by the vendor in the transaction in question.*

The argument from EE, that when firms grow by vertical integration they grow in a direction of something closely related, and the resource-based perspective's attention to the identification of competence inputs likely to generate rents, form the content of the concept of CPC. While EE gives the basic foundation for the understanding of economic actors' limited capacity to perform new and different tasks, RBT gives a comprehension of those competencies most likely to generate rent. The construct of CPC will capture both those aspects as its definition includes both the issue of being related to existing competence in the firm, and that this relatedness is based on the most important and value creating competencies in present business activities.

### **Competence imitation, learning processes and closeness to primary competence**

The definition above stated that a buyer's CPC would be favorable to internal learning processes and imitation of the vendor's competence. Below, we address the specific imitation problems that exist in buyer-vendor relations, and show why the buyer's CPC will act as a guide and be helpful to overcoming some of these problems. Imitating refers to a successful effort to achieve a level of performance by resting the manufacturing process on imitation of another firm in an imperfectly, but economically acceptable way (Zander, 1991). Thus, imitation occurs when a buyer discovers and simply copies a vendor's organizational routines

and procedures (Teece, Pisano & Shuen, 1997). The buyer's difficulties in imitating the vendor's competence can be divided into three parts.

First, *the coding problem* implies that encoded knowledge available to the buyer, must be decoded in order to be adjusted to the buyer's routines and recipes. Even though the competence will be closely related, there will always be other possible means to the same end. As mentioned by scholars in new institutional organization theory (Powell & DiMaggio, 1991), organizations will decouple their operational activities from the institutionalized myths and structures, while at the same time being isomorphic with the institutional norms. Therefore, the operational routines will be developed differently among organizations even though their end product and superior structure can be the same or similar. According to Nelson & Winter (1982), a firm's former investments and its repertoire of routines, restrict its future behavior. This follows because learning tends to be local (Cyert & March, 1963; Nelson & Winter, 1982), and opportunities for learning will be close to previous activities and thus production specific (Teece, 1988). As Teece et al. (1997) emphasize, learning is often a process of trial, feedback, and evaluation. If too many parameters are changed simultaneously "the ability to ascertain cause-effect relationships is confounded because cognitive structures will not be formed and rates of learning diminish as a result" (p. 523). Thus, since productive knowledge is embedded (Nelson & Winter, 1982), replication cannot be accomplished by simply transmitting information between parties with different routines (Kogut & Zander, 1992). Only in those instances where all relevant knowledge is fully codified and understood by the buyer can replication be collapsed into a simple problem of information transfer (Teece, et al., 1997). In other instances, the vendor's coded knowledge must first be recoded before it correspond to the buyer's own routines.

Second, *the availability problem* implies that not all of the vendor's coded knowledge will usually be available for the buyer. One of the greatest dangers for a vendor is that the buyer may learn enough about the vendor's operations to duplicate its routines and special competencies and become an effective competitor (Milgrom & Roberts, 1992). Accordingly, the vendor will normally not be willing to share all of his coded knowledge with the buyer, partly because the vendor apprehends losing a customer (the buyer could integrate), partly because the buyer by integration could be a future competitor in the market.

Third, *the tacitness problem* indicates that expressing know-how or skills in printed words and blueprints can be an insufficient way of transferring knowledge (Hennart, 1982), mainly because there is tacit knowledge involved. Knowledge, which is embedded in the vendor's routines and not coded and articulated, will represent the vendor's tacit knowledge. Such tacit knowledge is very difficult to replicate by the firm itself (Zander & Kogut, 1995). Thus, if self-replication is difficult, imitation is likely to be harder (Kogut & Zander, 1992). Indeed, imitation of such knowledge is often impossible absent the transfer away groups of key individuals (Teece, et al., 1997).

Because of the availability problem and the tacit problem, only a part of the relevant knowledge from the vendor can actually be coded. Further, due to the coding problem, available coded knowledge will be difficult to decode. If the buyer has a considerable amount of relevant manufacturing skills, it will be easier to overcome the coding problem. Knowledge from external sources will always be difficult to incorporate into a tangible product and hence extremely costly, if a firm does not have existing competence that can guide them in the imitation process. As emphasized by Cohen & Levinthal (1990), the buyer's capability to absorb, exploit and "borrow" new knowledge from the environment will depend on their existing competence base: "Absorptive capacity is more likely to be developed and maintained as a by-product of routine activity when the knowledge domain that the firm wishes to exploit is closely related to its current knowledge base" (p. 149). The coding of new information is therefore only successful if the search for new coding schemes do not require a comprehensive change in the firm's existing common codes or organizing principles (Kogut & Zander, 1992).

The availability problem and the tacit problem represent knowledge that the buyer will not have access to. The availability problem relates to articulated knowledge that the vendor refuses to share with the buyer, while the tacit problem is connected to knowledge that the vendor is not able to articulate inside their own boundaries. These problems, however, will partly be solved if the buyer has CPC. A firm's previous investments and repertoire of routines constrains its future behavior (Nelson & Winter, 1982). However, when having CPC, the buyer does not need to build completely new competencies if integrating the activity. The firm can instead, to a large degree, rely on their existing competence. However, relying on existing competence does not mean that they already have all the resources necessary to perform the activity. What it means, is that by deploying existing competence the firm can improve the



efficiency in terms of both cost and time (Verdin & Williamson, 1994) by making some adjustments in their existing routines as a result of internal learning processes in order to perform the 'new' activity. As widely recognized (e.g. Cyert & March, 1963; Nelson & Winter, 1982; Levitt & March, 1988), firms are able to make minor adjustments in their existing routines and learn in areas closely related to their existing practice as a product of localized search guided by the existing set of capabilities. Accordingly, having CPC will assist the buyer to successfully integrate the activity, without having accessibility to all the vendor's coded and tacit knowledge.

A firm can extend its competence base by internal learning processes and/or by imitating competence from sources outside the firm's boundaries. We have proposed that having CPC to an activity will contribute to both these processes in buyer-vendor dyads. The buyer can solve the coding problem by imitating the vendor and decode the knowledge adjusted to his own routines. The availability problem and the tacit problem, however, must mainly be solved as a result of internal learning processes.

## **2.5 The distinction between Firm-specific competence, Transaction-specific competence and Primary competence**

The study of properties of competence is to a limited degree theoretically and empirically treated in economics. Empirically measured concepts are mainly restricted to firm-specificity (Becker, 1962; 1975; Williamson, 1981; 1985) and human asset specificity (Williamson, 1979; 1981; 1985). In this section the goal is therefore to establish a link as well as to make a distinction between the concept of primary competence and the earlier concepts frequently used in economic analysis. Even though the concept of firm-specificity is not incorporated in the model developed in this study, a discussion of the concept is considered necessary for the logic established.

### **Firm-specific competence and transaction-specific competence - a distinction**

The main proposition in Human Capital (Becker, 1975) is that the acquisition of valued skills leads to greater compensation. With simple theoretical arguments, Becker is able to explain

relations between education and productivity, age and earnings, unemployment and level of skills and between age and on-the-job-training. Becker (1962) makes a distinction between specific and general training. He argues that firm-specific training is valuable to the organization and that firms will benefit from investments in on-the-job training. Human capital theory, however, has neither treated how human capital should be governed (Williamson, 1981) nor analyzed the substance of the human capital itself (Nordhaug, 1993). Accordingly, human capital theory, like neo-classical economics in general, views the firm as a black box.

The TCE-framework has been applied at three levels of analysis (Williamson, 1981; 1985). The first is focusing on the overall structure of the enterprise, the second on the make/buy decision, and the third is concerned about the internal organization of work. In the first level the concept of asset specificity is absent, while in the latter two asset specificity is present in the analysis. The 'organization of work level' regards the manner in which human assets are internally organized. Internal human assets is by Williamson (1981; 1985) described in terms of (1) the degree to which they are firm specific (Becker, 1962) and (2) the ease with which productivity can be measured (Alchian & Demsetz, 1972). The object is to "match internal governance structures with the attributes of the work groups in a discriminating way" (Williamson, 1981:549). This kind of organizational consideration is absent in human capital theory<sup>17</sup>. Accordingly, what TCE adds to human capital theory is that firm-specific skills need to be embedded in a protective governance structure (Williamson, 1981).

In contrast, Williamson (1981), when describing the dimension of asset specificity (or what may be labeled transaction-specific competence) in the make/buy level of analysis, states the following:

The reason asset specificity is critical is that, once an investment has been made, buyer and seller [seen as autonomous parts] are effectively operating in a bilateral .... exchange relation for a considerable period thereafter. Inasmuch as the value of specific capital in other uses is, by definition, much smaller than the specialized use for which it has been intended, the supplier is effectively 'locked into' the transaction to a significant degree. (p. 555).

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<sup>17</sup>Becker (1975) links skills to productivity and compensation and offers no attention to the way human capital should be governed.

Accordingly, in the make/buy level of Williamson's analysis, the important issue is to what extent autonomous parts are locked into relationships *ex post* because of investments that have substantially higher value inside the relation than outside it (Holmstrom & Tirole, 1989). However, when analyzing the organization of work, Williamson assumes *a priori* that the transaction in question involves asset specificity, and for that reason already brought inside the boundaries of the firm. Accordingly, there is a difference in level of analysis. The make/buy decision has the dyad as the level of analysis, while internal governance of competence has the firm or the group as the level of analysis.

Both firm-specific and transaction-specific competence can be classified under the umbrella of human asset specificity. However, firm-specific competence is about specific competence that is not transferred across a firm's boundaries, and defined as competence that can be used in one firm only, and has no value in the external market (Nordhaug, 1993). Transaction-specific competence, on the other hand, is exclusively used as a dimension for describing characterizations of transactions between autonomous exchange partners.

### **Primary competence, transaction-specific competence and firms-specific competence - a distinction**

A transaction-specific investment in competence arises when e.g. the buyer invests in the vendor's employees, in order to give them training in his own routines and procedures. Another kind of investment might be the buyer's investments in his own employees regarding competence in the vendor's procedures and routines (or vice versa). Accordingly, the investments are specialized with respect to one particular transaction partner. The rationale behind such investments will initially be to ensure that the interface between the buyer and the vendor functions well and reduces the degree of delays, breakdowns or other malfunctions. Such investments will, however, imply a loss of value if a buyer internalizes the activity, because transaction-specific competence has higher value in the bilateral relationship than

outside it (Holmstrom & Tirole, 1989; Perry, 1989) and the appropriable quasi-rents<sup>18</sup> (Klein, Crawford & Alchian, 1978) will be lost.

However, as Winter (1988) states, further progress of the concept of human asset specificity ".. must be redefined and linked to the broader context in which quasi rents to various sorts of productive knowledge are determined" (p. 179). Such a progress can be made by incorporating the competence argument in the analysis: In the decision either to make or buy, we expect a firm to evaluate to what degree the firm is capable of performing the activity itself by drawing on their existing competence, or in more formal terms, in which situations the appropriable quasi-rents loss, for the integrating party, will be least. Accordingly, there exist some situations where the appropriate quasi-rents are lower than in other situations, while holding transaction specific investments constant. In order to examine when the value loss will be least, a buyer has to identify when the formerly invested competence can be used directly or as a foundation for performing the new activity. Accordingly, the quasi-rents loss will be lower if the buyer has CPC to the activity compared with a situation when the buyer does not have CPC.

Primary competence should therefore be clearly distinguished from transaction specific competence. In the same line as the difference in level of analysis between transaction-specific and firm-specific competence, the level of analysis of primary competence is connected to the firm level, not the dyad. However, primary competence is to a higher degree than firm-specific competence, connected to the relationship to the environment. As shown in section 2.4, primary competence is connected both to efficient internal performance as well as to functioning as a catalyst in the process of imitating relevant competencies from the environment. Additionally, in a TCE-framework, the incentive to integrate is based on the argument that contractual difficulties make it costly to continue the relation with an exchange partner, because of investments in e.g. transaction specific competence. Contractual difficulties have, however, nothing to do with the degree to which there is sufficient competence to perform the activity in-house. What it means is that it would be less expensive to perform the activity in-house because of contractual difficulties. This argument comes clearly from

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<sup>18</sup>As previously mentioned, the appropriable quasi-rents refer (in this situation) to the difference between the value of the competence in the exchange and the value of the competence when internalizing the activity and illustrate the value loss between best and second best use.

Williamson's work. The main advantages of firms over markets in high asset specificity conditions are, according to Williamson (1981):

*First, common ownership reduces incentives to suboptimize. Second, and related, internal organization is able to invoke fiat to resolve differences, whereas costly adjudication is needed when an impasse develops between autonomous traders. Third, internal organization has easier and more complete access to the relevant information when dispute settling is needed. (p. 559)*

All of these advantages have to do with how internal organizing solves contractual problems that autonomous exchange is not able to solve as easily. Accordingly, all of these problems are connected to the difficulties of solving contractual problems because of a condition of high asset specificity. None of these advantages regards the nature of the competence involved, that is, the potential competence difficulties in performing the activity in question. In this respect, transaction specific and primary competence can be seen as complementary concepts. As investments in transaction specific competence would give implications for administrative governance structures, the pool of productive competence resources will also act as a determinant for how a firm should govern transactions.

The concept of primary competence is also conceptually distinct from firm-specific competence. While firm-specific competence is defined as competence that is of value in one firm only, primary competence is defined as the competence that is most important for the firm's profitability and survival. Hence, while primary competence is restricted to the firm's most important competence, firm-specific competence can, in principle, be all the competence in the firm that is not of value in other firms. Accordingly, there would exist different classes of firm-specific competencies in firms (Nordhaug, 1993), some more important than others.

## **Summary**

In this section the primary goal has been to conceptually distinguish the concept of primary competence from the earlier competence concepts used in economics. The concept of firm-specific competence was argued to be different from transaction-specific competence and primary competence was conceptually distinguished from both those concepts. Both firm-specific competence and transaction-specific competence were classified as special kinds of

human assets. However, firm-specific competence is the kind of competence that is only of value inside the boundaries of the firm, while transaction-specific competence is a dimension for describing characterizations of transactions in bilateral exchange relations.

While firm-specific competence includes all the competencies that are of value in the firm only, primary competence is restricted to one of the most important competencies a firm possesses. Primary competence is further seen as the competence that further development must be based on, and will thereby focus attention on a dynamic component. One difference between transaction-specific competence and primary competence is connected to the differences in level of analysis. Additionally, transaction specific competence creates problems for bilateral exchange and the substance of the competence is not itself interesting. The concept of primary competence, on the other hand, implies a focus on the potential in the existing competence and an evaluation of the potential advantage of using the existing competence when integrating an activity, and thereby minimizing the appropriable quasi-rents lost. Accordingly, these concepts are seen as complementary.

## **2.6 Summary and implications**

As shown, the competence approach and TCE focus on different factors that determines a firm's integration activities. TCE posits that asset specificity is the main determinant of vertical integration. The explanation for this is that when asset specificity is high, the incentive for opportunistic behavior is present and the transaction costs in bilateral exchange will increase. There have been extensive empirical works done within the TCE-framework, and the most important factor affecting vertical integration has been asset specificity. The competence approach, on the other hand, states that different firm capabilities and production costs play an independent role in make or buy decisions. However, no empirical studies focusing on closeness to existing competence as a determinant of vertical integration have been found in the literature. Accordingly, we developed such a concept. This concept was distinguished from the TCE-derived concept of asset specificity, and was built on theory that takes into account a firm's ability to create and develop competence as a product of learning processes. This ability moves attention to the kind of individual firm behavior that will contribute to a successful integration decision and we emphasized why a strategic integration decision has to be based on

a firm's existing competence. Additionally, drawing on Winter's (1987) and Zander & Kogut's (1995) studies, we introduced and defined the concept of tacitness.

According to Williamson, if the market fails, organizational solutions are assumed *a priori* to be efficient. A competence perspective will disagree with this, and will instead assert that organizations may still fail. Viewed from the competence perspective, a firm would refuse integration because of organizational failure. This means that even if the characteristics of the transaction in question in a TCE framework will predict vertical integration (market failure), a competence perspective will predict differently if the new activity does not fit the firm's existing operations. Accordingly, the probability of organizational failure is inversely related to the degree of fit to the firm's existing operations. In this way a competence perspective can be an answer to Williamson's (1994) requests for a theory of bureaucratic failure, a theory that can explain the limits to internal organization. However, even though the competence perspective can be viewed as a theory of organizational failure, there is still a need that "puts the study of internal organization more nearly on a parity with the theory of markets and market failure" (Williamson, 1994:46). Hence, there is a need to sort out if the theories regarded in this study are compatible. Without examining and confronting the underlying assumptions in the theories, this goal seems impossible. In order to make a synthesis of these theories, it is important to make a trade-off between the behavioral assumptions underlying TCE and the competence approach. This is the issue of the next chapter.

### **3. BEHAVIORAL ASSUMPTIONS**

Because TCE and the competence perspective start out with different assumptions, they end up with different destinations. Accordingly, the different behavioral assumptions underlying the two perspectives initially draw attention to different aspects of vertical integration. Starting with the assumptions of contractual constraints and opportunism, TCE identifies different modes of governance based on reducing opportunistic potential, and leads attention to asset specificity as the most important predictor of vertical integration. The competence perspective, on the other hand, emphasizes production constraints and indicates that closeness in competence to an activity is one important determinant of vertical integration. We believe that further progress in theory development on the make or buy decision has been impeded by the tendency to treat the behavioral assumptions from the competence perspective and TCE as separate and distinct. Therefore, in order to give credibility to the controversy that these theories are complementary, this chapter synthesizes arguments from TCE, Nelson & Winter (1982), Penrose (1959) and Hennart (1982). The chapter shows that by relaxing TCE's behavioral assumptions, answering the question of efficient organization gives room for both competence and TCE-predictions.

In section 3.1 the assumption of bounded rationality is outlined by using theory from TCE, EE and Penrose (1959). Section 3.2 discusses the assumption of opportunism by using theory from TCE and the knowledge transmission theory from Hennart (1982). A discussion of implications is presented in section 3.3.

#### **3.1 Bounded rationality**

The bounded rationality assumptions of evolutionary economics (EE) and transaction cost economics (TCE) were outlined in Section 2.2. Williamson (1985) classifies the two bounded rationality views as organic (EE) and semistrong forms of rationality (TCE), respectively. He further posits that these two views are complementary and that each will benefit from the insights from the other. He does not, however, address how and why they will benefit from each other. We argue below why both considerations should be regarded in the make-buy decision.



Nelson & Winter's basic criticism of neoclassical economics is like Williamson, connected to the bounded rationality problem. Both TCE and EE serve as alternatives to orthodox micro economic theory. Both stress the failure of equilibrium outcomes and maximizing behavior in orthodox models. However, TCE explains this by the fundamental transformation process (Williamson, 1985), that is, initially atomistic competitive markets will gradually be transmitted to a bilateral monopoly, because of the irreversible process and 'lock-in' effect shaped by asset specificity. And, "But for bounded rationality, all economic exchange could be efficiently organized by contracts" (Williamson, 1981:553). TCE is first of all concerned with contractual constraints as a result of human agents' cognitive limitations.

EE, as opposed to TCE, takes into account actors' cognitive limitations to perform production-related tasks. The ability to perform new tasks will take time and involve expensive activities. Therefore, the choice of organizational form must go beyond an assessment of contractual limitations, and also appreciate the limited capability to perform new and different tasks. As Penrose (1959) argued almost four decades ago, the expansion capability of firms is closely connected to how existing resources can be redeployed. The core of Penrose's explanation why firms will economize on growth is shown in the following simple but excellent argument. New tasks and new decision problems take up individuals' and groups' time and attention. As time passes, individuals and groups become capable of handling the former problems routinely, and different activities will be performed in a routine way. A smooth and effective sequence of routine behavior implies a high degree of tacit knowledge (Nelson & Winter, 1982). Accordingly, the internalization of articulable knowledge into tacit knowledge<sup>19</sup>, releases managerial as well as productive knowledge that can be used in the planning and performing of other activities. As Williamson, Penrose is concerned about how firms can economize on bounded rationality. However, opposed to Williamson, the Penrosian view is based on production constraints. When previous problems have been routinized, resources become available for solving tasks that have not yet been routinized (Penrose, 1959). These tasks need to some extent be related to previously performed tasks, if individuals may be able to

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<sup>19</sup> Penrose's book came out before Polanyi's (1966) concept of tacit knowledge was introduced. However, the meaning she put in her explanations is about the same: «Knowledge.... can be formally expressed and transmitted to others», or it can result from «learning in the form of personal experience» (Penrose, 1959:53). The former she labeled «objective» knowledge [articulable], the latter she labeled «experience» [tacit knowledge].

economize on bounded rationality: "Since there is a physical maximum to the number of things any individual or group of individuals can do, there is clearly some sort of limit to the rate at which even the financial transactions of individuals or groups can be expanded" (Penrose 1959:45). The competence perspective, thus, supplements the bounded rationality assumption as used in the TCE-program, by incorporating actors' limitations to perform new productive activities. Thus, the linkage of an input to the firm's existing competence base is central and constitutes a constraint as well as an opportunity for new input investments (Conner, 1991).

Using insights from both TCE and the competence perspective, the assumption of bounded rationality in this study views economic actors as exposed to both production (cf. Nelson & Winter, 1982; Penrose, 1959) and contractual constraints (cf. Williamson, 1985). Accordingly, we assume that intendedly rational actors (Williamson, 1985) will take both considerations into account when they evaluate the decision to integrate an activity or not. Actors need to regard all of the relevant scarcities, including contractual problems and the cognitive limitations of doing quite different things. The two considerations complement each other as they draw attention to different aspects of the firm constraints.

### **3.2 Opportunism**

The competence perspective does not consider the exchange costs involved in the evaluation of integrating a new activity (Winter, 1988, Collis, 1991). The view is strictly based on the assumption that it would be more efficient to produce something where the firm already has some degree of relevant knowledge, compared with producing something not related to current competence. Even though it is more attractive, *ceteris paribus*, for firms to produce something where the existing competence can be used, using the market can additionally reduce the production costs. Drawing on Williamson (1985) and economics in general, the market will always provide lower production costs. However, the economic problem is not restricted to production costs, but centers around combining inputs and outputs in a way that minimizes both production and exchange costs. The fact that some human agents may act opportunistically (Williamson, 1985), is what gives rise to exchange or transaction costs. Accordingly, while TCE operates with the strong assumption of the selfish motives of actors resulting in shirking and dishonesty, no such behavioral assumption is present in the

competence perspective (cf. Section 2.3). However, we show below how the assumption of opportunism can be incorporated into both perspectives by using the logic presented by Arrow (1974) and Hennart (1982) as the “connecting bridge”.

Following the work from Arrow (1974) on information and search costs, Hennart (1982) spells out a consistent logic why opportunistic behavior is hampered internally, and why the notion of trust, matters as it reduces search costs. Hennart extends Arrow's framework by stating that the common codes internally impair the employees' ability to cheat, because these common codes increase the possibility to detect and punish opportunistic behavior. According to Arrow (1974), a code refers to "all known ways, whether or not inscribed in formal rules, for conveying information" (p. 55)<sup>20</sup>.

The development of a common code is by Arrow argued to increase the efficiency of internal information exchange and transfer of knowledge. The common codes or dialects make the firm members able to receive messages, interpret the messages and perform the appropriate routines (Nelson & Winter, 1982). These common codes or organizing principles "act as mechanisms by which to codify technologies into a language accessible to a wider circle of individuals", and "facilitate the integration of the entire organization" (Kogut & Zander, 1992:389-390). A common code represents the common understanding of how to acquire, retrieve and transmit relevant information.

As discussed in Section 2.3.3, from a contractual (TCE) point of view, firms are constructed to hamper opportunism. The reason why firms develop its common codes and, thus, enhance cooperation compared with markets is because the common codes make firms better suited to control potential opportunistic behavior. Through the existence of the employment contract (Simon, 1951) and the ownership of assets (Williamson, 1985), firms provide mechanisms not available in the market<sup>21</sup>. Thus, a common code is a key source of the economies firms provide (Arrow, 1974), as it is supposed to; (a) increase the efficiency of the internal information

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<sup>20</sup>A common code (Arrow, 1974) is closely related to Nelson & Winter's (1982) term organizational dialect, or Kogut & Zander's (1992) organizing principles. Moreover, a firm's common codes correspond to our definition of organizational competence in the way that the common codes are the organizational knowledge, which underlie the performance of activities (organizational skills). This view of common codes as a part of the firm's knowledge base is therefore consistent with our definition of organizational competence (see Section 2.2 and Paragraph 3.3.1).

<sup>21</sup> However, and further outlined below, the efficiency of the common codes will vary depending on the degree of CPC.

transmission in the firm (Arrow, 1974); (b) make it possible for a firm to effectively perform its routines (Nelson & Winter, 1982) and; (c) increase the management's ability to detect and punish opportunistic behavior inside the firm boundaries (Hennart, 1982)<sup>22</sup>. Therefore, information exchange and transfer of knowledge are more easily and more efficiently obtained within firms than in markets (Arrow, 1974; Hennart, 1982; 1988). Moreover, the enhanced ability to develop common codes inside the firm, is the main reason why trust is more easily produced within the firm than in markets (Hennart, 1982). Employees inside the firm "... are not rewarded for the market value of the knowledge they sell but by their contribution to the group" (p. 26), and their "obedience to managerial directives" (Hennart, 1988:366). Autonomous firms, in contrast, will lack these common codes, which will impair the parties' ability to detect cheating and dishonesty. Autonomous firms are to a low degree willing to share proprietary information (Moorman, Zaltman & Desphande, 1992). This lack of sharing hampers the parties ability to develop common codes of information transmission and exchange. Beside, parties in interfirm relationships may also meet less often, and discussions may be formal (Moorman et al. 1992) and tactical. Thus, this lack of knowledge-based codes results in a lack of control compared with intrafirm conditions.

Hennart's theory is in accordance with TCE in the sense that one should choose governance structures that reduce search and transaction costs, and that people are inherently opportunistic. Accordingly, both perspectives assume that an attitude towards opportunism is an inherent characteristic of economic actors. The main difference stems from the solutions in which opportunistic behavior can be hampered, and the costs connected to these solutions. Hereafter, we refer to the behavioral manifestation of opportunism as *opportunistic behavior*, and to the opportunistic attitude of individuals as *opportunism* (Ghoshal & Moran, 1996).

Even though both Williamson and Hennart acknowledge actors' attitude toward opportunism, the explanations of what prevents or hampers opportunistic behavior differ. Both theories state that intrafirm conditions can prevent opportunistic behavior. However, while Williamson argues that opportunistic behavior is hampered by the use of fiat, Hennart emphasizes that the intrafirm common codes act as a condition that produces trust and decreases the degree of

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<sup>22</sup>As outlined in detail in chapter 4, a and b is connected to how firms by using existing common codes economize on production costs, while c is related to how these codes restrict opportunistic behavior and hence make firms able to economize on transaction costs.

opportunistic behavior. If the activities to be performed fit the code, the acquiring and transmitting of information are efficient (Arrow, 1974). If new activities does not fit existing codes, a deficiency in using them will arise, and such conditions increase the potential of opportunistic behavior inside firm boundaries (Hennart, 1982). This is an important distinction, because the TCE-view implies that increasing potential for opportunistic behavior only can be hampered by increasing costs of safeguarding, which "are likely to adversely affect [the firm's] performance" (Ghoshal & Moran, 1996:16). Accordingly, in a TCE-framework, preventing opportunistic behavior can only be done by added costs. Hennart, in contrast, specifies mechanisms that prevent actors from having any incentive to act opportunistically. While Williamson does not theoretically separate opportunism from its behavioral manifestation (Ghoshal & Moran, 1996), this is implicitly what Hennart does.

Moreover, when Williamson (1991) explicates the notion of fiat, he compares it with how the court solves disputes between autonomous firms. While the court grants firm disputes over prices, damages ascribed to delays etc., it refuses to accept disputes between internal divisions or units<sup>23</sup>; "access to the courts being denied" (Williamson, 1991:274). Hence, he emphasizes firms' superior ability to solve disputes and better ability to deal with disturbances, because the firm "... is its own court of ultimate appeal" (1991:274). Williamson does not distinguish between the way different internal condition affect firms' ability to solve disputes and reduce opportunistic behavior. What he amplifies, however, is why a firm is able to efficiently use the mechanism of fiat: "... parties to an internal dispute have *deep knowledge*<sup>24</sup> - both about the circumstances surrounding a dispute as well as the efficiency properties of alternative solutions" (Williamson, 1991:276). Hence, if the parties lack this deep knowledge, the power of fiat will be reduced. If firms suffer from having this 'deep knowledge', they are not able to detect cheating and dishonest behavior in the same manner. Accordingly, by the development of common codes within the firm, the opportunistic behavior is hampered without using the organizational mechanism of fiat (Hennart, 1982), or, the parties' 'deep knowledge' makes firms able to efficiently utilize the power of fiat. This latter issue is not theorized by TCE. In sum, Hennart's theory is complementary to TCE. The theory specifies the mechanisms through which the costs of hampering opportunistic behavior may be reduced. The theory is also

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<sup>23</sup>Leaving aside personnel disputes and issues like workers safety etc., which is, of course, often resolved by the court.

<sup>24</sup>The *emph.* is made by me.

complementary to the competence perspective as it highlights that existing common codes or routines are the main mechanism that reduce the employees possibilities to cheat.

Following Hennart, when introducing completely different undertakings, the degree of opportunistic behavior may increase, because the parties in-house lack the main mechanisms to codify the accomplishment of the new activity. One aspect of common codes is to know who knows what and how different activities should be organized (Kogut & Zander, 1992). If completely new techniques and routines have to be developed in order for a firm to perform an activity, firms will surely lack this knowledge. This will impair the ability to detect cheating, and the management will miss 'the detailed continuous information' regarding the employees. In such situations firms will be exposed to many of the same problems as in markets<sup>25</sup>. This argument may also explain why Nelson & Winter (1982) assert that firms' existing routines are the stabilizing forces in firms, and represent a "truce" in hampering intraorganizational conflict. Introducing new undertakings that cannot be supported by existing routines, however, would require introduction of new routines. In such situations selfish motives are relevant, because the management's ability to detect cheating will be reduced (Hennart, 1982).

### 3.3 Implications

As shown, the behavioral assumptions of this study are extended compared to TCE assumptions. The behavioral assumptions are based on the fact that firms are exposed to both production (cf. Penrose, 1959; Nelson & Winter, 1982) and contractual constraints (cf. Williamson, 1985), and we expect that intendedly rational actors will take both considerations into account when integrating an activity. Additionally, we adopt the view from Williamson and Hennart that opportunism (the opportunistic attitude of individuals) is a general characteristic of economic actors. However, the development of common codes inside firms is

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<sup>25</sup>In this respect it is interesting to note that Alchian & Demsetz (1972:111) claim that the firm "has no power of fiat, no authority, no disciplinary action any different in the slightest degree from ordinary market contracting". If the management lacks detailed information about their employees, this information asymmetry condition will contribute to reducing the power of fiat and put the firm in some of the unfavorable conditions involved in market exchange. Remember, by having an assumption of opportunism as an attitude, the study operates on the same premise as TCE that economic actors are self interested, seek to maximize their own utility – often at the expense of others – and will act strategically. By acting strategically, they will behave opportunistically only to the extent that they perceive that their behavior will not visit upon them consequences which completely obviate any of the gains they expected to achieve. Thus, if the management can

expected to produce trust (cf. Hennart, 1982). The use of these common codes is the internal mechanisms that reduce opportunistic behavior. The latter argument is built on Arrow and Hennart: "[Firms] become less efficient in acquiring and transmitting information not easily fitted into the code" (Arrow, 1974:57), and a deficiency in using existing codes, increases the degree of opportunistic behavior and decreases the degree of trust (Hennart, 1982). When existing codes and routines to a low degree can be used in performing a new activity, such a condition will increase both transaction costs and production costs.

The attention to and distinction between production and contractual constraints, combined with the fact that firms' common codes and routines produce trust and reduce opportunistic behavior, make us able to capture predictions from both perspectives in the same model. By using the existing competencies and routines, firms are able to economize on what we call *internal transaction costs* as well as production costs. Scholars in the competence perspective have previously emphasized the latter, while the former has not been an issue so far<sup>26</sup>. When firms have closeness in competence to an activity, they can use their organizing principles or common codes, as means to reduce opportunistic behavior and hence economize on transaction costs, when integrating the activity. Simultaneously, if firms are acquainted with the activity in question, the production costs will be lower, compared with integrating an activity far away from the present competence base. Accordingly and contrary to previous focus of scholars in the competence perspective, the competence predictions in this dissertation are built on both production and transaction cost efficiency. TCE directs attention to how the opportunistic behavior of external agents can be reduced or eliminated (i.e. contractual safeguards). The assumption of opportunism used here, however, also leads the attention to mechanisms expected to reduce the degree of internal opportunism. Contrary to TCE, this means that reducing opportunistic behavior and hence lowering transaction costs internally, will be solved more easily when firms' common codes and routines can be used to control behavior.

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*utilize its common codes in controlling behavior, employees act strategically inside firm boundaries if they have "obedience to managerial directives" (Hennart, 1988:366).*

<sup>26</sup> Foss (1996a), however, sketches some of the same arguments. He states that firm will be confronted with increasing agency costs when moving away from its core competence, "as increasingly unfamiliar activities produce more severe moral hazard and adverse selection problems" (p. 474.).

Making use of these behavioral assumptions will raises several implications, and shape the foundation for arguing that TCE and the competence perspective are complementary rather than competing theories of vertical integration (cf. Chapters 5 & 6).



## 4. INTERFIRM TRUST

The framework of this study is based on the assumption that people are inherently opportunistic (opportunistic attitude). In Chapter 3, we argued that mechanisms based on intrafirm knowledge may prevent people from acting opportunistically, and that these mechanisms give employees incentives to develop trust relationships inside firm boundaries. This argument implies that trust will only be produced when employees have economic motives to develop it. This belief, we argue, is in accordance with Williamson (1993) and Dasgupta (1988), when they argue that trust primarily involves a *calculative process*.

Trust is examined in several areas of the social sciences, and the definitions and operationalizations of the construct differ markedly across disciplines (Ring & Van de Ven, 1992). Our focus is connected to trust as a mechanism for governing transactions. We operate on the premise that trust can be a substitute for authority mechanisms and serve as an alternative control mechanism (Bradach & Eccles, 1989)<sup>27</sup>. Further, our view of trust follows what seems to be widely established in the literature, namely that there is a connection between trust and opportunistic behavior, and between trust and risk (Chiles & McMackin, 1996). Finally, our analysis is based on Shapiro, Sheppard & Cheraskin (1992) three types<sup>28</sup> of trust and Williamson (1993) and Dasgupta (1988) calculative reflection on trust. We argue that two of Shapiro et al.'s (1992) types of trust may be incorporated into the framework of the study. Thus, we argue that this calculativeness reflection on interfirm trust is consistent with this study's behavioral assumptions.

Section 4.1 addresses how interfirm trust is conceptualized in the study. In Section 4.2 the connection between trust and risk is thoroughly considered. Based on this discussion, we argue that some of the mechanisms that facilitate knowledge-based control in hierarchy also to some

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<sup>27</sup> This premise seems to be widely established within the interfirm trust literature. As Ouchi (1979) observed: "People must either be able to trust each other or to closely monitor each other if they are to engage in co-operative enterprises" (p. 846), and as Gulati (1995) asserts: "A detailed contract is one mechanism for making behavior predictability, and another is trust" (p. 93). According to Ring & Van de Ven (1992), trust-based relationships imply that; "authority and control systems related to performance outcomes can be loosely specified in the contracts. Incentive systems can be left adaptable to the changing needs of the specific relationship, and made independent of the other systems employed by the parties. Issues such as costs, quality, prices, volume, and other production-related matters can be left relatively open-ended".

<sup>28</sup> These are deterrence-based trust, knowledge-based trust and identification-based trust, and are defined below.

degree may be present in interfirm exchange conditions. Section 4.3 defines the concept of interfirm trust. Finally, a summing-up section is included.

## 4.1 Conceptualization of interfirm trust

Consistent with most interfirm studies of trust (Dahlstrom & Nygaard, 1995), this study focuses on interpersonal trust<sup>29</sup>. Often a distinction between trust as a personal interaction and a firm level phenomenon is discussed in the literature. Thus, the question regarding whether there can be trust between two firms that are simply an accretion of individuals has been raised (Gulati, 1995). As Gulati (1995:92) asserts, "Intuitively, trust is an interpersonal phenomenon". However, trust developed at an interpersonal level, taking place in the context of a transaction, is expected to reflect trust on the firm dyad level. Thus, trust may exist on the interfirm level (Bradach & Eccles, 1989). Even though expectations of trust ultimately reside within individuals (Gulati, 1995), it is possible to think of interfirm trust in economic transactions (Zucker, 1986).

Several conceptualizations of trust exist in the literature. What they generally share is a distinction between trust based on cognitive expectation, and trust based on affective preferences (McAllister, 1995). The former views trust as a conscious rational regulation of the other party. The latter foundation connects trust to emotional ties linking individuals and imply "genuine care and concern for the welfare of the partners" (McAllister, 1995:26). According to Shapiro et al. (1992), three types of trust within an interfirm context exist; deterrence-based trust, knowledge-based trust and identification-based trust. These types of trust are connected sequentially and attainment on one level is expected to promote development on trust on the next level (Shapiro et al., 1992). Deterrence-based trust is explained as consistent rational behavior based on an e.g. partner's reputation. Knowledge-

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*29 The notion of trust has proved to be complex when attempts are made to unravel its meaning and importance. According to Zucker (1986), there are at least three distinct forms of trust. Zucker's notion encompasses characteristic, institutional, and interpersonal facets of trust. Characteristic-based trust is granted due to some feature (e.g., kinship, ethnicity) inherent in the trading partners. Institutional-based trust is associated with social structures that guarantee that transactions take place as promised. For example, the Uniform Commercial Code serves as institutional-based trust governing interstate transaction in most of the U.S. (Dahlstrom & Nygaard, 1995). Interpersonal trust emerges through experience with a trading partner and implies a willingness to rely on that partner (Moorman et al. 1992). Zucker argues that these three forms of trust are supplements for one another. As one form of trust takes on greater importance, the other tends to diminish (cf. Williamson, 1993). When e.g. interpersonal trust is disrupted, characteristic-based trust or institutional mechanisms may be developed.*

based trust occurs when one has enough information about a potential exchange partner to understand and properly predict the partner's behavior. Identification-based trust implies internalization of the other party's wishes and intentions. Accordingly, from a sociological point of view, trust encompasses calculative and utilitarian aspects as well as affective preferences (Gulati, 1995).

A total internalizing of another autonomous party's wishes and intentions implies a kind of altruism (Smith, Organ & Near, 1983). Altruism implies that actors wish to contribute with assistance on completely unselfish motives, and refers to behavior that is: "... directly and intentionally aimed at helping a specific person in face-to-face situations" (Smith, Organ & Near, 1983:657). However, as Williamson argues this kind of altruistic view may be very rare in economic exchanges. According to Williamson (1993), real trust "should be characterized by (1) the absence of monitoring, (2) favorable or forgiving predilections, and (3) discreteness" ... and that "such relations are clearly very special", since most people "will need to figure it out - to look ahead and recognize that calculativeness will devalue the relation" (pp. 483-484)<sup>30</sup>.

This study follows Williamson (1993), and we expect trust relations to be developed on the basis of economic motives<sup>31</sup>, and to be present in situations when both parties will calculate that trust-based governance is more efficient than the alternatives. By having an assumption of opportunism as an attitude, the study operates on the same premise as TCE that economic actors are self-interested, seek to maximize their own utility – often at the expense of others – and will act strategically. By acting strategically, they will behave opportunistically only to the extent that they perceive that their behavior will not yield consequences which completely obviate any of the gains they expected to achieve (Akerlof, 1970).

Thus, we distinguish between calculative (or 'trust-like' behavior) and 'real' trust (Chiles & McMackin, 1996). The calculative aspect is connected to reputation and knowledge-based

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<sup>30</sup> Williamson (1993:483) gives a plausible explanation for this, as he states that "X reposes personal trust in Y if X (1) consciously refuses to monitor Y, (2) is predisposed to ascribe good intentions to Y when things go wrong, and (3) treats Y in a discrete structural way", and that X would continue the relations e.g. even though Y does wrong (which affect X's rents) because this act is "interpreted [good intentions] by X as stochastic events, or as complexity...., or as peccadilloes."

<sup>31</sup> By this we take the position that the conditions that generate trust are viewed through the lens of rational economics. Chiles & McMackin (1996) identify in the literature three other conditions that generate trust: as a result of social norms (e.g. Macneil, 1980); as a result of social embeddedness (e.g. Granovetter, 1985); or mediated through reputation (Chiles & McMackin, 1996).

trust (Shapiro et al., 1992), which are both cognitive components (McAllister, 1995)<sup>32</sup>. In recent years there has been a certain debate on whether behavior based on calculative motives may be described as trust (Williamson, 1993; Uzzi, 1997). We agree with those authors that argue that such utilitarian and calculative behavior may be described as trust (e.g. McAllister, 1995; Gulati, 1995; Shapiro et al. 1992). Deterrence-based trust and knowledge-based trust (Shapiro et al., 1992) imply calculative reasoning and may be incorporated in the framework of this study. Accordingly, we do not follow Williamson (1993) and Uzzi (1997), which argue that such utilitarian motives cannot be described as trust. Instead we view 'trust-like behavior' (Chiles & McMackin, 1996) as an issue that may provide insights into economic analysis<sup>33</sup>. Identification-based trust (Shapiro et al., 1992), on the other hand, may be labeled as "real trust" (Chiles & McMackin, 1996). A condition with established identification-based trust implies some kind of altruism and a genuine care and concern for another party's welfare (McAllister, 1995), and is neither consistent with the behavioral assumptions of TCE nor with the synthesis of the study. We don not argue, however, that such real trust behavior does not exist in exchange relationships. We follow Williamson (1993), however, that "such relations are clearly very special" (p. 485) in economic exchanges, and that identification-based trust may be very difficult to explain and incorporate within an economic framework.

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<sup>32</sup> *Deterrence-based trust and knowledge-based trust (Shapiro, 1992) are quite similar to what McAllister label cognitive expectation-based trust.*

<sup>33</sup> *Such behavior is illustrated in literature on repeated games (Axelrod, 1984). This research suggests that co-operation can be raised among self-interested parties if the structure of the game permits rewarding or punishing prior moves. In this view, purely self-interest or "calculativeness" determines cooperation. It is the expectation of gains involved in future co-operations that reduce the incentive for opportunistic behavior.*

## 4.2 Trust and risk

In the social science literature, the terms risk and trust are used interchangeably (c.f. Bradach & Eccles, 1989; Williamson, 1993). As Gambetta (1988:217) asserts, there is a convergence in the definitions of trust:

Trust (or, symmetrically, distrust) is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action both before he can monitor such action (or independently of his capacity ever to be able to monitor it) and in a context in which it affects his own action. When we say we trust someone or that someone is trustworthy, we implicitly mean that the probability that he will perform an action that is beneficial or at least not detrimental to us is high enough for us to consider engaging in some form of cooperation with him.

Thus, a source of risk in all transactions is “the need to make definitions in the face of the uncertainty of accomplishing tasks that require sustained cooperation with others” (Ring & Van de Ven, 1992:487). Such risk can take many different forms, e.g. commercial, technological, scientific and engineering risk (cf. Ring & Van de Ven, 1992). Whatever the sources or forms may be, however, they all imply a lack of information, and “will affect choices regarding the design of governance structure” (Ring & Van de Ven, 1992:488). Clearly, there is a risk involved in having a trust relationship, since it suffers from the safeguards that are embedded in authority-based mechanisms (Gambetta, 1988; Bradach & Eccles, 1989). In dealing with risk, “parties to a transaction will select a governance structure that provides appropriate safeguards against that risk” (Ring & Van de Ven, 1992:488).

The degree of risk inherent in any transaction will arise in direct proportion to decreases in time, control and knowledge (MacCrimmon & Wehrung, 1986). Thus, a condition with information asymmetry will gradually be reduced with recurrent transactions with the same partner: “Repeated personal interactions across firms encourage some minimum level of courtesy and considerations, and the prospect of ostracism among peers minimizes individual opportunism” (Ring & Van de Ven, 1994:48). Consequently, as a relationship develops, a set of common knowledge-based codes may gradually be developed, and the interorganizational relationship will show some similar features with organizational hierarchy. What rationalizes

interfirm organization is not unselfish motives or a wish to belong to a moral community (as argued by e.g. Kogut & Zander, 1996). However, as in hierarchies, such repeated interaction shapes a condition with low-cost knowledge-based coordination mechanisms that reduce the transaction cost. According to Doney & Cannon (1997:37) will “repeated interaction enables the party to interpret prior outcomes better, providing a basis for assessing predictability”. Consequently, as the relationship develops over time, information asymmetry decreases, and trust may gradually substitute for authority. The calculative effort of relying on trust is initially based on the other party’s reputation in the market (i.e., deterrence-based trust)<sup>34</sup>. Initially, the trust mechanism is to a great extent complemented with authority-based mechanisms. As times passes, and the “business partners ... have successfully completed transactions in the past and they perceive one another as complying with norms of equity” (Ring & Van de Ven, 1992:489), the risk of the other party acting opportunistically will be calculated to decrease. Consequently, prior alliances between firms may shift attention from deterrence-based to knowledge-based trust, and, “this substitution is based on the intuition that two firms with prior alliances are likely to trust each other more than other firms with whom they have had no alliances” (Gulati, 1995:94). As time passes and the knowledge stock about the other party’s reliability increases, trust as a protective mechanism may increase at the expense of authority.

As MacCrimmon & Wehrung (1986) point out, a lack of control is usually accompanied by a lack of information. This lack of information will affect the degree of risk faced by the parties in a transaction (Ring & Van de Ven, 1992). As trust develops, the parties in an exchange may be more willing to share proprietary information. However, even though the risk of the other party acting opportunistically is expected to decrease over time, some risk will always be present. When parties increase the reliance on trust, the consequences if the other party cheats also increase. This is the paradox with trust. The presence of trust establishes a condition for its abuse (Granovetter, 1985). So, even though the probability of opportunistic behavior may decrease, the *risk cost* involved in the relationship may be constant or even increase. As Ring & Van de Ven (1994:93) state: “... even though the parties may be confident of each other’s trustworthiness they also may be uncertain whether to rely exclusively upon it.” Even if trust-based governance may be cheap and flexible, “there always is the temptation of the golden

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<sup>34</sup> As emphasized by Ring & Van de Ven (1992:488): “... trust is more likely to be extended to an organization when that organization earns a reputation in the market place for following norms of equity”.

opportunity: the big chance to cash in on opportunism". (Nooteboom, 1997:17). Consequently, a condition with low information asymmetry does not necessarily imply that trust replaces authority in the relationship. Thus, we propose that in a relationship there are two kinds of risks. *First*, there is the subjective probability that the other party will act opportunistically. *Second*, there is the risk cost if the other party acts opportunistically (i.e., the economic consequences if he does).

Recently, Nooteboom et al. (1997) make a similar classification. They get empirical support for the distinction between the probability that the exchange partner will behave opportunistically (i.e., the risk), and the loss for the ego (i.e., the focal agent) if the partner does (i.e., the risk cost). They state that in a long-term relationship, because of investments in asset specificity, "there is more at stake, yielding a positive effect on size of loss (Nooteboom, et al., 1997:321). But long term relations also offer more possibilities of trust to grow, "so the perceived probability of loss is lower" (Nooteboom, et al., 1997:321). Consistent with Nooteboom et al. (1997), economic actors are expected to calculate the *risk costs* of governing the relationship based on trust. To illustrate this argument, consider the following example:

Assume a 5% possibility of the exchange partner cheating and a dichotomy choice between trust and authority as governance mechanism in a bilateral relation. If the exchange partner cheats and acts opportunistically it will cost the other party, let us say \$1.000.000. Assume further that the costs of using contractual safeguards (authority mechanisms) is \$50.000 higher than using trust, due to e.g. expected extra bargaining and control costs. The risk costs of using trust alone is then estimated to \$50.000 ( $\$1.000.000 * 5\%$ ).

A risk-neutral actor<sup>35</sup> will be indifferent about the two choices, *ceteris paribus*. However, if the costs of using authority mechanisms are calculated to be e.g. \$60.000, the risk-neutral actor will choose trust as a governance mechanism. Trust and authority mechanisms are alternative mechanisms that can be combined "in a variety of ways" (Bradach & Eccles, 1989:97). Thus, the subjective probability of the risk cost of relying on trust at the expense of the more expensive authority mechanisms, reflect the parties willingness to rely on trust as a governance mechanism.

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<sup>35</sup> We assume in the study, as TCE, economic actors to be risk neutral.

It is important to note that “trust’s effects may be more tenuous in interorganizational relationships than in intraorganizational relationships” (Moorman et al. 1992). While trust in intrafirm organization was argued to be a result of internal common codes (i.e., employees’ opportunistic behavior may be controlled on knowledge-based grounds), such codes exist much more limitedly between firms (Conner, 1991; Conner & Prahalad, 1996). Autonomous firms are to a lesser degree willing to share proprietary information than actors within the firm (Moorman, et al., 1992). Beside, the parties meet less often and the discussion may be more formal and strategic (Moorman et al., 1992). Compared with firms, markets will always have less ability to develop common codes of information transmission and exchange (Arrow, 1974; Hennart, 1982), and there will always be some lack of knowledge-based control compared with intrafirm conditions. Thus, the risk involved in losing control in interfirm relationships will always make a trust-relation much riskier than when trust is secured through common codes internally (Hennart, 1982).

### **4.3 Interfirm trust defined**

When trust is used in the management literature, two significantly different definitions are usually found; the goodwill trust perspective, and the risk-based perspective (Ring & Van de Ven, 1992; 1994). The goodwill trust perspective emphasizes “faith in the moral integrity or goodwill of other, which is produced through interpersonal interactions that lead to social-psychological bonds of mutual norms, sentiments, and friendships...” (Ring & Van de Ven, 1994:93). The risk-based perspective defines trust between parties as an expression of confidence or predictability in their expectation that they will not be put at risk, by the actions of the other party (Zucker, 1986).

Given the above conceptualization of trust as a calculative term, attention must be directed toward the latter kind of definitions. We exclude those definitions that view trust on the basis of ethics, customs, habituation or bonds of friend- or kinship (i.e., trust based on affective preferences (McAllister, 1995) or identification-based trust (Shapiro et al., 1992)). The risk-based perspective is consistent with a view of trust based on cognitive expectation (McAllister, 1995) or deterrence and knowledge (Shapiro et al., 1992).



The definition should reflect the belief that the other firm will perform actions resulting in positive outcomes for the firm (Williamson, 1993)<sup>36</sup>. Additionally, the definition should span a behavioral component (Moorman et al., 1992). This implies that the belief should be reflected in behavior as e.g. a willingness to share proprietary information<sup>37</sup>. Thus, the definition is based on Moorman et al.'s (1992) expectation about the other party's credibility, and Williamson's (1993) view that this credibility is based on calculative economic motives. The construct is defined as a "willingness to rely on an exchange partner in whom one has confidence" (Moorman, Zaltman, & Deshpande, 1992:315), which again is developed and persisted on the basis of credible commitments and calculative economic responses (Williamson, 1993).

#### 4.4 Summary and implications

The chapter has focused on the motives for entering and continuing interfirm trust relationships. In adopting the calculativeness argument from Williamson, we are able to incorporate the issue of interfirm trust in the model of this study by making use of the behavioral assumptions outlined (cf. Chapter 3). Economic actors involved in autonomous trading, we argued, will act opportunistically if they have motives to do so. For autonomous firms involved in the exchange of products or services, an interfirm trust relationship may function as long as both parties calculate that they will make a profit on using trust as a governance mechanism.

The above interfirm reflection on trust is consistent with the study's view on what will promote trust inside firm boundaries. Employees inside the firm are rewarded for their contribution to the group, and the intrafirm codes are what make the management capable to reward appropriate behavior and punish opportunistic behavior (Hennart, 1982). If the management should lack this ability, employees may cheat and act dishonestly, in favor of their own selfish motives (Hennart, 1982). This awareness of what promotes intrafirm trust is consistent with the conception that actors must have economic motives to enter into an interfirm trust

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<sup>36</sup> Thus, actors are supposed to take what Williamson (1993) calls 'calculative risks' because of their confident expectation that their counterpart will act responsibly.

<sup>37</sup> As Moorman et al. (1992) assert, believing that a partner is trustworthy without being willing to rely on the partner, trust is limited. The reliance should also be reflected in behavior intention. Thus, "both belief and behavioral intention

relationship. Interfirm trust relationships are created because the parties calculate that governing the relation by trust is the most efficient one. Since the development of interfirm trust is supposed to be based on calculative reasoning and expected economic gains, this will constrain opportunistic behavior, simply because such behavior will not be efficient. The development of trust is, accordingly, a result of self-interest seeking, and the assumption of opportunism (as an attitude) still has relevance. Compared with firms, markets will always have less ability to develop common codes of information transmission and exchange (Arrow, 1974; Hennart, 1982), and there will always be some lack of knowledge-based control compared with intrafirm conditions. Thus, interfirm relationships will always be riskier than when trust is secured through common codes internally (Conner, 1991; Conner & Prahalad, 1996; Moorman et al., 1992). Thus, from an economic point of view, trust cannot alone rationalize a market contract. Given a certain level of asset specificity, however, trust may complement or replace authority mechanisms on knowledge-based grounds (cf. Chapter 6 for further discussion).

An analogy can be drawn to our critique of previous competence-based perspectives on firms: Without opportunism, nothing rationalizes the firm (cf. Section 2.3 and Foss, 1996a; Foss, 1996b). Without opportunism, there is no risk in having an ongoing relationship. Trust is unnecessary if one has complete knowledge about the action of another party: "If all future actions and events were known with certainty, trust would be redundant" (Kay, 1996:252). Consequently, perfect knowledge implies honest behavior through complete unselfish sharing of information. Accordingly, without the risk of opportunism, there is nothing that rationalizes the presence of trust (Chiles & McMackin, 1996). Relying on calculative trust, however, does not imply that an opportunistic attitude is absent. What it implies, is that actors are willing to trust the other party, because it is calculated that this will be an efficient solution. Economic actors calculate that the risk of the other party's opportunistic attitude will not be manifested in opportunistic behavior is low enough that their needs will be efficiently fulfilled. As Gulati (1995:93) states: "... trust can arise when untrustworthy behavior by a partner can lead to costly sanctions that exceed any potential benefits that opportunistic behavior may provide". Thus, opportunistic behavior and calculative trust are likely to be negatively associated.

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*components must be present for trust to exist" (Moorman et al., 1992:315). And as McAllister (1995:25) asserts: "'Trust encompasses not only people's belief about others, but also their willingness to use that knowledge as the basis for action"*

## 5. SUMMARY

Throughout the literature review in Part I, we have indicated some answers to research question 1 and identified the major constructs in this study. Research question 1 was stated in the following way: *To what degree are the competence perspective and transaction costs economics complementary theories of vertical integration, and to what degree is it possible to develop a consistent synthesis of these perspectives?*

In Chapter 2, transaction cost economics and the competence perspective were reviewed. We concluded that these two perspectives lead attention to different factors as to what determines a firm's integration activities. In Chapter 3, we argued that the behavioral assumptions of TCE have to be relaxed in order to incorporate predictions from both perspectives in the same model. On this foundation, we argued that TCE and the competence perspective are complementary rather than competing theories of vertical integration, and may be integrated into a consistent synthetic framework. In Table 5.1, the comparison of the different perspectives discussed in the previous chapters is summarized. A summary of the arguments established throughout Chapters 2 to 4 is provided.

**Table 5.1 A comparison of perspectives**

	Transaction cost economics	Evolutionary economics (micro)	The Resource based perspective	Knowledge transmission perspective	A synthesis
<b>Bounded rationality</b>	Contractual constraints	Production constraints	Production constraints	Exchange constraints	Contractual constraints  Production constraints
<b>Opportunism</b>	Present/strong	Not regarded	Not regarded	Present/strong	Present/strong
<b>Unit of analysis</b>	Transaction	Institutional (A system perspective)	Internal resources/competencies	Transaction	Transaction
<b>Major constructs</b>	Asset specificity	Firm's routines Tacit Knowledge	Distinctive resources/core competence	Trust	CPC Asset specificity Trust Tacitness

## Behavioral assumptions

Chapter 3 examined the behavioral assumptions in TCE and the competence perspective. The competence approach neither evaluates nor rules out how to reduce opportunistic potential and does not regard the contractual problems involved in interfirm exchange processes. Because of this exclusion of opportunism and exchange costs in the analysis, the competence perspective is only concerned about why an integration decision should be favored in relatedness situations compared with non-relatedness situations. The perspective is not able to connect this relatedness argument to contractual issues<sup>38</sup>. In contrast, TCE does not regard firms' potential production constraints and gives limited attention to intrafirm mechanisms' ability to hamper opportunistic behavior.

The behavioral assumptions of this study are based on the fact that intendedly rational actors (bounded rationality) will consider both production and contractual constraints when they evaluate the decision to integrate an activity. One must therefore consider all the relevant scarcities, including contractual problems and the cognitive limitations of doing quite different things. Contrary to TCE, the distinction between the behavioral manifestation of opportunism (opportunistic behavior) and the opportunistic attitude of economic actors (opportunism) was emphasized. We acknowledge and assume the opportunistic attitude of economic actors. Individuals will act opportunistically if they expect to profit by doing so. For employees in a firm the possibility to act opportunistically will depend on the management's ability to detect and punish opportunistic behavior. This managerial ability will depend on the degree in which the firm's common codes can be used in controlling behavior. When these codes can be used, the employees inside the firm will have incentives for efficient knowledge transfer since they will be rewarded for their obedience to managerial directives as well as for their contribution to the entirety of the firm. Accordingly, these knowledge-based mechanisms, supposed to reduce internal opportunistic behavior, are not addressed by TCE. TCE directs attention to how the opportunistic behavior of external agents can be reduced or eliminated (i.e. contractual safeguards). The assumption of opportunism used here, however, also leads the attention to

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<sup>38</sup>As discussed in Section 3.2, even though it will be more attractive, *ceteris paribus*, to produce something where existing competence can be used, the production costs by using the market will, regardless, be lower. Moreover, if the cost of running the bilateral relation (that is transaction costs) is at a minimum (near perfect markets), some governance costs, in contrast, will always be present in the hierarchy (Williamson, 1985).

mechanisms expected to reduce the degree of internal opportunism. Contrary to TCE, this means that reducing opportunistic behavior and hence lowering transaction costs internally, will be solved more easily when firms' common codes and routines can be used to control behavior. These behavioral assumptions shape the foundation for arguing that TCE and the competence perspective may be synthesized into one unifying framework (cf. Chapter 6).

### **Unit of analysis**

The unit of analysis in this study is the transaction. The competence perspective might view the transaction as the basic unit of analysis as troublesome. This is mainly because the transaction in question will be substantially influenced by the existing transactions already in place (Winter, 1988). This is in line with any evolutionary perspective that focuses on incremental adjustments. Thus, using the transaction as the unit of analysis is not consistent with either RBT or EE. However, a view of the firm's boundaries at this micro level, leads us to avoid the analysis in the competence perspective where the performance of the firm as a whole is regarded. Such a view could mean that one part [e.g. a transaction] in the system can carry the cost burdens of less efficient parts [transactions] (Winter, 1988), which is surely not consistent with an efficiency principle. The adoption from TCE of using the transaction as the unit of analysis means that EE satisficing choices about micro level solutions (Nelson & Winter, 1982) are not regarded.

### **Constructs affecting vertical integration**

The constructs expected to affect vertical integration were selected or derived from TCE, the core competence approach, the knowledge transmission perspective (Winter, 1987; Kogut & Zander, 1993; Zander & Kogut, 1995), and the literature on interfirm trust and argued to be; asset specificity (cf. Section 2.2), closeness to primary competence (cf. Section 2.4), tacitness (cf. Section 2.3) and interfirm trust (cf. Chapter 4). The expected relationships and the explanatory logic that connect the independent variables to the dependent will be addressed in the next chapter when the model and the hypotheses are considered.

## **PART III: HYPOTHESES AND METHODOLOGY**

This part of the dissertation consists of 2 chapters. In Chapter 6 the research model and the accompanying hypotheses are presented. Chapter 7 discusses methodological issues connected to the empirical test of the theory.

## 6. RESEARCH MODEL AND HYPOTHESES

Based on the theoretical framework presented in Part II, a model (i.e., a formal representation of the theory) that will be subject to an empirical test is presented in Section 6.1. In Section 6.2 the hypotheses and the underlying arguments are presented.

### 6.1 Research model

Based on research question 2 specified in Section 1.3 a formal model to be investigated empirically is presented in this section. We recall from Section 1.2 that research question 2 addressed how central variables derived from the focused perspectives will affect vertical integration (VI)<sup>39</sup>. Throughout the literature review, we have presented and identified the major variables derived from the two perspectives. The independent variable chosen from the TCE framework was the transaction specific investments (TSI), and the independent variable from the competence framework was argued to be the buyer's closeness to primary competence (CPC). In addition, interfirm trust and tacitness were identified as major variables for explaining the phenomenon examined. All of these variables have been theoretically elaborated and empirically tested in previous studies, except the variable of buyer's closeness to primary competence. Accordingly, the variable of closeness to primary competence was developed in Section 2.4.

First, we outline and argue for the relevance of incorporating the two main variables of the study in the model. These are closeness to primary competence (cf. Section 2.3) and transaction specific investments (cf. Section 2.2). We address the explanatory mechanisms that connect these two variables to each other and to vertical integration. Particularly, we establish the logic for an interaction effect between CPC and TSI on vertical integration. Next, the relevance of incorporating tacitness and interfirm trust in our model is summarized.

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<sup>39</sup> *Research question 2 was: "How do major concepts derived from the competence perspective and transaction cost economics affect vertical integration?"*

## Closeness to primary competence and transaction specific investments

The variables of closeness to primary competence (CPC) and transaction specific investments (TSI) were outlined and defined in Section 2.4 and Section 2.2, respectively. Following Williamson (1985), TSI was defined, as *transaction specific investments required to realizing least cost supply*. Derived from the core competence approach (Prahalad & Hamel, 1990), but at the same time distinguished from the core competence construct (Rumelt, 1994), CPC was defined as *the degree to which the firm's existing primary competencies can be used as a catalyst in the internal learning processes and in the process of imitating environment-specific competencies*. Moreover, the operationalization of environment-specific competence was in the present study restricted to the competence represented by the vendor in the transaction in question.

The complementarity of the two perspectives is shown in Figure 6.1, where the concept of closeness of primary competence (CPC) is incorporated into Williamson's (1991) originally heuristic model<sup>40</sup>. The TCE prediction implies that the buyer will bring the activity in-house with increasing degrees of transaction specific investments (TSI), *ceteris paribus*. However, because production costs are expected to be in favor of the vendor, the point of TSI will exceed 'switchover level'<sup>41</sup>  $K(M)$  in the Figure, before the sum of production and transaction costs will favor an integration decision. When CPC is high, however, this level will come at an earlier point at the X-axes, namely at level  $K(H)$ . Accordingly, the interaction effect of these two variables is expected to move the decision level of integration from  $K(M)$  to  $K(H)$ <sup>42</sup>. We elaborate this argument below, and consider the buyer's decision to make or buy.

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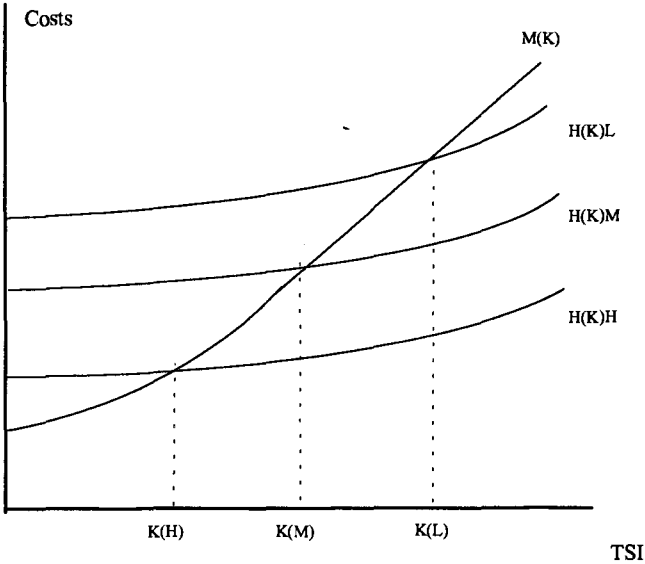
<sup>40</sup>For simplicity we exclude the hybrid form that Williamson originally included in his model, since it is not necessary for establishing the logic here. Williamson's reduced-form analysis focuses solely on transaction costs. In our analysis we also include production costs considerations.

<sup>41</sup>Following Williamson (1985), the "switchover" levels represent points where the buyers are indifferent between market and hierarchy.

<sup>42</sup>Notice that some minimum values of TSI have to be present before an integration solution would be efficient. We return to this argument below and in the presentation of hypothesis 2 (section 5.2).



**Figure 6.1 Interaction effect of Buyer's CPC and TSI on the Buyer's sum of transaction and production costs**



$M(K)$  = Cost curve for market governance (including the hybrid mode)  
 $H(K)$  = Cost curves for hierarchy under conditions of low (L), medium (M) and high (H) degrees of buyer's CPC  
 $K(H), K(M), K(L)$  = Switchover levels for high, medium and low degrees on buyer's CPC

In Section 3.2 we posit that a common code is a key source of the economies a firm provides (Arrow, 1974) as it (a) increases the efficiency of the internal information transmission (Arrow, 1974); (b) increases the effectiveness of performing routines (Nelson & Winter, 1982); and (c) reduces the degree of internal opportunistic behavior (Hennart, 1982). When using the market, a buyer is exposed to high transaction costs when TSI is great. However, if CPC is great, the common codes contribute to minimizing opportunistic behavior (see c) and reducing transaction costs, if the activity is internalized. Hence, the behavioral uncertainty will be reduced, which implies lower bargaining, monitoring as well as maladaptation costs compared with using a vendor. In addition, increasing degrees of CPC will reduce the production cost differences (see a and b, above) between internal production and market exchange. As argued in Section 2.4, buyer's CPC will contribute to solving the decoding problem by imitating processes, and the available and tacit problem by internal learning processes.

To establish the logic for the interaction effect, we first consider the direct effect of buyer's CPC on vertical integration. The direct effect of buyer's CPC on vertical integration is discussed by holding TSI constant at an intermediate level<sup>43</sup>. An increase in CPC will reduce production cost differences between producing internally and using a vendor. This argument, however, is not sufficient to predict vertical integration, since the high-powered incentives of markets will be manifested through lower production costs (Williamson, 1985). Accordingly, transaction cost considerations must also be regarded. At an intermediate level of TSI, some requirements of special adaptive and safeguarding mechanisms to administer the relationship (transaction costs) will exist. When CPC is great, however, the common codes contribute to minimizing opportunistic behavior and transaction costs internally. At a given level of CPC the internal governance costs will be lower than the governance costs of market procurement. The difference in production costs will, as argued, also decrease with increasing values of buyer's CPC. Accordingly, the switchover level will be exceeded when the transaction cost savings exceed the loss in production costs. In sum, internal organization is preferred when CPC is great, given a minimum level of TSI.

Next, we consider the interaction effect of the two variables. As Williamson outlines, when TSI is great the transaction costs of market procurement is high. There exist safeguarding problems because of the vulnerability due to the potential opportunistic behavior of the other actor. Such increasing potential for opportunistic behavior can only be hampered by increasing costs of safeguarding (Williamson, 1985). Accordingly, when both TSI and CPC increase, the transaction cost differences between internal organization and market exchange will be reinforced. The increase in TSI will increase the transaction costs of market procurement, while the increase in CPC will, simultaneously, decrease the transaction costs with internal production. The interaction effect will, however, not influence the production cost differences. The potential production cost savings from increasing TSI will be neutralized by the potential production cost savings from increasing CPC.

Moreover, medium degrees of CPC, K(M), will roughly be captured by TCE-considerations. Level K(L), however, illustrates a condition with low degrees of buyer's CPC. In such

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<sup>43</sup> Notice that at the intermediate level of TSI, transaction cost economics predicts the hybrid form (Williamson, 1991).

situations we expect that even very high degrees of TSI will be in favor of market procurement (the hybrid form). By internalizing in low CPC situations, the buyer will be exposed to both high production costs as well as high internal transaction costs. We expect a buyer in such situations to select the hybrid (Williamson, 1991) governance mode, and to invest in authority-based mechanisms.

### **Tacitness and interfirm trust**

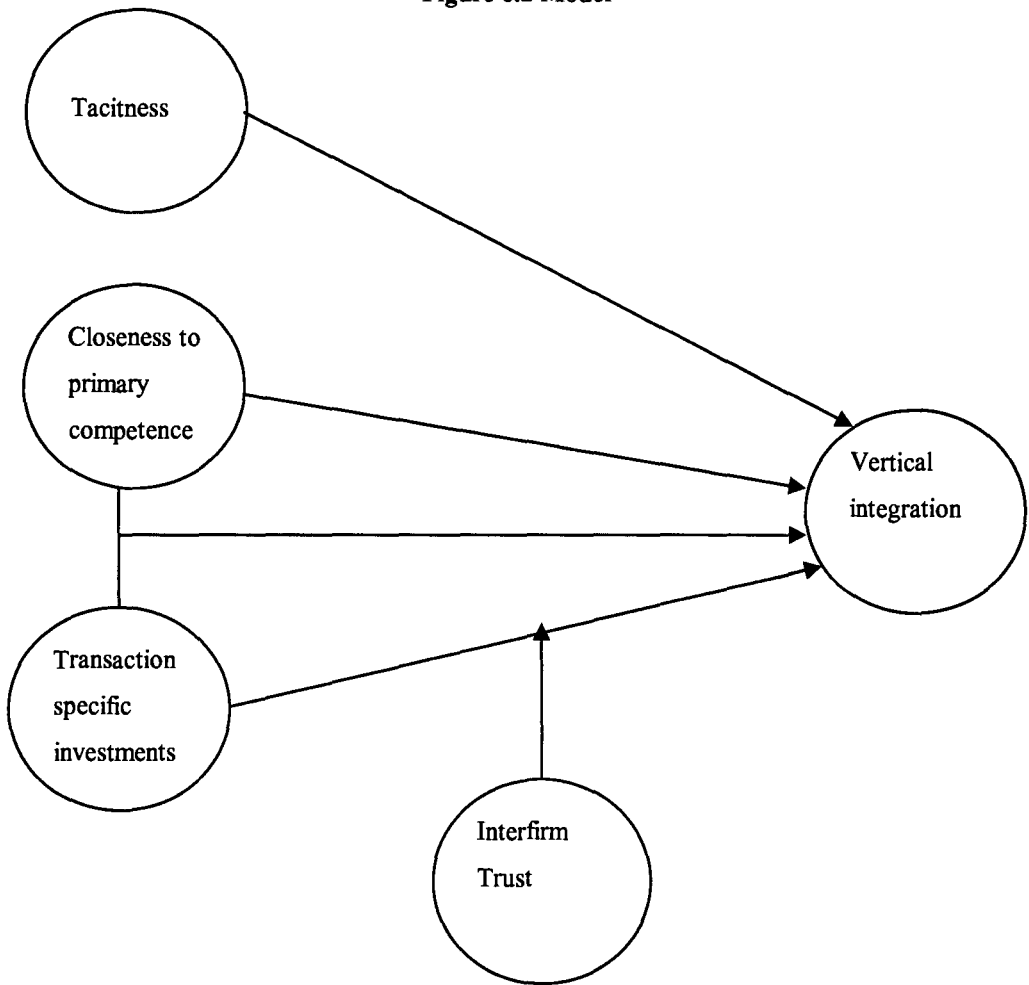
**Tacitness.** The variables of tacitness was outlined and defined in Section 2.3. Based on Winter (1987) and Kogut & Zander's works (1993), and evolutionary economics (Nelson & Winter, 1982) in general, tacitness was defined as *the buyer's perceived degree of the tacit knowledge underlying the vendor's performance of the activity purchased*. A high degree of tacitness represents knowledge that is difficult to transfer across firm boundaries (Winter, 1987; Kogut & Zander, 1992; 1993). If tacitness is high the possibility to imitate knowledge from the vendor will be reduced. If a major part of the knowledge underlying the performance of the transaction is perceived as tacit for the buyer, this will reduce the ability to imitate and hence decode this knowledge. If tacitness is high, we expect the buyer's production costs in performing the activity himself to increase compared with a situation where tacitness is low.

**Interfirm trust.** In adopting a calculativeness reflection on interfirm trust, the variable was incorporated into the study's framework in Chapter 4. Economic actors involved in autonomous trading will act opportunistically if they have economic motives to do so. For autonomous firms involved in exchange of products or services, a interfirm trust relationship will function as long as both parties calculate that they will make a profit from using trust as a governance mechanism. Interfirm trust was outlined and defined in Section 4.3. The construct was defined as a *willingness to rely on an exchange partner in whom one has confidence, which is developed and persisted on the basis of credible commitments and calculative economic responses* (Moorman, Zaltman, & Deshpande, 1992; Williamson, 1993).

## **The model**

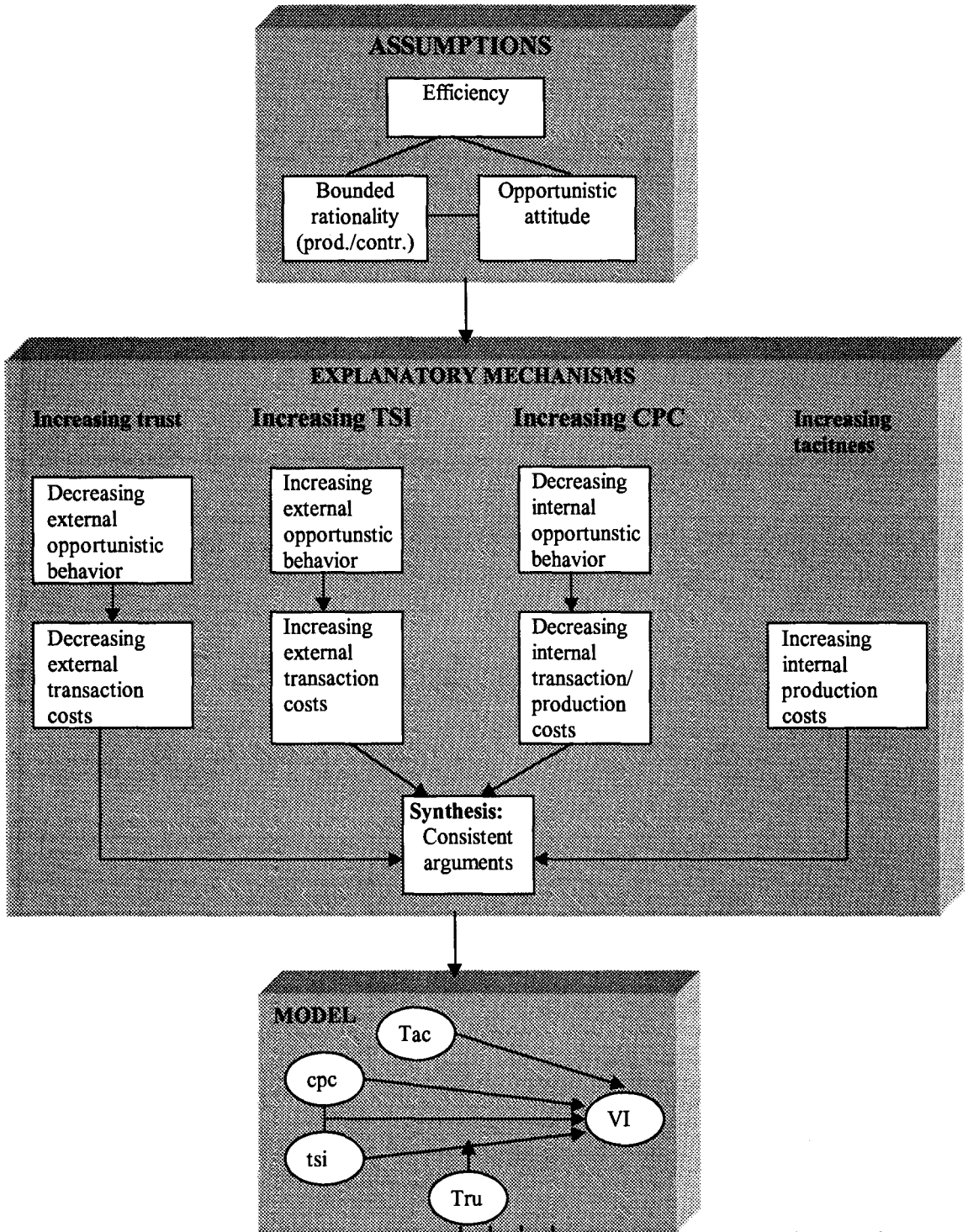
In sum, these four variables along with the dependent variable of vertical integration (VI) form the conceptual model shown in Figure 6.2. The independent variables of buyer's CPC, tacitness, and the TSI are expected to affect the dependent variable (VI) directly. The expected interaction effect between buyer's CPC and vendor's TSI are meant to illustrate the complementarity of the two perspectives examined and was illustrated in Figure 6.1. Accordingly, we expect a positive interaction effect of these variables on vertical integration. By this we will test empirically, what we have argued theoretically, the complementarity of transaction costs economics and the competence perspective. Additionally, we expect further that interfirm trust will moderate the relation between vendor's TSI and VI. The underlying arguments for the connection between the variables and the formal statement of the hypotheses are presented in the next section.

**Figure 6.2 Model**



The theoretical answering of research question 1 and 2, discussed throughout Chapters 5 and 6, is summarized in Figure 6.3 below. In the upper part of the figure the assumptions of the study are shown. Next, the explanatory mechanisms derived from these assumptions are formalized. Finally, the connections between the constructs in the model, logically deduced from the explanatory mechanisms are shown in the bottom part of the figure.

**Figure 6.3 The overall theoretical framework of the study**



## 6.2 Hypotheses

### **The vendor's transaction specific investments**

Investments in specific assets will create a safeguarding problem because of the vulnerability due to the potential opportunistic behavior of the other actor. Investments in such assets are supposed to create a lock-in effect caused by a fundamental transformation *ex-post* (Williamson, 1985). The lock-in effect will shape a condition where autonomous trading conditions *ex-ante* will be supplanted by unified ownership (Williamson, 1985). The underlying TCE argument for this proposition is that with high degrees of transaction specific investments, the expected transaction cost savings by internalizing the activity will exceed the extra production costs that are supposed to exist internally. Based on Williamson (1979, 1981, 1985) and earlier empirical TCE-studies on vertical integration (e.g. Monteverde & Teece, 1982; Masten 1984; Walker & Weber 1984; 1987; Masten, Meehan & Snyder 1989; Lieberman, 1991), we state the following hypotheses:

#### **H1:**

**The buyer's investments in transaction specific assets will have a positive effect on vertical integration.**

### **The buyer's closeness to primary competence**

EE holds that when firms grow by vertical integration they grow in a direction of something closely related. RBT argues that firms will expand in those areas where their existing competence is the foundation for a firm's value creating process. These two sources are the theoretical departure for the expected relation between buyer's CPC and vertical integration. While EE gives the basic foundation for the understanding of economic actors' limited capacity to perform new and different tasks, RBT gives an understanding of those competencies most likely to generate rents. The competence perspective, however, is not able to connect these arguments to transaction costs and opportunism. The underlying arguments for the connection

between these variables must therefore be further extended. Our discussion is based on the behavioral assumptions outlined in Chapter 3, and contrary to previous attention in the competence perspective, we connect the competence prediction to production cost as well as to transaction cost efficiency. The underlying arguments for this hypothesis are divided into two parts. First, we argue, *ceteris paribus*, why an integration decision based on relatedness will be preferred compared with a non-relatedness situation. Next, it is argued that increasing degrees of CPC will favor internal organizing compared with using a vendor.

**Argument 1.** Some of the barriers and problems that impede effective competence accumulation for the buyer in buyer-vendor relations will be overcome if the buyer has CPC regarding the activity in question. When CPC is high, the buyer can use his existing competence as a guide in learning processes and in imitating relevant competence from the vendor. The coding problem (available knowledge from the vendor must be decoded by the buyer), the available problem (the vendor refuses to share his coded knowledge with the vendor), and the tacit problem (not all knowledge embedded in the vendor's routines is articulated in written documents), will through internal learning and imitating processes be reduced if the buyer has CPC (cf. Paragraph 2.4.3). When CPC is low, in contrast, it will take considerable time and spending of resources before the buyer will be able to absorb and learn the relevant knowledge necessary to effectively perform the activity. Accordingly, as previously argued by scholars in the competence perspective, if an integration of a new activity is not linked to the firms' existing competence base they will face high production costs. A relatedness will provide gains from the redeployment of existing competence (Penrose, 1959) as well as give the opportunity to economize on intraknowledge and information transfer. Note that this statement roughly covers what scholars in the competence perspective previously have emphasized (e.g. Winter, 1988; Conner, 1991).

Performing completely different undertakings, however, will also increase the transaction costs. The selfish and dishonest behavior of actors inside the firm will increase if the management lacks the common codes necessary to detect cheating (Hennart, 1982). Accordingly, if the existing codes and routines to a limited degree can support the performance of an activity, the firm is exposed to many of the same problems as in conventional market transactions. An inability to detect cheating and dishonesty will increase the search and transaction costs internally. This opportunism statement is an extension of previous works



within the competence perspective. However, argument 2, must be included to give an understanding of why high CPC will make integration decisions more efficient than market procurement.

**Argument 2.** In absence of uncertainty/complexity complete contracting is, according to Williamson (1975), possible. Bounded rationality has relevance "... only to the extent that the limits to rationality are reached - which is to say, under conditions of uncertainty and/or complexity" (Williamson, 1975:22). This limit on rationality is reached with relatively low degrees of asset specificity in autonomous trading (Williamson, 1991). However, if internalizing when CPC is high, a buyer economizes on bounded rationality. 'The limit of rationality' is not reached when the degree of CPC is high enough. This possibility to economize on bounded rationality assumes, however, that there exist some safeguarding problems in the buyer-vendor relation. In a perfectly competitive market, a buyer can, if exposed to opportunistic behavior, simply recontract with other vendors. Discrete (Macneil, 1980) market transactions occur only when transaction specific investments are zero (Williamson, 1991). Consequently, the expected effect of CPC on VI implies that a minimum (constant) level of TSI is present in the relationship. In Section 6.1, we argued that an increase in CPC would reduce production cost differences between producing internally and using a vendor. This argument, however, is not sufficient to predict vertical integration, since the high-powered incentives of markets will be manifested through lower production costs (Williamson, 1985). Accordingly, the sphere of application for the hypothesized effect is restricted to relationships where some minimum levels of TSI are present<sup>44</sup>.

Given this premise, as CPC increases, the buyer's production costs will gradually be approaching the vendor's (cf. Section 6.1). At the same time, a great CPC will increase the transaction cost differences, which will be in favor of internal organization. Accordingly, the buyer will reach a level where these savings exceed the production cost loss: the greater CPC, the higher the transaction cost differences and the lower the production cost differences between internal organization and market procurement. We propose the following:

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<sup>44</sup> Although it is believed that the effect of CPC on VI will depend on the level of TSI, few transactions between firms are of a discrete kind (Macneil, 1980), i.e., most transactions include some minimum levels of TSI. Thus, it can be argued that a main effect of CPC on VI may be a reasonable approximation, despite the further complexity in the theoretical argumentation.

## H2:

**The buyer's CPC will have a positive effect on vertical integration.**

### **Interaction of buyer's CPC and TSI**

A firm's former investments and its repertoire of routines, restrict its future behavior (Nelson & Winter, 1982). This follows because learning tends to be local (Cyert & March, 1963). Thus, even though the buyer's existing competence may be close to the vendor's, the way of doing things is different (Meyer & Rowan, 1977), and the buyer and the vendor will have different common codes (Arrow, 1974; Hennart, 1982; Kogut & Zander, 1992; 1993). This implies that the parties will react differently when trying to co-ordinate disturbances (Williamson, 1991), which again will increase the bargaining costs of reaching an agreement for solving the disturbances<sup>45</sup>. In situations with great TSI, the buyer is therefore exposed to high transaction costs, independent of the degree of CPC. Accordingly, the buyer's ability to detect cheating and dishonesty from the vendor is initially low and can only be reduced by added safeguardings, which increase the transaction costs. These transaction costs will gradually increase with increasing degrees of TSI (Williamson, 1979; 1981; 1985). By internalizing, the buyer will therefore economize on transaction costs by using their common codes (Arrow, 1974; Hennart, 1982) and organizing principles (Kogut & Zander, 1992) as guidelines in controlling behavior. Accordingly, the interaction effect of CPC and TSI increases the transaction cost differences between market exchange and internal organizing<sup>46</sup>: An increase in TSI increases the transaction costs of market procurement, while an increase in CPC, simultaneously, decreases the transaction costs of internal organizing. Accordingly, we propose:

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<sup>45</sup>Note that this different reaction may be a result of disagreements on good intentions (Conner & Prahalad, 1996) or on self-interested bargaining (Williamson, 1985), or on both. As Williamson (1991:278) asserts, failures of co-ordination between autonomous parts may happen because they "... read and react to signals differently, even though their purpose [might be] to achieve a timely and compatible combined response".

### H3:

**The interaction effect between the buyer's CPC and TSI on vertical integration will be positive.**

### Tacitness

A high degree of tacitness represents knowledge that is difficult to transfer across firm boundaries (Winter, 1987; Kogut & Zander, 1992; 1993). Accordingly, the more articulable the knowledge underlying the activity is, the easier it is for the buyer to imitate relevant knowledge from the vendor. By contrast, if tacitness is high the possibility to imitate knowledge from the vendor will be reduced. If a major part of the knowledge underlying the performance of the transaction is perceived as tacit for the buyer, this will reduce the ability to imitate and hence decode this knowledge<sup>47</sup>. If tacitness is high, we expect the buyer's production costs in performing the activity himself to increase compared with a situation where tacitness is low.

The hypothesis is embedded in the broader framework within evolutionary economics' perspective on the growth of the firms (Penrose, 1959; Nelson & Winter, 1982; Kogut & Zander, 1992; 1993; Zander & Kogut, 1995). Thus, the rationale for the variable impact on vertical integration is connected to production cost efficiency. Moreover, given some level of asset specificity, the vendor will have incentives for not sharing his knowledge with a buyer<sup>48</sup>. Accordingly, as with hypothesis two, the expected effect of tacitness implies that a minimum (constant) level of TSI is present in the relationship. As emphasized by agency theory, if the outcome of a performance can be perfectly measured and/or evaluated (i.e., low asset

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<sup>46</sup> Note that the explanatory logic for the interaction effect is strictly based on transaction costs consideration. The interaction effect will, not influence the production cost differences. The potential production cost savings from increasing TSI will be neutralized by the potential production cost savings from increasing CPC (cf. Section 6.1).

<sup>47</sup> We addressed this issues in depth in paragraph 2.2.3, when we stated that the tacitness problem and the availability problem could be overcome by internal learning processes, while the coding problem was related to the imitation of the vendor's competence.

<sup>48</sup> That the vendor will not share his knowledge with the vendor may not be characterized as opportunistic behavior. Such behavior is more connected to the neoclassical assumption of simple self-interest seeking (see Williamson (1985: Chapter 2) for the distinction between simple self-interest seeking and opportunism). However, when tacitness is low, there may exist some opportunism independent transaction costs (Conner & Prahalad, 1996). Thus, the knowledge transaction cost, i.e. the buyers' costs of absorbing the vendor's knowledge through co-operation may increase as tacitness increase (cf. Cohen & Levinthal, 1990). Again, however, we find it difficult to agree to this argumentation, because it implies a

specificity implies that the market function, cf. Williamson, 1985), there is no need to engage in the costs associated with controlling and monitoring behavior (Eisenhardt, 1989). Accordingly, in the production of such kinds of goods and services (i.e., low asset specificity), it does not matter if tacitness is involved or not: The markets do perfectly well.

Kogut & Zander (1993) received empirical support for the hypothesis that the degree of tacitness is positively related to internal diffusion of manufacturing, and negatively associated with using an agent. Thus, imitation of knowledge from firms that possess capabilities with high degrees of tacitness may be extremely difficult. The extent to which capabilities can be articulated and taught affect the time and resources necessary to imitate the knowledge. Thus, as the knowledge becomes less codified, less easily thought and more system dependent (i.e., high degrees of tacitness), the less likely it is that the knowledge may be transferred from the vendor to the buyer. Thus, the following hypothesis is proposed:

**H4:**

**The buyer's perceived tacitness of the vendor's knowledge will have a negative effect on vertical integration.**

**Modification effect of interfirm trust**

To properly determine the characteristics of what he is buying, a buyer must strive to achieve sufficient knowledge or information about the goods or services he intends to buy. There are, at least, two possibilities of appropriating this information in bilateral relations; by developing a trust relation or by using authority mechanisms and contractual safeguards. When trust is low other control mechanisms are employed (Shapiro, 1987). Consequently, legalistic remedies (e.g., accrediting organizations, insurance, bonds, guarantees) are established to compensate for the lack of trust in exchange (Ring, 1997). Thus, to prevent opportunistic behavior from the vendor, one solution for the buyer can be to invest in authority mechanisms. Research investigating these kinds of mechanisms suggests that they may lead to higher level of mistrust (Dahlstrom & Nygaard, 1995). Thus, a consequence of authority mechanisms may be absence

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*paradox: Absent opportunistic attitude, there are no incentives for the vendor not to share all his knowledge with the buyer, and there are no incentives for the buyer to either absorb the knowledge or integrate the activity.*

of trust and appears to raise the costs of the relationship (Ring, 1997). These costs can exceed the costs of internal organization (Williamson, 1985; Chiles & McMackin, 1996).

By contrast, trust seems to be a less expensive mechanism to use than authority. When trust is present within relationships, the cost of transacting appears to be lower (Arrow, 1974; McAllister, 1995; Chiles & McMackin, 1996; John, 1984; Ring & Van de Ven, 1992) as fewer controls are needed to measure and monitor performance (Ouchi, 1980). Powell (1990) states that "... trust reduces complex realities far more quickly and economically than prediction, authority, or bargaining" (p. 305). A firm will reduce behavioral uncertainty and complexity by having interfirm trust (Chiles & McMackin, 1996). Trust may solve problems associated with contract specifications (Dwyer, Schurr, & Oh, 1987), and may facilitate adaption to uncertainty (Macneil, 1980). Trust reduces the parties' withdrawal of information (Hennart, 1982). As trust increases among trading parties, the communication and information efficiency will increase and establish a working relationship that facilitates performance (Dahlstrom & Nygaard, 1995). Thus, relying on trust "profitability is enhanced, all other things remaining equal" (Ring, 1997:6).

Consequently, trust is viewed as a way to economize on bounded rationality (cf. Chiles & McMackin, 1996). However, this potential of economizing on bounded rationality come at an expense. The risk costs of being exposed to opportunistic behavior increases. As discussed in Chapter 4, relational risk has two dimensions: Size of probability (*risk*) and the size of possible loss (*risk costs*) (cf. Chapter 4; Nooteboom et al., 1997). As empirically supported by Nooteboom et al. (1997), asset specificity has a positive effect on the risk costs, rather than an effect on its risk. Asset specificity increases the stake that the party has in a relationship and therefore increases the size of risk costs, even though the subjective risk is shown to be reduced (Nooteboom et al., 1997). Accordingly, the subjective risk may be reduced with increasing levels of trust, while the estimated risk costs will not. Consistent with the behavioral assumptions of this study, we expect that interfirm trust relationships are created on the basis of calculative reasoning. Hence, if trust is present, the parties have calculated that opportunistic behavior is not efficient. Accordingly, a rational actor will regard the size of loss as the baseline when evaluating governance decisions. This trade-off is the issue of an economist (i.e. the effort of calculating the most efficient solution).

The TCE-framework assumes that the probability of the actors behaving opportunistically increases as investments in specific assets increase (Hill, 1990). And as evidently illustrated in the literature, trust is created in order to hamper or eliminate opportunistic behavior. Consequently, trust may only be rationalized in the presence of transaction specific investments. Accordingly, from an economic point of view trust cannot alone rationalize a market relationship. Instead, the potential ability to economize on trust increases as the degree of transaction specific investments increases. Chiles & McMackin (1996) propose that interfirm trust will alter the efficient boundaries of the firm, since it decreases negotiating, drafting as well as monitoring costs, and, hence economizes on transaction costs. Accordingly, in the presence of trust, higher degrees of transaction specific investments are expected to make market or hybrid governance more efficient than in the absence of trust. Accordingly, based on Chiles & McMackin's (1996) theoretical framework and proposition, and the discussion above, we expect that interfirm trust will modify the effect on the relationship between transaction specific investments and vertical integration. We therefore propose:

**H5:**

**Interfirm trust will moderate negatively the relationship between TSI and VI.**

## **7. METHODOLOGY**

The chapter provides a description of the research design and data collection procedures for an empirical test of the theory. In Section 7.1, considerations regarding the choice of research design are addressed. Section 7.2 includes discussion and description of the empirical setting. In Section 7.3, the sample frame and the sample procedures of the study are addressed. Issues with respect to measurement are considered in Section 7.4. Section 7.5 provides considerations with respect to control variables. Finally, data collection issues are addressed in Section 7.6.

### **7.1 Research design**

The hypotheses (cf. Chapter 6) impose certain requirements for the research design. The empirical study is designed to conduct theory testing of the causal model of this research. We discuss design requirements for testing such causal models in general, and why the model of this study can be tested using a correlation design.

#### **Causality**

As our model has been argued to be a causal one, we briefly illustrate the three conditions causality rests on. The necessary conditions for demonstrating causality are isolation, association, and directionality (Bollen, 1989). Isolation means that no other variable, except the ones included in the model must affect the association between the cause and the effect. Thus, a potential influence of a “third” variable on the effect must be ruled out (i.e., absence of spurious and masked associations between the constructs in the model). Association implies that changes in the level of an independent construct (cause) must be associated with changes in the level of the dependent construct (effect). Finally, directionality means that the direction of influence must be temporal, i.e. the cause must precede the effect in time.

Different designs have different strengths and weaknesses. Most designs can to some extent deal with the requirements of association and isolation. However, as discussed below,

particularly the possibility to assess temporal asymmetry (i.e., directionality) differs with respect to the research designs available.

### **Available research designs**

Among the three main research designs available, the classical experiment, the quasi-experiment and the non-experimental field study, the first two have superior features for conducting tests of causal relationships. Especially with respect to the establishment of temporal precedence, experiments and quasi-experiments are the most appropriate designs (Cook & Campbell, 1979).

If manipulative variables can be used, one can change or manipulate one variable in a model and examine subsequent effects on other variables, thereby determining cause-and-effect relationships. The ability to control the situation, manipulate the treatment and make comparisons between treatment conditions, makes the classical experiment appropriate to establish the requirements for isolation and directionality (Calder, Phillips & Tybout, 1981). However, when a model (such as this one) has several predictor variables, conducting an experiment becomes difficult due to the need of establishing many experimental groups (Cook & Campbell, 1979). This problem becomes even more complex when introducing moderator variables. Additionally, the experimental testing procedure very often has a limited time perspective. The variables used in our model are complex phenomena and presumed to develop slowly over time. Manipulation of variables, such as trust, tacitness and closeness to primary competence seems to be impossible in a short time frame. Moreover, treatment of manipulation is difficult when firms or strategic business units represent the level of analysis (McGrath, 1982). Accordingly, experimental testing of the model is inadequate and excluded as a possible option.

The quasi-experiment, the idea of study causality in natural settings (Cook & Campbell, 1979), is not seen as a possible design options either. In such a design, subjects confronted with the independent variable are compared with subjects not confronted with it. Using such a design, the division of subject into experimental versus control groups should ideally be randomized. Using quasi-experiments mean that we are allowed to manipulate the independent variables of



CPC and TSI, in a subset of randomly chosen dyads. Next, we should be able to compare this subset with another subset of dyads, without changing the value of the same variables. Alternatively, we should have access to a group of dyads where some included were changing values of these variables, and some did not. None of these options are available.

Regarding non-experimental designs, the best alternative to test the direction of influence is through a panel design (Menard, 1991). Utilizing such a design, at least observations from two periods are necessary to get the appropriate information. However, the resources available do not allow the time scope and costs associated with a design involving two periods of data collection. Consequently, this alternative is neither possible.

### **Choice of research design**

The only realistic design alternative is considered to be the correlation design. However, such a design has some limitations when testing causal models. Below, we discuss these potential limitations with respect to the conditions of causality. The limitations as well as the advantages of testing the theory using correlational design will also be addressed.

**Isolation.** Mitchell (1985) argues that Cook & Campbell's (1979) list of threats to internal validity is of marginal help when using correlation designs. In such studies, the effort must be connected to an identification of third variables through systematic thinking (setting characteristics) and theory-reviews. Consequently, the isolation of other intervening influences may be met by a homogenous population and by the use of control variables (Mitchell, 1985).

**Association.** Association may be reasonably established by correlational design. However, two aspects are important to consider for establishing associations in the chosen design. *First*, sufficient variance in the independent constructs is necessary to achieve covariations among constructs (Calder, Phillips & Tybout, 1981; 1982). Drawing on previous studies, sufficient variance in the independent constructs of TSI, trust, and tacitness will be obtained in most buyer-vendor contexts. However, the variable of CPC is more problematic. If we select an industry where the buyers are in no position to obtain close competence in performing the activity they purchase, it will surely limit the range of variation in the variable. Thus, the choice

of empirical setting should first and foremost be guided by the possibility to secure variation in the variable of CPC. *Second*, the other aspect concerns the issue of stability. Causes do not always produce their effects instantly (Hoyle, 1995). The reasonable solution is to measure the effect when it has achieved equilibrium in not changing further (Hoyle, 1995). Usually in correlation design, system equilibrium is assumed. This should not, however, be done without some knowledge about the time distance between a change in the cause producing the expected effect. The connection between the independent constructs and the dependent one is complex. As argued in the theoretical discussion, a change in the independent variable of CPC, TSI, tacitness and trust will influence the dependent variable through a set of mechanisms (opportunism, transaction costs, production costs) that couple the causes to the effect. This implies that the time since the relationship was established should be sufficient for the mechanisms, by which the causal influences are transmitted to the effect, to be stabilized. How the requirement of stability is secured is discussed in Section 7.3.

**Directionality.** For correlation design, temporal asymmetry poses the most serious problem for inferring causality. Directionality may be established either by logic, theory, or, most powerfully, by research design (Hoyle, 1995; McGrath, 1982). To test if the cause precedes the assumed effect cannot be inferred by the chosen design. It may, however, be adequate to conduct a causal study even though the time effect cannot be tested, if theory and/or logic indicate the causal direction (McGrath, 1982).

The hypotheses developed all rest on arguments about causal relations, which, of course, also imply directionality. Thus, theory supports the directionality of the hypotheses. However, the use of theory "to justify an inference of directionality is the most problematic because often there are competing theories that offer different accounts of the association among two or more variables" (Hoyle, 1995:10). Even though other "theories" exist in the literature (e.g., the neoclassical power argument), these theories have been ruled out by TCE considerations (Williamson, 1975; 1985; Argyres, 1996; Perry, 1989). Beside, these theories will first and foremost imply potential problems for isolation rather than directionality (i.e., the theoretical influence from TCE on the phenomena is highly accepted, cf. Perry, 1989). Thus, the issue is more a question of to what degree the protective belt (cf. Lakatos, 1978) may be extended. A competence theory, however, has not been ruled out by TCE (cf. Chapter 3 & 4). However, TCE and the competence theory, previously viewed as competing theories of vertical

integration, have been integrated into one theoretical framework in this study. Thus, the direction of the hypotheses in the study's theory is; (1) supported by, and consistent with, the literature, and (2) competing theories that offer different accounts of the direction of influence among the model's variables are, to my knowledge, absent.

Nevertheless, theory alone may not be sufficient to "confirm" causality when the chosen design lacks the possibility to explicitly test directionality. Particularly, by conducting correlational design it may be so that the real direction of influence goes the opposite way of the hypothesized, or alternatively, that the influence is reciprocal. Thus, *a priori* statement for the logic behind the direction of influence will further increase the confidence that causality may be inferred (Hoyle, 1995; McGrath, 1982). Thus, in addition to theory, the way the study's design is conducted implies that it is logically impossible that the influence can go the other way of the one hypothesized. As illustrated in the next section, in order to appropriately capture CPC (i.e., closeness in competence to an activity), we have to select cases where the activity in question is not performed in-house. For the purpose of this study, it will be meaningless to talk about closeness in competence to an activity, which a firm already performs. Similar arguments yield the other predictor variables in the model. Thus, the ways the variables are measured imply that logic, in addition to theory, supports the directionality of the hypotheses.

## Summary

As argued above, strong cause-effect influences can only be inferred from experimental designs. As not all the three causality conditions are established by the chosen research design, only association rather than causation can be inferred from the empirical study (Schumacker & Lomax, 1996). The main reason for this was argued to be the difficulty involved in encountering the requirement of temporal precedence. Thus, the chosen design is not alone sufficient to establish causality. However, the temporal precedence is *a priori* established through theory and logic. Beside, the two other conditions (isolation and association) will be reasonably accomplished in the study. Accordingly, if the theory is empirically supported, we find it reasonable to argue that the requirements of causality are, at least to some extent, established.

## 7.2 Empirical setting

As argued, the empirical study can be classified as a theory test. Internal validity should have priority over external validity when conducting theory testing (e.g. Cook & Campbell, 1979). By selecting a particular industry, one accounts for the potential impact of industry effects, and thus, internal validity is improved. Additionally, the choice of one single industry may decrease the amount of error variance, and statistical power will be improved. As a general theory of vertical integration, the study's theory should hold for firms in general. A theory claimed to be general can be rejected if it is falsified for any subgroup of firms (Calder, Phillips & Tybout, 1981). Even if the theory is supported in the study, however, establishing external validity can only be done through several studies in different contexts (Salipante et al., 1982).

A description of the empirical setting is reported below. Further, we discuss the organization of the activities in the chosen setting. The latter aspect is discussed in order to illustrate how the setting satisfies the study's important requirement of properly measuring the construct of CPC. The requirements for measuring this construct are therefore discussed first.

### **The construct of CPC and the choice of empirical setting**

The possibility of measuring this variable must be connected to criteria based on the theoretical definition of the construct. In Section 2.4, CPC was defined as the degree to which the *firm's existing primary competencies* can be used as a catalyst in the internal learning processes and in the process of imitating *environment-specific competencies*.

Accordingly, the units in the chosen empirical setting should be able to satisfy the following criteria:

- i) The activity or transaction examined must not be performed internally (cf. '*environment-specific competence*')

ii) The units must perform other activities where some of the competence developed might be of relevance for performing the activity now purchased and examined (cf. *existing primary competence*).

## **Description of the empirical setting**

The chosen industry is the Norwegian hydroelectric power industry. Up to 1991 the industry was organized as a natural monopoly, and the local power stations covered the supply in specific geographic markets. In 1991, however, the hydroelectric power market in Norway was deregulated, which resulted in one of the most competitive power markets in the world (EnFo, 1995). The deregulation of the market opened for competition in the production and selling of electric power. During the last six years, the industry has become more and more competitively oriented and shows obvious similarities with completely unregulated markets.

The electric utility industry consists of many different sectors with respect to production and distribution of electric power. A major and central part of the power stations' activities concerns the maintenance activities of the stations. These are divided into three main areas; mechanical, electronic, and building and construction maintenance. The governance of mechanical maintenance activities is the focus of this study. This part of the industry has never been regulated, as the case was for distribution of electric power.

The level of analysis is the power station (i.e., either a firm or strategic business unit). A single (or strategic) business unit is defined as the boundaries of an autonomous organizational subunit (D'Aveni & Ravenscraft, 1994). The unit of analysis is the mechanical maintenance activities, i.e., the transactions (cf. Chapter 5). Using the transaction in vertical relationships between buyers and vendors as the unit of analysis, this study examine attributes of the economic exchanges between buyers and vendors in the power station industry and regards buyer's make or buy decision of the maintenance activity in question.

The empirical setting of the study is highly relevant for testing the theoretical model. It is homogenous and is assumed to secure variation in the independent constructs. Below, it is

shown how it is possible to isolate and categorize the different maintenance activities in the examined sector of the power industry. This aspect allows us to measure CPC in superior way.

## **Organizing the activities of mechanical power maintenance**

From field interviews, it appears that the mechanical maintenance activities in the power station industry can be divided and ranked into seven different components or categories. The ranking of the maintenance activities was based on expert evaluation of the degree of advanced engineering competence necessary to perform the different categories or activities and their relatedness to each other. The expert evaluation was done in two different rounds. First, we worked closely with one expert on power maintenance activities, and developed the initial categories. Later, in round two, six informants from different power station units were asked to rank these activities with regard to the complexity of performing these activities, and the degree of relatedness between the activities<sup>49</sup>. The results of this test gave reasonable matching and convergent results, and corresponded and thereby confirmed the initial categorization in round one.

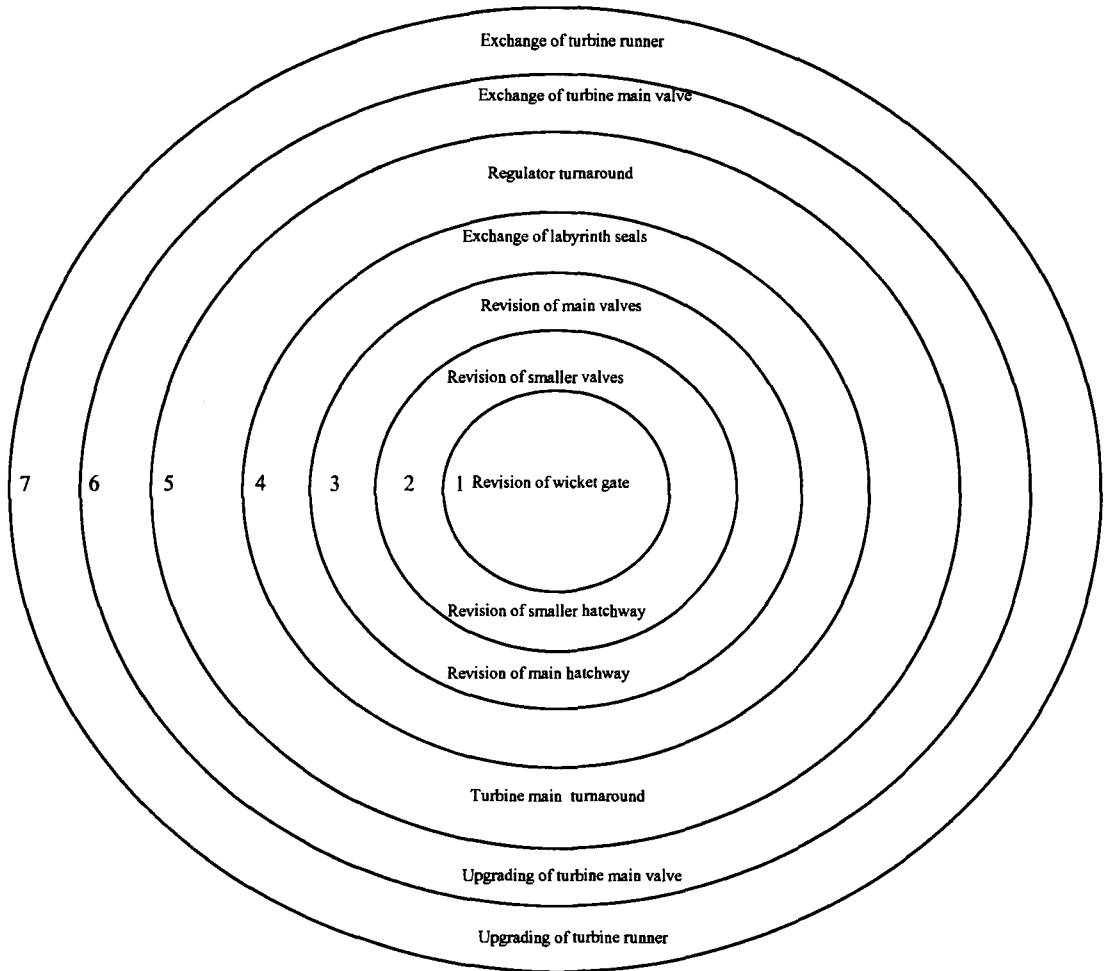
Figure 7.1 illustrates that the inner circle represents an activity that requires less advanced engineering competence than the next activity in the circle, and so on. Accordingly, we are able to rank these categories with respect to the complexity involved in performing them (from 1 to 7 with increasing degree of complexity<sup>50</sup>).

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<sup>49</sup>Several interviews were conducted with experts in the industry. Additionally, a preliminary questionnaire (cf. Gulbrandsen, 1996) concerning the issue of relatedness and complexity was distributed to managers of power stations participating in a course held by EnFo in October 1995 ('Vedlikeholdsfilosofi for kraftforsyning, Lederkurs, Ernst Park Hotel, 18. -19. October 1995').

<sup>50</sup>As we can see, several of the activities were reported to have about the same complexity, and were impossible to distinguish on the evaluated criteria. Moreover, the complexity of the activity was evaluated by the degree to which different disciplinary engineering knowledge must be combined in order to perform the activity adequately (cf. Kogut & Zander, 1993).

**Figure 7.1. Ranking of mechanical maintenance activities.**



Further, the expert evaluations showed that these maintenance activities are not unrelated to each other. If a power station is able to perform the activity in circle 2, it is better suited to perform the next activity. This means that being able to perform activity 2 in-house, a power station is assumed to have some familiarity with and relevant knowledge to perform the next, but the station will not be familiar with how to perform e.g. activity 6. The ranking of activities is meant to represent the degree of closeness in competence to an activity. This aspect implies that it is possible to regard the evolutionary economics' argument that *closeness in competence* to an activity can be an important indicator of where integration will take place. Besides, the maintenance activities represent *one of the primary competencies* the stations possess. This was obvious from the preliminary studies, since without a high standard of maintenance, the power stations will gradually be damaged, and they will not be able to meet the requirements claimed by NVE (Norges Vassdrags og Energiverk). This latter aspect implies that it is possible to regard RBT's argument that firms are expected to expand in areas where their primary competencies are the departure for further growth. Thus, by having the mechanical maintenance activities in the power industry as the unit of analysis, all the requirements for properly measuring the construct of CPC are satisfied (i.e., the activities are related, existing competence is of relevance, the activities can be ranked with respect to complexity and connection, maintenance in one form or another is part of the power stations primary competence, and the activities or transactions examined are not performed internally).

### **7.3 Sample frame and sampling procedures**

#### **Population, sample frame and sampling procedures**

The industry consists of approximately 600 business units (EnFo, 1995). Some hydroelectric power firms carry out both production and distribution of electric power, while other only perform one of these operations. Only units accomplishing production maintenance activities (i.e., production of electric power) are included. Thus, 411 units, which produce electric power, were identified, and these units represent the sampling frame. The units were identified from EnFO's ('Energiforsyningens Fellesorganisasjon') membership database<sup>51</sup>.

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<sup>51</sup> 99% of all the power station firms in Norway are members of EnFO (EnFO, 1995).



Data was collected from the buyer side of the dyad<sup>52</sup>. Each of the business units was informed to select the last activity carried out by a vendor in whom the respondent was well informed. Consequently, which one of the twelve activities the informants selected was not controlled by the researcher.

## Sample size

The appropriate size of the sample in this study will depend on the type of statistical method to be used as well as the available cases. When conducting theory testing of models with latent variables, structural equation modeling (SEM) has advantages over multiple regression (see e.g. Jöreskog and Sörbom, 1982, Bollen, 1989). Thus, SEM is probably the best method for testing the measurement and structural model of the study. Even though “no hard and fast rule” (Bollen, 1989:268) exists for determining sample size associated with theory testing in SEM, tentative guidelines and simulations indicate that sample sizes down to 100 are often adequate to give reliable test statistics (Bagozzi & Yi, 1988; Anderson & Gerbing, 1984). Additionally, the greater the number of free parameters in a model, the greater sample size is needed (Bollen, 1989). There is, however, little experience on which to base such recommendations (Hu & Bentler, 1985). The study’s model has a moderate number of indicators, namely 21. Thus, following Bagozzi & Yi (1988) and Anderson & Gerbing’s (1984) suggestion, a sample size of more than 100 should be satisfactory in order to test the model in SEM. The study, however, includes 2 moderators or interaction effects.

When moderators are included, the sample sizes requirements for testing structural models in SEM increase. Jonsson (1997) states that if one interaction effect is included, the sample size should be at least 400 cases. Klein et al. (1997) suggest that the requirements should be twice as many  $n$  for every moderator included as when testing a model without moderators. Consequently, following Jonsson and Klein et al., the sample size for testing the structural model should be 800. Accordingly, given the available sample frame of the study ( $N=411$ ),

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<sup>52</sup>The often-discussed trade-off between selecting data from one or both sides of a dyad is of less relevance in this study. Although divergent perceptions about the characteristics of the relation may exist (John & Reve, 1982), the interesting issue here is to capture the buyer’s perception of the research problem (cf. Section 7.6 and Heide & John, 1991 for the relevance of this).

SEM cannot be used when testing the structural model. However, since the two-step modeling approach (cf. Chapter 8 and Anderson & Gerbing, 1988) is used in this study, the measurement model can be estimated using SEM, and product term analysis in multiple regression is applied for the structural analysis (cf., Section 8.3).

Four factors must be specified to determine the necessary sample size when conducting product term analysis (Jaccard, Turrisi & Wan, 1990). The balance between the two first factors, known as the Type I and Type II errors dilemma, implies that a too small or too large sample size is undesirable. With low statistical power<sup>53</sup> a potentially important effect may go undetected, while a too high alpha level<sup>54</sup> might give a bias toward accepting false effects. Ideally, one should take into account the experience from previous studies when determine the appropriate sample size (Kaplan, 1995). However, for the variables in the model there has not been reported any information regarding effect size and power (i.e., the variable of CPC has never been measured). Thus, common standards in the social sciences are regarded as appropriate rule-of-thumb for determining the power and alpha level for the study.

*First*, the desired level of power of the statistical test must be set. Following Cohen (1988), 0.80 is viewed as an appropriate criterion. *Second*, one must specify the Type I error rate (alpha level) for the test. The rate of the study is 0.05, which is the common standard in the social sciences (Jaccard et al., 1990). *Third*, one must estimate the population squared multiple correlation for the main-effects-only model. *Fourth*, one must additionally estimate the squared multiple correlation for the model including the product terms (Jaccard et al., 1990). The difference between the third and fourth estimate is the estimated strength of the interaction effect (Jaccard et al., 1990). Since there is little help in previous research, we have few guidelines when estimating the squared multiple correlation of the population. A solution would be that a relatively small squared multiple correlations was assumed. However, in the theory chapters it is argued that the synthesis of the two perspectives forms a strong paradigm for explaining vertical integration. Consequently, these theoretical guidelines will indicate a relatively great squared multiple regression. In the social sciences a squared multiple

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<sup>53</sup> Power refers to the probability of correctly rejecting the null hypotheses (i.e., the probability of not making Type II error).

<sup>54</sup> The alpha level (or Type I error rate) refers to the probability of rejecting the null hypothesis when it should be accepted.

correlation less than 0.20 is not uncommon. However, given that previous research in the TCE-framework has been successful, we estimate the population square correlation for the main effects to be 0.40, and, when including the product terms to be 0.45. Thus, the approximate sample size needed to achieve the *a priori* power of 0.80 for  $\alpha = 0.05$  with an estimated population square correlation of the main-effect-only model of 0.40 and the full model of 0.45, is 88 (cf. Cohen, 1988; Jaccard et al. 1990). However, “the greater the number of interaction terms, the lower the power” (Jaccard et al. 1990:36). Following Jaccard et al. a sample size of 110 cases should be sufficient when two product terms are included. Thus, while the sample size necessary to test the measurement model in LISREL was estimated to be 100, the sample size necessary to estimate the structural model when conducting product term analysis in multiple regression, is 110. Consequently, the sample size is set to 110.

## 7.4 Measurement

This section addresses the measurement procedures applied in the study. First, the measurement process is described. Next, we describe how the observed variables were measured. The full set of measures representing the constructs and the questionnaire are presented in Appendix B and A, respectively<sup>55</sup>. Validity and reliability issues are addressed together with the assessment of the measurement models in Chapter 8.

### 7.4.1 The measurement process

Four steps should be included in a measurement process (Bollen, 1989); (1) give the meaning of the construct (i.e., the theoretical definition), (2) identify the dimensions and latent variables to represent it, (3) form measures, and (4) specify the relation between the measures and the latent variable. *The first two* steps were accomplished in Part II. As we recall from the part, all of the constructs except tacitness were argued to consist of one dimension. Measurement is how a construct is linked to one or more latent variables, and how the latent variables are linked to observed variables (Bollen, 1989). Thus, latent variables are the representations of constructs in measurement models (Bollen, 1989). A construct can consist of one or several

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<sup>55</sup> Note that the items reported have been translated into English. The original items have Norwegian wording.

dimensions. Consequently, one latent variable per dimension is needed. Accordingly, the model of the study consists of five constructs and seven latent variables (the construct of tacitness is represented or formed by three latent variables or dimensions).

To form measures that represent the latent variables (*step 3*), the study relied on Churchill (1979) recommends to adopt measures used and validated in other studies. The dependent construct of this study has previously been measured and operationally defined in a number of different ways. Thus, considerable effort was made to find appropriate measures representing this construct. Moreover, the study includes four independent constructs, in which three have to various degrees been used and validated in previous studies. While the constructs of TSI and trust have been operationalized and measured in a number of earlier studies, the dimensions representing tacitness have been operationalized in rather few studies. The variable of CPC has never previously been operationalized. Several interviews and preliminary tests (cf. Section 7.2 and Gulbrandsen, 1996) were particularly accomplished in order to establish content validity for the construct.

Regarding *step 4* (i.e., the connection between the measure and the latent variable), all the latent variables were measured using reflective scales<sup>56</sup>. Moreover, all the observed variables except one were measured by perceptual data. Annual sales represent a control variable (cf. Section 7.5), and are based on data available from EnFO's annual report. Below, the measures representing the latent variables in the theoretical model are presented.

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<sup>56</sup> *The dimensions or latent variables of codifiability, teachability and system dependence form the concept of tacitness. The observed variables representing the dimensions, however, are argued to be reflective measures (cf. Chapter 2).*

## 7.4.2 Vertical integration

There have been a number of different ways to defining and measuring vertical integration in the literature, and one of the key problems in vertical integration research is with respect to measurement issues (Spiller, 1985; MacMillan, Hambrick & Pennings, 1986; Wiggins, 1991; Perry, 1989). Our review of different measuring strategies of vertical integration suggests that the ways of measuring vertical integration may be classified into three major categories. The *first* is by measuring the variable as dichotomous (Monteverde & Teece, 1982). The *second* is connected to some kind of a portion of value added to sales or costs (Adelman, 1955). A *third* way is to use the method of hypothetical choices (Whyte, 1994). Below, the different categories are reviewed and assessed, and it is argued why the third strategy is chosen.

### Dichotomous measuring

Most previous studies on backward vertical integration in a TCE-framework have been based on measuring vertical integration as a dichotomous variable (Joskow, 1988). Examples of such studies in a TCE-framework include Monteverde & Teece (1982); Masten (1984); Walker & Weber (1984: 1987); Masten, Meehan & Snyder (1989); Lieberman, (1991). The advantage of this approach is that the definition of vertical integration is clear and precise (Spiller, 1985). As an example of this kind of studies, Monteverde & Teece (1982) investigated the effects of human asset specificity (defined as worker-specific knowledge or 'application engineering effort') on the make-buy decision of automobile manufacturers. Their dichotomous dependent variable takes on a value of one if the component is manufactured internally and zero otherwise.

This operationalization, however, is not able to distinguish between TCE-explanations and the competence proposition that firms continue to do what they are good at, and thereby gradually develop this ability. For example, the theoretical rationale behind the Monteverde & Teece (1982) study includes, in addition to transaction cost efficiency, also the difficulties in transferring competencies across firms' boundaries: "This article attempts to draw together the

literature on transaction costs and *industrial know-how*<sup>57</sup>.... The existence of transaction-specific know-how and skills and the *difficulties of skill transfer* mean that it will be costly to switch to an alternative supplier" (p. 206). The latter argument corresponds closely to the motives for integration as emphasized by Hennart (1982) and Kogut & Zander (1992; 1993), that firms specialize in knowledge and skills that are difficult to transfer across boundaries and that this, and not safeguards against opportunistic behavior, drive boundary decision. Accordingly, by measuring vertical integration this way, one blends together two motives for vertical integration: namely the competence motive and the transaction cost motive. One can therefore, alternatively to the TCE-consideration, interpret the results that firms continue to do what they have done earlier. Thus, this category of empirical studies does not draw attention to the standard TCE-argument that parties are locked into a relationship ex-post, which again creates the fundamental transformation process (Williamson, 1985). Moreover, by measuring what a firm already has integrated, it is rather obvious that it has sufficient present competence to perform it. Therefore, since CPC is included in the model, a dichotomous operationalization of the dependent variable is excluded.

### **Portion of value added of production**

Value added measures (Adelman, 1955) are viewed as the difference between total production (or sales) and the costs of the purchased inputs (Tucker & Wilder, 1977). Operationalizing vertical integration as a ratio of value added to sales or costs has been done in different ways in the literature, and include value-added-to sales ratio (e.g. Levy, 1985), and the portion of the cost of the manufactured product incurred by the firm itself (MacMillan, Hambrick & Pennings, 1986). The use of value-added measures, however, has been criticized to reflect other factors than vertical integration (e.g. Tucker & Wilder, 1977; Harrigan, 1985; Perry, 1989). Of special importance for this study is the argument by Perry (1989) that the operational definition on vertical integration should be strongly affected by the theoretical rationale behind the model.

According to Perry, value added measures are appropriate as long as the studies consider vertical integration raised from transactional economies. However, these measures are less

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<sup>57</sup> *The emphasizing is done by me.*

appropriate when the models are based upon production decisions, because this can confound the cause with the effect (MacMillan, Hambrick & Pennings, 1986; Perry, 1989). Consequently, the danger of committing this tautology may be present in the study as the theoretical rationale is based upon production cost logic as well as transaction cost logic, i.e., the competence rationale for vertical integration stems from contractual issues as well from production considerations. Accordingly, value added measures are not seen as an appropriate operationalization of the dependent variable of the study either.

### **Hypothetical measure**

The method of hypothetical choices (Whyte, 1994) is used to indicate if the unit will continue to purchase the goods from the vendor or if he will perform the activity in-house. According to Whyte, hypothetical measures are a reasonably valid indicator of the vertical integration decision, and have "fewer weakness than may seem apparent at first blush" (p. 293).

The weaknesses of hypothetical measures have been indicated by studies in the field of cognitive psychology. According to Tversky & Kahneman (1986), a normative model of rational choice does not provide a satisfactory foundation for a descriptive theory of decision making. The most common problem with the normative theory has been described as the preference reversal problem (Slovic & Lichtenstein, 1983). In short, the observed preference reversal phenomenon relates to a discrepancy between an individual's preferences and choices. Even though much effort has been made to reject this phenomenon, preference reversals remain much in evidence (Grether & Plott, 1979). Therefore, this phenomenon is inconsistent with the traditional preference theory, where preferences and choices are expected to be consistent. The studies focusing on preference reversal, however, have been made by empirically examining individuals' behavior in lottery. Consequently, the broader implication of this phenomenon connected to economic action and theory on firm levels is, however, still undiscovered (Slovic & Lichtenstein, 1983; Whyte, 1994). Accordingly, to what degree the hypothetical measure is a valid indicator of real choice behavior cannot be inferred by the design chosen. We expect, however, that the characteristics of the dimensions surrounding the transaction will affect the evaluation of hypothetical choices connected to buying or making. Accordingly, we expect that increasing transaction specific investments and closeness to

primary competence will induce an increased preference toward integration. This implies that we adopt a rational choice approach and assume preferences to be consistent with choices. Therefore (and consistent with the behavioral assumptions of the study), we expect economic actors to be effective in pursuing their goals and that choices can be described as a maximization process.

As the above discussion implies, this measure is included for two reasons. *First*, since some of the arguments underlying the competence prediction are connected to production cost efficiency, this measure covers the weakness associated with the value-added measure (the second best alternative). *Second*, Williamson (1985) presumes that economic actors, though bounded rationally, are able to calculate beforehand the efficiency consequences of various governance modes. According to Williamson, the bounded rationality assumption does not imply non-rationality or irrationality. In fact, economic actors are expected to economize on bounded rationality: "Given limited competence, how do the parties organize so as to utilize their limited competence to best advantage?" (Williamson, 1985:47). This means the dimensions describing the transaction are expected to shape preferences for governance forms.

### **Measures of vertical integration**

The empirical test concerns backward vertical integration by expansion. The setting characteristics exclude backward merger or acquisitions as available options in the industry, since mainly three large companies in Norway and two large companies abroad represent the vendor side of the dyadic relations. Given the limited attention vertical integration has been given in the competence framework, it may be more suitable to study expansion rather than merger or acquisition. According to Penrose (1959), a theory of firm growth may best be understood and developed as a theory of internal expansion: "The significance of merger [and acquisition] can best be appraised in the light of its effect on the process of and limits to internal growth" (1959:5).

The construct is operationally defined as the degree to which the units intend to continue to purchase the goods from the vendor or if it will perform the activity in-house (Whyte, 1994).



The four measures representing the construct are listed below (7-point scale, anchored by "very poor description" and "very good description").

1. In the longer term, the principal responsibility for carrying out the maintenance activity will be executed by our own organization.
2. If the need for maintenance should arise unexpectedly, the activity will next time be carried out internally in our own organization.
3. If the need for maintenance can be foreseen, the activity will next time be carried out by our own organization.
4. It is very likely that our own staff will carry out the activity next time.

### **7.4.3 Independent variables**

#### **Buyer's Transaction Specific Investments (TSI)**

The buyer's TSI scale will describe the extent to which the buyer has made specific investments tailored to the specific relation. Thus, a high amount of specificity represents sunk costs that have little value outside of a particular exchange relationship. Williamson (1985) identifies four types of specificities, of which one (human asset specificity) is of most relevance in the power maintenance industry. Human asset specificity is also the one most commonly assessed in empirical studies (Rindfleisch & Heide, 1997). Human assets specificity refers to specialized investments in human competence tailored to the specific transaction. Below, based on previous empirical research (Stump & Heide, 1995; Haugland, 1994; Buvik, 1995), the items reflecting this conceptualization of the construct is listed (5 item, 7-point scale, anchored by "very poor description" and "very good description").

1. We have spent significant resources in reorganizing the power production in connection with this particular co-operation
2. Employees working together with our supplier were given specialized training
3. During the collaboration we brought into notice significant aspects of our supplier's operations.
4. We have spent significant time to acquire knowledge about our supplier's technical standards
5. We have spent resources on training and development of our supplier's employees tailored to the particular situation

## **Buyer's Closeness to Primary Competence (CPC).**

Core competencies (and subsequently primary competencies) are very difficult to measure directly on a consistent basis across different industries (Verdin & Williamson, 1994). The measures of buyer's closeness to primary competence reflect this, and may not be appropriate indicators across different industries. We have, however, identified one possible way of measuring such competencies in one industry by careful inspection of the characteristics surrounding the chosen setting. Buyer's CPC is operationally defined as the buyer's perceived degree of closeness to the vendor's competence. A "pool" of 14 items, based on the construct's definition and interviews and discussions with experts in the industry, was initially developed (cf. Gulbrandsen, 1996). Further expert evaluations and preliminary tests (cf. Section 7.2) resulted in the following items reflecting the construct (4 item, 7-point scale, anchored by "very poor description" and "very good description").

1. The competence our unit already possesses is close to the competence our supplier offers in accomplishing the activity
2. Our unit's knowledge can be compared with the knowledge our supplier's employees possess in carrying out the activity
3. Our unit's skills are suitable for carrying out the activity, compared with our supplier's skills.
4. Our routines and procedures are suitable in accomplishing the activity approximately as well as our supplier

## **Tacitness**

The dimensions of codifiability, teachability and system dependence forming the tacitness construct are derived from Kogut & Zander (1993) and Zander & Kogut's (1995) scales. The original items were revised, since the study concerns the buyer's perception of the vendor's tacit knowledge. Moreover, Kogut & Zander's measures were specially developed for measuring the tacitness of knowledge connected to manufacturing, which is quite similar with the study's requirements. The items reflecting each dimension follow (8 item, 7-point scale, anchored by "very poor description" and "very good description"):

**Codifiability:**

1. A useful manual describing how the supplier carries out the maintenance activity can be written by our power station
2. Extensive documentation describing critical parts of how the supplier carried out the activity exists in our unit

**Teachability:**

1. Our personnel can easily learn how to carry out the maintenance activity by talking to skilled personnel
2. Our personnel can easily learn how to carry out the activity by studying a complete set of blueprints
3. New personnel can easily learn how to accomplish the maintenance activity, if they possess general technical power station practice

**System dependence:**

1. It is possible for one person to know everything about how to carrying out the entire activity
2. To accomplish the activity satisfactorily, it is important that the personnel have experience from corresponding tasks
3. Workers accomplishing the activity have to be in constant contact with others having different expertise than themselves

**Interfirm trust**

The operational definition of the construct is a perceived willingness to rely on an exchange partner in whom one has confidence (Moorman, Zaltman, & Deshpande, 1992), which is developed and persisted on the basis of credible commitments and calculative economic responses (cf. Williamson, 1993). The construct is based on the scale from Moorman, et al. (1992). The original items are somewhat adjusted in order to also reflect Williamson's calculative term. The items are shown below (3 item, 7-point scale, anchored by "very poor description" and "very good description")

1. We trusted our supplier to accomplish the work in a 100% honest and truthful way
2. We have full confidence that our supplier will act with our best interests in mind
3. We generally trust our supplier to a great extent

## 7.5 Control variables, rival predictors and explanatory mechanisms

In addition to the variables in the theoretical model, three types of variables are included in the empirical tests. *First*, we include those control variables that are important for meeting the requirement of isolation (i.e., overcoming potential spurious and masked effects). *Second*, the most evident variables representing rival explanations for vertical integration are included. As discussed in Chapter 1 and 2, several different motives for vertical integration exist in the literature. Thus, by accounting for other possible determinants for vertical integration than our focal theoretical variables, the adequacy of the model in terms of explanation power can be assessed. As argued by Meehl (1990) and Jöreskog & Sörbom (1993), in order to increase our confidence in the proposed model, it should be compared with competing "theories". *Third*, tests of some of the study's explanatory mechanisms are provided. Below, the measures are presented.

### 7.5.1 Control variables

**Vendor's transaction specific investments.** Previous studies have shown a high correlation between buyer's and vendor's transaction specific investments (Buvik, 1995; Stump & Heide, 1995). Additionally, vendor's transaction specific investments may be associated with vertical integration. In other words, vendor's TSI may be positively correlated with buyer's TSI and vertical integration, and thus, may be a potential source of masked or spurious effects. The measures, based on Stump & Heide (1995), Haugland (1994), and Buvik (1995), are the following (5 item, 7-point scale, anchored by "very poor description" and "very good description").

1. Our supplier spent significant resources in reorganizing the production in connection with this particular co-operation
2. Our supplier gave their employees specialized training in connection with this particular co-operation
3. During the collaboration the supplier brought into notice significant aspects of our unit's operations.
4. The supplier spent significant time to acquire knowledge about our unit's technical standards
5. The supplier spent resources on training and development of our unit's employees.

**Environmental uncertainty.** Uncertainty regarding future events is a common feature of many trading relationship (Williamson, 1985). The primary consequence of environmental uncertainty is an adaption problem, i.e., difficulties with modifying agreements to meet the changing circumstances (Rindfleisch & Heide, 1997). According to TCE, high level of environmental uncertainty increases the transaction costs of adapting contractual agreements. Thus, if the level of asset specificity remains constant, then an increase in uncertainty increases the likelihood of vertical integration. Even though several studies have examined the effect of uncertainty on vertical integration, the findings provide mixed results. Studies by Anderson & Schmittlein (1984), Levy (1985) and Walker & Weber (1987) support the hypothesis that demand or volume uncertainty is positively associated with vertical integration, while Harrigan (1985, 1986) finds a negative relationship between demand uncertainty and vertical integration. Thus, empirical studies have illustrated either negatively or positively relationship between uncertainty and vertical integration. Additionally, an increase in uncertainty may lead a firm to invest in less transaction specific assets (Mahoney, 1992). Given the mixed results involving the uncertainty concept, no particular hypothesis about the concept's impact on vertical integration is provided. However, due to the concept's potential variation with both vertical integration and transaction specific investments the concept is included as a control variable.

Environmental uncertainty is defined as “unanticipated changes in circumstances surrounding an exchange” (Noordewier, John & Nevin, 1990:82). The measures of the construct, based on Noordewier, et al. (1990), are the following (5 item, 7-point scale, anchored by “very poor description” and “very good description”):

1. Availability of alternative vendors in the market is highly uncertain.
2. Uncertainties in accomplishing the maintenance activity in the market are a real problem
3. The market in which we buy the maintenance activity is complex.
4. Supply of accomplishing the maintenance activity in the market is not stable.
5. Prices for accomplishing the maintenance activity are volatile

**Size.** Williamson (1985) argues that because of the potential to economize on scale and scope, larger firms or units will tend to integrate more easily than smaller firms or units. Consequently, size may be correlated with CPC as well as with VI. Hence, including the

variable may capture a possible spurious connection between CPC and VI. The size of the business unit is measured as annual sales. This measure was available from EnFO's database.

### 7.5.2 Rival predictors

**The buyer's dependence on the vendor.** Pfeffer & Salancik (1978) reported a number of strategies used to manage interorganizational dependence in order to reduce uncertainty. Of particular interest in the current setting is the argument that a buyer will fear integrating an activity if this can lead to vendor retaliation. A buyer may backwardly integrate one of the maintenance activities, but still, to some degree, be dependent on a particular (large) vendor. The buyer can be in a position where he is not able to satisfy all the input demands of the activity himself, or he can be dependent on the particular vendor with respect to other transactions. The vendor can in such situations take punitive action (e.g. refuse supply), if the buyer wishes to buy a portion that cannot be supplied by his own integrated capacity (MacMillan, Hambrick & Pennings, 1986). In the power station industry the most powerful actors possess important information regarding the particular power stations units. The vendors could then as a punitive action, refuse to share this information with the buyer. Accordingly, even though the performance of one activity can be a cost efficient solution, other activities can be impossible to perform in-house. Accordingly, a buyer's integration decision can be a trade-off between a cost efficiency solution and a danger of retaliation from the vendor, as the latter may have consequences for the efficiency of other transactions. Thus, even though the only included motive originally derived from sociology, the dependence argument may have efficiency consequences for the units in the setting. The following item was used to measure this variable (1 item, 7-point scale, anchored by "completely independent" and "completely dependent").

How dependent is the unit on this particular supplier for carrying out the maintenance activity?

**Technological economies.** The investment in "hard-core" technology for performing one activity may to some extent affect the decision to integrate another activity. As long as the firm has access to production equipment that can be used in performing another maintenance activity, this can to some degree affect the integration decision. A unit can for example, invest in material saving and capital augmenting technology, originally meant to support another

activity, which is of relevance for the performance of the activity in question. One measure (reversed) was developed (1 item, 7-point scale, anchored by "very poor description" and "very good description").

In order to accomplish the activity in-house, we have to undertake great investments in technology and production equipment.

**Capacity utilization.** Interviews with respondents in the setting indicated that the degree of free productive capacity of personnel to some extent will affect the decision to make or buy maintenance activities. Accordingly, an indicator of free capacity utilization is included. One measure was developed (1 item, 7-point scale, anchored by "very poor description" and "very good description").

In order to accomplish the activity in-house, to a great extent we have to employ new personnel.

**Formalization.** In a situation with medium investments in asset specificity, Williamson (1991) proposes that the hybrid mode will be an efficient solution. The hybrid form means those intermediate forms between market and hierarchy (Williamson, 1991). According to Buvik (1995), formalization is an appropriate reflection of the hybrid mode. Formalization refers to the extent to which the interorganizational exchange is regulated by rules, procedures and fixed policies (e.g. Dwyer & Oh, 1987). The degree of formalization reflects contractual issues and specifies the rules of the game to be followed in the relation. Hence, formalization may be negatively related to vertical integration. Based on previous studies (John, 1984; Dwyer & Welsh, 1985; Dwyer & Oh, 1987; Haugland & Reve, 1993; Haugland, 1994; Buvik, 1995), the following measures were selected (4 item, 7-point scale, anchored by "very poor description" and "very good description").

1. All aspects regarding quality control of the activity we purchased from the supplier were stipulated in a contract.
2. The daily control relationship was expressed in written agreements.
3. We outlined procedures for how the supplier should follow up agreements and sendings
4. Written contracts managed the handling of discontent, complaints and disputes.

Some potential rival predictors are *ruled out* by the setting. These are:

**Scale economies.** In this study the neo-classical scale argument is ruled out by the setting. First of all, the power maintenance activities are to a great degree specialized for the specific power stations, depending on the extent of the waterfall, the specific topography surrounding the station and so on. Besides, if any scale advantages are available, this should favor the vendors in the market. None of the power stations are expected to start out as competitors to the vendors. Accordingly, no scale economies are available or will act as determinants for the power stations' decision to integrate maintenance activities.

**Market power.** The market power motives for vertical integration are mainly determined by the possibility to secure large shares of markets, raise barriers to new entrants, deter existing competitors from getting access to the supplier side (Crandell, 1968; Gould, 1977; Etgar, 1978) or enable producers to evade surcharge imposed by suppliers (Spengler, 1950). However, as with scale economies, no such motives are available on the buyer side in the power maintenance market. For example, if a power station in e.g. Telemark integrates an activity, this does not prevent another power station (in e.g. Vestfold) from getting access to market shares or the supplier side.

### **7.5.3 Explanatory mechanisms**

In the study, the underlying logic for the hypotheses was specified as a set of mechanisms coupling the assumed causes to the effect. According to Mulaik & James (1995:132): "When formulating causal hypotheses, one should specify the mechanisms ... by which causal influences are transmitted to their effects ... [and] one must show that the mechanisms ... coupling the causes to the effects are intact and uninterrupted". Usually this is only done by logic without the possibility (or necessity) of empirical illustrations. In Chapter 5 and 6, the underlying logic for the hypotheses was specified as a set of mechanisms coupling the assumed causes to the effect. The main contribution of the study is centered around the theoretical arguments of the effects of CPC and TSI on VI. Thus, individual empirical tests of the mechanisms by which the influence from CPC and TSI are transmitted to the criterion will be included.



When testing the mechanisms, we used previously established scales on opportunistic behavior (John, 1984; Gundlach, Achrol & Mentzer, 1994; Provan & Skinner, 1989; Morgan & Hunt, 1994) and transaction costs (Buvik, 1995). To test the mechanisms coupling the influence of CPC on VI, we developed and constructed two variables; *expected opportunistic behavior if integrating the transaction*; and *expected transaction costs if the transaction is integrated*. These latter measures were derived from the scales used to measure transaction costs and opportunistic behavior, respectively. The measures (7-point scales, anchored by "very poor description" and "very good description") are as follows.

### **Transaction costs**

1. We used too much time controlling the supplies of this supplier
2. It was time-consuming and difficult to get necessary verification of production performance and costs from this supplier
3. The co-ordination and governing of the relationship with this supplier was very costly
4. Our firm did not manage to utilize the skills and production resources of this supplier very well
5. It was difficult to agree with this supplier about specifications of products and services
6. Negotiations about price and payment terms with this supplier proved time-consuming

### **Opportunistic behavior**

1. Occasionally, our supplier altered information in order to carry out things his own way
2. Sometimes our supplier promised to do things without actually doing them later
3. Sometimes, our supplier altered the facts slightly when negotiations were carried out
4. We could expect the supplier to keep back information in order to protect his own interest

### **Expected transaction costs if integrating the transaction**

1. We will use a lot of time to control and monitor our own employees when they carry out the activity
2. It may prove difficult and time-consuming to make agreement with our employees about specifications and procedures for performing the activity
3. The co-ordination and governing of the employees will be very costly

### **Expected opportunistic behavior if integrating the transaction**

1. We may expect our employees to alter or keep back information about the activity if this is to their own advantages
2. We will expect that our employees will alter procedures in order to get the things they want
3. We will expect our employees to keep back information in order to protect their own interests

## 7.6 Data collection

Information about the constructs was gathered through primary data. Key informant data through the application of structured mail questionnaires, was applied for the study. To reduce the risk of biased information, however, ideally one should use multiple informants (Phillips, 1981). In interorganizational research it is not uncommon to select data from both sides of the dyad. However, the often-discussed trade-off between selecting data from one or both sides of a dyad, is of less relevance in the study. Although divergent perceptions about the characteristics of the relation may exist (John & Reve, 1982), the interesting issue here is to capture the buyer's perception of the research problem<sup>58</sup>. Thus, information was only gathered from the buyers. Moreover, another possible option would be to use multiple informants from the units in the study. However, the use of multiple informants raised some problems in the setting. It was rather difficult to identify two (or more) informants in each unit that were both responsible for mechanical maintenance activities and knowledgeable about a specific buyer-vendor relationship. Consequently, the risk of missing data from a major portion of the units was very high. Accordingly, choosing a key-informant approach may be considered to be justifiable due to the relevance of capturing the buyers' perception and the benefits associated with increased sample size.

The questionnaire was designed in accordance with guidelines of 'the key informant' literature (Phillips, 1981; John & Reve, 1982; Heide & John, 1991). Thus, one individual in each unit reports on behalf of the organization. The individuals were deliberately selected by virtue of their position within the unit and their knowledge (John, 1984) about the issues reported. Thus, questionnaires were sent to the top-level manager of the firms, and the managers were asked to distribute the questionnaires to the respective responsible managers of the firm's business units. If the firm consists of only one unit, the top managers (or if available, the manager responsible for the maintenance activities) were asked to answer the questionnaire on behalf of the firm. The respondents were instructed to respond to one of the twelve activities reported in Figure 7.1. The informants were instructed, in accordance with the above description, to select the focal transaction or activity in the introduction of the questionnaire.

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<sup>58</sup>See e.g. Heide & John (1991) for the relevance of this approach: "... firms will act upon their specific interpretation of a situation, regardless of whether the firms' perceptions are accurate, or converge with that of its exchange partner" (p. 18).

118 out of 214<sup>59</sup> hydroelectric power firms were contacted, and 411 business units were identified (the different firms varied from consisting of 1 to 5 business units). Before the questionnaires were mailed out, all of the 118 firms were first contacted by phone. 5 of the firms stated that they were inappropriate as informants for the study, either because the firms were to a lesser degree engaged in this kind of production and/or because they did not have the time to respond to the questionnaire. Questionnaires were mailed to all of the remaining 113 firms in April 1997. 5 questionnaires were mailed to firms with 5 units, and 4 questionnaires were mailed to firms with 4 units, and so on. Totally, 411 questionnaires were mailed. Total response rate (first and second round) was 28% (116 cases out of 411). The response rate from the contacted firms was 64% (i.e., 75 out of 118 contacted firms responded with one or more questionnaires). 88 questionnaires were returned within May 1997, when a second mailing to the informants was administered. 28 informants responded to the second mailing within June 1997.

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<sup>59</sup> As discussed in Section 7.2, some hydroelectric power firms perform both production and distribution of electric power, while some only perform one of these activities. Only firms that accomplish production of electric power are relevant, since these firms conduct production maintenance activities.

## **PART IV: ANALYSES AND DISCUSSIONS**

This part consists of two chapters. In chapter 8 the results of the different analysis conducted in the study are presented. The last chapter of the dissertation, Chapter 9, contains a discussion of the results from the study and suggestion for future research and implications for theory and practice are provided.

## **8. ANALYSIS**

The chapter contains the different analyses conducted in the study. Descriptive statistics for the variables are presented and discussed in Section 8.1. Further, the analyses follow the recommended two-step approach from Anderson & Gerbing (1988). First, confirmatory factor analysis, using LISREL 8.14 (Section 8.2), is conducted. Next, the structural relationships among the latent variables are examined, and the research hypotheses outlined in chapter 5 are tested in Section 8.3. Due to a too small sample size for testing interaction effects in LISREL, multiple regression is used to test the structural relationships among the latent variables in the model. Finally, a summing-up section (8.4) is included.

### **8.1 Descriptive statistics**

The first step in the analysis includes an assessment of the adequacy of input data and the statistical assumptions underlying the estimation methods being used (Bagozzi & Yi, 1988; Hair et al. 1995). A summary of the descriptive statistics is shown in Table 8.1.

An assumption for multivariate analysis is that the variables have multinormal distribution. The distributional aspects of the variables are captured in the reported values for skewness and kurtosis. Highly skewed data and high kurtosis may cause biased parameter estimates, leading to unreliable standard errors and overall model fit (Bagozzi & Yi, 1988). Thus, if possible, variables that are highly non-normal should be deleted from further analysis. Based on a review of findings regarding non-normality and consequences with respect to model fit, Kaplan (1990) suggested that skewness and kurtosis values exceeding 1 in absolute value should be treated with caution for moderately sized samples (such as this).

With some exceptions, skewness and kurtosis seem not to impose specific problems in the sample. In terms of absolute values, 16 out of 24 items have both kurtosis and skewness values

less than 1. Two of the items (item 11 and 24) have clearly unsatisfactory normality, and are excluded in the measurement model presented in the next section<sup>61</sup>.

Of the remaining 22 items, four items (item 2, 17, 18 and 19) have both kurtosis and skewness values of more than 1 (absolute value). Item 2 (skewness: 1.289; kurtosis: 1.012) and item 18 (skewness: -1.141; kurtosis: 1.401) are close to the "critical" values of both skewness and kurtosis. Thus, the departure from normality with respect to these two items is not dramatic and they will be retained in the further analysis. By contrast, item 17 (skewness: -1.484; kurtosis: 2.416) and item 19 (skewness: -1.334; kurtosis: 2.308) seem to be somewhat problematic, as indicated by their negative skew and leptokurtic distribution. Both of the "problematic" items are measures of trust. They seem to be items that are too easy to agree with in the setting, and, thus, do not entail a satisfactory variance and normal distribution. However, the items represent two out of three measures for the construct and cannot be excluded without causing construct validity problems. However, both the skewness and kurtosis values indicate that these items should be treated with caution in the further analysis.

Missing values do not appear to be a problem in the sample<sup>62</sup>. 15 of the 24 examined items have no missing values at all. Of the remaining 9 items, 7 items have only one missing value, while 1 item has two and 1 item has three missing values, respectively. Overall, the data is evaluated to be missing by random. Thus, pairwise deletion of missing data seems justified.

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<sup>61</sup> Item 11 is derived from Zander & Kogut's (1995) "system dependence" scale. However, the wording in the original scale states "... long experience from ..." while the item in this study leaves out the word "long" (see question b9\_9 in the questionnaire). I presume that this "mistake" explains the extremely high mean value of the variable (6.114), and, accordingly, the negative skewness (-2.089) and probably the very high peakedness of the distribution (kurtosis: 5.979). Item 24 is derived from Buvik (1995) "Buyer Specific Assets" scale. As with item 11, the wording of item 24 (see question b2\_9 in the questionnaire) is different from the original scale and suffers from the expression "a lot of". Accordingly, we would expect this variable to have a higher mean value relatively to the other items representing the construct. However, the opposite is the case. We do not have any other explanation of this than that the item is not a particularly relevant sample item in the specific setting (as a kurtosis of 3.593 may indicate).

<sup>62</sup> However, two cases were excluded from the sample due to a very high degree of missing data (more than 50%) and particularly because all the items representing the dependent variable were missing (Hair et al. 1995).

**Table 8.1. Descriptive statistics of the sample (Evaluative Dimensions)**

	Mean	Std.dev.	Skewness	Kurtosis	N
<b>Vertical Integration</b>					
Item 1	2.788	1.724	0.846	-0.432	113
Item 2	2.368	1.592	1.289	1.012	114
Item 3	2.588	1.828	0.976	-0.312	114
Item 4	2.421	1.708	1.346	0.943	114
<b>Codiafiability</b>					
Item 5	3.807	1.504	-0.172	-0.909	114
Item 6	3.947	1.703	-0.081	-0.964	114
<b>Teachability</b>					
Item 7	4.319	1.633	-0.378	-0.764	113
Item 8	3.982	1.603	-0.169	-0.748	113
Item 9	4.114	1.655	-0.149	-1.080	114
<b>System dependency</b>					
Item 10 <sup>a</sup>	4.263	1.900	-0.181	-1.225	114
Item 11 <sup>b</sup>	6.114	1.062	-2.089	5.979	114
Item 12	4.184	1.659	-0.394	-0.791	114
<b>CPC</b>					
Item 13	3.430	1.551	0.177	-0.935	114
Item 14	3.596	1.550	1.575	-0.822	114
Item 15	2.921	1.575	0.824	-0.218	114
Item 16	3.018	1.609	0.586	-0.664	113
<b>Trust</b>					
Item 17	5.798	1.199	-1.484	2.416	114
Item 18	5.526	1.249	-1.141	1.401	114
Item 19	5.737	1.065	-1.334	2.308	114
<b>TSI (Human)</b>					
Item 20	2.901	1.763	0.721	-0.560	111
Item 21	2.416	1.450	1.118	0.324	113
Item 22	2.688	1.513	0.945	0.036	112
Item 23	2.699	1.362	0.693	-0.303	113
Item 24 <sup>b</sup>	1.858	1.141	1.863	3.593	113

<sup>a</sup> Reversed items<sup>b</sup> Excluded items

## 8.2 Measurement models

The two-step modeling approach, emphasizing the analysis of two conceptually distinct models, measurement and structural, is employed for this study. Thus, the fit of the measurement and the structural model should be assessed independently. Jöreskog & Sörbom (1993:113) summarize these thoughts when they state:

The testing of the structural model, i.e., the testing of the initially specified theory, may be meaningless unless it is first established that the measurement model holds. If the chosen indicators for a construct do not measure that construct, the specified theory must be modified before it can be tested. Therefore, the measurement model should be tested before the structural relationships are tested.... In doing so, one should let the constructs themselves be freely correlated, i.e., the covariance matrix of the constructs should be unconstrained.

LISREL 8.14 was applied to the measurement models reported in this section. In confirmatory factor analysis the factor-analytic technique is used to confirm that the *a priori* set of variables define the construct or factor. Accordingly, the objective is to test the hypothesized theoretical measurement model. A test of the measurement model is a test of the measures' unidimensionality, i.e., internal and external consistency<sup>62</sup> (Gerbing & Anderson, 1988). A set of items is unidimensional if their covariations are accounted for by a common factor model with just one common factor (Kumar & Dillon, 1987). When testing the usefulness of the scales, unidimensionality as well as the reliability and validity of the constructs in the model are assessed.

Before assessing the full measurement model (Section 8.2.2), the dimensionality of the concept of tacitness is estimated and evaluated (Section 8.2.1).

### 8.2.1 The dimensionality of tacitness.

All the measures in the study, except the measures representing tacitness, are argued to be effect measures (i.e., the indicators or items reflect the latent variable). The theoretical



discussion of the concept of tacitness suggested that there were three relevant dimensions of the construct (Winter, 1987; Kogut & Zander, 1993; Zander & Kogut, 1993). Theoretically, it has been stated that tacitness represents a concept formed by several dimensions (Winter, 1987), i.e., the dimensions cause the latent variable of tacitness. However, empirical studies (e.g. Kogut & Zander, 1993; Zander & Kogut, 1995) have treated the dimensions as separate. Accordingly, the literature does not seem to agree about how the concept should be conceptualized. Thus, this section is concerned about how the three dimensions should be treated in the general measurement model as well as in the structural model of the study. Should tacitness be treated as (1) separate dimensions (Kogut & Zander, 1993; Zander & Kogut, 1995), (2) as a reflective unidimensional concept, or (3) as a higher-order formative concept caused by the three dimensions (as theoretically argued by Winter (1987) and further outlined in this study).

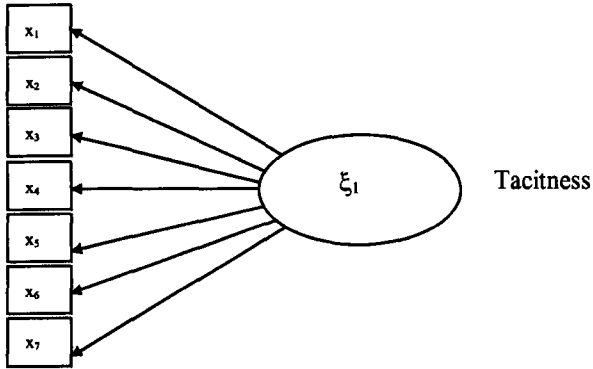
Below, we first regard the two former alternatives, and evaluate how the concept should be treated in the general measurement model. If the different dimensions warrant separate treatment (i.e., the different dimensions have their own sets of effect indicators), the dimensions should be treated as unique dimensions in the measurement model. If, however, a unidimensional solution indicates a better fit, at least an empirical argument can be offered that the concept should be treated as a unidimensional concept in the general measurement model. However, if tacitness is caused by the indicators measured in the study, by chance there should be a very low probability that these measures are internally consistent. Thus, we expect that the three-dimensional conceptualization obtain a better model fit. The two different models are presented in Figure 8.1.

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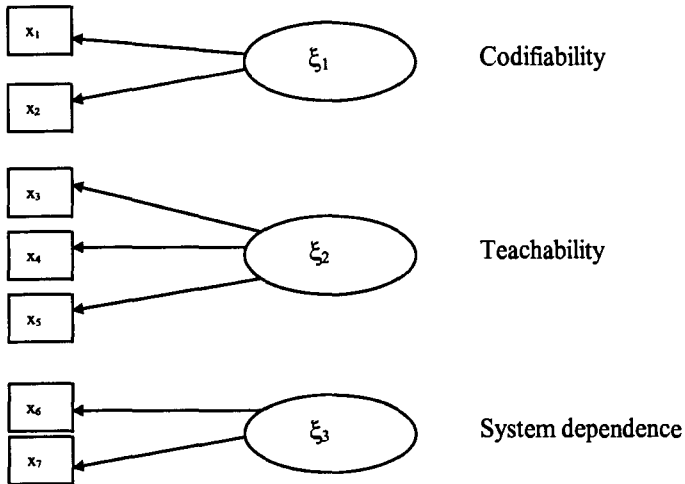
<sup>63</sup> *Internal consistency is to which degree the items included in a construct's domain are reproduced by a single factor. External consistency implies to which degree the items only reflect the intended construct when other constructs are added to the measurement model.*

**Figure 8.1. Dimensionality of the tacitness construct**

**Model a)**



**Model b)**



The first model (a) includes a unidimensional conceptualization of tacitness, while the second (b) includes the three dimensions of codifiability ( $\xi_1$ ), teachability ( $\xi_2$ ), and system dependency ( $\xi_3$ ), respectively. Below, the results of the model estimations are presented.

**Table 8.2 Dimensionality test of the tacitness construct**

		Tacitness	
		Unidimensional	Three dimensional
$\chi^2$		47.55 (14 df) (p=0.0) <sup>a</sup>	16.39 (11 df) (p=0.13)
RMSEA		0.15 (p(close fit) = 0)	0.066 (p(close fit)=0.31)
NNFI		0.79	0.96
IFI		0.86	0.98
CFI		0.86	0.98
	$\lambda_{1,1}$	0.28	$\lambda_{1,1}$ 0.63
	$\lambda_{2,1}$	0.25	$\lambda_{2,1}$ 0.73
	$\lambda_{3,1}$	0.82	$\lambda_{3,2}$ 0.82
	$\lambda_{4,1}$	0.94	$\lambda_{4,2}$ 0.95
	$\lambda_{5,1}$	0.73	$\lambda_{5,2}$ 0.73
	$\lambda_{6,1}$	0.39	$\lambda_{6,3}$ 0.79
	$\lambda_{7,1}$	0.19	$\lambda_{7,3}$ 0.40

<sup>a</sup>n = 114

<sup>b</sup>Standardized coefficient

In Appendix C we provide an overview and justification for the fit indexes chosen for model selection and evaluation based on the characteristics of the study. All the fit indexes indicate better fit for the three-dimensional conceptualization of tacitness. The chi-square difference between the two models is 31.17 (with 3 df), i.e., the difference is significant. Moreover, the incremental fit indexes also show a clearly better fit of Model B than Model A. Thus, all fit indexes satisfy the required values (cf. Appendix C) for Model B, while none are satisfied for Model A. As the dimensions clearly warrant separate treatment, the dimensions should be treated as separate in the overall measurement model. Accordingly, empirical support is given to the argument that tacitness does not represent a unidimensional concept, Thus, the indicators in the study are not effect indicators of the concept of tacitness. Instead, we receive support for the argument that each dimension should be treated separately with its own set of effect indicators.

However, it remains to be assessed if the three dimensions reflect the concept (tacitness as a reflective higher-order concept) or if the three dimensions cause the concept (tacitness as formative higher-order concept). Indicators or dimensions reflecting a concept should be internally consistent, and, thus, positively correlated (Bollen & Lennox, 1991). Accordingly,

dimensions reflecting a higher-order factor should be highly intercorrelated. By contrast, if tacitness is caused by the dimensions, the dimensions will be highly intercorrelated only by chance. In Table 8.3 the estimated intercorrelations between the three dimensions are reported.

**Table 8.3 Intercorrelation between the three dimensions of Tacitness**

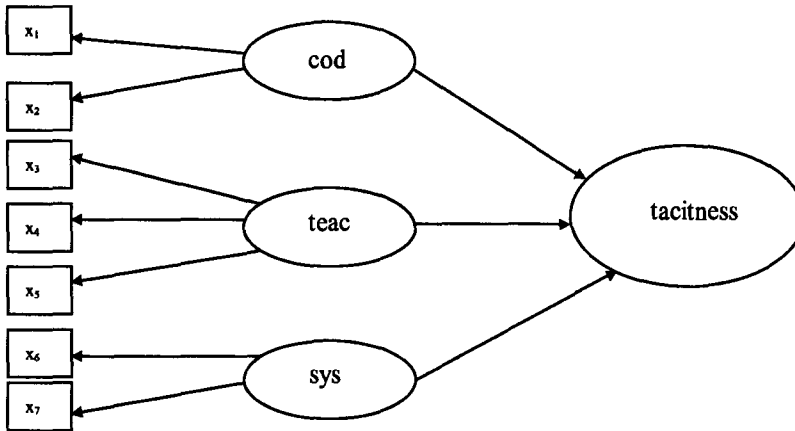
	Codifiability	Teachability
Teachability	0.38 (0.11) <sup>a</sup>	
System dependency	0.00 (0.15)	0.49 (0.13)

<sup>a</sup>Standard errors

Table 8.3 shows moderate to high intercorrelation between codifiability and teachability (0.38) and between teachability and system dependency (0.49). However, the intercorrelation between codifiability and system dependency is zero. Causal dimensions of the same concept may have positive, negative, or no intercorrelation (Bollen & Lennox, 1991). The intercorrelations between the dimensions vary between zero to 0.49. Consequently, the empirical data do not support tacitness as a reflective higher-order concept. Accordingly, the conceptualization of tacitness as a formative higher-order concept is retained.

If a construct is complex and consists of many facets, then "each dimension should be treated separately with its own set of effect indicators" (Bollen & Lennox, 1991:308). Thus, as empirically supported, we treat each dimension separately in the measurement model. In the structural model, the construct of tacitness is viewed as composed by its set of causal indicators. The final conceptualization of the concept of tacitness is illustrated in Figure 8.2.

**Figure 8.2 The final conceptualization of tacitness**



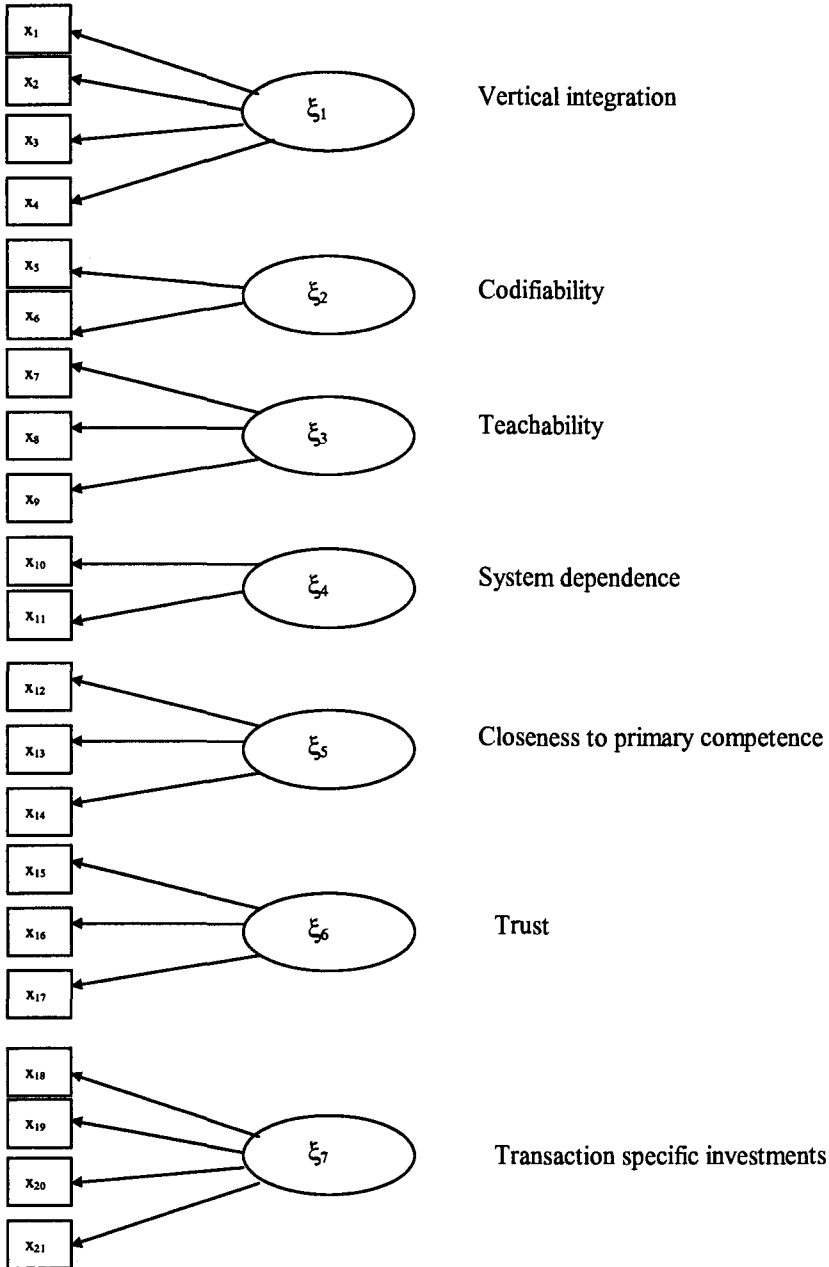
### **8.2.3 The overall measurement model**

The evaluation of the constructs in the measurement model follows the recommended steps by Gerbing & Anderson (1988). First, we evaluate the measures' unidimensionality by assessing various goodness-of-fit indices. Next, the reliability and validity of the constructs in the measurement model are assessed.

#### **Assessment of overall model fit.**

The measurement model includes the concepts (or evaluative dimensions) of vertical integration ( $\xi_1 = VI$ ), codifiability ( $\xi_2 = COD$ ), teachability ( $\xi_3 = TEACH$ ), system dependence ( $\xi_4 = SYSDEP$ ), closeness to primary competence ( $\xi_5 = CPC$ ), trust ( $\xi_6$ ), and buyer's human transaction specific investments ( $\xi_7 = TSI$ ). In addition to the paths in the measurement model (as illustrated in Figure 8.3), all latent constructs were allowed to freely correlate with each other (Jöreskog & Sörbom, 1993; Anderson & Gerbing, 1988). Accordingly, the absence of structural constraints enables the test of the measurement model since lack of fit can only come from the relations among the measures and the latent variables and from the relations among the measures' error terms. The final version of the measurement model is illustrated in Figure 8.3.

**Figure 8.3 Measurement model (evaluative dimensions)**



Three different models were tested. The overall fit of the models is reported in Table 8.4. The first model, i.e., the general model based on the original conceptualization, received reasonable model fit. Even though the fit indexes imply that substantial improvements were not necessary, one item (representing CPC) was deleted due to high crossloadings with other constructs<sup>64</sup>. By excluding the item, a substantial improvement in chi-square (from 271.77 to 196.06 with 188 and 168 df, respectively) with the p-value of 0.068 was observed. Improvement in RMSEA was also observed (RMSEA=0.038, p(close fit) = 0.80). Additionally, improvements in the other reported indexes were also obtained. Thus, Model 2 received adequate and good fit according to all the fit indexes.

Finally, a third model was tested based on potential  $\chi^2$  - improvements from allowing crossloadings and correlated error terms. According to the information in the modification indices from Model 2, no items had significant and substantial crossloadings to other constructs. Accordingly, there was no indication for allowing crossloadings in Model 3. By contrast, allowing for correlated measurement errors between two items showed a chi-squared improvement of 7.16. However, only minor improvement was shown in the other reported indices. Due to a potential loss of interpretability and theoretical meaningfulness<sup>65</sup>, the more parsimonious Model 2 was preferred over Model 3. As can be seen from Table 8.4, Model 2 receives acceptable and good fit by all fit indexes. Accordingly, Model 2 is chosen as the final measurement model of the evaluative dimensions in the study and was illustrated in Figure 8.4. The model holds satisfactorily in dimensionality since all factors are significant (cf. Table 8.5) and there are no crossloadings and correlated error terms. The next steps are to evaluate the reliability of the measures, and validity of the constructs in the measurement model.

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<sup>64</sup> According to Anderson & Gerbing (1988:417): "Given a converged and proper solution but unacceptable overall fit, there are four basic ways to respecify 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 solutions are always, *ceteris paribus*, preferred because they preserve the potential to have unidimensional measurement, whereas the latter two do not, because they may "obfuscating the meaning of the estimated underlying construct" (Anderson & Gerbing, 1988:417). The exclusion of item 13 may thereby be an adequate and "straight forward" solution, since several items representing the construct of CPC exist, and because no theoretical rationale for relating this item to another factor exists.

<sup>65</sup> The use of correlated error terms may ideally only be justified when they are specified a priori (Anderson & Gerbing, 1988), or, alternatively, at least one should have theoretical and/or methodological reasons justifying the modification *ex-post* (Bagozzi & Yi, 1988). In the study we did not have any a priori explanation or a good *ex post* theoretical rationale that could justify the correlation between these two errors terms. Thus, in general one should not respecificate in such situations because the cost of a consequent loss of interpretability and theoretical meaningfulness may be high, and empirical studies have demonstrated that use of correlated error terms can mask a true underlying structure (Anderson & Gerbing, 1984). Additionally, in this study the "clean" and parsimonious model showed a good fit, and, accordingly, hardly any rationale actually exists for not choosing Model 2.

**Table 8.4 Fit indexes of measurement models**

	Goodness of fit	Specification
Model 1	$\chi^2 = 271.77$ (df=188) (p=0.000062) RMSEA = 0.063 (p(close fit) = 0.11) NNFI = 0.93 CFI = 0.94 IFI = 0.94	General measurement model
Model 2 <sup>a</sup>	$\chi^2 = 196.06$ (df=168) (p=0.068) RMSEA = 0.038 (p(close fit) = 0.80) NNFI = 0.97 CFI = 0.98 IFI = 0.98	One item excluded
Model 3	$\chi^2 = 188.90$ (df=167) (p=0.12) RMSEA = 0.034 (p(close test) = 0.87) NNFI = 0.98 CFI = 0.98 IFI = 0.98	Correlated error terms (between two items)

<sup>a</sup>Chosen measurement model

## Reliability

Below, the three reliability measures recommended by Bagozzi & Yi (1988) are evaluated. All these three reliability measures (individual item reliability, composite reliability, and average variance extracted) as well as the factor loadings and error terms with the accompanying *T*-values, are presented in Table 8.5. The structure is the same as given in Figure 8.4. The item reliability is defined as;  $\rho_i = \lambda_i^2 \text{var}T / (\lambda_i^2 \text{var}T + \theta_{ii})$ , where  $T = \xi_j$  (in standardized solutions,  $\text{var}\xi_j = 1$ ). This formula is valid and meaningful in situations, like this one, where each of the measures is unidimensional; i.e. only one latent variable has influence on the specific item (Gerbing & Anderson, 1988; Bagozzi & Yi, 1988). Individual item reliabilities are computed directly in the LISREL-output and listed as multiple correlation for the  $x_i$  variables. Average variance extracted is defined as follows:  $\rho_v = \sum \lambda_i^2 \text{var}T / (\sum \lambda_i^2 \text{var}T + \sum \theta_{ii})$ , where values greater than 0.5 are considered adequate (Bagozzi & Yi, 1988). Composite reliability is



defined as:  $\rho_c = (\sum \lambda_i)^2 \text{varT} / ((\sum \lambda_i)^2 \text{varT} + \sum \theta_{ii})$ , and values exceeding 0.6 are desirable (Bagozzi & Yi, 1988). As with item reliability, composite reliability measures are valid only under unidimensionality (Bollen & Lennox, 1991; Gerbing & Anderson, 1988).

**Table 8.5. Measurement model: Reliability measures and factor loadings**

Factor loadings <sup>a</sup>		Error term <sup>a</sup>		Item reliability	Average variance extracted	Composite reliability	
/T-values		/T-values					
<b>Vertical integration</b>							
$\lambda_{1,1}$	0.84	10.83	$\theta_{1,1}$	0.30	6.58	0.70	
$\lambda_{2,1}$	0.89	11.93	$\theta_{2,2}$	0.21	6.00	0.79	
$\lambda_{3,1}$	0.92	12.78	$\theta_{3,3}$	0.15	5.10	0.85	0.8
$\lambda_{4,1}$	0.93	12.88	$\theta_{4,4}$	0.14	4.96	0.86	0.94
<b>Codifiability</b>							
$\lambda_{5,2}$	0.80	4.93	$\theta_{5,5}$	0.36	1.55	0.64	
$\lambda_{6,2}$	0.57	4.28	$\theta_{6,6}$	0.68	4.61	0.32	0.48
<b>Teachability</b>							
$\lambda_{7,3}$	0.83	10.36	$\theta_{7,7}$	0.31	5.27	0.69	
$\lambda_{8,3}$	0.93	12.21	$\theta_{8,8}$	0.14	2.54	0.86	0.70
$\lambda_{9,3}$	0.75	8.80	$\theta_{9,9}$	0.46	6.48	0.54	0.87
<b>System dependency</b>							
$\lambda_{10,4}$	0.71	4.87	$\theta_{10,10}$	0.50	2.76	0.50	
$\lambda_{11,4}$	0.44	3.79	$\theta_{11,11}$	0.80	6.38	0.20	0.35
<b>CPC</b>							
$\lambda_{12,5}$	0.70	8.32	$\theta_{12,12}$	0.51	7.05	0.49	
$\lambda_{13,5}$	0.90	12.10	$\theta_{13,13}$	0.19	4.60	0.81	0.74
$\lambda_{14,5}$	0.95	13.27	$\theta_{14,14}$	0.09	2.44	0.91	0.89
<b>Trust</b>							
$\lambda_{15,6}$	0.66	7.54	$\theta_{15,15}$	0.56	6.73	0.44	
$\lambda_{16,6}$	0.90	11.00	$\theta_{16,16}$	0.20	2.76	0.80	0.66
$\lambda_{17,6}$	0.86	10.48	$\theta_{17,17}$	0.25	3.61	0.75	0.85
<b>TSI</b>							
$\lambda_{18,7}$	0.45	4.76	$\theta_{18,18}$	0.80	7.27	0.20	
$\lambda_{19,7}$	0.55	5.90	$\theta_{19,19}$	0.70	7.03	0.30	
$\lambda_{20,7}$	0.95	11.15	$\theta_{20,20}$	0.11	1.15	0.89	0.48
$\lambda_{21,7}$	0.71	7.99	$\theta_{21,21}$	0.49	5.81	0.51	0.77

<sup>a</sup> Standardized coefficients

The item reliability varies from 0.20 to 0.89. Even though no exact rule for sizes of item reliability exists, a rule-of-thumb may be 0.25<sup>66</sup>. The two items having lower size than 0.25 are item 11 and item 18. Accordingly, the reliability of these two items implies that they may explain a small portion of the variance of the construct they reflect. With the exception of  $\xi_4$  (system dependency), all the theoretical constructs in the study have adequate sizes of composite reliability and average variance extracted. Item 11 (which reflects  $\xi_4$ ) was the only item that to some extent violated the assumption of unidimensionality. Thus, part of the systematic variance of this item is not attributable to its latent construct. Therefore, the systematic variance is reflected in the item's relatively low item reliability size. However, item 11 is not radically below the 0.25 limit and the test of composite reliability of  $\xi_4$  showed a value of 0.5. Beside, the construct of system dependency is only measured by two items. Accordingly, the item will be retained. The problem with item 18 is mainly attributable to its high random error variance (i.e. the low reliability seems mainly to be caused by random, rather than systematic error variance). High inter-correlations, however, are alone not sufficient in order to obtain sound measurement, if we are not able to capture all facets of the construct (Bollen & Lennox, 1991). Thus, this item is included in the further analysis in order to maintain a broader domain for the TSI construct.

## Validity

Above, we have demonstrated unidimensional and reliable measurement scales. However, in order to test the theory, we must be able to prove the construct validity of the scales, i.e., assessing "that the meaning of the underlying factor corresponds to the construct of interest" (Gerbing & Anderson, 1988:191). Several measures regarding aspect of construct validity are proposed in the structural equation modeling (SEM) literature. Bollen (1989) suggested several measures that could compensate for some weaknesses associated with the traditional validity approaches. Although all of his suggestions can be used when a measure depends solely on one latent variable, they appear to be more useful when several latent variables affect the measure. For instance, Bollen's standardized validity coefficient is equal to the  $\lambda$ 's in Table 8.5, but since no items are measured with more than one latent variable the relative influence is

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<sup>66</sup> This rule-of-thumb is derived from Bagozzi and Yi's preliminary fit criteria, implying that factor loadings ideally should exceed 0.5. Given the formula of item reliability this should approximate a value of 0.25.

not obtainable. Similarly, Bollen’s unique validity variance equals the item reliability when the measures depend on one latent variable only.

The assessment of convergent and discriminant validity is done using the approach offered by Anderson & Gerbing (1988)<sup>67</sup>. According to Anderson & Gerbing, convergent validity can be assessed by determining whether each indicator’s estimated pattern coefficient on its hypothesized underlying construct is significant. The *T*-values for the  $\lambda$ ’s in Table 8.5 show that all of them are significant, and, thus, based on Anderson & Gerbing’s criterion convergent validity is assured (see also e.g. Hoyle & Panter, 1995). Discriminant validity can be assessed by determining whether the confidence interval (+/- two standard errors) around the correlation estimate between two factors include 1.0 (absolute value). In Table 8.6 the estimated correlation matrix between the latent constructs including the standard errors is reported.

**Table 8.6 Estimated correlation matrix between latent constructs**

	VI	COD	TEACH	SYSDEP	CPC	TRUST
COD	0.31 (0.11) <sup>a</sup>					
TEACH	0.39 (0.09)	0.36 (0.11)				
SYSDEP	-0.35 (0.13)	-0.08 (0.15)	-0.54 (0.13)			
CPC	0.70 (0.05)	0.28 (0.11)	0.51 (0.08)	-0.46 (0.12)		
TRUST	-0.18 (0.10)	-0.08 (0.12)	-0.13 (0.10)	-0.04 (0.13)	-0.24 (0.10)	
TSI	0.36 (0.09)	0.09 (0.12)	0.02 (0.10)	0.04 (0.13)	0.16 (0.10)	0.00 (0.10)

<sup>a</sup> Standard errors

The correlation matrix shows that no correlation estimate includes 1.0 in its confidence interval (5th and 95th percentile). The closest relationship is between VI ( $\xi_1$ ) and CPC ( $\xi_5$ ) where the correlation is estimated to be 0.70 with the corresponding confidence interval between 0.65 and 0.75. Thus, discriminant validity is assured according to Anderson & Gerbing’s (1988) requirement (see also Hoyle & Panter, 1995).

<sup>67</sup> Another complementing way of assessing construct validity is through the set of relationship of the construct with other constructs as specified by some theory (Gerbing & Anderson, 1988). The nomological network in which the different

## Concluding comments on the measurement model

The above consideration leads us to conclude that the measurement model is good. The model is valid, both in terms of unidimensionality, reliability as well as construct validity given the assessment presented above. According to Anderson & Gerbing (1988:412), the distinction between exploratory and confirmatory factor analysis is often “obscured”, because the initially “specified measurement model almost invariably fails to provide acceptable fit” and that normally a “series of respecifications” have to be done before an acceptable fit is reached. However, the analysis conducted here is as close to an exclusively confirmatory analysis one can hope to reach. As we recall, only one item was deleted, due to high crossloadings, from the *a priori* specified model.

Moreover, the fact that no crossloadings or correlated error terms were necessary to obtain a good model fit provides us with greater confidence in the forthcoming structural analysis. Thus, we can provide a clear theoretically driven unidimensional constructs solution. By this we avoid the conflict between preferences for interpretability vs. goodness of fit scholars often experience (Browne & Cudeck, 1993). This is especially important since we have to use multiple regression in the hypotheses testing phase. Accordingly, a major reduction of the potential biases by using multiple regression instead of SEM may then be obtained, compared with using a measurement model that would have to allow for correlated error terms or crossloadings in order to get acceptable model fit. In the latter case, such a model would surely reduce the confidence in our hypotheses testing, and would to a higher degree than what is the case here, ask for a structural analysis that could estimate the measurement and structural models simultaneously (as e.g. LISREL).

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*constructs are a part of will be tested in structural analysis in the next section. Moreover, a test of the underlying explanation mechanisms that drive the predictions in the model is shown in Section 7.3.*

## **8.3 Structural analysis**

Below, the hypotheses outlined in Chapter 5 as well as the significance of the structural model will be tested (8.3.2). Section 8.3.3 includes tests of control variables. In Section 8.3.4, the proposed model will be compared with rival models. Section 8.3.5 tests the adequacy of the underlying explanatory mechanisms that maintain the logic of the arguments for the hypotheses. First, however, the statistical methods used and the test procedures applied, are discussed (8.3.1).

### **8.3.1 Statistical methods**

Below, the independent and moderator variables included in our theoretical model are classified. Based on the classification, the choice of statistical methods and test procedures to be used are assessed and chosen.

#### **Type of variables in the model**

Sharma, Durand & Gur-Arie (1981:292-294) distinguish between three different types of moderator variables; homologizer, quasi moderator and pure moderator. The first type implies that the strength (and not the form) of the relationship between the predictor and the criterion is influenced by the moderator. None of the moderators in the study are of this type. The study has hypothesized a bilinear functional form of the modification effects. This implies that moderator variables ( $Z$ 's) are hypothesized to change the form of the relationship between a predictor ( $X$ ) and the criterion ( $Y$ ). Thus, the slope of the relationship between  $X$  and  $Y$  are supposed to change across values of the moderator. A quasi moderator as well as a pure moderator interacts with the  $X$  to modify the form of the relationship, and is not significantly related to  $X$ . What distinguishes a quasi moderator from a pure moderator, is that the former kind of variable will act as predictor variable itself.

As evident from the theoretical arguments in part 1, the construct of trust is in the study hypothesized to be pure moderator (cf. Chapter 6; hypothesis 5). By contrast, the variables of CPC and TSI are argued to be quasi-moderators. In the case of two quasi moderators one

cannot interpret which of the variables moderates the other one: "... the moderator effect [i.e., quasi moderator] is not clear because each of the independent variables can, in turn, be interpreted as a moderator" (Sharma, Durand & Gur-Arie, 1981:294). Thus, in Chapter 6 it was hypothesized that CPC and TSI will interact (hypothesis 3) as well as being predictor variables themselves (hypotheses 1 and 2).

Moreover, summated scales of the observed variables are used as the method for calculating the latent variables. The score is computed as the average of the items reflecting its latent construct. Other methods for selecting factors are the use of surrogate variables and factor scores (Kim & Mueller, 1978; Hair et al. 1995). Surrogate variables are best suited in explorative research (Hair et al. 1995). If the scales are well-constructed, valid, and reliable instruments (as have been proven in Section 8.2), the summated scale is the best alternative (Hair et al. 1995).

## **Statistical method**

**Choice of statistical method.** Three methods have been widely used when testing for interaction or modification effects; (1) median split analysis, (2) moderator median split analysis, and (3) product term analysis in multiple regression (Jaccard et al., 1990). The product term method is applied for the structural analysis. As emphasized by Jaccard et al. (1990:49): "...dichotomization or trichotomization reduces precision (and subsequently statistical power) and represents a somewhat crude approach to the analysis of interaction effects." However, subgroup analysis (i.e., methods 1 and 2) may be appropriate if the moderator variable is a homologizer (Sharma, Durand & Gur-Arie, 1981), or if scale reduction is theoretically appropriate and meaningful (Jaccard et al. 1990). None of these aspects, however, are of relevance for the study.

**Type of product term test.** It is proposed that the most adequate way of testing interaction and modification effects is by using hierarchical *F*-tests (see e.g. Hair et al. 1995; Jaccard et al. 1990). Utilizing this method, one first estimates the unmoderated equation and then estimates the moderated relationship, and, finally, one examines if the change in  $R^2$  is statistically significant. In such tests the direct effects of both the X's and Z's (i.e., both predictors and

moderators) are included in both equations, regardless in which the moderators are quasi or pure moderators (cf. Hair et al. 1995; Jaccard et al., 1990). Utilizing such a method may, however, only be justified if the proposed variables are quasi moderators (i.e., direct effects are hypothesized in addition to the moderator effect). If the moderator is a pure moderator, however, such a method may not be justified (i.e., since no direct effect of the moderator on the criterion is proposed in such models), if theory testing is the issue. However, the hierarchical  $F$  test yields the same substantive results as the  $t$  test (i.e.,  $t$  squared yields the same value as  $F$  for incremental). Thus, the confirmatory design of the study implies that the theory is tested by one equation. Consequently, the  $t$  test of the multiplicative terms as well as for the direct effects is assessed in one equation.

### **Test procedures.**

Four types of empirical tests are conducted in this section. *First*, the “pure” theoretical model is tested. Thus, a test of the study’s research hypotheses is provided. *Second*, we include the control variables to test the robustness of the findings (parameter estimates) from the pure theoretical model. Accordingly, the possibilities of masked and spurious effects are accounted for within such an approach.

*Third*, models that include rival predictors are included. The most common way of testing theories is to adopt a strictly one-time confirmatory approach (Meehl, 1990). There may, however, be weaknesses in choosing such an approach as the only test. Arguments have been offered for including additional tests in order to “prove” that the proposed theory is the best approximation (e.g. Meehl, 1990; Jöreskog & Sörbom, 1993). Usually rationalized by some theory, a rival model may consist of a respecification of the structural paths. No such rival theory is proposed in the study. However, in the literature there exist several predictor variables in addition to the variables proposed in the study. Consequently, in Section 7.5 additional variables that may add exploratory power to the criterion (i.e., rival models) were presented. For all of these variables, except capacity utilization, there exists some theoretical rationale for their potential influence on the criterion. Clear preferences, though, for the study’s theoretical model have been offered in the dissertation. Thus, these variables should not be included in the main model as long as theory testing is the issue. However, the tests of the rival

models are more exploratory than confirmatory in nature and may therefore be justified. Accordingly, there are mainly two reasons for testing models including these variables. First, as argued by e.g. Meehl (1990) and Jöreskog & Sörbom (1993), in order to increase our confidence to the proposed model, it should be compared with competing "theories". Second, use of rival models may be an indicant of the parsimony of the theoretical model with respect to its ability to explain the dependent variable.

*Fourth*, tests of the study's explanatory mechanisms are provided. The main contribution of the study is centered around the theoretical arguments of the effects of CPC and TSI on VI. Thus, empirical tests of the mechanisms by which the influence from CPC and TSI are transmitted to the criterion are provided.

### 8.3.2 Test of hypotheses

In Chapter 5 we proposed the rationale for the following five hypotheses. The hypotheses were:

- H<sub>1</sub>:** Closeness to primary competence (CPC) has a positive effect on vertical integration (VI).
- H<sub>2</sub>:** Buyer's human transaction specific investments (TSI) has a positive effect on VI.
- H<sub>3</sub>:** The interaction effect of CPC and TSI has a positive effect on VI.
- H<sub>4</sub>:** Tacitness has a negative effect on VI.
- H<sub>5</sub>:** Trust will moderate negatively the relationship between TSI and VI.

Three main effect hypotheses, one quasi moderator hypothesis and one pure moderator hypothesis are proposed. Following the recommendations of Cronbach (1987) and Jaccard et al. (1990), we centered the composite X's prior to forming the multiplicative terms in order to avoid the multicollinearity problem<sup>68</sup>: In appendix D the correlations between all the variables in the equation, including the product terms, are illustrated. As expected (cf. Jaccard, 1990), multicollinearity is not a problem in the study.

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<sup>68</sup> The multiplicative term of CPC and TSI [(CPC)(BTSI)] is formed by the following equation: CPCTSI = (CPC - meanvalue)(TSI - meanvalue). Identical procedures are done when forming the other multiplicative term (i.e., TSITRUST).



In Table 8.7 the parameter estimates for the estimated model is reported. The model is significant with an F value of 17.46 (Sig. F < .001). The main effects of CPC (T=5.09, p<.001), TSI (T=4.37, p<.001) and tacitness (T=-3.20, p<.01) on VI are all significant (hypotheses 1, 2, and 4, respectively). The interaction effect of CPC and TSI [(CPC)(TSI)] on VI (hypothesis 3) is significant (T=2.12, p<.05). Thus, hypothesis 3 is supported. Hypothesis 5 is not supported. The results show that TSI effect on VI does not significantly decrease with increased values on trust. Thus, trust does not negatively mediate the relationship between TSI and VI. In sum, hypotheses 1, 2, 3 and 4 are supported while hypothesis 5 is not supported.

**Table 8.7 Results from OLS regression analysis**

Dependent variable: Vertical integration (VI)		
(n=114)		
	Beta <sup>a</sup>	T <sup>b</sup>
H1 Closeness to primary competence (CPC)	.434	5.098***
H2 Buyers transaction specific investments (TSI)	.322	4.373***
H3 Interaction effect between CPC and TSI	.164	2.120*
H4 Tacitness	-.265	-3.201**
H5 Modification effect of Trust on TSI and VI	-.056	-.755
	R <sup>2</sup>	.466
	R <sup>2</sup> adj.	.439
	F	17.463
	Sig. F	.0000

<sup>a</sup> Standardized regression coefficients <sup>b</sup> One-tailed test

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

### 8.3.3 Including control variables

In Table 8.8, the results of a multiple regression test including the control variables are reported. In addition to the control variables presented in Section 7.5, the construct of trust is included. According to Jaccard et al. (1990) one should control for the direct effects of the variables forming a product term. Notice, though, that no theory for this is proposed in the study. Thus, in addition to the variables in the baseline model, the model includes trust, vendor's transaction specific investments (vendor's TSI), annual earning and uncertainty.

The overall fit of the measurement model including control variables is presented in the table along with the OLS regression results. The model received acceptable model fit. Descriptive statistics and factor loadings for the items reflecting the constructs of vendor's TSI, annual earning and uncertainty are shown in appendix E. Reliability measures and factor loadings for these measures were all satisfactory.

The inclusion of the control variables does not change the overall pattern observed in the baseline model. From Table 8.8 one can see that the *Beta* and *T* values for the independent variables included in the baseline model show only minor trivial changes when the control variables are added to the baseline model. The results indicate no spurious or masking effects for the relationships in the theoretical model, given the included control variables. Trust has, however, a significant effect on VI ( $T=-1.77$ ,  $p<.05$ ). We return to the implication of this finding in Chapter 9.

**Table 8.8 Comparison between the theoretical model and the theoretical model + Control variables**

Dependent variable: Vertical integration Baseline model (n=114)			Dependent variable: Vertical integration Baseline model + Control variables (n=114)		
	Beta <sup>a</sup>	T <sup>b</sup>		Beta <sup>a</sup>	T <sup>b</sup>
CPC	.434	5.098***	CPC	.429	5.019***
TSI	.322	4.373***	TSI	.294	3.238**
(CPC)(TSI)	.164	2.120*	(CPC)(TSI)	.172	2.189*
Tacitness	-.265	-3.201**	Tacitness	-.250	-2.872**
Trust mod.	-.056	-.755	Trust mod.	-.079	-1.035
TSI effect on VI			TSI effect on VI		
			Trust	-.134	-1.771*
			Vendor's TSI	.056	.619
			Annual earning	.047	.585
			Uncertainty	.032	.418
R <sup>2</sup>	.466		R <sup>2</sup>	.489	
R <sup>2</sup> Adj.	.439		R <sup>2</sup> Adj.	.441	
F	17.463		F	10.193	
Sig. F	.000		Sig. F	.000	
Measurement model <sup>c</sup>	$\chi^2 = 196.06$ (df=168) (p=0.068) RMSEA = 0.038 (p(close test) = 0.80) NNFI = 0.97 CFI = 0.98 IFI = 0.98		Measurement model <sup>c</sup>	$\chi^2 = 467$ (df=390) (p=0.0043) RMSEA = 0.042 (p(close test) = 0.83) NNFI = 0.94 CFI = 0.95 IFI = 0.96	

<sup>a</sup> Standardized regression coefficients; <sup>b</sup> One-tailed test - OLS regression; <sup>c</sup> LISREL 8.14  
\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

### 8.3.4 Tests of rival models

Below, several rival models are tested. The approach utilized evaluates if the inclusion of additional predictor variables increases the predictability ( $R^2$ ) of the criterion significantly (see e.g. Berry, 1993; Jaccard et al. 1990). By entering a new variable at each step, the increase in  $R^2$  on each step is assessed in terms of statistical significance on the  $F$  test. The test of the null

hypotheses that this increment is zero is yielded by the following formula:  $F = [(R_2^2 - R_1^2)/(k_2 - k_1)] / [(1 - R_2^2)/(N - k_2 - 1)]$ .

In Table 8.9 the results of four hierarchical multiple regression tests are reported. The first model includes buyer's dependence of the vendor, in addition to the variables in the baseline model. The second model adds technological economies (T\_E), the third includes T\_E and capacity utilization, and the fourth includes T\_E and formalization.

The overall fit of the different measurement models is presented in Table 8.9 along with the OLS regression results. All the models received acceptable model fit. Except the chi-square values of Model 3, all models were significant (RMSEA and chi-square). Additionally, all models received adequate and good fit-values on the incremental indexes. Descriptive statistics and factor loadings for the items reflecting the constructs rival predictors are shown in appendix E. Reliability measures and factor loadings for these measures were all satisfactory. Thus, on overall the assessment of the measurement models included in this section indicates that they all are valid.

The increment in  $R^2$  associated with model 1 and the baseline model is not statistically significant ( $F(1, 107) = 0$ ). The same pattern (i.e., not significant) yields models 3 ( $F(1, 107) = 0$ ), (and 4 ( $F(1, 107) = 0$ )). In sum, no significant increases in  $R^2$  emerge when other variables are entered, except for the model including technological economies (T\_E). The increment in  $R^2$  in model 2 is statistically significant ( $F(1, 107) = 11.15, p < .01$ ). The strengths of T\_E's effect (i.e., the increment in  $R^2$ -adjusted) is .05.

**Table 8.9 Hierarchical regression: Stepwise inclusion of rival predictors**

Dependent variable: Vertical integration (n=114)						
Variable entered	Measurement model <sup>a</sup>	Total multiple corr. ( <i>R</i> ) <sup>b</sup>	Total <i>F</i>	<i>R</i> <sup>2</sup>	increment in <i>R</i> <sup>2</sup> ( <i>sr</i> <sup>2</sup> ) <sup>c</sup>	<i>F</i> for increment
Baseline model (B) <sup>d</sup>		.68	17.46	.47	.47	17.46
1. B + Dependence	$\chi^2 = 206.68$ (182 dg) ( <i>p</i> =0.10) RMSEA = 0.035 ( <i>p</i> (close test) = 0.87) NNFI = 0.98 CFI = 0.98 IFI = 0.98	.68	14.51	.47	.00	0
2. B + T_E	$\chi^2 = 211.71$ (182 dg) ( <i>p</i> =0.065) RMSEA = 0.036 ( <i>p</i> (close test) = 0.82) NNFI = 0.97 CFI = 0.98 IFI = 0.98	.72	17.72	.52	.05	11.15**
3. B + T_E + Capacity utilization	$\chi^2 = 231.72$ (196 dg) ( <i>p</i> =0.041) RMSEA = 0.040 ( <i>p</i> (close test) = 0.78) NNFI = 0.97 CFI = 0.97 IFI = 0.98	.73	15.97	.53	.01	2.25
4. B + T_E + Formalization.	$\chi^2 = 302.10$ (264 dg) ( <i>p</i> =0.053) RMSEA = 0.036 ( <i>p</i> (close test) = 0.90) NNFI = 0.97 CFI = 0.98 IFI = 0.98	.72	15.09	.52	.00	0

<sup>a</sup>LISREL 8.14; <sup>b</sup>OLS regression analysis; <sup>c</sup> sr, semipartial correlation;

<sup>d</sup> The theoretical model of the study (cf. 8.3.2)

\**p*<.05; \*\**p*<.01

In sum, three out of four potential variables that may add exploratory power to the criterion have been rejected. T\_E, however, accounts for 5% of the variance of the criterion, and, thus, its inclusion in the model is statistically significant. The inclusion of this variable does not change the overall pattern observed in the baseline model, and, thus, additional support is given

to the adequacy and parsimony of the theoretical model of this study. The latter issue is supported by the results shown in Table 8.10, where *Beta* and *T* values for the variables in the two models (i.e., the baseline model and model 5 from Table 8.8) are compared. From the table one can see that the *Beta* and *T* values for the independent variables included in the baseline model show only minor trivial changes when T\_E is added to the baseline model. The results indicate that T\_E cause neither spurious nor masking effects. Thus, empirically the inclusion of T\_E as an additional predictor variable seems relevant. A discussion of this empirical finding will be returned to in the next and final chapter.

**Table 8.10 Comparison between the theoretical model and the theoretical model + T\_E**

Dependent variable: Vertical integration Baseline model (n=114)			Dependent variable: Vertical integration Baseline model + T_E (n=114)		
	Beta <sup>a</sup>	T <sup>b</sup>		Beta <sup>a</sup>	T <sup>b</sup>
CPC	.434	5.098***	CPC	.357	4.348***
TSI	.322	4.373***	TSI	.280	3.927***
(CPC)(TSI)	.164	2.120*	(CPC)(TSI)	.154	2.086*
Tacitness	-.265	-3.201**	Tacitness	-.213	-2.616**
Trust mod. TSI effect on VI	-.056	-.755	Trust mod. TSI effect on VI	-.050	-.710
			T_E	-.256	3.258**
R <sup>2</sup>	.466		R <sup>2</sup>	.518	
R <sup>2</sup> Adj.	.439		R <sup>2</sup> Adj.	.489	
F	17.463		F	17.721	
Sig. F	.000		Sig. F	.000	

<sup>a</sup> Standardized regression coefficients; <sup>b</sup> One-tailed test - OLS regression

\*p < 0.05; \*\*p < 0.01; \*\*\*p < 0.001

### 8.3.5 Test of explanatory mechanisms

Empirical tests of some of the mechanisms by which the influence from the predictors are transmitted to the criterion are provided below. As argued in Chapter 6 and 7, the effect of

CPC on VI is rationalized through the arguments that CPC has an impact on production as well as transaction costs. We recall from Chapter 6 that compared with low CPC, high CPC reduce internal production costs, if internalizing the activity in question. Accordingly, high CPC (1) increases the efficiency of the internal information transmission, and (2) increases the effectiveness of performing the appropriate routines, compared with low CPC, if internalizing. Additionally, high CPC will also reduce the degree of internal opportunistic behavior and internal transaction costs compared with low CPC, when internalizing. Thus, it is proposed that CPC will be negatively related to both expected internal opportunistic behavior and expected internal transaction costs if internalizing the activity. The rationale for TSI's effect on VI is a straightforward TCE logic. As Williamson outlines, when TSI is great the transaction costs of market procurement is high. In such situations, there exist safeguarding problems because of the vulnerability due to the potential for opportunistic behavior of the other actor (i.e., the vendor). Such increasing potential for opportunistic behavior can only be hampered by increasing costs of safeguarding (Williamson, 1985), i.e., increasing transaction costs. Thus, it is expected that TSI will be positively related to opportunistic behavior and transaction costs, respectively<sup>68</sup>. The theoretical arguments for the mechanisms coupling CPC and TSI to VI are summated in Table 8.11 below.

**Table 8.11 Explanatory mechanisms coupling CPC and TSI to VI.**

	Explanatory Mechanism: Production costs	Explanatory mechanism: Opportunistic behavior	Explanatory mechanism: Transaction costs
CPC	<ol style="list-style-type: none"> <li>1. The efficiency of the internal information transmission increases with increasing CPC</li> <li>2. The effectiveness of performing the appropriate routines increases with increasing CPC</li> </ol>	Existing common codes decreases the possibility to cheat with increasing CPC	Existing common codes increases the possibility to detect and punish opportunistic behavior with increasing CPC
TSI	Reduced	Incentives for opportunistic behavior increase with increasing TSI	High TSI increases the potential for opportunistic behavior and increases the costs of safeguarding

<sup>68</sup> Note also that TSI will reduce production costs (cf. Section 2.4; Williamson, 1985).

The study (cf. Chapter 3) emphasizes the importance of the distinction between the behavioral manifestation of opportunism (opportunistic behavior) and the opportunistic attitude of economic actors (opportunism). The scale used to measure opportunism reflects this, and measures opportunistic behavior and not attitude toward opportunism. Accordingly (and to my knowledge not emphasized by previous empirical research), in line with the study's arguments, the fact that opportunistic behavior will vary, does not contradict the assumption that the attitude toward opportunism still may be present. Consequently, the analyses illustrated below do not test the assumptions, i.e., the hard core of the synthesis (bounded rationality and an attitude toward opportunism). Instead, we test the adequacy of the logic derived from these assumptions. We test whether the theoretical arguments underlying the empirically supported results reflect the core of the argument of this study; namely that actors calculate the efficiency of different governance forms. Accordingly, we assess the degree to which the economic actors assess opportunistic behavior and consequently transaction costs based on the degree of CPC and TSI, when they evaluate the criterion of the study.

When the rationale for the CPC prediction is tested, we control for TSI, and when testing the mechanisms coupling TSI and VI we control for CPC. Thus, when the CPC logic is tested, we expect no significant effect of TSI on expected internal opportunistic behavior and expected internal transaction costs, respectively. The same will yield for CPC on opportunistic behavior and transaction costs, when testing for the underlying TSI logic. Strictly speaking, these variables should not be included in the model as no rationale for their influence is present. However, given the expected effect of e.g. TSI on transaction costs, a negative effect, zero effect, or no positively significant effect of CPC on transaction costs, will give additional support to the logic offered in the study. In Table 8.12 the results from four different multiple regression tests are reported.



**Table 8.12 Test of explanatory mechanisms: Results from OLS regression analysis**

**a. Test of the explanatory logic rationalizing the TSI hypothesis**

Dependent variable: Transaction costs (n=114)			Dependent variable: Opportunistic behavior (n=114)		
Variables	Beta <sup>a</sup>	T <sup>b</sup>	Variables	Beta <sup>a</sup>	T <sup>b</sup>
TSI	.222	2.348**	TSI	.1364	1.415*
CPC	-.022	-.238	CPC	.023	.247
Measurement model <sup>c</sup>	$\chi^2 = 109.96$ (62 dg) (p=0.000) RMSEA = 0.083 (p(close test) = 0.02) NNFI = 0.92 CFI = 0.94 IFI = 0.95		Measurement Model <sup>c</sup>	$\chi^2 = 55.19$ (41 dg) (p=0.068) RMSEA = 0.055 (p(close test) = 0.38) NNFI = 0.97 CFI = 0.97 IFI = 0.98	

<sup>a</sup> Standardized regression coefficients; <sup>b</sup> One-tailed test - OLS regression; <sup>c</sup> LISREL 8.14  
\*p < 0.1; \*\*p < 0.05; \*\*\*p < 0.01

**b. Test of the explanatory logic rationalizing the CPC hypothesis**

Dependent variable: Expected transaction costs if internalizing the activity (n=114)			Dependent variable: Expected opportunistic behavior if internalizing the activity (n=114)		
Variables	Beta <sup>a</sup>	T <sup>b</sup>	Variables	Beta <sup>a</sup>	T <sup>b</sup>
CPC	-.408	-4.666***	CPC	-.192	-2.033**
TSI	-.129	-1.476*	TSI	.161	1.713**
Measurement model <sup>c</sup>	$\chi^2 = 27.28$ (32 dg) (p=0.70) RMSEA = 0.000 (p(close test) = 0.93) NNFI = 1.01 CFI = 1.00 IFI = 1.01		Measurement model <sup>c</sup>	$\chi^2 = 23.83$ (32 dg) (p=0.85) RMSEA = 0.000 (p(close test) = 0.97) NNFI = 1.03 CFI = 1.00 IFI = 1.02	

<sup>a</sup> Standardized regression coefficients; <sup>b</sup> OLS regression - One-tailed test; <sup>c</sup> LISREL 8.14  
\*p < 0.1; \*\*p < 0.05; \*\*\*p < 0.01

The overall fit of the different measurement models is presented in the table along with the OLS regression results. All the models received acceptable model fit. Except for the chi-square value of model 1, all models were significant (RMSEA and chi-square). Additionally, all

models received adequate and good fit-values on the incremental indexes. Descriptive statistics and factor loadings for the items reflecting the explanatory mechanisms, are included in appendix E. Reliability measures and factor loadings for these measures were all satisfactory. Consequently, the assessment of the measurement models included in this section indicates that they all are valid.

The results show that TSI has a significantly positive effect on transaction costs ( $T=2.348$ ,  $p<0.05$ ) and opportunistic behavior ( $T=1.415$ ,  $p<0.1$ ). CPC has a significantly negative effect on expected internal transaction costs ( $T=-4.666$ ,  $p<0.01$ ) and expected internal opportunistic behavior ( $T=-2.033$ ,  $p<0.05$ ). Regarding the controls, CPC has, as expected, no effect on either transaction costs or opportunistic behavior. Note that this is a support to our arguments throughout the study that CPC do not reduce the transaction costs in a relationship nor the opportunistic behavior of a vendor<sup>69</sup>. Moreover, TSI has a positively significant effect on expected internal opportunistic behavior, which also is a support of the study's argument. However, TSI has a significantly negative effect on expected internal transaction costs ( $T=-1.476$ ,  $p<0.1$ ). Thus, all the four predicted effects are supported, while three out of four predicted zero effects are not rejected. Overall, great support is given to the underlying logic of the hypotheses empirically supported in Section 8.3.2. Thus, empirical support is given to the theoretical arguments of the proposed set of mechanisms coupling the two main independent variables to the dependent. Consequently, support is given to the argument that actors assess opportunistic behavior and transaction costs based on the degree of CPC and TSI when they evaluate the criterion of the study. A further abstraction will lead us to conclude that the results also indicate a support of the core economic assumptions of the study (as well as the Williamsonian), namely, that economic actors calculate the efficiency of different governance forms.

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<sup>69</sup> In Section 2.4 (see also Chapter 6), following Nelson & Winter (1982), we argued that a firm's former investments and its repertoire of routines, restrict its future behavior. This follows because learning tends to be local (Cyert & March, 1963). Thus, even though the buyer's existing competence may be close to the vendor's, the way of doing things is different (Meyer & Rowan, 1977), and the buyer and the vendor will have different common codes (Arrow, 1974; Hennart, 1982; Kogut & Zander, 1992; 1993). This implies that the parties will react differently when trying to co-ordinate disturbances (Williamson, 1991), which again will increase the bargaining costs of reaching an agreement for solving the disturbances.

## 8.4 Summary

In Chapter 6 we presented five hypotheses about proposed effects on the criterion of vertical integration. In Table 8.13 the hypotheses are listed together with the accompanying results from the empirical study.

**Table 8.13 Summary of hypotheses**

Constructs	Hypothesized Effect on VI	Findings	Sign. level <sup>a</sup>
<b>H<sub>1</sub>.</b> Buyers closeness to Primary competence (CPC)	+	+	(p<0.001 )
<b>H<sub>2</sub>.</b> Buyers transaction specific competence (TSI)	+	+	(p<0.001 )
<b>H<sub>3</sub>.</b> Interaction effect between CPC and TSI	+	+	(p<0.05)
<b>H<sub>4</sub>.</b> Tacitness	-	-	(p<0.01 )
<b>H<sub>5</sub>.</b> Modification effect of Trust on TSI and VI	-	0	

<sup>a</sup> One tailed test

The results of the regression analyses showed that four out of five hypotheses were supported. The direct effects of CPC, TSI and tacitness as well as the interaction effect of CPC and TSI were all significant. Finally, the hypothesis containing the modification effect of trust on CPC and VI was not supported.

## **9. DISCUSSION AND IMPLICATIONS**

This final chapter contains four sections. After a brief summary of the study, Section 9.1 discusses the overall results of the empirical tests conducted. In Section 9.2 implications for research and practice are discussed. Section 9.3 addresses the study's strengths and limitations and suggestions for future research are provided. Finally, concluding remarks are presented.

### **9.1 Summary**

The main purpose of this dissertation has been to extend the two perspectives addressed by developing a synthesis and to test that synthesis empirically. Consequently, we have combined insights from both perspectives and developed a unifying framework with consistent common assumptions. Particularly, the study has argued that many of the perceived shortcomings in earlier empirical and theoretical works of TCE and the competence perspective are in part attributable to inadequate specifications of the behavioral assumptions. We have illustrated how the behavioral assumptions can be extended to incorporate constructs and predictions from both perspectives in an integrated model. From this theoretical model, five testable hypotheses were derived. Using a correlational design, the hypotheses were tested empirically in the Norwegian power station industry. The summary in Table 9.1 shows that four out of five hypotheses were supported.

**Table 9.1 Summary of hypotheses**

Constructs	Hypothesized Effect on VI	Findings	Sign. level <sup>a</sup>
<b>H<sub>1</sub>.</b> Buyers closeness to primary competence (CPC)	+	+	(p<0.001)
<b>H<sub>2</sub>.</b> Buyers transaction specific competence (TSI)	+	+	(p<0.001)
<b>H<sub>3</sub>.</b> Interaction effect between CPC and TSI	+	+	(p<0.05)
<b>H<sub>4</sub>.</b> Tacitness	-	-	(p<0.01)
<b>H<sub>5</sub>.</b> Modification effect of Trust on TSI and VI	-	0	

<sup>a</sup> One tailed test

Several tests were conducted in order to secure a critical test of the theory. After testing the overall theoretical model, a test including control variables was conducted. Additionally, in order to prove that the proposed theory was a good approximation, rival predictors that may increase the explained variance of the dependent variable, were introduced in separate tests. All these tests indicated that the theory was a good approximation of the phenomenon studied. Finally, we also found empirical support for the underlying mechanisms by which the influences from CPC and TSI are transmitted to the criterion of vertical integration.

The discussion of the results below follows the same steps as the test procedure from Section 8.3. Thus, first, the test of the hypotheses is discussed (9.1.1). Next, Paragraph 9.1.2 discusses the results from the tests including control variables, rival predictors and explanatory mechanisms.

### 9.1.1 Hypotheses

Four out of five hypotheses were supported. The direct effects of buyers' closeness to primary competence (CPC) and buyers' transaction specific investments (TSI) as well as the interaction effect of CPC and TSI were all significant. Additionally, the hypothesis involving tacitness' effect on VI was supported. Hypothesis 5, containing the modification effect of trust on CPC and VI, was not supported. The information from the descriptive statistics and reliability analysis, respectively, showed that the concepts of trust had to be treated with caution (cf. Section 8.1). Particularly, all the items representing trust have high mean values and low standard deviation. Consequently, these items seem to be items that are easy to agree with in the setting, and, thus do not entail a satisfactory variance and normal distribution. Accordingly, it seems like the items representing the construct was poorly measured. This may be one reasonable explanation for the rejection of this hypothesis. The probability that the interpretability of this construct was obscured in the structural analysis is higher than for the other variables included in the model.

The support of four out of five hypotheses indicates the relevance of integrating competence-based and transaction cost economics explanations into a unified framework. The theoretical and practical implications of the findings will be returned to in the following sections.

### 9.1.2 Controls, rivals and explanatory mechanisms

**Control variables.** The result from the test including control variables indicated no spurious and masked effects for the relationship in the proposed model. Regarding vendor's transaction specific investments the results are interesting. Arguments have been offered that reciprocal assets may tend to moderate opportunistic behavior by serving as 'hostages' in a relationship (Williamson, 1983). However, no such motives are indicated by the results in the study. The results from the study follow previous research in that the correlation between the two constructs is high (cf. Buvik, 1995). However, the effect of buyer's investments on VI is still significant when introducing the vendor's specific investments in the model. Accordingly, there is no indication of a spurious effect between the buyer's transaction specific investments and vertical integration. Moreover, the analysis also shows clearly that TSI is the most powerful

variable within the TCE-framework. Uncertainty, however, is a part of the TCE-framework. Because of the mixed results involving the uncertainty concept, we did not hypothesize any effect of the variable's impact on vertical integration. Absent asset specificity, however, TCE does not predict that uncertainty would itself lead to hierarchical governance (Williamson, 1985). Uncertainty depends on competitive conditions, and, thus, it is hypothesized to interact with asset specificity. According to Shelanski & Klein (1995) the failure of studies not to take this aspect into account may explain some of the conflicting results on the effect of uncertainty. Thus, further studies may include and test the interaction of environmental uncertainty and TSI on VI within the study's framework.

**Rivals predictors.** The empirical analysis showed that the main factors explaining vertical integration are the three major variables derived from the two synthesized perspectives as well as the interaction effect between CPC and TSI. Other factors (dependency, technological economies, capacity utilization and formalization) that may have an influence on vertical integration are, except technological economies, not supported in the study. Empirically, the inclusion of technological economies as an additional predictor variable seems relevant. However, even though the variable increased the predictability of the criterion significantly, the «specification of a model should be determined by theoretical considerations rather by rigidly following a rule of thumb based on an empirical measure of goodness-of-fit» (Berry & Feldman, 1985:16). The rationale for the variable's effect stems from the literature of industrial organization, where technological possibilities are expected to increase the possibility of getting monopoly power. Following the arguments from Williamson (1975; 1985) and Argyres (1996), however, a theoretical rationale for its impact on vertical integration is difficult to find<sup>71</sup>. Beside, the tests of the rival predictors were somewhat exploratory in nature. When testing four rival predictors in an exploratory way, I presume that the possibility of a chance effect is present (i.e. that one out of the four predictors will be significant by chance).

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<sup>71</sup> TCE rules out the traditional scale argument by stating that scale economies do not determine the make or buy decisions (Williamson, 1975:16-19). The argument for this is that any scale economies available to e.g. a vendor should be similarly available to each of the buyers, except for the other buyers potential opportunism problems, in selling inputs to customers, i.e. competitors in the same industry. It is the potential costs of opportunism combined with the fact that all future contingencies cannot be foreseen, that prevent the buyers from realizing scale economies. Accordingly, "true production cost differences between firms due to scale economies are creatures of high transaction costs; they do not independently affect make-or-buy decisions" (Argyres, 1996:130). However, the efficiency due to different and unique competence, plays an independent role in the make or buy decision. This aspect, as opposed to the scale argument, however, is not ruled out by TCE considerations (Williamson, 1994).

Moreover, the variable was measured by only one item, and, thus, this fact may further increase the probability of a chance effect. We have previously indicated preferences toward the Williamsonian logic (i.e., ruling out the technological economies argument). Thus, following Williamson and the possibility of a chance effect, we do recommend the variable to be included in the framework of the study.

**Explanatory mechanisms.** Theory and hypotheses should be rationalized by a set of mechanisms that transmit the influence from the predictor to the criterion (Mulaik & James, 1995). As our confidence in a theory increases if the hypotheses are supported by the data, the confidence will further increase if the explanatory logic that connects the predictor to the criterion is empirically supported. Thus, the test of the explanatory mechanisms is a support of the explanatory logic underlying the predictions of the study.

## **9.2 Theoretical and managerial implications**

Below, the theoretical implications of the study are addressed (9.2.1). Paragraph 9.2.2 discusses the managerial implications of the study.

### **9.2.1 Theoretical and empirical implications**

In a recent review of transaction costs economics, Rindfleisch & Heide (1997) summarize the research needs within the transaction costs framework. *First*, further research is needed to clarify the role of production costs vs. transaction costs in determining appropriate governance structures. *Second*, research is needed to assess the costs of internal organization, i.e., to what degree transaction costs may exist within firms. *Third*, they ask for studies that address the implications of deviations from opportunistic behavior. Additionally, Shelanski & Klein (1995) criticize empirical studies for not testing alternate hypotheses that may also fit the data as well as the TCE-variables. Thus, they argue that there is a need for studies that explicitly compare TCE derived hypotheses with hypotheses derived from other perspectives.



From a competence-based point of view, Barney (1996) asks for studies that integrate a competence-based view with transaction cost economics. According to Barney (1996), such new knowledge or resource-based theories have to explain why firm organization is needed, which implies a discussion of the limitations and weaknesses of TCE theories of the firm. He continues by asserting that this to a lesser extent has been incorporated in previous knowledge theories of the firm.

This study has provided an answer to research needs addressed from TCE and the competence perspective. Consequently, the study may be seen as an extension of both the competence perspective as well as TCE. Accordingly, the main contribution of the study lies in the consistent theoretical arguments for a synthesis of the two perspectives. However, arguments can be offered that the framework instead can be viewed as an extension of the TCE-program. Related to Lakatos' (1978)<sup>72</sup> terminology, we have to some extent kept in line with the hard-core of TCE. Moreover, we have extended the so-called protective belt or positive heuristics by introducing "new" explanation variables. One can argue that conducting this strategy is keeping in line with the research program of TCE. However, as should be evident from the discussion in the study, we have emphasized and argued in direction of a synthesis of the two perspectives. We have extended the content in the behavioral assumptions, which is in fact is a modification of the hard-core (Lakatos, 1978) of the TCE-program<sup>73</sup>.

We have shown how important insight from the competence perspective can be incorporated into a model intended to explain vertical integration. The competence perspective, like TCE, assumes actors to be bounded rationally. This is explicitly discussed in Nelson & Winter's (1982) book. Moreover, the assumptions underlying the resource-based perspective are that firms are heterogeneous with respect to the resources they control, and that resources are not perfectly mobile across firms (Barney, 1991). If the actors were perfectly rational, resources would be mobile and competitive advantage, because of heterogeneity (out of equilibrium), would only be temporary. Accordingly, the industry would in a short-term perspective be brought back to equilibrium. What we have done in this study is to incorporate and emphasize

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<sup>72</sup> According to Lakatos, a scientific research program consists of a "hard-core" (specifications of assumptions) that by definition is viewed as not falsifiable, and a "protective belt" of "auxiliary" hypotheses.

the issue that firms have production constraints as well as contractual constraints. This argument clearly deviates from TCE, as it sees firms as existing only because of their ability to attenuate opportunism (Conner, 1991; Ghoshal & Moran, 1996). Accordingly, we have emphasized the issue that firms are repositories of knowledge and skills, which in some circumstances provide firm advantages over autonomous market exchange with respect to efficiency and adaptation.

Moreover, we have shown that in order to throw light on the actual costs firms are exposed to, the assumptions of opportunism must also be addressed in order to predict the most efficient governance form. In two respects, our assumption of opportunism deviates from TCE. First, we distinguish between opportunism as an attitude (assumed present), and opportunism as a kind of manifest behavior (opportunistic behavior). This distinction is absent in Williamson's formal theorizing (Ghoshal & Moran, 1996). Second, we are able to specify the mechanisms (i.e. the use of common codes) through which internal opportunistic behavior is reduced. Accordingly, our assumption of opportunism also rests on arguments from the competence perspective.

As shown above, we have used extensive arguments from both perspectives when outlining the synthesis. Consequently, we do not view the theoretical arguments and the model developed in this study as a modification of the TCE-program, but rather as a synthesis of the competence perspective and TCE. According to Knudsen (1996:1), "it is probably not feasible at this point to describe the competence-perspective as a coherent research program, or paradigm, characterized by a common hard-core and positive heuristics." However, by connecting arguments that are inherent in the competence perspective and combining these with TCE-arguments, we have also contributed to showing how further progress in outlining the behavioral assumptions of the competence perspective can be made.

Moreover, asset specificity's effect on vertical integration is consistent with previous research within a TCE-framework. CPC's effect on vertical integration fits well into evolutionary economics and resource based perspectives theorizing on the growth of the firm. The

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<sup>73</sup> However, the assumptions are not radically changed, as the use of TCE-explanations is still, though relaxed, assessed relevant. It would be impossible to change dramatically or leave out one or both of the behavioral assumptions of opportunism and bounded rationality and still be able to utilize the explanation power in the TCE-framework.

operationalization of the CPC-construct represents an empirical contribution to the literature. Additionally, our research shows that tacitness has a significantly negative effect on VI. This observation is a support of previous studies examining related issues (e.g. Kogut & Zander, 1993; Zander & Kogut, 1995), and is consistent with a broader evolutionary framework. The interaction effect of TSI and CPC is an important empirical contribution, since this illustrates empirically the relevance of integrating the framework.

Following Rindfleisch & Heide (1997), few studies have explicitly examined the TCE-proposition that investments in asset specificity increase opportunistic behavior and transaction costs. Our study gives empirical support to the TCE-proposition that the costs of safeguarding contractual agreements increase as the level of asset specificity increases. Additionally, this study shows that as CPC increases, internal opportunistic behavior and internal transaction costs decrease.

## **9.2.2 Managerial implications**

Ghoshal and Moran (1996) argue that TCE is "bad for practice", mostly having in mind the normative implications of the TCE assumption of opportunism. Not only are the prescriptions drawn from TCE likely to be wrong, they state, but "also dangerous for corporate managers because of the assumptions and logic on which it is grounded" (p. 1). Our model, we think, has to some extent added more realism to the assumptions compared with TCE. Even though it seems to be widely recognized that some (or maybe many) economic actors act opportunistically (Milgrom & Roberts, 1992), studies have also shown clear discrepancy from such behavior. We presume most managers have experienced that not all employees act opportunistically. However, maybe they also have experienced that actors will act opportunistically if the organizational competence and routines do not contribute to an evaluation of the performance of their work. Our practical guidelines imply that the organizational routines and common codes may be suitable for controlling the opportunistic behavior of employees. As long as the existing managerial capacity supported by existing routines can capture the extent to which the work is being done in an appropriate way, the employees are expected to act in accordance with managerial directives. In this way, managers should distinguish between opportunism as an inherent attitude and opportunistic behavior.

Following TCE, increasing potential for opportunistic behavior can only be hampered by increasing costs of safeguarding, which "are likely to adversely effect [the firms] performance." (Ghoshal & Moran, 1996:16). In contrast, managers of firms can choose to perform activities when existing common codes can be used as a means in controlling behavior. Accordingly, by emphasizing the effort in this direction, they will economize on internal transaction costs, and the potential threat of opportunism will not necessarily increase the transaction costs.

Moreover, when managers evaluate integration decisions, they cannot only be concerned about transaction-cost-economizing calculus, i.e. the costs connected to solving contractual issues. They should also be concerned about the ability to perform activities within their own boundaries. If only using directives derived from TCE, managers will certainly draw attention away from capability evaluations. Maybe the latter has caused the "...dearth of practical advice for managers that it [TCE] has produced" (Chiles & McMackin, 1996:94). Our guidelines imply that firms should use more time, and more resources to map and identify the competence resources they possess, and evaluate which activities they in different time perspectives are capable of performing inside their boundaries if they decide to grow. Managerial guidelines as to how such mapping and evaluations can be done are e.g. found in part 3 of Hamel & Heene's (1994) work. Finally, managers might evaluate critically the efficiency of creating interfirm trust relations. Our guidelines imply that closer and tighter relationships (i.e. building trust relations) between buyer and seller, as often emphasized in practice oriented reporting (Buvik, 1995), will not always be desirable. By governing a relation solely based on trust, firms are laid open for potential opportunistic behavior from the exchange partner. Introducing contractual safeguards will contribute to decreasing the potential of opportunistic behavior from the exchange partner. However, added authority mechanisms will increase the governance costs and reduce the adaptation abilities. Accordingly, managers should make comparative efficiency calculations of the consequences of using trust or authority (or a combination) as governance mechanisms.

### **9.3 Strengths, limitations and suggestions for future research**

Paragraph 9.3.1 discusses some strengths of the study. In Paragraph 9.3.2, limitations in the study are discussed and suggestions for future research are provided.

### 9.3.1 Strengths

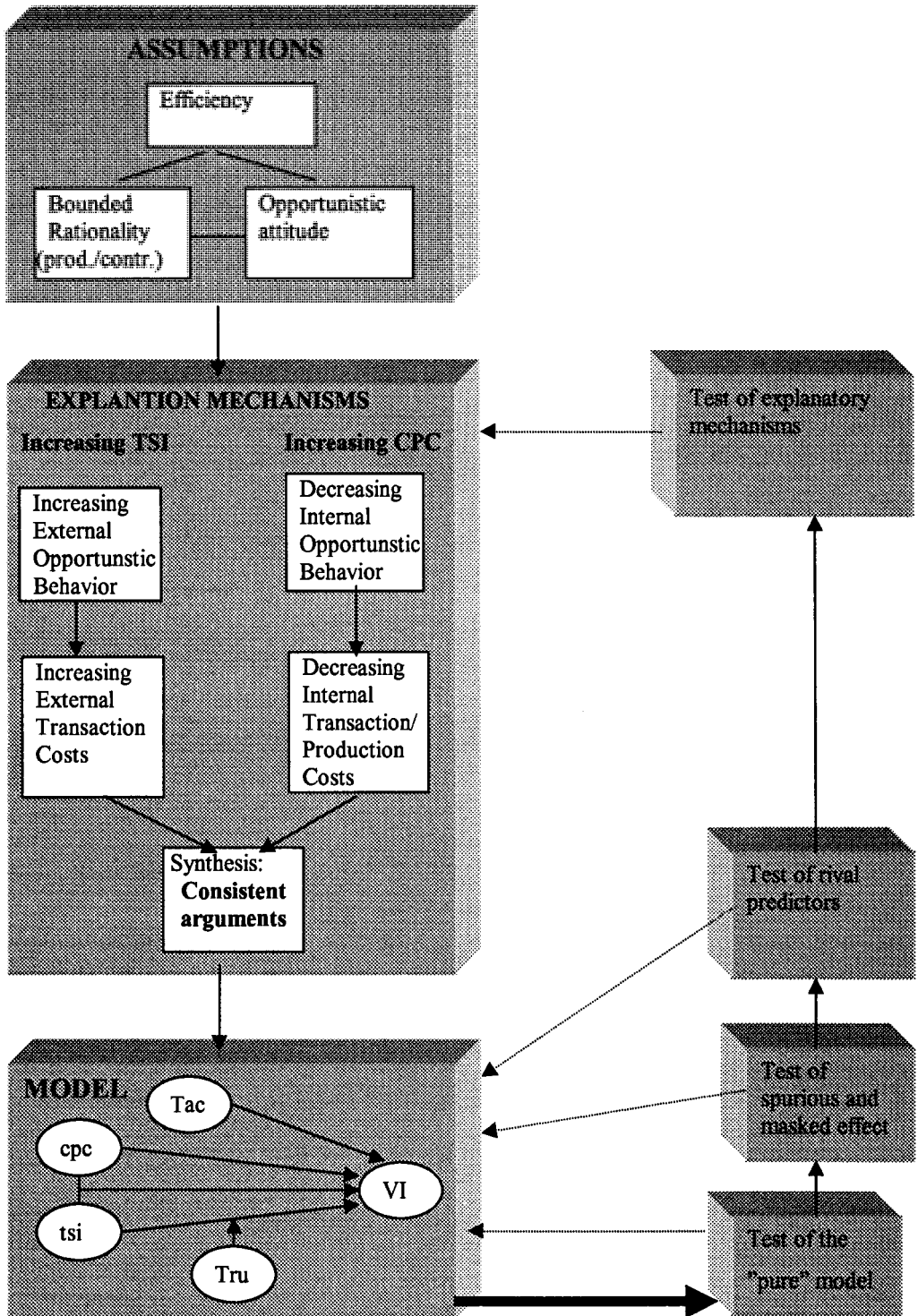
One strength of the study is the outlining of clear and precise assumptions. This, in turn, gave us the possibility to specify consistent underlying explanatory mechanisms for the predictions in the developed model. Lakatos (1978) and Camerer (1985) among other factors inspired this way of deductive theorizing. However, a careful inspection and specifications of the underlying behavioral assumptions that drive the predictions in a theoretical framework will always come at an expense. Consequently, there will be a trade-off between the clarity and precision in the assumptions and the realism in predictions derived from a model. The choice of assumptions is the foundation of a theory, as it influences the selection of variables included in the model (Simon, 1991). Thus, the danger of omitting relevant (or including irrelevant) variables is present. However, compared with TCE, we have added more realism to the assumptions. That is, we believe that our assumptions more clearly correspond to the real motives of firms. Accordingly, our intention has not been restricted to only presenting a logical model for its own sake, but also emphasizing the understanding of vertical integration as a case of real firm behavior.

Figure 9.1<sup>74</sup> illustrates the way the theory was built up, and how the study utilized a deductive theorizing approach (Camerer, 1985; Lakatos, 1978). Thus, we started at the “bottom” of the theory with discussions and definitions of the theory’s assumptions. Next, the explanatory mechanisms derived from these assumptions were logically outlined. Finally, the connection between the variables in the model, logically deduced from the explanatory mechanisms, was approached. The test procedure was approached the opposite way. *First*, we started with testing the theoretical model, i.e. the connections between the variables. *Second*, we controlled for potential spurious and masked effects. *Third*, we included a test of rival predictors, and *fourth*, we provided tests of the explanatory mechanisms. We believe that this way of outlining a theory followed by the four-step empirical test is a strength of the study. Thus, we believe that this gives confidence to the whole framework that constitutes the theory.

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<sup>74</sup> In the figure, the mechanisms coupling tacitness and trust to VI are removed (see Figure 6.3 where these are included).

Figure 9.1 The theoretical and empirical part of the study.



Another major strength of the study is the focus on firms' underlying competence as departure for growth. Thus, we have taken seriously the insight from resource-based theory that knowledge and competencies, and not a particular product or service, are the foundation of value-creating processes. As Conner (1991:145) asks: "To what extent should outcomes [e.g. products] of application of firm resources be used as proxies for the underlying resources?" She continues by asserting that the reason for this application is "that reliable measures of underlying resources pose a heavy burden on empirics"(p. 145).

Several studies have supported the efficiency of related diversification through horizontal or vertical integration (cf. Teece, Pisano & Shuen, 1997). However, other studies have found that even unrelated diversification is positively associated with profitability (cf. D'Aveni & Ravenscraft, 1994). What can be the reason for this empirical anomaly? Most empirical studies, examining these issues, have often used fixed classification systems of companies and industries<sup>75</sup>. One criticism of the use of these classification systems has been that most major companies are in a multiple line of business (MacMillan, Hambrick & Pennings, 1986). However, this criticism is based on the same assumption that firms classified in the same code, share or are quite similar with respect to the generic resources and competencies they possess.

Our criticism, in contrast, is more fundamental. We think there should be sufficient evidence (e.g. in the theory of the growth of the firm, in the organizational learning literature, in the new institutionalism in organization theory and in the resource-based theory) that producing the same or similar products, does not necessarily imply that two firms share or have identical resources and competence. As Conner (1991:145) asserts, "firms measuring identically on launches may have entirely different components of ... capabilities". If the latter is correct, we may be skeptical to studies that *a priori* state that Standard Industrial Classification codes are appropriate ways of studying integration strategies. These studies de-emphasize the possibility that the firms' underlying worker competence and managerial capability are what gives rise to most synergies (Penrose, 1959). As for example emphasized by Prahalad & Hamel (1990), a firm's underlying competence can give rise to several distinctive and unrelated markets. This implies that companies classified within the same four-digit code are not necessarily more closely connected than companies not classified within the same code. If this is right, an *a*

*priori* assumption of synergies of such integration will indeed be wrong. The key issue is to what extent firms can deploy their existing primary competence and resources as a departure for growth, whether this is made in so-called related or unrelated markets. Accordingly, the possibility to accumulate existing competence and resources in a dynamic growth perspective will both give the opportunities and set the limits for a firm's growth.

In sum, the way we study vertical integration here should clearly be distinguished from those studies that start out with industry or firm classifications. Contrary to the present study, these studies assume *a priori* that companies within the same four-digit or three-digit SIC code are quite homogenous with respect to the technology, competence and resources they possess. Thus, these studies are very close to the neoclassical assumptions of resource mobility and homogeneity that we so seriously have neglected in this study.

### 9.3.2 Limitations and future research

We have throughout this dissertation exclusively used efficiency, as a part of the study's hard-core in addition to the two behavioral assumptions of bounded rationality and opportunistic attitude. Accordingly, in the theoretical discussion we have *a priori* assumed that firms pursue their goals in a rational economizing way. *First*, this implies that we have always searched explanations based on firms' interest in choosing the most efficient governance form. *Second*, this implies that firms beforehand are assumed to calculate the efficiency of different governance forms, and consequently, that they will choose the most efficient one. This *a priori* assumption is also reflected in the way we operationalize our dependent variable (cf. Section 7.4). As stated, different motives for vertical integration, as e.g. power and resource dependency, exist in the literature. Many of these motives, however, have no direct connection with efficiency. The exclusion of these motives may, especially from a sociological point of view, be criticized<sup>75</sup>. As Chiles & McMackin (1996:95) assert: "Ultimately, the question of which paradigm or alternative explanation is capable of explaining the most variance in governance structures is an empirical one". Accordingly, future studies may examine the

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<sup>75</sup> As Conner (1991:145) states, this may be tempting, since "it appears that reliable measures of underlying resources pose a heavy data burden on empirics".

<sup>76</sup> However, many of the relevant rival motives have been controlled for.



sociological explanations for vertical integration and compare the effect of these explanations with the efficiency-driven explanations provided in this study.

Moreover, the empirical test of the study has examined integration as a strategy of internal expansion. Thus, no effort was made to distinguish between the different options available for vertical integration<sup>77</sup>. The theoretical framework outlined may also be appropriate for explaining merger/acquisition. However, we think that additional variables may be incorporated. We think that further progress when studying merger/acquisition can use and further elaborate many of the arguments from Penrose (1959). As we see it, the insight from Penrose might be even more important today than it was nearly four decades ago, because of the progress done in the resource-based theory and evolutionary economics. Accordingly, the below discussion is mainly connected to Penrose's work from 1959.

We recall from Section 2.3 Penrose's (1959) main argument why firms will economize on growth: When previous problems can be handled routinely, managerial and productive resources are released and become available for planning and performing new activities. Moreover, a firm considers two groups of resources - its own inherited resources, and those it must obtain in the market in order to carry out its production and growth program (Penrose, 1959). If a firm decides to expand, individuals with relevant experience can to some extent be hired. In a short-term perspective, however, the possibility of efficient use of new employees is limited, because new employees will lack the experience within the given group or firm (Penrose, 1959). Besides, if some people should have this experience, such workers may be available to limited degree. In contrast, merger and acquisition strategies can be used as a means of obtaining new managerial and productive resources as a supplement to the firm's own resources (Penrose, 1959). But still, according to Penrose, such strategies must rely on resource relatedness in such a way that existing resources can be more appropriately used: "Acquisition is often a profitable process precisely because the firm has peculiar qualifications

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<sup>77</sup> As discussed in Section 7.4, the empirical test concerns backward vertical integration by expansion. The setting characteristics exclude backward merger or acquisitions as available options in the industry, since mainly three large companies in Norway and two large companies abroad represent the vendor side of the dyadic relations. Given the limited attention vertical integration has been given in the competence framework, it may be more suitable to study expansion rather than merger or acquisition. According to Penrose (1959), a theory of firm growth may best be understood and developed as a theory of internal expansion: "The significance of merger [and acquisition] can best be appraised in the light of its effect on the process of and limits to internal growth" (1959:5).

in the new field" (1959:129). Firms conducting merger/acquisition strategies are expected to search for potential firms, which can complement or supplement their existing resources (Penrose, 1959). Accordingly, while a high degree of relatedness (great buyer's CPC) may be related to internal expansion, medium closeness will probably be related to merger/acquisition. Consequently, a proposition can be offered that the increase from low to medium degrees of buyer's CPC is expected to be positively related to merger/acquisition.

However, we expect that other factors to a larger extent than is the case with internal expansion, may determine the decision of merger and acquisition. Penrose introduces factors such as the ease of developing appropriate co-ordinating procedures between the firms, the issue that the former independent firm requirement of autonomy, potential financial problems, merger or acquisition must be profitable for both parties, as representing possible modification effects. Thus, a proposition may be that increasing degrees of buyer's CPC (from low to medium) will be positively related to merger or acquisition, if:

The buyer's present routines are stabilized (and, accordingly, managerial and productive resources are released).

The acquired firm also will profit from the merger or acquisition.

The co-ordinating procedures are expected to be easily developed.

The acquiring firm has sufficient financial support or strength.

From this very general proposition, several testable hypotheses can be derived in future research. The "if statements", we presume, can act as moderating variables between the main effect in a model. The problem of conducting large-scale studies must, however, be examined. As previously stated, we do not think that e.g. standard industry classification systems will be an appropriate departure for such empirical work. Moreover, much effort must be directed to the operationalization of the "moderating" variables, especially with respect to "routine-stability". One strategy can be to measure for how long present activities have been performed in the firm. The longer the time, the more stabilized the routines, and the more resources may be released. The proposition can also be extended to distinguish between when merger and acquisition strategies will be chosen instead of internal expansion. As the increase from low to medium degrees of buyer's CPC is expected to be positively related to merger/acquisition, the increase from medium to high degrees of buyer's CPC is expected to be positively related to internal expansion. However, some firms may choose merger or acquisition if they for some

specific strategic reasons wish to acquire knowledge unrelated to current competence. In such situations, however, the firms must dedicate a strong degree of effort and willingness "... to sacrifice current output as well as gains from specialization to permit ... personnel to acquire the requisite breadth of knowledge that would permit absorption of knowledge from new domains" (Cohen & Levinthal, 1990:149). This is, however, beyond the Penrosian and RBT-perspective on how firms are expected to get 'above normal rents', and cannot be explained within this framework. However, firms in such situations must be able to devote a large amount of investments to maintain the efficiency of the firm. Not only must they make extensive investments in the new field, they must also "keep up with competitor's innovation and expansion in its existing field" (Penrose, 1959:137).

Moreover, this study has focused on the choice between market versus hierarchical and governance forms. However, during the last decade increasing attention has been directed towards the intermediate forms between market and hierarchy. Interfirm arrangements are often viewed as intermediate or hybrid forms along an institutional continuum of market to hierarchies. Our study is faced with the limitations of not trying to explain these hybrid forms. Below, however, we outline an initial step to how the framework of the study may be utilized in the study of the hybrid form.

In Table 9.3 the variables of transaction specific investments (TSI) and closeness to primary competence (CPC) have been combined to form a typology based on the theoretical framework of the study. The four cells represent different kinds of costs determined by the value of the variables in the table. Transaction and production cost differences in favor of either market or hierarchy are classified as high difference, marginal differences or no differences. In parenthesis it is indicated which governance mode is the most efficient solution with respect to production costs and transaction costs, respectively (either Market (M), Hierarchy (H) or no). The most efficient governance mode based on the sum of production and transaction costs is indicated after the number of the cell (e.g. in Cell 1, marked is proposed to be the most efficient solution).

**Table 9.3 A typology of predicted governance forms**

		TSI	
		Low	High
CPC	Low	1. Marked High PC differences (M) High TC differences (M)	2. Marked High PC differences (M) No TC differences
	High	3. Market Marginal PC differences (M) No TC differences	4. Hierarchy High TC differences (H) Marginal PC differences (M)

Using a strict cost efficiency analysis, utilizing the arguments from the study's synthesis, markets will be preferred in three out of the four cells. The way the synthesis differs from TCE and the competence perspective is illustrated in Table 9.4, where the cells indicate what TCE, the competence perspective, and the synthesis will predict, respectively.

**Table 9.4 Comparing the predictions in the perspectives**

	TCE	Competence Perspective	Syntheses
Cell 1	Market	Market	Market
Cell 2	Hierarchy	Market	Market
Cell 3	Market	Hierarchy	Market
Cell 4	Hierarchy	Hierarchy	Hierarchy

Both the competence perspective and TCE will predict "right" in three out of four cases. However, TCE is "wrong" in Cell 2 while the competence perspective is wrong in Cell 3. Notice, however, that the two perspectives predict similarly in two of the cases. However, the fact that the two perspectives do not account for the main variable in the other perspective is a crucial shortcoming of both perspectives. Using only the TCE-framework when TSI is high, one does not know if Cells 2 or 4 represent the described situation. This is acute, since Cells 2

and 4 in our framework actually predict different governance modes. The same problem is present using only the competence framework when CPC is high. If using only the competence perspective one does not know if Cells 3 or 4 represents the described situation.

Case 1 and 4 are the straightforward situations, where market and hierarchy are preferred, respectively. In Cells 2 and 3 the situations are not so clear-cut. In Cell 2, due to high production costs differences and similar transaction costs, the market will be preferred (note that this contrasts the standard TCE-predictions). The situation is even more complex in case 3, where the only cost efficiency argument that speaks for market is marginal TC-differences in favor of a market solution. In such situations there will be marginal cost differences between the two choices and other aspects than cost efficiency analysis will probably influence the decision. However, both cases in Cells 2 and 3 may alternatively be governed by a kind of hybrid form (Bradach & Eccles, 1989). Thus, we propose that further research on the hybrid form may utilize the framework developed in this study to examine the situations described in Cells 2 and 3 in Table 9.4.

Moreover, the only hypothesis that was not empirically supported, was trust's expected modification effect on TSI and VI. In Section 9.1 we provided one possible *post-hoc* explanation for the negative finding (i.e., the construct was poorly measured). The other interpretation, addressed below, may question the behavioral assumption of this study.

We argued that trust might be seen as a necessary condition for recurrent transactions, but not as a sufficient one (cf. Chapter 4 and Ring & Van de Ven, 1992). However, the direct effect of trust on vertical integration was significant (see Table 8.8). This empirical finding is inconsistent with our theoretical arguments. By contrast, this finding may fit well into those competence theories, which try to rationalize economic organization as the desire of belonging to a moral community (cf. Section 2.3 and Kogut & Zander, 1992; 1996). Within this framework, firms exist in light of being distinct social entities because of their ability to develop shared identities among its members (cf. Section 6.2; Kogut & Zander, 1996; Conner & Prahalad, 1996). Consequently, if interfirm relationships may provide the satisfaction of belonging to a moral community (Kogut & Zander, 1996), markets will do as well as firms. Thus, both firms and interfirm relationships may be viewed as 'social communities of voluntaristic action' (Kogut & Zander, 1996). Consequently, in some contexts the issue of

having social ties and interpersonal relations provide an incentive in itself for continuing the relationship. This potential extension of Kogut & Zander (1996) and Conner & Prahalad's (1996) works, however, result in the paradox that they therein are not able to rationalize the firm on knowledge grounds. If interfirm relations may satisfy the same requirement as firms, transactions may be governed equally in markets as in firms. The proposition would be that as long as the wish of social belonging to a moral community is satisfied, market and firms do equally well.

Within a calculative economic framework, such a view cannot explain the difference between firm and market organization. In Chapter 4, we distinguished between calculative and real trust (Chiles & McMackin, 1996). We argued that the calculative aspect is connected to reputation and knowledge-based trust. By contrast, real trust implies a total internalizing of somebody else's wishes and intentions and some kind of altruistic behavior. According to Williamson (1993:484), real trust makes no sense in an efficiency framework: "Be that as it may, trust, if it obtains at all, is reserved for very special relations between family, friends, and lovers". However, may it be that the actual problem of the treatment of real trust primarily is a result of the trade-off between consistency and realism in assumptions (Simon, 1991). Thus, may it be that so-called real trust (based on ethics, kinship, friendship, and empathy, cf. Nooteboom et al., 1997) may have positive effect on efficiency?

Our study shows that trust has a direct effect on vertical integration. However, this study is a reduced form of analysis and efficiency is not tested explicitly. Thus, it is examined whether actors behave according to the theory, and it is assumed that the choice of governance from is an efficient one. To address efficiency explicitly, one should examine governance forms' effect on efficiency depending on the level of asset specificity. Thus, future research may address to what degree trust as a calculative and an affective component, respectively, may have an impact on efficiency. Two hypotheses should be examined. Further studies should examine both the calculative dimension of trust as well as test the real trust dimension effect on efficiency. Both hypotheses may be addressed as interacting with asset specificity. However, the inclusion of trust's effect on efficiency is not just an empirical question. If the issue of real trust has something to tell economics, theoretical "answers" are even more important. However, in light of our study, one should be careful with changing the assumptions of opportunistic attitude of economic actors. All the other predictions in the study, based on this

assumption, were supported. Thus, the theoretical challenge of solving the issue of real trust is a great challenge for future research.

The present findings should be interpreted in the light of the study's methodological limitations. The use of hypothetical measures on the dependent variable may introduce some uncertainty in the interpretation of the results. Especially, the most common problem with this normative theory has been described as the preference reversal problem (cf. Section 7.4). The broader implication of this phenomenon connected to economic action and theory on firm levels is, however, still undiscovered (Slovic & Lichtenstein, 1983; Whyte, 1994), and should be subject to further research. When studying vertical integration one can e.g. conduct a longitudinal design measuring preferences at one point of time, and subsequently follow up with measuring real choice behavior. Consequently, the consistency between preferences and behavior can be used to evaluate to what degree the hypothetical measure is a valid indicator. The operationalization of the dependent variable is, however, consistent with a rational choice approach, assuming preferences to be consistent with choices. Additionally, the results obtained (i.e., asset specificity's impact on vertical integration) are consistent with previous research within the transaction cost economics framework.

Moreover, since the buyers in the empirical setting are subject to some economic regulation by state regulatory agencies (e.g. the distribution network of electric power is still regulated), a more complicated set of incentives is probably present than when studying the supply arrangement of completely unregulated firms (Joskow, 1985). However, the maintenance part of the industry, which is examined in this study, has never been regulated. Nevertheless, it is necessary to be sensitive to potential biases in supply arrangements that may be caused by the special circumstances surrounding the setting. The inclusion of control variables was expected to contribute to this. Additionally, the chosen empirical setting is very homogeneous. Thus, some possible third variables were ruled out by the setting (cf. Section 7.5). Thus, with respect to internal validity the study seems valid. However, given the correlational design, causality cannot be established from this study alone. Our focus was to examine if the pattern of relationships was consistent with a specific causal understanding. Thus, the present findings are an initial step on the road to causality determination. In order to establish directionality, subsequent longitudinal field studies will prove useful in further research.

The study's sample includes private as well non-privately owned organizations. The latter category, though, is to a large degree forced to act competitively. Thus, the results from the study may prove useful for all organizations present in environments with some pressure on economic profit. However, further research is needed to establish the generalizability of these findings to other kinds of contexts.

## **9.4 Concluding remarks**

In this dissertation we have shown how the study of vertical integration can benefit from an integration of transaction cost economics and the competence perspective. By doing this, we also indicated the promise of a fruitful integration of transaction cost and competence theories in general. This chapter has shown that, as is common for most academic endeavors, the study has both strengths and limitations. However, most of the limitations arise out of the fact that no one study can address all aspects relevant for studying a particular phenomenon. Particularly, this is evident with respect to our choice of assumptions, our choice of methodology and the way the dependent variable was operationalized. As we see it, however, these limitations may illustrate useful directions for future research. It is only through a collection of studies that the issue of integrating transaction cost economics and the competence framework can be properly unraveled.



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# APPENDICES



## APPENDIX A. Questionnaire

### STUDIE AV LEVERANDØRRELASJONER I KRAFTVERKSBRANSJEN

Undertegnede gjennomfører for tiden et dr.grads arbeid om leverandørrelasjoner i kraftverksbransjen. Studien gjennomføres i samarbeid med EnFO (se vedlegg). Innkjøp og forsyning er områder som har fått stor oppmerksomhet i norsk næringsliv den senere tid. Et sentralt punkt er hvordan bedrifter kan effektivisere sine innkjøpsrutiner. Denne studien analyserer sentrale faktorer som påvirker styring og organisering av leverandørrelasjoner i kraftverksbransjen. For å realisere studien er vi imidlertid avhengig av Deres velvilje til å delta. Vi ønsker derfor å kartlegge de erfaringer Deres organisasjon har vedrørende kjøp av mekaniske vedlikeholdsaktiviteter.

Vedlagte spørreskjema inneholder spørsmål om én mekanisk vedlikeholdsaktivitet, hvor én leverandør har hatt hovedansvaret for gjennomføring. Den som svarer kan selv velge hvilken aktivitet han/hun ønsker å ta utgangspunkt i. Kravet er at leverandør ble benyttet sist gang aktiviteten ble utført. Vedlagt finner De 5 identiske spørreskjemaer. Vi ønsker at De evt. svarer på ett av de vedlagte spørreskjemaene. I tillegg ber vi om Deres velvilje til å **distribuere resterende skjema** til andre i Deres organisasjon som har **kjennskap** til og en **viss innflytelse** på leverandørhåndtering i **mekaniske vedlikeholdsaktiviteter**. Disse personene bør være lokalisert i underavdelinger eller separate organisatoriske enheter. Hvis f.eks. Deres organisasjon returnerer 4 skjemaer, skal 4 ulike aktiviteter omhandles og helst besvares av 4 ulike personer. Vi håper naturligvis at flest mulig av de 5 skjemaene besvares, men uansett er vi er svært takknemlig for de skjemaene som returneres.

Vi gjør oppmerksom på at alle opplysninger vil bli behandlet strengt konfidensielt. Dataene vil kun benyttes i aggregert form. Det vil altså ikke vil være mulig å tilbakeføre opplysninger til den enkelte organisasjon. Vi takker for at De og Deres organisasjon vil delta i undersøkelsen. Vennligst returner utfylte spørreskjemaer i de vedlagte svarkonvolutter **innen torsdag 17. april**. De personer som svarer på spørreskjemaet vil få tilsendt et **sammendrag av undersøkelsens resultater**. I tillegg vil alle som sender et ferdig utfylt skjema, få en **musikk-CD** tilsendt i posten. Dersom De har noen spørsmål angående undersøkelsen, vær vennlig å ta kontakt med Boge Gulbrandsen (tlf.: arbeid - 32 11 72 08 / privat - 22 06 23 05, e-mail: Boge.Gulbrandsen@hibu.no).

Vennlig hilsen

Boge Gulbrandsen  
Høyskolelektor / Dr.grads stipendiat  
Høgskolen i Buskerud

Hans Anton Stubberud  
Dekanus  
Høgskolen i Buskerud

Vedlegg

Brev fra EnFO og deltagerne i EFFEN prosjektet Vedlikeholdssystemer.  
Spørreskjemaer og svarkonvolutter

## LEVERANDØRRELASJONER I KRAFTVERKSBRANSJEN

Denne studien inngår som en del av et dr.grads arbeid og utføres i samarbeid med EnFO. I dette spørreskjemaet blir De hovedsakelig bedt om å svare på spørsmål om en mekanisk vedlikeholdsaktivitet hvor en leverandør har hatt hovedansvaret for gjennomføring. De velger selv hvilken aktivitet og leverandør De ønsker å ta utgangspunkt i.

De fleste spørsmål er formulert som utsagn og det benyttes en sværskala fra 1 til 7. De svarer ved å sette en ring rundt ett av tallene. Tallet De velger skal gjenspeile i hvilken utstrekning utsagnet er beskrivende for ditt kraftverk. Når det gjelder spørsmål hvor vi ber om tallstørrelser eller prosenter, er det tilstrekkelig å oppgi omtrentlige verdier. Det skal ikke være nødvendig å lete frem opplysninger for å besvare skjemaet. Noen spørsmål kan virke ikke, men de har alle til formål å øke presisjonen av undersøkelsen. Din umiddelbare reaksjon er sannsynligvis den riktige og vi ber deg besvare spørsmålene i et raskt og jevnt tempo.

Alle opplysninger som blir gitt i dette skjemaet vil bli behandlet strengt konfidensielt. Det er kun totalresultatene fra alle kraftverkene som deltar i undersøkelsen som vil bli offentliggjort. Vennligst returner utfyllt spørreskjema i den vedlagte svarkonvolutten lørdag 30. april. De personer som svarer på spørreskjemaet får tilsendt et sammendrag av undersøkelsens resultater samt en musikk-CD. Dersom De har noen spørsmål angående undersøkelsen, vær vennlig å ta kontakt med Boge Gulbrandsen, HIBU, Bredalshv. 14, 3500 Hønefoss (lf: arbeid - 32 11 72 08 / privat - 22 06 23 05, e-mail: Boge-Gulbrandsen@hibu.no). Vennligst benytt blokkstaver når du fyller ut med tekst.

Navn på den som besvarer spørreskjemaet: \_\_\_\_\_

Stilling: \_\_\_\_\_

Firmanavn \_\_\_\_\_

Evt. avdeling/lokalisering: \_\_\_\_\_

Ditt navn og firmanavn brukes for å identifisere hvor sammendraget av undersøkelsen og CD'en skal sendes.

Dersom du ønsker å få tilsendt et sammendrag av resultatene fra denne undersøkelsen, vennligst sett et kryss i rutem:

Vennligst sett ett kryss ved den CD-en som du vil ha tilsendt i posten:

- Best of GRIeg
- Odd Berretzen: Noen ganger er det allright
- Thorbjørn Egner: De skåsten beste Egner-viser
- The romantic of Mozart

## DEL A. VALG AV VEDLIKEHOLDSAKTIVITET OG LEVERANDØR

1 Under listes det opp ulike mekaniske vedlikeholdsaktiviteter. Vennligst veig én av disse aktivitetene hvor én ekstern leverandør hadde hovedansvaret for gjennomføringen slat gang den ble utført. Når du velger, bør du prioritere en aktivitet som du har god kjennskap til hvordan reaksjonen til leverandøren ble håndtert.

Aktiviteten du velger kan også alternerast utføres for tiden, hvis prosjektet er godt etablert og hovedtyngden av arbeidet er gjennomført. Vennligst sett ett kryss ved den valgte aktiviteten under (kan én aktivitet skal velges):

- Oppgradering av løpehjul
- Utskifting av løpehjul
- Oppgradering av kuleventiler foran turbin
- Anstakfeise av kuleventiler foran turbin
- Hovedrevisjon av turbin
- Revisjon av regulator
- Skifte av spallering
- Revisjon av store luker (av typen stenge/lappe organer i henhold til NVE)
- Revisjon av store ventiler (av typen stenge/lappe organer i henhold til NVE)
- Revisjon av mindre luker
- Revisjon av mindre ventiler
- Revisjon av gtrinder

2 I hvilket år startet arbeidet med den valgte aktiviteten? \_\_\_\_\_

3 Hvor lang tid tok det totalt å gjennomføre prosjektet?: Ca. \_\_\_\_\_ uker

4 Hva var totalkostnaden for denne aktiviteten? Ca.: \_\_\_\_\_ kroner.

5 Hvor ofte antar du at aktiviteten utføres i gjennomsnitt i deres kraftverk?

Ca. hvert \_\_\_\_\_ år, eller

Ca. hver \_\_\_\_\_ måned

0-20%    20-40%    40-60%    60-80%    80-100%

6 Hvor stor andel av den valgte aktiviteten ble utført av leverandøren?

1	2	3	4	5
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7 Hvis du vil, vennligst oppgi navnet på leverandøren som utførte denne vedlikeholdsaktiviteten?

**DEL B. SPØRSMÅLENE I DENNE DELEN SKAL BESVARES I RELASJON TIL DEN VALGTE AKTIVITET OG LEVERANDØR FRA DEL A.**

**1. Nederfor har vi listet noen utsagn som omhandler deres organisasjons kompetanse tilknyttet den valgte aktivitet og leverandør. Vennligst vurder påstandene ved å sette en sirkel rundt tallet som passer best.**

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Den kompetansen vår organisasjon har er i nærheten av den kompetansen som leverandøren tilbyr i forbindelse med gjennomføringen av aktiviteten								
2	Vårt kraftverks kunnskap kan sammenlignes med de kunnskapsene leverandørens personell har i utførelsen av aktiviteten								
3	Vår organisasjons ferdigheter er godt egnet for utførelse av aktiviteten, sammenlignet med leverandørens ferdigheter								
4	Våre ruiner og prosedyrer er godt egnet som grunnlag for å utføre aktiviteten tiluæret like godt som leverandøren								
5	Vårt kraftverk har svært begrenset kompetanse i utførelse av aktiviteten, sammenlignet med leverandøren								
6	Våre ansatte har ikke på langt nær tilstrekkelige ferdigheter til å kunne utføre aktiviteten så effektivt som leverandøren.								
7	Sammenliknet med leverandørens personell, vil kvaliteten reduseres betraktelig hvis vårt personell skulle utføre aktiviteten								

**2. I dette spørsmålet ønsker vi å belyse hvilke tilpasninger din organisasjon gjennomførte i dette samarbeidet. Vennligst vurder påstandene under.**

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Vi har brukt mye tid for å sikre at spesifikasjoner for denne aktiviteten er godt tilpasset leverandøren								
2	Det var nødvendig å tilpasse vårt produksjonsutstyr til leverandørens krav								
3	Leverandøren har tekniske standarder som krevde spesialtilpassing fra oss								
4	Vi har gjennomført investeringer i utstyr og anlegg som er tilpasset leverandørens standarder								
5	Vi brukte en del ressurser på omorganisering av kraftproduksjonen i forbindelse med dette samarbeidet								
6	Ansatte som arbeidet med leverandøren ble gitt spesiell opplæring								
7	Under samarbeidet var vi nødt til å sette oss inn i mange sider ved leverandørens virksomhet								
8	Vi har brukt mye tid på å tilegne oss kunnskap om leverandørens tekniske standarder								
9	Vår bedrift brukte ressurser på opplæring og utvikling av leverandørens personell i forbindelse med samarbeidet								

3. I dette spørsmålet ønsker vi å belyse hvilke tilpasninger du tror at din leverandør foretok i dette samarbeidet. Vennligst vurder påstandene.

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Deler av leverandørens produksjonsstyr var spesialtilpasset for utførelse av denne vedlikeholdsaktiviteten	1	2	3	4	5	6	7	
2	Leverandøren brukte mye tid for å sikre at spesifikasjoner for denne aktiviteten var godt tilpasset vårt kraftverk	1	2	3	4	5	6	7	
3	Vårt kraftverk har tekniske standarder som krevde spesialtilpassing fra leverandørens side	1	2	3	4	5	6	7	
4	Leverandøren gjennomførte spesielle investeringer i utstyr og anlegg som var tilpasset vårt kraftverk	1	2	3	4	5	6	7	
5	Vår leverandør brukte en del ressurser på omorganisering av produksjonen i forbindelse med samarbeidet	1	2	3	4	5	6	7	
6	Vår leverandør ga egne ansatte spesiell opplæring i forbindelse med samarbeidet	1	2	3	4	5	6	7	
7	Under samarbeidet var leverandøren nødt til å sette seg inn i mange stider ved vår virksomhet	1	2	3	4	5	6	7	
8	Leverandøren brukte mye tid på å tilegne seg kunnskap om våre tekniske standarder	1	2	3	4	5	6	7	
9	Leverandøren brukte mye ressurser på opplæring og utvikling av vårt personell	1	2	3	4	5	6	7	

4. I dette spørsmålet ønsker vi å se på hvordan dere vurderer å gjennomføre vedlikeholdsaktiviteten i fremtiden.

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Vi vurderer på sikt å overta hovedansvaret for å gjennomføre vedlikeholdsaktiviteten selv.	1	2	3	4	5	6	7	
2	Hvis behovet for vedlikeholdet skulle oppstå uventet, vil aktiviteten neste gang bli utført internt i egen organisasjon	1	2	3	4	5	6	7	
3	Hvis behovet for vedlikeholdet kan forutses, vil aktiviteten neste gang bli utført av egen organisasjon	1	2	3	4	5	6	7	
4	Det er svært sannsynlig at aktiviteten neste gang vil utføres av eget personell	1	2	3	4	5	6	7	
5	Neste gang vedlikeholdsaktiviteten skal utføres vil vi også benytte en eller annen ekstern leverandør	1	2	3	4	5	6	7	
6	Neste gang vedlikeholdsaktiviteten skal utføres vil vi benytte samme leverandør	1	2	3	4	5	6	7	

5. I dette spørsmålet ønsker vi å se på hvordan leverandørforholdet ble styrt. Vennligst vurder påstandene under.

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Alle forhold knyttet til kvalitetskontroll av aktiviteten vi kjøpte fra leverandøren var kontraktfestet	1	2	3	4	5	6	7	
2	Den daglige styringen av samarbeidet var klart uttrykt i en skriftlig avtale	1	2	3	4	5	6	7	
3	Det var uarbeidet faste prosedyrer for hvordan leverandøren skulle følge opp avtaler og foresendelser	1	2	3	4	5	6	7	
4	Skriftlige avtaler regulerte alle forhold ved håndtering av misnøye, klager og konflikter	1	2	3	4	5	6	7	

6. I dette spørsmålet ønsker vi at de samme/nikler din organisasjons kompetanse med leverandorens kompetanse i planlegging, organisering og utførelse av aktiviteter. Venligst ta stilling om ditt kraftverk er på nivå med eller i nærheten av leverandorens kompetanse på områdene listet under. Alle kompetanseområdene skal vurderes i relasjon til den valgte aktiviteten.		Svært nær leverandorens kompetanse-nivå	Svært langt unna leverandorens kompetanse-nivå	8. I dette spørsmålet ønsker vi at du vurderer din leverandørs ytelse i utførelsen av aktiviteten på områdene listet under. Venligst foreta vurderingen i forhold til gjeldende industrinorm, eller i forhold til hva du kunne oppnådd ved bruk av andre leverandører.													
		1	2	3	4	5	6	7	Svært dårlig ytelse av leverandøren	1	2	3	4	5	6	7	Svært god ytelse av leverandøren
1	Utførelse av spesifikasjoner for utførelse	1	2	3	4	5	6	7	Kvaliteten på utførelsen	1	2	3	4	5	6	7	
2	Beherske bruken av relevant produktjonsutstyr for utførelse	1	2	3	4	5	6	7	Overholdelse av definerte spesifikasjoner	1	2	3	4	5	6	7	
3	Tekniske rutiner og prosedyrer for utførelse	1	2	3	4	5	6	7	Overholdelse av tidsfrister	1	2	3	4	5	6	7	
4	Administrative rutiner og prosedyrer for planlegging og utførelse	1	2	3	4	5	6	7	Respons på endringer	1	2	3	4	5	6	7	
5	Tekniske støtteamaktiviteter av relevans for utførelsen	1	2	3	4	5	6	7	Generell assistanse ved forespørsler	1	2	3	4	5	6	7	
6	Oppfølging og instruksjon av personell	1	2	3	4	5	6	7	Teknisk støtte under utførelse	1	2	3	4	5	6	7	
7	Organisering og styring av personell som utfører aktiviteten	1	2	3	4	5	6	7	Oppfølging og instruksjon	1	2	3	4	5	6	7	
8		1	2	3	4	5	6	7	Oppfølgingservice	1	2	3	4	5	6	7	

7. Hvor dekkende er følgende utsagn for samarbeidet med leverandøren?		Svært dårlig beskrivelse	Svært god beskrivelse					
		1	2	3	4	5	6	7
1	Vi stolte på at leverandøren utførte arbeidet på en 100% ærlig og redelig måte	1	2	3	4	5	6	7
2	Det var greit at leverandøren tok beslutninger av betydning for vårt kraftverk uten vår innblanding	1	2	3	4	5	6	7
3	Vi hadde ingen meningsstillinger mot at leverandøren utførte oppgaver som vi ikke kunne kontrollere	1	2	3	4	5	6	7
4	Vi hadde stor tillit til at leverandøren handlet til vårt beste	1	2	3	4	5	6	7
5	Generelt hadde vi stor tillit til leverandøren	1	2	3	4	5	6	7

9. I dette spørsmålet ønsker vi å se på ulike sider ved hvordan vedlikeholdsaltdrivteten kan dokumenteres og utføres.

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Det er mulig for oss å utarbeide en håndbok som beskriver hvordan leverandøren utfører dette arbeidet	1	2	3	4	5	6	7	
2	Omfattende dokumentasjon om hvordan leverandøren utførte arbeidet er tilgjengelig i vår organisasjon	1	2	3	4	5	6	7	
3	Spesifikke prosedyrer for utførelse av arbeidet finnes kun i leverandørens arkiver, og er ikke tilgjengelig for oss	1	2	3	4	5	6	7	
4	Prosedyrer for kvalitetskontroll av arbeidet finnes kun i leverandørens arkiver, og er ikke tilgjengelig for oss	1	2	3	4	5	6	7	
5	Det er lett for vårt personell å lære hvordan vedlikeholdsaktiviteten skal utføres ved f.eks. informasjonsutveksling med erfarne fagfolk	1	2	3	4	5	6	7	
6	Vårt personell kan relativt lett lære hvordan vedlikeholdsaktiviteten utføres ved å studere tilgjengelige manualer, tegninger, planer o.l.	1	2	3	4	5	6	7	
7	Det er enkelt å lære opp personell til å utføre aktiviteten, hvis de har generell teknisk kraftverktørføring fra før	1	2	3	4	5	6	7	
8	Det er mulig for én person å vite alt om hvordan denne aktiviteten skal utføres	1	2	3	4	5	6	7	
9	For å utføre aktiviteten tilfredsstillende er det viktig at de som utfører den har erfaring fra tilsvarende arbeidsoppgaver	1	2	3	4	5	6	7	
10	De som utfører aktiviteten har behov for å være i kontinuerlig kontakt med annen ekspertise om de har selv	1	2	3	4	5	6	7	

10. Nedenfor ber vi deg ta stilling til påstander om hvordan beslutningsansvaret mellom din organisasjon og leverandøren var i dette samarbeidet.

	I sin helhet besluttet av leverandør	1	2	3	4	5	6	7	I sin helhet besluttet av vårt kraftverk
1	Leverandørens produksjonsprosess i forbindelse med utførelsen	1	2	3	4	5	6	7	
2	Leverandørens valg av teknologi	1	2	3	4	5	6	7	
3	Pågående design og konstruksjonsendringer	1	2	3	4	5	6	7	
4	Valg og godkjenning av leverandørens underleverandører	1	2	3	4	5	6	7	
5	Leverandørens prosedyrer for kvalitetskontroll	1	2	3	4	5	6	7	
6	Kontraktstengden	1	2	3	4	5	6	7	
7	Leveringsplanen og leveringstiden	1	2	3	4	5	6	7	
8	Betalingsbetingelsene	1	2	3	4	5	6	7	

11. I dette spørsmålet ønsker vi å undersøke om Deres bedrift og den valgte leverandøren har gjennomført investeringer som er spesifikke for dette kunde-leverandørforholdet. Disse investeringene er av en slik art at verden reduseres vesentlig dersom samarbeidet opphører (dvs. investeringer som har lav alternativ verdi). Eksempler på slike investeringer er tilpassing av produksjonsutstyr, tekniske standarder, utstyr, anlegg og ansatte som er spesifikke for dette kunde-leverandørforholdet.

	I hvilken grad har leverandøren gjennomført slike spesifikke investeringer?	1	2	3	4	5	6	7	I hvilken grad har din organisasjon gjennomført slike spesifikke investeringer?
1	I hvilken grad har leverandøren gjennomført slike spesifikke investeringer?	1	2	3	4	5	6	7	
2	I hvilken grad har din organisasjon gjennomført slike spesifikke investeringer?	1	2	3	4	5	6	7	

12. I dette spørsmålet skal du utgangspunktet i at den valgte aktiviteten skal utføres av en personell neste gang behovet oppstår. Dvs. du skal svare at aktiviteten neste gang skal utføres uten bruk av ekstern leverandør. Gitt dette utgangspunktet, hvor dekkende er påstandene nedenfor?

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Vi må foresta store investeringer i teknologi og produksjonsutstyr	1	2	3	4	5	6	7	
2	Vi må i stor grad ansette nytt personell	1	2	3	4	5	6	7	
3	Vi må basere utførelsen på støtte fra innleide konsulenter	1	2	3	4	5	6	7	
4	Vi vil bruke mye tid på å kontrollere og følge opp egne ansatte når de utfører aktiviteten	1	2	3	4	5	6	7	
5	Å bli enig med de ansatte om spesifikasjoner og prosedyrer for utførelse kan bli tidkrevende	1	2	3	4	5	6	7	
6	Koordinering og styring av de ansatte vil bli kostnadskravende	1	2	3	4	5	6	7	
7	I forbindelse med utførelsen av aktiviteten kan vi forvente at de ansatte vil endre på informasjon for å få det som de ønsker	1	2	3	4	5	6	7	
8	Våre ansatte kan i forbindelse med utførelsen være tilbøyelig til endre på enkelte prosedyrer for å oppfylle egne behov	1	2	3	4	5	6	7	
9	Vi kan forvente at våre ansatte vil holde tilbake noe informasjon om utførelsen hvis det er til egen fordel	1	2	3	4	5	6	7	
10	Ledelsen vil være villig til å la de ansatte ta sentrale avgjørelser uten selv å delta i beslutningsprosessen	1	2	3	4	5	6	7	
11	Vi lar gjerne ansatte utføre denne aktiviteten uten at vi kontrollerer arbeidet	1	2	3	4	5	6	7	

13. Nedenfor har vi listet en rekke påstander som omhandler tilpassningen mellom deres bedrift og leverandørene. Venligst vurder påstandene.

	Svært dårlig beskrivelse	1	2	3	4	5	6	7	Svært god beskrivelse
1	Det var forventet at både leverandøren og vårt kraftverk foretok justeringer underveis for å tilpasse oss endrede forhold	1	2	3	4	5	6	7	
2	Hvis en uventet situasjon oppsto, ble partene lett enige om ny avtale isteden for å holde seg til den opprinnelige	1	2	3	4	5	6	7	
3	Begge parter var fleksible med hensyn til forespørsler om endringer	1	2	3	4	5	6	7	
4	Vi utvekslet informasjon med leverandøren selv om det ikke var avtalt på forhånd	1	2	3	4	5	6	7	
5	I denne relasjonen var det forventet at begge parter ville tilby hverandre informasjon hvis dette var til hjelp	1	2	3	4	5	6	7	
6	I relasjonen var det forventet at partene informerte hverandre om hendelser og endringer som var relevant for motparten	1	2	3	4	5	6	7	
7	Problemer som oppsto i relasjonen ble i stor grad betraktet som felles og ikke som egne	1	2	3	4	5	6	7	
8	Partene i relasjonen hadde ingen ting imot å stille seg til raddighet for hverandre	1	2	3	4	5	6	7	
9	Ansvar for at relasjonen fungerte, var felles delt mellom vår leverandør og oss	1	2	3	4	5	6	7	
10	Uenighet mellom leverandøren og oss ble håndtert på en konstruktiv måte	1	2	3	4	5	6	7	
11	Møter mellom leverandøren og oss ga ofte ny innsikt	1	2	3	4	5	6	7	
12	Vår leverandør viste en svært god forståelse for vår virksomhet	1	2	3	4	5	6	7	
13	Vi har et svært omfattende samarbeid med denne leverandøren som har pågått i mange år	1	2	3	4	5	6	7	

14. Under vil vi at du skal vurdere noen flere påstander om den valgte leverandøren.		Svært dårlig beskrivelse		Svært god beskrivelse				
1	Denne leverandøren har rykte for å være ærlig	1	2	3	4	5	6	7
2	Leverandøren har også rykte for å være oppriktig og/eller kostnadsdata som vi ønsket fra leverandøren	1	2	3	4	5	6	7
3	Hos de fleste kundeforhold har denne leverandøren et godt renommé	1	2	3	4	5	6	7
4	Det hendte at vår leverandør endret på informasjon for å få gjennomført ting på sin måte	1	2	3	4	5	6	7
5	Vår leverandør lovet fra tid til annen å utføre noe som ikke ble gjort	1	2	3	4	5	6	7
6	Det hendte at leverandøren ga et feilaktig bilde av virkeligheten når forhandlinger ble utført	1	2	3	4	5	6	7
7	Vi kunne forvente at leverandøren holdt tilbake informasjon hvis det var til egen fordel	1	2	3	4	5	6	7
8	Vi brukte unødvendig mye tid på å kontrollere leveransene fra leverandøren	1	2	3	4	5	6	7
9	Det var vanskelig å få tak i de produktions- og/eller kostnadsdata som vi ønsket fra leverandøren	1	2	3	4	5	6	7
10	Koordinering og styring av dette samarbeidet var svært kostnadsforøvende	1	2	3	4	5	6	7
11	Vår bedrift klarer ikke å utnytte leverandørenes kompetanse og produktivitet særlig godt	1	2	3	4	5	6	7
12	Det var vanskelig å bli enig med denne leverandøren om spesifikasjoner og støttes tjenester	1	2	3	4	5	6	7
13	Forhandlinger om priser og/eller bonusordninger med denne leverandøren var tidskrevende	1	2	3	4	5	6	7

15. Til slutt i denne delen har vi listet noen påstander om problemer og usikkerhet forbundet med aktiviteten. Venligst vurder påstandene.		Svært dårlig beskrivelse		Svært god beskrivelse				
1	Det krevides omfattende inspeksjoner for å vurdere denne leverandørenes ytelser	1	2	3	4	5	6	7
2	For å få et tilfredsstillende inntrykk av denne leverandørenes ytelser, måtte vi utføre uventet inspeksjon av arbeidet	1	2	3	4	5	6	7
3	Det var vanskelig å evaluere om leverandøren fulgte vedtatte prosedyrer for produktions- og kvalitetskontroll	1	2	3	4	5	6	7
4	Vi vil beholde eksisterende leverandør fordi det krever for mye tid, energi og kostnader å bytte	1	2	3	4	5	6	7
5	Det er en nødvendighet å beholde eksisterende leverandør, siden få reelle alternativer eksisterer med hensyn til pris og kvalitet	1	2	3	4	5	6	7
6	Tilgjengeligheten på alternative leverandører for denne vedlikeholdsaktiviteten er veldig varierende	1	2	3	4	5	6	7
7	Usikkerhet i utførelsen av vedlikeholdsaktiviteten er et stort problem på dette markedet	1	2	3	4	5	6	7
8	Markedet hvor vi kjøper vedlikeholdsaktiviteten er uoversikkelig	1	2	3	4	5	6	7
9	Markedstilgangen for utførelse av aktiviteten er ustabil	1	2	3	4	5	6	7
10	Pris på utførelse av aktiviteten varierer mye	1	2	3	4	5	6	7
11	Vi vurderer nye om vår leverandør holder tritt med andre aktuelle aktører med hensyn til pris og kvalitet	1	2	3	4	5	6	7





## APPENDIX B. Measures

**Table B.1 Measures of variables in the theoretical model**

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### **Vertical integration (Composite Reliability = 0.94)**

1. In the longer term, the principal responsibility for carrying out the maintenance activity will be executed by our own organization.
2. If the need for maintenance should arise unexpectedly, the activity will next time be carried out internally in our own organization.
3. If the need for maintenance can be foreseen, the activity will next time be carried out by our own organization.
4. It is very likely that the activity next time will be carried out by our own staff.

### **Tacitness**

#### **Codifiability (Composite Reliability = 0.64)**

1. A useful manual describing how the supplier carries out the maintenance activity can be written by our power station
2. Extensive documentation describing critical parts of how the supplier carried out the activity exists in our unit

#### **Teachability (Composite Reliability = 0.87)**

3. Our personnel can easily learn how to carry out the maintenance activity by talking to skilled personnel
4. Our personnel can easily learn how to carry out the activity by studying a complete set of blueprints
5. New personell can easily learn how to accomplish the maintenance activity, if they possess general technical powerstation practice

#### **System dependence (Composite Reliability = 0.50)**

6. It is possible for one person to know everything about how to carrying out the entire activity
7. Workers accomplishing the activity have to be in constant contact with others having different expertise than themselves

### **Interfirm trust (Composite Reliability = 0.85)**

1. We trusted our supplier to accomplish the work in a 100% honest and truthful way
2. We have full confidence that our supplier will act with our best interests in mind
3. We generally trust our supplier to a great extent

### **Buyer's closeness to primary competence (Composite Reliability = 0.89)**

1. Our unit's knowledge can be compared with the knowledge our supplier's employees possess in carrying out the activity
2. Our unit's skills are suitable for carrying out the activity, compared with our supplier's skills.
3. Our routines and procedures are suitable to accomplish the activity approximately as well as our supplier

### **Buyer's human transaction specific investments (Composite Reliability = 0.77)**

1. We have spent significant resources in reorganizing the power production in connection with this particular co-operation
  2. Employees working together with our supplier were given specialized training
  3. During the collaboration we brought into notice significant aspects of our supplier's operations.
  4. We have spent significant time to acquire knowledge about our supplier's technical standards
-

## **Table B.2 Measures of control and rival variables.**

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### **Vendor's human transaction specific investments**

1. Our supplier spent significant resources in reorganizing the production in connection with this particular co-operation
2. Our supplier gave their employees specialized training in connection with this particular co-operation
3. During the collaboration the supplier brought into notice significant aspects of our unit's operations.
4. The supplier spent significant time to acquire knowledge about our unit's technical standards
5. The supplier spent resources on training and development of our unit's employees.

### **Environmental uncertainty**

1. Availability of alternative vendors in the market is highly uncertain.
2. Uncertainties in accomplishing the maintenance activity in the market are a real problem
3. The market in which we buy the maintenance activity is complex.
4. Supply of accomplishing the maintenance activity in the market is not stable.
5. Prices for accomplishing the maintenance activity are volatile

### **Annual sales**

The measure was available from EnFO's database.

### **Formalization**

1. All aspects regarding quality control of the activity purchased from the supplier were stipulated in a contract.
2. The daily control relationship was expressed in written agreements.
3. We outlined set procedures for how the supplier should follow up agreements and sendings
4. Written contracts managed the handling of discontent, complaints and disputes.

### **Buyer's dependence of the supplier**

How dependent is the unit of this particular supplier for carrying out the maintenance activity?

### **Technological economies**

In order to accomplish the activity in-house, we have to undertake great investments in technology and production equipments.

### **Capacity utilization**

In order to accomplish the activity in-house, to a great extent we have to employ new personnel.

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**Table B.3 Measures of variables representing explanatory mechanisms.**

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**Transaction costs**

1. We used too much time controlling the supplies of this supplier
2. It was time-consuming and difficult to get necessary verification of production performance and costs from this supplier
3. The co-ordination and governing of the relationship with this supplier was very costly
4. Our firm did not manage to utilize the skills and production resources of this supplier very well
5. It was difficult to agree with this supplier about specifications of products and services
6. Negotiations about price and payment terms with this supplier proved time-consuming

**Opportunistic behavior**

1. Occasionally, our supplier altered information in order to carry out things his own way
2. Sometimes our supplier promised to do things without actually doing them later
3. Sometimes, our supplier altered the facts slightly when negotiations were carried out
4. We could expect the supplier to keep back information in order to protect his own interest

**Expected transaction costs if integrating the transaction**

1. We will use a lot of time to control and monitor our own employees when they carry out the activity
2. It may prove difficult and time-consuming to make agreement with our employees about specifications and procedures for performing the activity
3. The co-ordination and governing of the employees will be very costly

**Expected opportunistic behavior if integrating the transaction**

1. We may expect our employees to alter or keep back information about the activity if this is to their own advantages
  2. We will expect that our employees will alter procedures in order to get the things they want
  3. We will expect our employees to keep back information in order to protect their own interests
-

## APPENDIX C. The choice of estimation method and fit-indexes

A study should not report a long list of indexes but only the most suitable for the study addressed (Hoyle & Panter, 1995). As recommended by Tanaka (1993) and Hoyle & Panter (1995) we provide; (1) an overview and justification of the fit-indexes chosen based on the characteristics of the study; (2) a definition of each index, and, (3) the critical value of each index that indicates an acceptable fit. Below, we first rationalize the choice of estimation method before we give an overview of the different fit indexes available. Finally, we justify the choice of absolute and incremental fit indexes to be evaluated in the study.

### ESTIMATION METHOD

There seem to be a widely accepted, and growing body of research indicating (Hoyle & Panter, 1995) that the estimation method of maximum likelihood (ML) performs more consistent than generalized least squares (GLS) and asymptotic distribution-free (ADF) in most situations. Hu & Bentler (1995) through a review of the studies examining this issue, state: "... all the fit indexes obtained from ML performed much better than those obtained from GLS and ADF and should be preferred .. for model selection and evaluation." Thus, ML is used as estimation method in the study.

### MODEL FIT: AN OVERVIEW

At the most general level, it is common to classify fit indexes as absolute and incremental indexes, respectively. Absolute fit assesses how well the covariances implied by the fixed and free parameters specified in the model reproduce the observed covariances. The RMSEA and chi-square tests have a known sampling distribution and can be applied as test statistics. For absolute fit indexes, higher values imply increasing discrepancy, and, thus, these indexes are actually measuring "absence-of-fit". *Incremental fit*, by contrast, measures the degree to which the model in question is superior to an alternative model. The alternative model (i.e. the "null" or independence model) is usually one that specifies no covariation or correlation among the observed variables in reproducing the observed covariances. Larger values indicate greater improvement of the model in question over the alternative, and thus, these indexes measure "goodness-of-fit".

#### Absolute fit indexes

The  $\chi^2$  test is a measure of perfect fit (i.e., to which degree the measurement model accounts for the observed correlations or covariations among the indicants). Optimal fit or exact reproduction of the sample data is indicated by a value of zero. Since the statistical theory for  $T$  is asymptotic, the problem is that the  $\chi^2$  test is sensitive to sample sizes (i.e., as the sample sizes increases the chances of rejecting the null-hypotheses also increases). The test is, however, viewed as the most promising index for which the sampling distribution is known (Hoyle & Panter, 1995). RMSEA is a statistical test of close fit and, thus, it is concerned about the phenomenon of approximation. RMSEA will be zero if there is no discrepancy between the estimated and the observed covariances. RMSEA adjusts for degrees of freedom as it will increase in size if additional parameters reduce the discrepancy only slightly (Browne &

Cudeck, 1993). A value of less than 0.05 indicates a close fit of the model in relation to the degrees of freedom (Browne & Cudeck, 1993).

Several other absolute fit indexes (e.g. GFI, AGFI, AIC, CAK, CK, MCI, CN) exist in the literature. The evaluation of these indexes shows mixed results, with the GLE-based GFI as the most promising candidate (Hu & Bentler, 1995).

### **Incremental indexes**

Because of a growing dissatisfaction with the  $\chi^2$  goodness-of-fit test (Hoyle, 1995; Hu & Bentler, 1995), a number of alternate fit indexes of fit have been generated. These descriptive indexes are not statistics (i.e. the distribution is unknown and there is no definitive critical value) and they are often intuitively interpreted. Thus, incremental indexes cannot be used to conduct formal statistical tests of model fit. Instead they are treated as global indexes of model adequacy and derive from the comparison between the fit of a specified model and the fit of an independence or null model. The null model is one in which no relations among variables are specified (i.e., all paths are fixed to zero and only variances are estimated). Accordingly, the null model is of no interest, and serves only as the statistical baseline of comparison for the evaluation of fit. Normally, the incremental indexes vary between zero and one. 0.90 is widely accepted as a value such indexes must exceed before a model can be considered adequate (Hoyle, 1995; Hu & Bentler, 1995). Therefore, accepting values lower than 0.91 should be particularly justified in a study (Hoyle & Panter, 1995).

Hu & Bentler (1995:83), in reviewing different fit-indexes, distinguish between three different types or groups of incremental indexes; type-1, type-2 and type-3 indexes. "Type 1 indexes use information only from the optimized statistics  $T$  used in fitting baseline ( $T_B$ ) and target ( $T_T$ ) models.  $T$  is not necessarily assumed to follow any particular distributional form, although it is assumed that the fit function,  $F$ , is the same for both models. Type-2 and type-3 indexes are based on an assumed distribution of variables and other standard regularity conditions. A type-2 index additionally uses information from the expected values of  $T_T$  under the central  $\chi^2$  distribution. A type-3 index uses type-1 information but additionally uses information from the expected values of  $T_B$  and/or target  $T_T$  under the relevant noncentral  $\chi^2$  distribution. When the assumed distributions are correct, type-2 and type-3 should perform better than type-1 indexes because more information is being used; however, note also that type-2 and type-3 indexes may use inappropriate information because any particular  $T$  may not have the distributional form assumed".

### **THE CHOICE OF INDEXES**

Due to the low to medium sample size of this study, relying too much on  $\chi^2$ -test may cause Type II errors. However, since the  $\chi^2$ -test is the only sharp test of the null hypothesis  $\Sigma = \Sigma\theta$ , it is strongly recommended that it should be included (cf. Hoyle & Panter, 1995). The higher probability of Type II errors as well as the lack of information of the degree of fit (i.e., the dichotomous decision strategy implied by a statistical decision rule) in the  $\chi^2$ -test clearly indicate that additional indexes should be incorporated. According to Browne & Cudeck (1993) a test of close fit (RMSEA) with a corresponding statistical test is a more realistic test than the test of perfect fit. In contrast to the chi square, RMSEA penalizes models tested with small sample sizes. RMSEA adjusts for degrees of freedom, and should be included as an additional statistical test (Browne & Cudeck, 1993). Numerous absolute indexes in addition to  $\chi^2$  and RMSEA exist. Of these, GFI seems "to perform better than any other absolute indexes"

(Hu & Bentler, 1995:91). However, several studies have reported a positive association between GFI and sample size, and GFI has behaved especially poor under dependency conditions. Accordingly, the only two absolute indexes included are  $\chi^2$  and RMSEA.

Type-1 incremental fit indexes seem to underestimate their asymptotic values and overreject true models at small sample sizes, i.e., the indexes are positively related to sample size (Hu & Bentler, 1995:94). Thus, type-1 indexes (as e.g. NFI and BL86) should in general, and especially at low sample size be avoided (Hu & Bentler, 1995; Hoyle & Panter, 1995). Following this advice we do not report type-1 indexes.

By contrast, at least one of each from the type-2 and type-3 indexes should be reported (Hoyle & Panter, 1995). Among the type-2 indexes, NNFI or IFI perform consistently across ML and marginal association with sample size is reported (Hoyle & Panter, 1995). However, NNFI behaves somewhat erratically when the latent variables are (as in this study) dependent (Hoyle & Panter, 1995). Thus, even though both NNFI and IFI will be reported, priority will be given to IFI, *ceteris paribus*. From type-3 indexes CFI is preferred (cf. Hu and Bentler, 1995). As noted by Hu and Bentler (1995), CFI is identical to FI and RNI when their values fall outside the 0-1 range. However, for FI and RNI overfitting and sampling error can lead to values greater than 1 (Hoyle & Panter, 1995). CFI, however, may behave somewhat inconsistently under dependence conditions at sample sizes of 250 or lower (Hoyle & Panter, 1995).

Based on the above discussion the choices of estimation method and indexes of model fit is shown in table D.1. Note, that when the latent variables are dependent, all types of incremental indexes (also the included one) seem to overreject models of sample sizes of 250 or less (Hoyle & Panter, 1995). Accordingly, as the  $\chi^2$  test is not a conservative test in the study (i.e., "gain" because of a low sample size), the other chosen indexes surely imply conservative tests (i.e., a "penalty" with low sample size).

**Table C.1 The choice of method and indexes**

	Name	Definition	Critical value
<b>Estimation method</b>	ML		
<b>Absolute indexes</b>	Chi-square ( $\chi^2$ )	Statistical test of the lack of fit resulting from overidentifying restrictions placed on a model.	p=0.05 (Good fit indicated by a p-value>0.05)
	RMSEA	Statistical test of the lack of close fit. An index measuring the discrepancy per degrees of freedom	p(close fit)=0.05 (Good fit indicated by a RMSEA < 0.05)
<b>Incremental indexes</b>			
Type-2	NNFI	Compares the lack of fit of a target model to the lack of fit of a baseline model.	NNFI = 0.9 (Good fit indicated by a NNFI > 0.9)
	IFI	Same interpretation as NNFI.	IFI = 0.9 (Good fit indicated by a IFI > 0.9)
Type-3	CFI	Indexes the relative reduction in lack of fit as estimated by the noncentral $\chi^2$ of a target model versus a baseline model.	CFI = 0.9 (Good fit indicated by a CFI > 0.9)

**APPENDIX D. Estimated correlation matrix between product terms and variables forming the product terms**

	(CPC) (BTSI)	(BTSI)(TRUST)
CPC	-.27	.01
BTSI	-.08	.05
TRUST	.02	.13
TACIT	.02	.16

<sup>a</sup> Standard error in parentheses



**APPENDIX E. Descriptive statistics and factor loadings for control variables, rival predictors and variables representing explanation mechanisms**

	Mean	Std.dev.	Skewness	Kurtosis	Factor loadings
<b>Control variables</b>					
VTSI					
Item 1	2.549	1.581	0.834	-0.502	0.74
Item 2	2.310	1.542	1.266	0.660	0.57
Item 3	2.549	1.476	0.955	0.143	0.65
Item 4	2.106	1.249	1.195	0.773	0.67
Item 5 <sup>a</sup>	1.947	1.148	1.330	1.254	
ENV_UNC					
Item 1	3.851	1.684	0.064	-0.990	0.65
Item 2	3.398	1.623	0.568	-0.517	0.63
Item 3	2.579	1.356	1.022	0.366	0.82
Item 4	2.598	1.371	1.044	0.524	0.79
Item 5	4.544	1.482	-0.545	-0.545	0.42
ANN_E	599.711	814.912	3.260	12.315	1.0
<b>Rival predictors</b>					
DEP	3.421	1.886	0.403	-1.077	0.98
T_E	4.754	2.039	-0.853	-0.763	0.98
C_U	4.500	2.114	-0.315	-1.374	0.98
FORM					
Item 1	4.754	1.743	-0.585	-0.644	0.73
Item 2	4.404	1.899	-0.235	-1.089	0.87
Item 3	4.561	1.960	-0.413	-1.210	0.73
Item 4	4.482	1.979	-0.347	-1.125	0.72
<b>Explanatory Mechanisms</b>					
EX_TC					
Item 1	4.858	1.817	-0.722	-0.531	0.77
Item 2	4.363	1.808	-0.115	-1.050	0.78
Item 3	4.080	1.734	0.041	-0.947	0.82
EX_OPP					
Item 1	3.080	1.699	0.535	-0.692	0.80
Item 2	2.752	1.533	0.640	-0.913	0.83
Item 3	2.248	1.299	1.367	1.785	0.45

TC

Item 1	2.447	1.482	1.150	0.596	0.81
Item 2	2.825	1.620	0.735	-0.523	0.80
Item 3	2.307	1.311	1.234	0.794	0.83
Item 4	2.491	1.441	0.949	0.048	0.70
Item 5	2.202	1.415	1.446	1.269	0.77
Item 6	2.579	1.545	0.926	0.088	0.75

OPPORT

Item 1	2.919	1.334	0.759	-0.151	0.38
Item 2	2.840	1.470	0.697	-0.670	0.82
Item 3	2.298	1.296	1.287	1.205	0.92
Item 4	2.544	1.488	0.791	-0.510	0.79

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<sup>a</sup> Excluded items